TRANSACTIONS

OF THE

SOCIETY

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES, AND COMMERCE.

TRANSACTIONS

OF THE

SOCIETY,

3Iiiflt(tuteD at LONDON,

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES, AND COMMERCE;

WITH THE

PREMIUMS OFFERED JJV *THE YEAR* 1821.

VOL. XXXIX.

LONDON:

SOLD BY THE HOUSEKEEPER, AT THE SOCIETY'S HOUSE
IN THE ADELPHI;
AND BY ALL BOOKSELLERS.
[Price Ten Shillings and Sixpence.]

MDCCCXXI.

Printed by T. C. Hansard, Peterborough-court Fleet-street, London.

\ RRANGEMENT

OK THE VOLUME.

LIST OF PLATES,

AND DIRECTIONS FOR PLACING THEM.

PREFACE.

THE Committee of Correspondence and Papers, to whom, with the Secretary, the publication of the annual Volume of Transactions is intrusted, have, for the last three or four years, been strenuously exerting themselves to expedite, as far as possible, this very important object. For this purpose they have continued their weekly meetings through the greater part of the vacation, devoting their time and attention to the multifarious details which the due execution of the business confided to them by the Society urgently requires. The success which has attended their labours in this respect, has been eminently gratifying to them. Never before has so short a period intervened between the conclusion of a Session, and the publication of its Transactions. The ground thus gained will, it is hoped, be permanently secured, and the present success serve as a stimulus and example for the future.

On a review of the contents of the present Volume, it will be found that the Communications rewarded during the late Session, fully keep up the

credit of the Society as the depository of useful inventions, and the encourager of undertakings which combine private advantage with the public good. The Communications of C. F. Palmer, Esq. M. P., of Sir W. Templer Pole, Bart-, of Mr. Wilkinson, and of Mr. Potts, on planting Forest Trees, and raising Oaks; of Mr. Dawson, on Embanking Land from the Sea, and of J. C. Curwen, Esq., M. P. on Draining, are very satisfactory, as showing, that the severe privations to which the proprietors of land have of late years, been subject, from the diminished demand for agricultural produce, has by no means extinguished in them that liberal sacrifice of present emolument to great prospective advantages, by which their permanent interest is best secured.

In the class of Polite Arts, Mr. Steart's Drawing Paper for the use of Artists has been thought worthy of flie Society's reward, both on account of the excellent quality of the material of which it is formed, and on its freedom from those defects to which thick papers composed of several layers are unavoidably subject.

The praiseworthy and successful endeavours of Mr. Salisbury to open a new source of industry, peculiarly within the reach of the labouring poor, and of parochial workhouses, have received the ap-

Jobation oftl« Society, both on their own account, and in the hope, that by being recorded in the Volume, they may excite others to similar exertions. A material hitherto unemployed, the spontaneous produce of pools and irreclaimable swamps in every part of the. kingdom, peculiarly fitted to serve as the basis oi domesue manufacture in the cottages of the poor, and the produce of which, whether sold, or employed by **the** makers, will **contribute** essentially to **the** hecrease of their comforts, is not to be lightly passed over. One os the uiost serious privations to which cottagers in the agricultural districts are exposed, is thar **of** cold during Winter, arising in part from the inadequate shelter afforded by the Iovels in which they live, and frora the want of bedding. Their own pecuniary resources are but too often insufficient to supply the more imperious demands for food and clothing, so that in ordinary circumstances tl:eir sufferiiigs fr*tm* cold during the hours intended by nature for repose and restoration, are excessively severe, as tlose w**ell know** who have seen, with satisfaction not unmingled with sorrow, the joy which **the** donation of a single blanket invariably produces. [f those who *h*ave the opportunity, would instruct and encourage ihe industrious poor in the **manufacture of mattii**g from the •" Typha," they would thus be e**tabled to** supply themselvrs with an article, which, when employed as a cover to their damp floors, as curtains to **their** couch*s, and as an a**tuxUiary** to their

scanty stock of bedding, would most materially contribute both to their comfort and to their health.

The discovery of a Quarry of Millstone in Halkin Mountain, near Holy well, has deservedly entitled Mr. Bishop to a small Gold Medal. Hitherto no millstones for grinding wheat at all comparable to the French Buhr had been discovered in Great Britain; and in time of war serious inconvenience had been felt from the scanty and uncertain supply of so essential an article. Mr. Bishop and his partners have had the good fortune to discover, and the perseverance to bring into fair trial, a stone which, judging from the specimens laid before the Society, and from very satisfactory testimonials from all the millers who have, made use of it, bids fair, in a great degree, if not entirely, to supersede the necessity of having recourse to a foreign and too often hostile country for the means of preparing our daily bread.

In the class of Mechanics the most important communication is Mr. Barlow's, of his improved apparatus for the purpose of correcting the Aberration of the Mariner's Compass, occasioned by the local attraction of the iron on board a ship. This aberration, amounting in many cases to several degrees, and varying according to the position of the ship's head with respect to the magnetic poles, has been a continual, and (till the observations of

the late Captain Flinders) an unsuspected cause of error in ships reckonings. It was reserved for Mr. Barlow, by a series of most ingenious and satisfactory experiments, to discover the laws of this variation, and then to reduce his philosophical investigations to practical utility, by the invention of an apparatus of extreme simplicity, by which all mistakes in navigation arising from this source, are completely avoided. The intrinsic merit of the discovery, and its peculiar value to a country ranking first among the maritime powers, have induced the Society to confer unusual marks of their approbation on Mr. Barlow.

The large Gold Medal has been bestowed on Mr. Perkins, for his very ingenious and useful application of the Mercurial Level to the use of the navigator in ascertaining the Trim of a Ship, or that degree of inclination with regard to the horizon, which is requisite for the most rapid passage through the water. By means of this instrument, the navigator is enabled to adjust the angular inclination of his ship with a degree of precision wholly unknown before, and thus to make the utmost possible advantage of the wind.

In a former Volume the Society have published the description of Mr. James Allan's machine for dividing the Circular Limbs of Mathematical and Astronomical instruments. The liberal reward

bestowed subsequently on the inventor by the Board of Longitude, for the unrivalled accuracy of his Engine, coinciding with the previously expressed opinion of the Society, has induced them to bestow a farther reward on the inventor, for his apparatus for cutting the Divisions. The description of this apparatus, added to that of the Dividing-Circle itself in Vol. 28, completes the account of this admirable machine; and the Society regret, that the recent and untimely decease of this excellent artist has deprived them of an associate whose abilities and public spirit have repeatedly entitled him to their honorary medals.

The large Gold Medal, being the highest mark of the Society's approbation, has been bestowed during the last session on Henry Earle, Esq. for his Method for Patients under Surgical Treatment, by which the temporary ease and final cure of persons suffering under the most serious accidents and constitutional derangements of the bony structure of the body, are very materially advanced.

Mr. Brandt's Spring Pendulum Crutch, by which a clock is put into beat with greater precision, and in shorter time than by the common method of beading the crutch by hand, has received a Medal, and no doubt will be found useful on many occasions. Mr. Kotch's Arcograph, Mr. Rider's machine for cutting Tips for Mats, Mr. Baker's

Bullet Mould, Mr. lleveley'a substitution of Soap for Oil in setting Cutting lustruments, Mr. Goodwin's Spring Crofor Horses, Mr. Story's Portable Oven, and Mr. Lake's Double Door-hinge, fulfil respectively the purposes for which they were intended, and will be duly appreciated by those who may stand in need of them.

The reward bestowed on Mr. Witty for his Fire-Escape, is in accordance with the desire which the Society have always felt to encourage to the utmost those inventions which offer even a rational probability of use under circumstances the most appalling to human nature.

The attention which Dr. Wallich, Superintendent of the Botanic Garden at Calcutta, has shown to the interests of the Society of Arts, by an active correspondence with the Secretary and by the frequent transmission of seeds and other articles, demands this public acknowledgment of respect. A selection from the letters of this gentleman, containing several interesting particulars respecting the Mountain Ficus of Napal, is inserted in the present Volume.

Such are the contents of the Volume now offered to the acceptance of the public; and if from the perusal of the following pages any benefit should accrue to individuals, to the country, or to society

at large, the object of this Institution will be Fully attained.

THE Society take the present opportunity of returning their Thanks to the different Public Bodies and Individuals who have honoured them with Presents during the Session, the particulars of which are noticed in the body of the Volume. Without presuming to direct in what channels the liberality of the friends to this Institution shall flow, it may be stated that such contributions as may put the Society in possession of a complete collection of the Publications of any value on the application of Mathematics to practical Mechanics, will be especially acceptable.

The Society also acknowledge the receipt of the greater part of a Legacy of 500£, bequeathed to them by the late Dr. Anthony Fothergill. The legal forms, necessary to substantiate their claim and to put them in possession, have been gone through, and rendered effective by W. Tooke, Esq., Vice-president, to whose gratuitous professional assistance the Society have on various occasions been indebted.

The Society desire it to be clearly understood that, as a Body, they are not responsible for any Opinion or Representation of Facts, contained in the following Pages.

ERR AT A.

IN VOLUME XXXVII.

In *List of Plates 13, for* « Mr. Smith's How and Spring," *read* Mr. Smart's Bow and String.

Page 18, *line* 16, *for* *' Fig. 1," read (Fig. 4-.

——C7, — 6, *for* » Model/' rea</ Drawing.

•—• 73, — 3 *and* 4/mm *bottom, dele* " each succeeding one filling up the interstices of the former."

——73, — 23,/or." The first and second strings (figs. 6, 7), should be a. violoncello third and fourth of the largest size,'[1] *read* Tbe first string fig. 7, should be a violoncello fourth of the largest size *if* covered by a smaller onp *k.* The second string, fig. 6, should be a violoncello third g, covered by a smaller one/*.

—. 74., _ 12,/or « C and G," *read G* and C.

—-lit, — 18,/or " corner," *read* corners.

—.904., __ 15 *and* 17, *dele* ".The late".

IN VOLUME XXXVIII.

Page 29, *line* *G,Jbr* " figure 4-," *read* figure 1.

—— 30, — *%*fr< m,Jbr* " drawn," *read* withdrawn.

—— 79, — 13, *after* « fig. 5," *add,* « the body of the anvil ; *h* the quarter; *c* the beak; *d d d* the feet.

—— — — 6 *from bottom, after* [1(iron/' *add, a* fig. 6, *after* " another," " *add b, and omit in the following line,* " as shown fig. 6."

—— 81, — 2, and 3, *for* " the radiant heat from the stove is rapidly carried off," *read* the heat *i&* rapidly carried off from the stove.

—— 81, — *% from bottom) for"* diameter," *read* circumference.

—— 91, — 10, *for* " outline plan," *read* elevation in outline.

—— 91, — 12, *for* ditto *read* ditto.

—— yi» — — *insert* line 14 *between lines* 11 *and* 12.

E 11 It A T A.

Page 99, *line* 14, *for*'" transverse,'[1] *read* traverse.

——104, — 10, *for* " the 1st, 3rd, or 4th portions/' *read* the 1st, 2nd, 3rd, or 4th junctions of the hose.

——104, — 15, *for* " female," *read* male ; *and for* " which is attachdB to the hose," *read* to which the hose is attached.

—104s — 16, *for* " it is," *read* the hose is*

——104, — *6 from bottom, for*" B," *read* h.

——105, — *5 from bottom, for* " they," *read* that.

——110, —• *5>for* " from," *read* through.

——112, — 15, *for* « they," *read* the tumblers.

——120, — *7from bottom, for* " pole," *read* palL

——122, — *Q from bottom, for* <€ fig. 3 a horizontal view," *read* figs. S and 4 are elevations.

——124, — *Sfrom bottom, for* " z," *read* 2.

——125, — *11 from bottom, for* " adapted,'[1] r^arf adopted.

—126a—*2 from bottom, for* <c ruder," *read* rudder.

——142, — ^9 *for* " the extremity of the floats of each paddle wheel is connected," *read* the extremities are connected.

— 146, — 5, *for* " board *h ; i*9" *read* board; *h* i.

——146, — *14f*t *for* "p q,9f *read p p.*

——163, — 7 *from bottom,fbr* " requires," *read* acquires.

——172, — 10*from bottom, for* « *c*9" *read* C-

—174, — The *o* on the escape wheel, is by mistake made O in the engraving.

.—-176, — *$ from bottom, for*'[1] preceding," *read* succeeding,

—177, — 22, *for* " lower,** *read* upper.

——177, — *last line, for* " tooth next succeeding the topth 17," *read* the tooth 17.

——178, — *l,for* " before," *read* behind.

——•180, — *8from bottom, for* xxxvii, *read* jcxxviiù

-—182, — 14/roro *bottom, for* " 38," *read* 37.

—.184?, *— 16, *for* " xxxviii," *read* xxxvii.

IN THE LIST OF PREMIUMS FOE 1821-1822,

Page xxiv, *last line but one, for* " No. 16S/[1] *read* No- 153.

Jteemium* ofiereH

IN THE SESSION 1821—1822,

A LIST of the OFFICERS of the SOCIETY.

PRESIDENT,

His Royal Highness Prince AUGUSTUS FREDERICK
DUKE OF SUSSEX, K. G. Ac. &c.

VICE PRESIDENTS,

JOHN Duke of BEDFORD, *F. S. A.*
HUGH Duke of NORTHUMBERLAND, *F. R. S. & F. S. A.*
GEORGE GRANVILLE LE.VESON Marquis of STAFFORD, *K. G.*
JACOB PLEYDELL Earl of RADNOR, *F. R. S. & F. S. A.*
ROBERT Earl of LIVERPOOL, *K. G. F. R. S.*
CHARLES Earl of ROMNEY, *F. It. S.*

SIR ROBERT PEEL, *Bart. M. P.*
SIR WATKIN LEWES, *Knt.*
SIR NATHANIEL CONANT, *Knt.*
THOMAS PITT, Eeq, *F. S. A.*
RICHARD CLARK, Esq. R *S. A.*
RICHARD POWELL, M. D.
JOHN CHRIST. CURWEN, Esq. *M. P.*
RICHARD WILSON, Esq. *F. S. A.*
JOSEPH HUME, Esq. *M.* P. *F. R. S.*
WILLIAM TOOKE, Esq. F. *B. S.*

CHAIRMEN OF COMMITTEES.

Accounts.

WILLIAM LUMLEY, Esq.
EMERSON DOWSON, Esq.

Correspondence and Papers.

DANIEL MOORE, Esq. *F. R. S. F. S. A. & F. L. S.*
GEORGE MOORE, Esq. F. *S. A. & F. L. S.*

Polite Arts.

JOHN THOMAS BARBER BEAUMONT, Esq. *F. S. A.*
RICHARD HORSMAN SOLLY, Esq. *F. R. S. & F. S. A.*

Agriculture.

THOMAS HARRISON ANDREW, Esq.
CHARLES WAISTELL, Esq.

Manufactures.

JAMES PEARSALL, Esq.
JOHN SMITH, Esq.

*Mechanics**

THOMAS GILL, Esq.
BRYAN DONKIN, Esq.

Chemistry.

HENRY COXWELL, Esq.
GEORGE DEACON MIDGLEY, Esq.

Colonies and Trade.

WILLIAM LEWIS, Esq. *F. L. S.*
THOMAS HOBLYN, Esq. F. *R. S.*

Miscellaneous Matters.

WILLIAM KIRKBY, Esq.
CAPT. T. M. BAGNOLD.

Secretary..,... ..... ARTHUR AIKIN, Esq. *F. L. S**.
Assistant Sec..... MR. THOMAS WOODFALL.
Housekeeper,..... Miss A. B. COCKINGS.
Collector..... MR. HENRY HARRISON.

ADVERTISEMENT TO THE PUBLIC.

THE chief object of the SOCIETY is, to promote the Arts, Manufactures, and Commerce of this Kingdom, by giving honorary or pecuniary Rewards, as may be best adapted to the case, for the communication to the SOCIETY, and through the SOCIETY to the Public, of all such useful Inventions, Discoveries, and Improvements (whether specified in these Premiums or not) as tend to that purpose; in pursuance of this plan, the SOCIETY have already expended upwards of EIGHTY-FIVE THOUSAND POUNDS, derived from voluntary subscriptions and legacies.

The meetings of the SOCIETY are held every Wednesday, at seven o'clock in the evening, from the first Wednesday in November to the second Wednesday in June. The Committees meet on other evenings in the week during the session, for the purpose of taking into consideration the subjects referred to them by the SOCIETY. A person desirous of becoming a Member of the SOCIETY, may be proposed according to the following form, which must be signed by three Members of the SOCIETY, and delivered in to the Secretary:

A. B. *[Trade, Profession or Designation of the Candidate"]* proposed as & Member of the Society for the Encouragement of Arts, Manufactures, and Commerce by

C. D.
IDate] . E. F.
G. H.

Peers of the Realm, or Lords of Parliament are, on their being proposed, immediately balloted for; the names of other persons proposed to become Members are read by the Secretary to the SOCIETY, and are then inserted in lists which are hung up in the SOCIETY'S room; they are balloted for at the second following ordinary meeting. In both cases, if two-thirds of the Members then voting ballot in their favour, they are deemed Perpetual Members upon payment of not less- than Tflkty Guineas in one sum, or Subscribing Members upon payment of any sum noWess than Two Guineas annually.

Ladies are eligible as Members of the SOCIETY, and alone are entitled to vote by proxy at elections, through the medium of any gentleman who is a Member, on his producing a written authority for the same.

Members are entitled to vote and assist in all the business of the SOCIETY and of the several Committees. They have also the privilege of recommending two persons as visitors at the meetings of the SOCIETY ; and, by addressing a note to the housekeeper, of introducing their friends on any week day, except Wednesday, between the hours often and two, to examine the various Models, Machines, and Productions, in different branches ef Arts, Manufactures and Commerce, fur which rewards have been bestowed; also to inspect the magnificent series of Moral and Historical Paintings, executed by the late J. BARRY, Esq. which, with some valuable Busts, Statues, Portraits, &c. decorate the public rooms of the SOCIETY.

Members have the use of the SOCIETY'S Library, which is valuable, and annually increasing by the purchase and donation of scientific and useful books, and of engravings. Contributions from Members and others, in augmentation of the Library and of the collection of Maps and Prints, will be thankfully received, and duly acknowledged in the annual volume of the Society's Transactions, to a cupy of which every Member is entitled.

V To persons inclined to leave a sum of money to this SOCIETY by Will, the following form is offered for that purpose:

Item,—*I give and bequeath to A. B. and* C. *D. the sum of*
upon condition and to the intent that they, or one if them, do pay the same to the Collector for the time being, of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures, and Commerce; *which said sum of I will and desire may be paid out of my personal estate, and applied towards the parrying on the laudable designs of the Society.*

The SOCIETY desire it to be dearly understood, that as a Body they are not responsible for any opinion or representation of facts contained in their Volumes. And the Public are requested to guard against impositions, from persons advertising as having Patents for Articles rewarded by the SOCIETY; they are also cautioned against purchasing articles sold under the pretended sanction of the SOCIETY'S name.

The SOCIETY have lately published the 38th *Volume* of their Transactions, which may be had by Members on application to the Housekeeper. Complete SETS of their TRANSACTIONS, or any single Volume, may be purchased at the SOCIETY'S house: where may be had also,

An *Analytical Index of the first Twenty-five Volumes* of **the** Transactions to the **Termination of the Session, June 1807, price 2*.** ***6d.***

A list of the Machines and Models in the SOCIETY'S Repository, to the year 1813, inclusive.

A Catalogue of Books in the SOCIETY'S Library, Is.

A description of Mr. Barry's Paintings in the Great Room of the SOCIETY.

All communications are to be made by letter, addressed to ARTHUR AIKIN, Esq. the Secretary, at the SOCIETY OF ARTS, &C. Adelphi, London.

And where articles are sent by Sea for the SOCIETY, the Bills of Lading are to be addressed to the care of WILLIAM VAUGHAN, Esq,, Mincing-lane, London, who has undertaken to receive them for ihe SOCIETY.

GENERAL NOTICE TO CANDIDATES.

THE great object of the SOCIETY in rewarding individuals is, to draw forth and give currency to those inventions and improvements which are likely to benefit the public at large. Candidates are therefore requested to observe, that if the means by which the respective objects are effected, require an expense or trouble too great for general purposes, the SOCIETY will not consider themselves bound to give the offered reward; but, though they expressly reserve the power, in all cases, of giving such part only of any premium as the performance shall be adjudged to deserve, or of withholding the whole if there be no merit, yet the Candidates may be assured the SOCIETY will always judge liberally of their several claims.

The SOCIETY by no means restrict their liberality to the subjects for which premiums are specially offered, but will take into consideration, and will reward, by a bounty proportioned to its merit, any communication, the subject of which is of a practical nature, and calculated to promote the public good.

All communications are to be made by letter addressed to the Secretary, and are to contain full and particular details, according to the nature of the subject, as well as accurate descriptions of such Drawings and Models as form part of the communication : the Models to be sent carriage paid.

In those cases in which certificates are required to be produced in claim of premiums, they should be expressed, as nearly as possible, in the words of the conditions attached to the respective premiums, and be signed by disinterested persons, who have a positive knowledge of the facts stated.

The premiums are designed for the United Kingdom, unless expressly mentioned to the contrary; but no claim will be attended to, unless the previous conditions have been fully complied with.

No person shall receive any premium, bounty, or encouragement, from the SOCIETY, for any matter for which he has obtained any premium or reward from any other SOCIETY, or for which he has obtained, or purposes to obtain a patent; it being a condition stipulated with every candidate, that all articles rewarded by the SOCIETY, shall be freely given up to the public, to be made or manufactured by any person whatever.

All Models, the production of which is attached as a condition to any premium, sluikupon the delivery of such premium, remain the property of the SOCIETY.

^Bere premiums or bounties are obtained in consequence of specimens produced, the SOCIETY will retain such part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No member of this SOCIETY shall be a Candidate for, or entitled to receive, any premium, bounty, or reward whatsoever, except the honorary medal of the SOCIETY.

No Candidate, not a member, shall be present at any meeting of the SOCIETY or Committees, or admitted at the SOCIETY'S rooms, after they have delivered in their claims, until such claims are adjudged, unless summoned by the Committee.

A Candidate for a premium, or a person applying for a bounty, being detected in any attempt to impose on the SOCIETY, shall forfeit such premium or bounty, and be deemed incapable of obtaining any for the future.

The consideration of the Claims lor the premiums offered in the present List, will take place during the Session of the SOCIETY commencing on Wednesday, the 5th of November, 1821. The several Candidates and Claimants, to whom the SOCIETY shall adjudge Premiums or Bounties, are to attend on the last Wednesday in May, at eleven o'clock in the forenoon precisely, to receive the same, that day being appointed by the SOCIETY for the Distribution of their Rewards; and before that time no Premium or Bounty will be delivered, except to those who are about to leave the Kingdom.

ID cases where the SOCIETY may think fit to admit excuses for not attending in person, Deputies may be substituted to receive the rewards, provided such Deputies are either Members of the Society, or superior Officers thereof.

PREMIUMS IN AGRICULTURE.

N. B.—The Winchester bushel is the measure referred to for grain; and, as the Acres of different districts vary in extent, it is necessary to observe, that the Society mean Statute acres of five and a half-yards to the rod or pole, and they request that all communications to them may be made agreeably thereto.

1. IMPBOVEMENT OF LAND.

Gaining Land from the Sea.

1. TO the person who shall have gained the greatest quantity of Land from the Sea, not less than fifty acres, on the coast of Great Britain or Ireland; —*the Gold Medal.*

Certificates of the quantity of Land, and that the experiments were begun after the first of January, 1816, to be produced to the Society on or before the first Tuesday in February, 18*22.

2. The same premium is extended one year farther, on the same conditions.

Improving Waste Land.

3. For the most satisfactory account of the best method ofimprovinganyone of the following soils, being Land lying Waste and uncultivated, viz.clay, gravel, sand, chalk, peat earth or bog, verified by experiments on not less than fifty acres of land;—*the Gold Medal.*

4. For the next greatest quantity, not less than thirty acres;—*the Silver Medal.*

It is required, that the Land, before such improvement, be absolutely uncultivated, and IB a great measure useless, and that in its unproved state, it be inclosed and cultivated.

Certificates of the number of acres, of the quality of the Land so improved, with a full account of every operation and expense attending such improvement, the state it is in as to the proportion of grass to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1822.

Manures.

5. For the most satisfactory set of experiments, to ascertain the comparative advantages of the following Manures, used as top-dressings on grass and corn land, viz. soot, coal-ashes, wood-ashes, lime, gypsum, bones, night-soil, or any other fit article ;—*the Gold Medal.*

It is required that the above experiments be made between two or more of the above-mentioned Manures, and that not less than two acres of land be dressed with each Manure.

An account of the nature of the soil, quantity, and expense of the manure and crops, with certificates, to be produced on or before the last Tuesday in February, 1822.

2. PLANTATIONS.

Forest Trees.

6. To the person who shall have inclosed and planted, or set, the greatest number of acres (not less than fifteen) of land that is incapable of being ploughed, such as the borders of rivers, the^Mes of precipices, and any land that [redacted] many rocks, or that is not calcun^PRo repay the expense of tillage, owing to the surface bring too hilly, mountainous, or otherwise unfit for tillage, with the best sorts of Forest Trees, namely, oak, Spanish chesnut, ash, elm, beech, alder, willow, larch, spruce, or silver fir (with or without screens of Scotch fir) adapted to the soil, and intended for timber trees, between the first of Oct. 1818, and the first of April 1819;—*the Gold Medal.*

7. For the second greatest quantity of land; not less than ten acres;—*the Silver Medal.*

A particular account of the methods used in making and managing the plantations, the nature of the soil, the probable number of each sort of plants, together with proper certificates that they were in a healthy and thriving state two years at least after

making the plantations, to be delivered to the Society on or before the second Tuesday in February, 1822.

N. B. With the above Forest Trees, the seeds, cuttings, or plants, of such other trees as are adapted to the soil, and proper for underwood, may or may not be intermixed.

Oaks.

B. To the person who shall have raised, since the year 1817, the greatest number of Oaks, not fewer than five thousand, either from young plants or acorns, in order to secure a succession *of* oak timber in this kingdom;—*the Gold Medal.*

9. For the next greatest number, not fewer than three thousand;—*(he Silver Mtdal.*

Certificates that there were on the land at least the number of young Oak Trees required, in a thriving condition, two years after the planting, with an account of the methods pursued in making and managing the plantation, to he produced to the Society on or before the first Tuesday in February, 1822,

Oaks, not transplanted.

10. For having set, between the first of October, 1819, and the first of April, 1820, the greatest quantity of land, not lesbian ten acres, with Acorns, with of^Btout seeds, cuttings, or plants of otnWtrees, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber;—*the Gold Medal.*

11. For the second greatest quantity of land, not less than five acres, set agreeably to the above conditions *;—t/te Silver Medal.*

Certificates of setting agreeably to the above conditions, and that there are not fewer than three hundred young Oaks on each acre, to be delivered to the Society on or before the first Tuesday in February, 1822.

Elm.

12. For having planted the greatest number of the English Elm, not less than eight thousand, between the 24th °f June, 1819, and the 24th of June, 1820, and for having effectually fenced and preserved the same, in order to raise *limber;—the Gold Medal.*

13. For the second greatest number, not less than five thousand \—*the Silver Medal.*

Certificates of having planted agreeably to the above conditions, that the plants were in a healthy and thriving state two years at least after making the plantation, and specifying the distance of the plants, to be delivered to the Society on or before the first Tuesday in April, 1822.

Larch.

14. For having; planted out, between the 24th of June) 1818, and the 24th of June, 1819,thc greatest number of Larch Trees, not fewer than five thousand, and for having effectually fenced and preserved the same, in order to raise timber ;—*the Gold Medal.*

15. For the next greatest number, not fewer than three thousand;—*the Silver Medal.*

Certificates of the number of plants, that they were in a healthy and thriving stale two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in February, 1822.

N. B. The Larch Trees may be plan ted either mixed with other trees, or by themselves, as may best suit the convenience of the planter.

Ash.

16. For having sown or set, in the year 1818, the greatest quantity of land, not less than six acres, with Ash for timber, with or without seeds, cuttings, or plants of such other trees as are adapted to the soil;—*the Gold Medal.*

17. For the next greatest quantity, not less than four acres;—*the Silver Medal.*

Certificates of the sowing or setting, agreeably to the above conditions, and that there are not fewer than six hundred Ash Plants on each acre, in a thriving and healthy condition, two years at least after the sowing or setting, with a general account of the methods used -in making the planta-

lion, to be delivered to the Society on or before the last Tuesday in February, 1822.

Norway Fir.

18. To the person who shall have planted in the united kingdom, during the year 1819, the greatest number, not less than two thousand, of red wood and white wood Norway Fir Seedlings, at sufficient distances from each other to stand for timber trees;—*the Gold Medal.*

Certificates of the number of plants, that they were in a thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the first Tuesday in February, 1822.

N. B. It is recommended to plant the seedlings of about three or four years growth, and in a moderately good soil, somewhat sheltered; the wood from the district of Christiana is esteemed the best for carpenters' and joiners' use: and for spars and ufers the trees near to Lung Sound are most valued.

Chesnuts.

19. For having sown or set between the first of October, 1819, and the first of April, 1820, the greatest quantity of land, not less than six acres, with Spanish Chesnuts, with or without seeds, cuttings, or plants of other trees, adapted to such soil, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber;—*the Gold Medal.*

20. For the second greatest quantity, not less than four acres;— *the Silver Medal*

Certificates of sowing or setting, agreeably to the above conditions, and that there are not fewer than three hundred Chesnut Plants in a thriving state, on each acre, to be delivered to the Society on or before the first Tuesday in February, 1822.

Walnut Trees.

21. For having planted the greatest number of Walnut Trees, not less than fire hundred, since June, 1819, and for having effectually fenced and preserved the same, in order to raise timber;—*the Gold Medal.*

22. For the next greatest number, not fewer than three hundred;—*the Silver Medal.*

Certificates of having planted agreeably to the above conditions, and that the plants were in a healthy and thriving state two years at least after making the plantation, and specifying the distance of the plants from each other, to be delivered to the Society on or before the first Tuesday in April, 1822.

Securing Plantations.

23. To the person who shall give to the Society the most satisfactory account, founded on experience, of the most effectual and least expensive method of securing young plantations of timber trees and hedge rows, from hares and rabbits, as well as from sheep and cattle, which at the same time shall be least subject to the depredations of wood-stealers; — *the Silver Medal.*

The accounts, and certificates of the efficacy of the method to be produced to the Society on or before the last Tuesday in March, 1822.

---

3. COMPARATIVE EXPERIMENTS ON RAISING TREES,

Oaks.

24. To the person who shall ascertain in the best manner, by actual experiment, the comparative merits of the different modes of raising Oaks for timber, either from acorns set on land properly dug or tilled, from acorns set by the spade or dibble, without digging or tillage, either on a smooth surface, or among bushes, fern, or other cover; or from young plants previously raised in nurseries, and transplanted: regard being had to the expense, growth, and other respective advantages of the several methods;—*the Gold Medal.*

The accounts and proper certificates that not less than one acre has been cultivated in each mode, to be produced to the Society on or before the first Tuesday in February, *l$Vi.*

Walnuts.

95. To the person who shall communicate to the Society an improved mode °f propagating the superior varieties of Walnuts, either by budding, grafting, or *ny other mode, except sowing;—Me *Gold Medal.*

Certificates that not fewer than fifty trees have been so raised; with a full account of the method practised, to be produced to the Society on or before the first Tuesday in April, 1822.

4. CULTIVATION OF CORN AND CTHEE PLANTS.

Wheat.

26. For the best set of experiments made on not less than twelve acres, four acres being sown broad-cast, four drilled, and four dibbled (the two latter in equi-distant rows), in order fully to ascertain which is the most advantageous mode of cultivating wheat;—*the Gold Medal.*

It is required that every operation and the expense of each mode of culture be fully described; and that proper certificates of the nature and condition of the land on which the experiments were made, together with an account of the produce of the corn, the weight per bushel, and also of the straw, be produced to the Society on or before t^last Tuesday in February, 1822.

Grass Seeds.

27. To the person who shall raise the greatest quantity of each or any of the following named grass seeds, viz.—Meadow Fox-tail (alonecurus prat en sis), Sweet-scented Vernal-grass tanthoxan-^um odoratum), Timothy-grass phleuni pralense), meadow Fescue grass (festuca pratensis),smooth-stalked Meadow- grass (poa pratensis), rough-stalked Meadow-grass (poa trivialis), rough Cock's-foot (dactylis glomerata), perennial Ray-grass (wll'ium perenne);—*Ae *Siher Medal.*

It is required that certificates from persons who have viewed them in a proper state to identify that they are one or other of the seeds above-mentioned, indicating clearly the particular species, and noticing the quantity produced of such seeds, free from weeds or mixture of other grasses, together with proper samples of the seeds, be produced to the Society on or before the first day of March, 1822.

Beans.

28. To the person who shall discover and cultivate, either by the drill or dibbling method, on not less than five acres, a species of Horse-beans or Tick-beans that will ripen their seeds before the 21st of August;—*the Silver Medal.*

It is required that a particular account of the bean, the cultivation, and the expense attending it, with proper certificates of the nature and condition of the land on which the experiments were made, together with an account of the produce, the weight per Winchester bushel, and a sample of not less than a peck, be produced to the Society on or before the last Tuesday in February, *182*2.* It is apprehended that if a Bean should be brought into cultivation with the habits of hotspur or other early peas, it would in a great measure escape the danger arising from the collier insect, or other insects, and allow more time for the farmers to till the land for the subsequent crop of wheat.

Parsnips.

29. To the person who shall cultivate the greatest quantity of land, not less than five acres, with Parsnips, for the particular purpose of feeding cattle or sheep;—*the Gold Medal.*

Certificates of the quantity of land so cultivated, with a particular account of the nature of the soil and weight of the produce on sixteen perches, and also of the condition of the cattle or sheep fed with the Parsnips, and the advantages resulting from the practice, to be produced to the Society on or before the last Tuesday in February, 1822.

Potatoes.

30. To the person who shall, in the year 1822, cultivate the greatest quantity of land, not less than fifty acrct, with Potatoes of such qualities as shall be fit for the use of the table in the months of April, May, and June, 1823 ;—*the Gold Medal,* **of** *Thirty Guineas.*

Proper certificates, along with other necessary particulars, to be delivered in to the Society on or before the first Tuesday in Nov. 1823.

Hemp.

31. The Society, wishing to encourage the growth of Hemp, in every part of the united empire, for the use of the navy, offer to the person who shall have sown with Hemp, in drills at least eighteen inches asunder, the greatest quantity of land in any part of the united empire, not less than fifty acres statute measure in the year 1821, and at the proper season shall have caused to be plucked the summer Hemp (or male Hemp bearing so seed), and continue the winter Hemp (or female Hemp bearing seed) on the ground until the seed is ripe;—*the Gold Medal.*

bZf To the person who shall have sown with Hemp, in drills at least eighteen inches asunder, the next greatest quantity of land in any part of the united empire, not less than twenty-five acres, statute measure, in the year 1821, and shall at the proper season cause the same to be plucked as above-mentioned;—*the Silver Medal.*

Certificates of the number of acres, cf the distance of the drills, of the plucking of the Hemp, with a general account of the soil, cultivation, and produce, to be delivered to the Society along with fourteen pounds of the Hemp and two quarts of the seed, on or before the last Tuesday in February, 1822.

N. B. The two preceding premiums arc continued for one year longer on the same conditions.

Cultivation of the zcltite Poppy fPapaver somniferum) and Extraction of the Opium.

S3. To the person who shall obtain the greatest quantity of Opium, not less than 20 lbs. from the white Poppy (Papaversomniferum), raised by the claimant, in Great Britain or Ireland, in the year 1821;—/Ac *Gold Ceres Medal,* or *Thirty Guineas.*

Certificates of the quantity and quality of the produce, with specimens, and ? full description of the mode of culture, and of the extraction and preparation of the Opium, to be sent to the Society on or before the first Tuesday in February, 1822.

34. The above premium is extended to the succeeding year on similar conditions.

Persons proposing to claim the above premium are referred to Mr. Young's communications on the subjectjpuhlished in the 37th and 38th Vols. of the Society's Transactions.

---

5. PRESERVATION OF VEGETABLE PRODUCE.

Preserving Turnips, Carrots, Parsnips, Beets, or Mangel Worzel

35. To the person who shall discover to the Society the best and cheapest method of preserving these roots perfectly sound, and in every respect fit for supporting and fattening sheep and neat cattle during the months of February, March, and April;—*the Gold Medal.*

It is required that a full and accurate account of the method employed, and the expense attending the process, together with certificates that the produce of four acres, at the least, has been preserved according to the method described, and applied to the feeding of sheep and neat cattle; that the whole were drawn out of the ground before the first day of Fcb^ry, in order to clear the greater part of it previous to its being prepared for corn, and to save the soil from being exhausted by the turnips or other roots, and also of the weight of an average sixteen perches of the crop; be produced to the Society on or before the last Tuesday in April, 1822.

36. For the next in quantity and merit, on not less than two acres;—*the Silver Medal.*

Preserving Cabbages.

37. To the person who shall discover to the Society the best and cheapest method of preserving drum-headed Cabbages perfectly sound, and in every ccspect fit for supporting and fattening sheep and neat cattle during the months of February, March, and April;—*the Gold Medal.*

38. Fur the next in quantity and merit, on not less than two acres;—*the Sitter Medal.*

Conditions the same as for preserving turnips, Art. 35.—And the accounts to be produced on or before the last Tuesday in April, 1822.

Harvesting Corn in Wet Weather.

39. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of Harvesting Corn in Wet Weather;—^ *Gold Medal.*

A full account of the method employed, and of the expense attending the process, with not less than two sheaves of the corn, and certificates that at the least the produce of ten acres has been harvested according to the method described, and that the whole is of equal quality with the samples; to be produced to theSociety on or before the first Tuesday in February, 1822.

6. DESTROYING INSECTS AND OTHER VERMIN.

Destroying the Grub of the Cockchafer.

40. To the person who shall discover to the Society, an effectual method, verified by repeated and satisfactory trials, of destroy ing the Grub of the Cockchafer, or •!' preventing or checking the destructive effects which always result from the attack of these insects on corn, Seas, beans, and turnips;—*the Cold Sledal.*

The accounts, with proper certificates, to be produced on or before the first Tuesday in February, 1823.

Destroying Worms.

41. To the person who shall discover to the Society, an effectual method, verified by repeated and satisfactory trials, of destroying worms, or of preventing the destructive effects they occasion on corn, beans, peas, or other pulse;—*the Silver Medal.*

The accounts, with proper certificates, to be produced to the Society on or before the first Tuesday in February, 1822.

Destroying the Fly on Hops.

42. To the person who shall discover to the Society an easy and efficacious method of destroying the Fly on Hops, superior to any hitherto known;—*the Gold Medal.*

Accounts and certificates of the method having been successfully practised on not less than four acres of Hop ground; to be delivered to the Society on or before the first Tuesday in February, 1822.

Preventing the Blight on Fruit Trees and Culinary Plants.

43. To the person who shall discover to the Society the most effectual method of preventing the Blight or ravages of Insects, on Fruit Trees and Culinary Plants, superior to any hitherto known or practised, and verified by actual and comparative experiments;—*the Gold Medal.*

The accounts, with proper certificates, to be delivered to the Society on or before the last Tuesday in February, 1822.

7. CATTLE AND SHEEP.

Feeding Cattle.

44. For the best experiments on Stall feeding of Cattle (not fewer than five head), to be continued for the space of twelve months, in order to prove the earliest maturity and greatest propensity to fatten, of the most approved breeds of cattle in Great Britain, or Ireland, specifying the nature of the food given, together with the daily consumption of each beast, with its weekly increase in weight, and such other observations as may be deemed of consequence;—*the Gold Medal.*

A full account of the methods employed, and of the expenses attending the same, and certificates of the sundry matters stated, to be produced on or before the second Tuesday in Feb. 1822.

Protecting Sheep.

45. To the person who, in the winter 1821—1822, shall have protected the greatest number of sheep, not fewer

than one hundred, by hovels, sheds, or any other means ;—*the Gold Medal.*

A particular account of the experiments made, with the advantages arising therefrom, together with the expense, and certificates of its utility, to be produced to the Society on or before the first Tuesday in March, 1822.

N. B. It is required that the certificates shall specify the length of time the sheep were so protected, and the manner in which they were maintained during that time; together with the general method of managing them.

Cure of the Rot in Sheep.

46. To the person who shall discover to the Society the best and most effectual method of curing the Rot in Sheep, verified by repeated and satisfactory experiments ; —*the Gold Medal,*

It is expected that the Candidates furnish accurate accounts of the symptoms and cure of the disease, together with the imputed cause thereof, and the actual or probable means of prevention, which, with proper certificates, must be delivered to the Society on or before the last Tuesday in February, 1822.

Cure of the Foot'Rot in Sheep.

47. To the person who shall discover to the Society the best and most effectual method of curing the Foot-rot in sheep;—*the Silver Medal.*

It is required that the cure be ascertained by repeated and satisfactory •experiments, and the method of performing it be verified by proper certificates, delivered to the Society on or before the last Tuesday in February, 1822.

Preventing the ill-effects of Flies on Sheep,

48. To the person who shall discover to the Society the most effectual method of protecting sheep from being disturbed and injured by flies;—*the Silver Medal.*

It is required that the method be ascertained by repeated experiments, and that a certificate of its efficacy be delivered to the Society on or before the first Tuesday in February, 1802.

8. BEES.

49. To the person who shall erect, previous to the first, day of September, 1820, an apiary, containing the greatest number and heaviest hives or boxes stocked with Bees, not less than one hundred;—*the Silver Medal,* or *Twenty Guineas.*

50. For the next greatest number, not fewer than fifty stocks;—Ten Guineas.

51. For the next greatest number, not fewer than twenty-five stocks;— *Five Guineas.*

Proper certificates of the number of stocks, and that they have been in the possession of the claimant during the preceding summer, to be produced to the Society on or before the first Tuesday in March, 1822.

It is expected that the claimant will give such particular information on the subject, as may tend to benefit the public, and enable other persons to keep Bees to advantage; also that improved methods be made use of in their management.

9. AGRICULTURAL MACHINES.

Irrigation of Land.

52. To the person who shall discover to the Society the cheapest and most effectual method of raising water in quantities sufficient to be beneficially employed for the purpose of irrigating land superior to, and cheaper than any other method now in use;—*the Gold Medal ,* or *Fifty Guineas.*

A model, on a scale of one inch to a foot, with certificates that a machine at large, on the same construction, has been used, specifying the quantity of water delivered in gallons per hour, and the height to which it was raised, to be produced to the Society on or before the first of March, 1822.

Paring Plough.

53. To the person who «hall invent and produce to the Society a Machine or Plough for the purpose of Paring land preparatory to burning, superior to any hitherto known or in use for such purpose, and to be worked by not more than one man and two horses ;~-fAe *Silver Medal,* or *Twenty Guineas.*

The machine and certificates that at least ten acres have been pared by it in a proper manner, to be produced to the Society on or before the first of February, 1822.

Dibbling Machine.

54. To the person who shall invent a machine, superior to any hitherto known or in use, to answer the purpose of dibbling wheat, by which the holes for receiving the grain may be made at equal distances and proper depths;—*the Silver Medal,* or *Fifteen Guineas.*

The Machine with certificates that at least three acres have been dibbled by it, to be produced to the Society on or before the second Tuesday in February, 1823.

Thrashing Machine.

55. To the person who shall invent a Machine by which corn of all sorts may be thrashed more expeditiously, effectually, and at a less expense, than by any method now in use;—*the Gold Medal.*

The Machine, or a Model, with proper certificates that such a Machine has been usefully applied, that at least thirty quarters have been thrashed by it, and of the time employed in the operation, to be produced to the Society on or before the last Tuesday in February, 1822.

PREMIUMS

PO& THE PRACTICAL APPLICATION OF DISCOVERIES AND IMPROVEMENTS III

CHEMISTRY, DYEING, AND MINERALOGY.

Increasing Steam.

56. To the person who shall invent and discover to the Society a method, verified by actual experiment, of increasing the quantity or force of Steam in Steam Engines, with less fuel than has hitherto been employed, provided that in general the whole amount of the expenses in using steam engines maybe considerably lessened;—*the Gold Medal,* or *Fifty Guineas.*

To be communicated to the Society on or before the last Tuesday in February 1822.

Prevention of Smoke.

57. To the person who shall invent and produce to the Society the best and easiest means, superior to any now before the public, of preventing the emission of dense Smoke, from the chimnies of steam-engines, breweries, and manufactories;—*the Gold Medal,* or *Fifty Guineas.*

Certificates that the means proposed . Jjave been found to succeed in practice, to be produced to the Society on or before the first Tuesday in February, 1822.

Test for Arsenic.

58. To the person who shall discover to the Society a test for arsenic in solution, superior to any hitherto known;—*the Gold Medal.*

It is required that any communication in claim of this premium shall include a method of detecting arsenic, not only in its usual form of white arsenic, or arsenious acid, but also in the state of arsenic acid, and of the soluble salts formed by the combination of arsenious and arsenic acids with alkaline substances.

Claims for this premium to be delivered in on or before the last Tuesday in February, 1822.

Preventing the Ill-Effects of Smelting Ores.

59. To the person who shall invent and discover to the Society the most

effectual method of preventing the ill-effects arising to vegetation and animal life, from the sulphureous, arsenical, or other noxious fumes disengaged in smelting the ores of Copper, Zinc, Lead, Tin, Iron, &c. in the large way, and, if possible, of converting those pernicious fumes to useful purposes, in a manner superior to any hitherto known, or in use;—*the Gold Medal,* or *Fifty Guineas.*

It is required that a full account of the process employed, with certificates of its being successfully carried into effect, be produced to the Society on or before the first Tuesday in March, 1822.

Fine Bar Iron.

60. To the person, who shall make the greatest quantity of Bar-iron, not less than ten tons, with coak, from coak pigs, equal in quality to the best iron imported from Sweden or Russia, and as fit for being converted into steel;—*the Gold Medal,* or *Fifty Guineas.*

Samples, not less than one quarter of a hundred weight, with certificates that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in March, 1822.

*Refining Copper from the Ore**

61. To the person who shall discover to the Society a method of separating, purifying, and refining Copper from the Ore, so as to render it fit for those purposes to which fine copper is now applied, and by a process cheaper than and superior to any hitherto known or in use;—*the Gold Medal,* or *Fifty Guimeas.*

Certificates that not less than three tons have been so prepared or refined, and a quantity not less than 14 lbs. of the copper so refined, to be produced to the Society on or before the last Tuesday in February, 1822.

*Refining Zinc from the Ore**

62- To the person who shall invent and communicate to the Society a process of refining Zinc from the Ore superior to any hitherto known or in use, and fit for the purpose of making fine brass \—*the Gold Medal,* or *Fifty Guineas**

Conditions the same as in the preceding premium.

Preparing Brass.

63. To the person who' shall discover a method of making Brass from materials the produce of Great Britain or Ireland, of superior quality to that commonly manufactured in this country, and equal to foreign brass;—*the Gold Medal,* or *Thirty Guineas.*

A full account of the process, and of the ingredients employed, together with their proportions, and certificates that one ton has been so manufactured, and a sample of the brass, not less than 14 lbs. to be produced to the Society on or before the last Tuesday in February, 1822.

Improved Earthenware Crucibles,

64. To the person who shall invent and discover to the Society a process for manufacturing earthenware crucibles which shall be capable of enduring higher degrees of heat than those now in use, and shall not be too expensive;—*the Gold Medal,* or *Thirty Guineas.*

A full account of the process, and of the materials employed, with satisfactory certificates of the crucibles having been found to answer in use, and specimens of the crucibles, to be produced to the Society on or before the last Tuesday in March, 1822.

Preparation of Sulphuric Acid, from Sulphur, without the Use of any hitric Salt.

65. To the person who shall prepare the largest quantity (not less than one ton) of Sulphuric Acid from sulphur, without any nitric salt, of a specific gravity not inferior to the best sulphuric acid of commerce;—*the Gold Medal,* or *Fifty Guineas.*

Certificates that not less than the above quantity of such an acid has been pre* pared, together with a sample, and a

full account of the process employed, to he produced to the Society on or before the first Tuesday in February, 1822.

Purification of Coal Gas.

$6. To the person who shall discover the cheapest method of purifying the inflammable gas procured from coal, superior to any method now in use;—*the* ***Gold Medal,*** **or** ***Thirty Guineas.***

A full account of the process, with certificates of its fully answering the intended purpose, to be produced to the Society on or before the second Tuesday in February! 1822.

Refining Whale or Seal Oil.

67. For disclosing to the Society an effectual method of purifying Whale or Seal Oil from the glutinous matter that incrusts the wicks of lamps, and extinguishes the light, though fully supplied with oil; provided that such purified oil resists congelation in an equal degree with the unpurified;—*the Gold* ***Medal,*** **or** ***Fifty Guineas.***

It is required that the whole of the process be fully and fairly disclosed, in order that satisfactory experiments may be made by the Society to determine the validity of the claim; and certificates that not less than twenty gallons have been purified according to the process delivered in, together with two gallons of the oil in its unpurified state, and two gallons so refined, to be produced to the Society on or before the second Tuesday in February, 1822.

Superior Oil for Chronometers and Watches.

68. To the person who shall invent and discover to the Society the best method of distinguishing the kind of oil fittest for chronometers and watches, ascertained by actual experiment; or for a superior method of rendering oil more fit for the above purpose than any hitherto in use, and particularly in rendering it less liable to become thick or **rancid;—Me** ***Gold Medal,*** **or** ***Fifty Guineas.***

A full account of the experiments and of the process or processes employed, verified by satisfactory certificates, together with a specimen of the oil, to be produced to the Society on or before the last Tuesday in March, 1822.

Glazing common Red Earthen ware without Lead or Arsenic.*

69. To the person who shall discover to the Society, the cheapest, safest, most durable, and most easily fusible, composition, fit fur the purpose of glazing common red Earthenware, without any preparation of lead, arsenic, or other pernicious ingredients, and superior to any hitherto in use;—Me *Gold Medal,* or ***Thirty Guineas.***

Specimens of the ware so glazed, with proper certificates of its having succeeded, and a sample of the materials made use of, to be produced to the Society on or before the first Tuesday in February, 1822.

Crown Glass.

70. To the person who shall make Crown or Window Glas9 equally transparent, and as free from blue and green colour as the best German **sheet;—Me** ***Gold his Medal,*** **or** ***Thirty Guineas.***

Certificates that not less than two cwt. has been made, together with one whole plate and two of the largest squares that can be cut, and a full account of the proportions of the ingredients, and of the process of manufacture, to be produced to the Society on or before the last Tuesday in February, 1822.

Flint Glass.

71. To the person who shall make flint glass free from veins, and as dense and transparent as the best now in use, and quite fit for the purposes of Opticians;—Me *Gold Medal,* or *Thirty* ***Guineas.***

A full account of the process, with certificates that not less than two cwt. has been made, together with 20 lbs. in plates not less than six inches wide **and** three quarters of an inch thick,

to be produced to the Society on or before the last Tuesday in January, 1822.

Indelible Ink.

72. To the person who shall discover to the Society a method of making a Black Ink proper for writing^uperior to any at present known, indestructible by chemical applications, and not materially dearer than that which is now in common use;—*the Silver Medal,* or *Fifteen Guineas,*

Certificates that not less than two gallons of such ink have been actually prepared, and found to possess the qualities above-mentioned, with a full detail of the process of making it, and two quarts of the ink to be delivered to the Society on or before the second Tuesday in February, 1822.

Printers[9] Ink.

73. To the person who shall invent and discover to the Society the best composition for Printers' Ink, superior to any hitherto known or in use;—*the Gold Medal,* or *Thirty Guineas.*

Certificates that 112 lbs. of such ink have been made, with a full account of the process employed, and 6 lbs. of the ink, to be produced to the Society on or before the lasl Tuesday in February, 1822.

Copper Plate Printers[1] Ink.

74. To the person, who shall invent and discover to the Society the best composition, superior to any hitherto known or in use, and fit for the finest kind of copperplate printing;—*the Gold Medal,* or *Thirty Guineas.*

Certificates and conditions the same as for the last premium.

Rendering Leather Water-proof.

75. To the person who shall discover a method, superior to any now in use, and of moderate price, of rendering Leather Waler-proof, without injuring its texture or pliability;—*the Silver Medal,* or *Fifteen Guineas.*

A full account of the process, and of the ingredients employed, together with their proportions, attested by satisfactory certificates, as well as samples of the leather in its unprepared and prepared state, to be produced to the Society on or before the last Tuesday in February, 1822.

Hardening Tallow for Candles.

76. To the person who shall discover to the Society a method of hardening or otherwise preparing Tallow, so that candles may be made of it which will burn as clear and with as small a wick as wax candles, without running, and may be afforded at a less expense than any at present made with spermaceti;—*the Gold Medal,* or *Fifty Guineas.*

Certificates that 112 lbs. of such tallow have been made into candles, and 12 lbs. of the candles made thereof, to be produced to the Society on or before the second Tuesday in February, 1822.

Preserving Seeds of Vegetables.

77. For the best method of preserving Seeds of Plants in a state fit lor vegetation a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial, to be communicated to the Society on or before the last Tuesday in December, 1822;—*the Gold Medal,* or *Thirty Guineas.*

Preserving Provisions by Salt or by other means, from becoming rancid or rusty.

78. To the person who shall discover to the Society the best, cheapest, and most efficacious method of preserving Salted Provisions from becoming rancid or rusty;—*the Gold Medal,* or *Thirty Guinea*.*

A full description of the method, with proper certificates that it-has been found, on repeated trials, to answer the purpose intended, to be produced to the- Society on or before the last Tuesday in February, 1822.

Preserving Iron from Rust.

79. To the person who shall invent and discover to the Society a cheap com-

position superior to any now in use, which shall effectually preserve Wrought Iron from rust;—*the Gold Medal,* or *Fifty Guineas.*

A full description of the method of preparing the composition, with certificates that it has stood at least two years unimpaired, being exposed to the atmosphere during the whole time, to be produced to the Society, with ten pounds weight of the composition, on or before the last Tuesday in January, 1822.

Preventing the Dry-rot in Timber.

80. To the person who shall discover to the Society a certain method of preventing the Dry-rot in Timber, superior to any hitherto known;—*the Gold Medal,* or *Thirty Guineas,*

The particulars of the method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the last Tuesday in February, 1822.

Note.—For a method of curing and preventing the dry-rot in ship timber see Mr. Bowden's communication in Vol. 36 of the Society's Transactions.

Preventing the Destructive Effects from Moths.

81. To the person who sball discover to the Society a cheap, easy, and effectual method, verified by repeated and satisfactory trials, of preventing the destructive effects occasioned by Moths and other insects, in furs, woollens, and other articles, superior to any hitherto known or practiced :—*the Gold Medut,* or *Thirty Guinea*

The accounts, witn proper certificates, to be produced to the Society on or before the first Tuesday in January, 1822.

Substitute for Lead Pipes.

89. To the person who shall invent and produce to the Society, a Substitute for the Lead Pipes used for conveying malt and other liquors from the cellars to the bars of public-houses;—*the Gold Medal,* or *Fifty Guineas,*

1821.

The substance of which the Pipe is made must be free from any poisonous or noxious quality, equally durable as lead, and of a moderate expense; and a specimen thereof, not less than ten yards in length, with a complete description of the process employed in forming it, must be produced to the Society on or before the last Tuesday in February, 1822.

Substitute for the Basis of White Paint.

83. To the person who sball produce to the Society the best substitute, superior to any hitherto known, for the basis of white paint, equally proper for the purpose as the white lead now employed ; such substitute not to be of a noxious quality, and to be afforded at a price not materially higher than that of white-lead;—*the Gold Medal,* or *One Hundred Guineas.*

A quantity of the substitute, not less than 25 lbs. weight, with an account of the process used in preparing it, and certificates that at least one hundred weight has been manufactured, to be produced to the Society on or before the first Tuesday in February, 1822.

Substitute for Tar.

84. To the person who shall invent and discover to the Society the best substitute for Stockholm tar, equal in all its properties to the best of that kind, and prepared from materials the produce of the United Kingdom, or its colonies;—*the Gold Medal,* or *One Hundred Guineas.*

A quantity of the substitute, not less than one hundred weight, with certificates that at least one ton has been manufactured, and that it can be afforded at a price not exceeding that of the best foreign tar, together with an account of the process, to be delivered up the Society on or before the first Tuesday in March, 1822.

N. B.—Considerable quantities of tar are produced in Sweden and Norway from the roots of fir-trees burnt for that purpose.

Turpentine from the Scotch Fir, or Pinus Sytvestris.

85. To the person who shall prepare in Great Britain the greatest quantity of

Turpentine, not les9 than two hundred weight, from that species of fir called theScotch fir, or Pinussylvestris,Linn.; —*the Gold Medal,* or *Fifty Guineas.*

Certificates of the Turpentine being prepared from such trees of British growth, together with fifty-six pounds of the Turpentine, to be delivered to the Society on or before^he second Tuesday in March, 1822.

86. For the next greatest quantity prepared, not less than one hundred weight, on similar conditions;—*the Silver Medal,* or *Twenty Guineas.*

N. B.—The Society being in possession of the method practised for extracting Turpentine from trees whilst growing, and of samples so procured, information will be given upon that subject, on application for that purpose, at the Society's house.

Preparation of Tan.

87. To the person who shall prepare in the most concentrated form, so as to be easily portable, and at a price applicable to the purposes of manufacturers, ^ the largest quantity, not less than one hundred weight, of the astringent principle called Tannin, which abounds in oak bark, and in many other vegetable substances;—*the Gold Medal,* or *Fifty Guineas.*

Certificates of the good quality of the quantity so prepared, and a sample of not less than 28lbs. to be produced to the Society on or before the last Tuesday in February, 1822.

British Indigo.

88. To the person who shall prepare Indigo, or a substance equal to it, from any plants (except woad), the growth of Great Britain or Ireland, at a price not greater than that of foreign indigo of equal quality;—*the Gold Medal,or Fifty Guineas.*

A full account of the process and ingredients employed, together with their proportions, and satisfactory certificates that at least one cwt. oYthe indigo has actually been prepared; also a sample of the same weighing not less than 7 lbs. to be produced to the Society oil or before the last Tuesday in February, 1822.

Dyeing Si/k or Woollen.

89. To the person who shall discover a method of dyeing Silk or Woollen, of any colour, superior to the same pro* duced by other British dyers, and equal to those produced by the Continental dyers;—*the Gold Medal,* or *Thirty Guineas.*

A full account of the process and ingredients employed, together with their proportions, attested b£ satisfactory certificates, as well as samples of the silk and woollen in its undyed and dyed state, to be produced to the Society on or before the first Tuesday in March, 1822.

Improved Black Dye for Silk or Wool.

90. To the person who shall invent and discover to the Society a black dye for silk or wool superior in colour and durability to any at present in use;—*the Gold Medal,* or *Fifty Guinea?.*

This premium is more immediately intended for the improvement of those colours known by the name of blue blacks.

A full account of the process and ingredients employed, together with their proportions, attested by satisfactory certificates, as well as samples of the silk or wool so dyed, to be produced to the Society, on or before the last Tuesday in March, 1823.

*Dying with Lac Lake**

91. To the person who shall invent and discover to the Society a process for dyeing silk, wool, or cotton with lac lake, superior to any now in use;—*the Gold Medal,* or *Thirty Guineas.*

A full account of the process, with certificates that it has been found to answer completely in use, and specimens of articles so dyed, to be produced to the Society on or before the last Tuesday in March, 1822.

*Preparation of a Red Stain for Cotton Cloth**

92. To the person who shall commu* nicate to the Society the most effectual method of printing or staining cotton cloth with a red colour, by an immediate application of the colouring matter to the cloth, equally beautiful and durable with the red colours now generally procured from decoctions of madder;—*the Gold Medal,* or *Fifty Guineas,*

Certificates that the process, has been advantageously used on ten pieces of calico, each twenty-one yards or upwards in length; one piece of the calico so printed, one pound of the colour, and a full account of the preparation and application, to be produced to the Society on or before the second Tuesday in February, 1822.

Preparation of a Green Colour for printing Cotton Cloth.

93. To the person who shall communicate to the Society the best method of printing with a full green colour on cotton cloth, by an immediate application of the colouring matter from a wooden block to the cloth, equally beautiful ami durable as the colours now formed from the complicated process of the decoction of weld, and the solutions of indigo;—*the Gold Medal,* or *Fifty Guineas.*

Certificates and conditions as for Premium 92.

Permanent White Paint for the Use of Artists.

94. To the person who shall produce to the Society a White Paint for oil, superior to any hitherto known, and not liable to be discoloured by exposure to light or to sulphuretted hydrogen gas;—*the Gold Medal,* or *Thirty Guineas.*

A full account of the process, and 1 lb. of the colour to be produced to the Society, on or before the second Tuesday in February, 1622.

Bed Pigment

95. To the person who shall discover to the Society a full and satisfactory process for preparing a tted Figment, fit for use in oil or water, equal in tone and brilliancy to the best carmines and lakes now known or in use, and perfectly durable;—*the Gold Medal,* or *•Fifty Guineas.*

One pound weight of such colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1822.

N. B. It is required, that the colour should remain unaltered by the common exposure to strong light, damps, and noxious vapours.

Ultramarine.

96. To the person who shall prepare an artificial Ultramarine, equal in colour, brilliancy, and durability, to the best prepared from lapis lazuli, and which may be afforded at a cheaper rate;—*the Gold Medal,* or *Thirty Guineas.*

The conditions are the same as in the preceding premium for the red pigment.

Colourless Lac Varnish.

97. To the person who shall produce 1o the Society a Lac Varnish equally hard with that made from shell or seed lac, and as fit for use in the arts, but deprived of its colouring matter;—*the Gold Medal,* or *Thirty Guineas.*

A full account of the process, and one quart of the varnish to be produced to the Society on or before the second Tuesday in January, 1822.

Statuary Marble.

98. To the person WIK> shall discover within Great Britain or Ireland, a quarry of White Marble fit for the purposes of statuary, and equal to those kinds now-imported from Italy;—*the Gold Medal,* or *One Hundred Guineas.*

A block of at least three feet in length, two in height, and two in width, with an account of the situation of the quarry, and certificates of its possessing considerable extent, to be produced to the Society on or before the first Tuesday in February, 1822.

IV. *B.* Tn order to prevent useless expense or trouble to the Claimant in forwarding so large a block, the Society will be ready to examine any smaller specimen of the marble and express their opinion of its value to the Candidate before the block required by the above premium is produced.

Stone for Lithography.

99. To the person who shall discover within Great Britain or Ireland, a quarry of stone fit for the purposes of Lithography, equa.1 at least'to the stones imported from abroad;—*the Gold his Medal,* or *Thirty Guineas.*

A specimen of the stone at least two feet square and two inches in thickness, with an account of the situation

of the quarry, and certificates of its possessing considerable extent, to he produced to the Society on or before the last Tuesday in February, 1822.

Mineralogical and Geological County Maps.

100. To the person who shall complete and publish the best Mineralogical and Geological Map of any County in the United Kingdom, on a scale of not less than one inch to a mile, containing an account of the situation of the different mines therein, and describing the kinds of minerals thence produced, with sections of the strata;—*the Gold Medal,* or *Fifty Guineas.*

Certificates of the accuracy of such maps, together with the maps, to be produced to *ijfie* Society on or before the first Tuesday in February, 1822. The maps to remain the property of the Society.

Mineralogical and Geological Map of Ireland.

101. To the person who shall complete and publish an accurate Mineralogical and Geological Map of Ireland, on a scale of not less than five miles to an inch, containing particulars described in the foregoing premium;—*the Gold Medal,* or *Fifty Guineas.*

Mineralogical and Geological Map of Scotland.

102. The same premium is offered for a Mineralogical and Geological Map of Scotland, on similar conditions.

Natural History.

103. To the author who shall publish in the year 1821, the Natural History of any county in the United Kingdom ;—*the Gold Medal,* or *Fifty Guineas.*

It is required that the several natural productions, animal, vegetable, and mineral, peculiar to the county, or found therein, be carefully and scientifically arranged and described, in order that the public may be enabled to judge what arts or manufactures are most likely to succeed in such county. A copy of the work to he delivered to the Society on or before the last Tuesday in February, 1822, to remain the property of the Society,

PREMIUMS IN POLITE ARTS.

Honorary Premiums for 'Nobility.

104. For the best Original Painting or Drawing of any kind, by geutlemen under the age of twenty-one, sons or grandsons of peers or peeresses in their own right, of Great Britain or Ireland;—*the Gold Medal.*

105. For the best Copy on similar conditions;—*the Silver Medal.*

106. For the best Original Painting or Drawing of any kind, by ladies under the age of twenty-one; daughters or grand-daughters of peers or peeresses in their own right, of Great Britain or Ireland;—Me *Gold Medal.*

107. For the best Copy on similar conditions;—*the Silver Medal.*

Honorary Premiums for Gentlemen or Ladies.

108. For the best Original Painting in oil colours by gentlemen under the age of twenty-five;—*the Gold Medal.*

109. For the best Copy in oil colours by gentlemen under the age of twenty-one ;—*the Silver Medal.*

110. For the best Original Drawing or Painting in water colours by gentlemen under the age of twenty-five;—*the Gold Medal.*

111. *For* the best Copy in water colours by gentlemen under the age of twenty-one;—*the Silver Medal.*

11-2. For the best Original Painting in oil colours, by ladies under the age of twenty-live;—*the Gold Medal.*

113. For the best Copy in oil colours by ladies under the age of twenty-one;—*the Silver Medal.*

114. For the best Original Drawing, or Painting in -water-colours, by ladies under the age of twenty-live;—*the Gold Medal.*

115. For the best Copy in water-colours, by ladies under the age of twenty* one ;—*/*€ *Silver Medal.*

N. B. As the foregoing honorary preniiums are intended only for the nobility and gentry; persons professing any, branch of the polite arts, or any business dependent on the arts of design, or the sons and daughters of such persons, will not be admitted candidates in the above classes.

PREMIUMS FOR ARTISTS AND OTHERS.

Human Figure.

116. For the best drawing in chalk, pencil, or Indian-ink, copied from any picture, print, or drawing, by persons under the age of sixteen;—*the Silver Palette.*

117. For the best outline, drawn from any entire figure of the antique, or cast in plaster—the size of the drawing to be not less than twenty-four inches, to be accompanied with a drawing of a hand and foot, the size of life—by persons under the age of eighteen ;—*the Silver Isis Medal; for the next in merit, the Silver Palette.*

118. For the best finished drawing from any antique figure, or from any cast in plaster—the size of the drawing to be not less than twenty-four inches, to be accompanied with a drawing of a hand and foot, the size of life, by persons under the age of nineteen—*the Silver Medal; for the next in merit the Silver his Medal.*

119. For the best finished drawing of an. anatomical human figure—the size of the drawing to be not less than twenty-four inches, to be accompanied with a drawing of a hand and foot, the size of life, by persons under the age of nineteen ;—*the Silver Medal; for the next in merit the Silver Isis Medal.*

120. For the best drawing, from the living figure—the size of the drawing to be not less than twenty-four inches—by persons under the age of twenty-one;—*the Silver Medal; for the next in merit the Silver Isis Medal'*

121. For the best original drawing of an historical composition of two or more figures—the principal figure not less than nine inches—by persons under the age of twenty-five;—*the Gold Isis Medal; for the next in merit the Silver Medal.*

122. For the best copy in oil from any historical picture, of two or more figures—the principal figure not less than twenty-four inches—by persons under the age of twenty-one;—*the Silver Medal; for the next in merit the Silver Isis Medal.*

123. For the best original painting, being an historical composition; the subject—David staying the hand of Abishai who was about to slay Saul whilst he was sleeping in the Trench, *vid.* 1st Samuel, ch. xxvi.—the principal figure not less than twenty-four inches, by persons under the age of twenty five; —*the Gold Medal; for the next in merit the Gold Isis Medal.*

Heads or Portraits.

124. For the best drawing of a head, copied from any picture, drawing, or print—by persons under the age ot sixteen ;— *the Silver Palette.*

125. For the best finished drawing of a head, not less than the size of life, from any bust—*by* persons under the age of eighteen;—*the Silver Isis Medal ; for the next in merit the Silver Palette.*

126. For the bebt original painting in water colours of a portrait—by persons under the age of twenty-one;—*the Silver Medal;for the next in merit the Silver Isis Medal.*

127. For the best copy, in oil, from a picture (a portrait)—by persons under the age of nineteen;—*the Silver Medal; for the next in merit the Silver his * Medal.*

128. For the best original painting in oil of a portrait—by persons under the age of twenty-three;—*the Gold Isis Medal; for the next in merit the Silver Medal.*

Models.

129. For the best model in bass-relief, from any entire antique figure, or cast in plaster, the size of the model not less

than twenly-four inches, by persons tinder the age of eighteen;—*the Silver Palette.*

130. For the best model in bass-relief from the living figure, by persons under the age of twenty-one, the model not less than twenty-four inches;—*the Silver Medal; for the next in merit the Silver Isis Medal.*

131. For the best restored model of the Ilissus in the Elgin collection—the size of the model not less than three feet—by persons under the age of twenty-one;—*the Silver Medal; for the next in merit the Silver Isis Medal.*

132. For the best original model of a group—the figures not less than twenty-four inches—by persons under the age of twenty-five;—*the Gold Medal; for the next in m§rit the Gold Isis Medal.*

Landscape.

133. For the best drawing of a land* scape, copied from any picture, drawing, or print—by persons under the age of eighteen;—*the Silver Paktte.*

134. For the best original drawing of a landscape from nature—by persons under the age of twenty-one;—*the Silver Isis Medal; for the newt in merit the Silver Pulelte.*

135. For the best original oil painting of a landscape from nature—by persons under the age of twenty-three;—*the Silver Medal; for the next in merit the Silver his Medal.*

136. For the best original composition of a landscape painted in oil—by persons under the age of twenty-five;—*the Gold Medal; for the next in merit the Gold his Medal.*

FlowetSy or Fruit.

137. For the best drawing from any picture, print, or drawing—by persons under the age of sixteen;—Me *Silver Palette.*

138. For the best original composition in water colours drawn from nature—by persons under the age of twenty-one; —*the Silver Medal; for the next in merit the Silver Isis Medal.*

139. For the best original composition in oil, painted from nature—by persons under the age of twenty five;—*the Gold Medal; for the next in menit the Gold his Medal.*

Animals.

140. For the best fhrawing of any animal copied from any picture, print, or drawing—by persons under the age of sixteen;—*the Silver Palette.*

141. For the best original drawing from nature of any animal—by persons under the age of twenty-one;—*the Silver Medal; for the next in merit the Silver Isis Medal.*

142. For.the best original painting of a group of not less than three animals painted from nature—by persons under the age of twenty-five;—*the Gold Medal; for the next in merit the Gold Isis Medal.*

Still Life.

143. For the best original composition, painted in oil or water colours, of three or more of such objects as are usually called Still Life, by persons under the age of twenly-one;—*the Silver Medal; for the next in merit the Silver Isis Medal.*

Architecture.

144. For the best drawing of any public building in the United Kingdom, drawn from actual measurement on a sheet of double - elephant paper—by persons under the age of twenly-oue;—• *the Silver Medal; for the next in merit the Silver Isis Medal.*

145. For the best original design in Greek architecture, forabuildingsuilahlc to the purposes of a court of justice; consisting of plan, elevation, section, and perspective view, to the scale of j-th of an inch to a foot; the drawing to remain the property of the Society, if required—by persons under the age of twenty-five;—*the Gold Medallion ; for the next in merit the Gold Isis Medal.*

The following inscription to be engraved on these medallions " The premium given by the Society for the encouragement of Arts, Manufactures, and Commerce, in conformity to the will of John Stock, csq. of Hampstead."

146. For the best original design in Gothic architecture for any public building, with a plan, elevation, section, and perspective view—each drawn on a sheet of large elephant paper—by persons under the age of twenty-five;—- *the Gold Medal; for the next in merit the Gold his Medal.*

Perspective.

147. For the best perspective drawing from any public building in the United Kingdom, from elevations taken by actual measurement, and projected according to rule, drawn on large elephant paper--by persons under the age of twenty-one;—//w *Silver Medal; for the next in merit the Silver Isis Medal.*

148. For the best perspective drawing of machinery—by persons under the age of twenty-one;—f/*e *Silver Medal; for the next in merit the Silver Isis Medal.*

Enamel Painting.

149. For the best enamel painting of a head—by persons under the age of twenty-one \—*the Silver Medal; for the next in merit the Silver Isis Medal.*

150. For the best historical painting in enamel—by persons under the age of twenty-five;—Me *Cold Medal; for the next in merit the Gold his Medal.*

Carving in Wood.

151. For the best carving in Wood, of fruit, or flowers, not less than nine inches high—by persons under the age of twenty-one;—*the Silver Medal; for the next in merit the Silver Isis Medal.*

152. For the best carving in wood, of one or more animals, the size of.the animal not less than six inches—by persons under the age of twenty-one ;—*the Silver Medal; Jor the next in merit the Silver Isis Medal,*

153. For the best carving in wood, of oue or more human figures, not less than a foot in height—by persons under the age of twenty-five;—*Ae *Gold Isis Medal; for the next in merit the Silver Medal.*

Etching of an Historical Subject.

154. For the best free Etching in historical composition, from a picture of eminence;—*the Gold his Mcdul.*

Etching of a Landscape.

155/ For the best free Etching of a Landscape, from a picture of eminence; —*the Silver MedaL*

Historical Engravings.

156. For the best finished Engraving in historical composition;—*the Gold Medal.*

Landscape Engraving.

157. For the best finished Engraving of a Landscape \—*the Gold his MedaL*

Engraving of a Portrait.

158. For the best finished Engraving of a Portrait;—*the Gold his Medal.*

***N. B.* In the class of finished Engravings the Society requires an aquafortis impression, and a finished proof to be sent, and to remain with the Society.**

Engraving on Steel.

158. For the best specimen of engraving on a steel plate not less than 5 niches by 3 inches in area, and not exceeding 4th of an inch in thickness; the plate to be afterwards hardened without injuringtheengraving;—*the Gold Medal.*

The Plate, with two impressions from it, both in its soft and hardened state, to be produced to the Society. The impressions, but not the plate, to remain the property of the Society.

Engraving en Wood or Metal Blocks.

159. For the best Engraving on Wood or Metal Blocks, of an historical subject, the bize of the principal figure not less than six inches in height, and the Block to be at least twelve inches by nine;—*the Gold Isis Medal.*

Two or more impressions, with the Block, to be produced to the Society. The impressions, but not the Block, to remain the property of the Society.

Prevention of Forgery.

160. To the person who shall communicate to the Society, the best method of preventing the impressions of prints from being transferred from the paper to plates or blocks for the purpose of l-eing etched or engraved;—*the Silver Medal,* or *Twenty Guineas.*

The communication, with a full description of the process, and of the materials employed, together with the spe-

cimens, to be sent to the Society on or before the last Tuesday in February, 1822.

As this premium is intended to increase the difficulty of forging Bank Notes, and other kinds of paper currency, it is required, that the process shall not be too difficult or expensive for general use.

Lithography.

161. For the best specimen in this art;—*the Silver Medal.*

A particular account of the process employed, with six impressions of the drawing, to be produced to the Society.

Medal Die Engravings.

162. For the best Die Engraving either of a single figure or group, after the engraver's own design and model;—*the Gold Medal.*

163. For the best Die Engraving of a head;—*the Gold his Medal.*

The Dies with two impressions or casts, and the model, in each claim for Medal Die sinking are to be produced to the Society, and the impressions or casts to remain the property of the Society.

Conditions for the Polite Arts.

All performances in the class of Polite Arts, whether for claims or bounties, are to be produced to the Society on or before the first Tuesday in March, 1822, and none can be received after that day.

No Candidate, under any pretence whatever, shall be allowed to retouch or varnish a performance after it has been received by the Society.

No person having received a premium or bounty, shall afterwards receive an equal or inferior one in the same department of art.

No more than one performance in each class shall be received from the same Candidate.

All performances to which premiums or bounties are adjudged shall remain with the Society until after the second Wednesday in June, 1822, when they will be re-delivered, unless mentioned in the premiums to the contrary.

No performance shall be admitted, that has obtained a reward from any other society, or academy.

No performance can be received with a view to obtain a bounty, which could have come into any of the foregoing classes.

It is required, that the subjects for which premiums are offered, be delivered in without the names, or any external intimation to whom they belong; that the claimant affix on the front of his performance whatever mark he pleases, and that the, same mark be inscribed on a paper sealed up, containing within, the name and residence of the Candidate, and *on the outside* the age and sex, and the number of the premium in claim of which the performance is offered; the name not to be disclosed unless the Candidate be successful, or in consequence of a special vote of the Society, or Committee.

To encourage real merit, and to prevent attempts to impose on the Society, by producing drawings made or retouched by any other person than the Candidate, the Society require a specimen of the abilities of each successful candidate to be made under the inspection of the Committee of Polite Arts.

All Candidates in the Polite Arts are required to signify on their drawings, whether the performances are originals or copies; and if possible to send the originals from which the copies are taken.

All copies of drawings, &c. are to be on a different scale from the original.

The Society reserve to themselves the power of giving a Medal of less value than the premium offered, or of withholding the same altogether in cases where the performance shall be deemed undeserving of reward.

In consideration of the great number of premiums here offered, embracing so many departments of the Fine Arts, no bounty will be given to any performance comprised in any of the classes, from No. 116, to No. 163 inclusive.

PREMIUMS FOR ENCOURAGING AND IMPROVING MANUFACTURES.

*Cloth from Hop Stalks, Nettles, &c. Wicks for Candles or Lamps**

164. To the person who shall produce to the Society the greatest quantity, not less than thirty yards, of cloth, at least 27 inches wide, made in Great Britain or Ireland, of Hop Stalks or Bines, Nettles, or other raw vegetable substances, the produce of Great Britain or Ireland, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as cloth of equal quality and appearance now made from hemp, flax, or cotton, and much finer in quality than any hitherto manufactured in England from Hop Stalks, &c.;—*the Gold Medal,* or *Thirty Guinetis.*

One pound of the thread of which the Cloth is made, and thirty yards of the Cloth, together with proper certificates that the whole is manufactured from Hop Stalks, or Bines, &c. to be produced to the Society on or before the last Tuesday in February, 1829.

***N.* B. The Society is already in the possession of Cloth made in England from Hop Stalks or Bines, and Nettles, which may be inspected by application to the house-keeper.**

Sheep's Wool.

165. To the person who shall prove to the Society, that he has sold the largest quantity of Merino Wool, or such Wool as will answer the same purpose, being the produce of his own flock, in the United Kingdom, for the purpose of being manufactured into superfine cloth, the quantity of Wool not less than five hundred weight, in the year 1821 ;—*the Gold Medal.*

Certificates, along with samples of the wool, and of the cloth manufactured from it to be produced to the Society on or before the last Tuesday in March, 1822.

166. For the next greatest quantity, not less than two, hundred and fifty pounds;—Me *Silver Medal,* on similar conditions.

167. To the person who shall discover to the Society, a method of manufacturing Hop-stalks or Bines, Nettles, or any other cheap material, the growth of the United Kingdom, so as to render them equally fit for the purpose of supplying the place of cotton, for Wicks of Candles or Lamps;—*the Silver Medal,* or *Twenty Guineas.*

Samples, not less than 5 lbs. weight, of the Wicks so prepared, to be produced to the Society on or before the last Tuesday in February, 1821, with certificates that the whole quantity is equal in quality to the sample.

Wicks for Candles,

168. To the person who shall make known to the Society the most satisfactory result of a series of experiments actually made by him to determine the best thickness of Cotton Wicks for Candles, so as to obviate the defects of those commonly used ;—*the Silver Medal,* or *Ten Guineas.*

Certificates, that not less than one hundred weight have been so made, and six pounds of the Candles, to be produced to the Society, on or before the last Tuesday in February, 1822.

***N. B.* The intention in offering this premium is, to ascertain the proper thickness or bulk of the Wick in proportion to that of the tallow, and to remove the unpleasant consequences and waste arising from the sparkling, or guttering of the candles in common use.**

Paper from Raw vegetable Substances.

"169. To the person who shall, between the first of January, 1821, and the first of January, 1822, make the greatest quantity, and of the best quality (not less than ten reams) of good and useful paper, from raw vegetable substances, the produce of Great Britain or Ireland, superior to any hitherto manufactured from such substances, and

which can be generally afforded as cheap as paper of equal quality and appearance now made from rags;—*the Silver Medal,* or *Twenty Guineas,*

Ik B. The object of the Society bein^ to add to the number and quantity of raw materials used in this manufacture, it is their wish to include every useful sort of paper, and to introduce such natural products as can be easily and cheaply procured in great quantities. The Society are in possession of two volumes containing a great variety of specimens of paper made from raw vegetable substances, viz. nettles, potato-haulm, hop-bines, &c. which volumes may be inspected by any person on application to the House-keeper.

Certificates of the making such paper, and one ream of the paper to be produced on or before the second Tuesday in February, 1832.

Transparent Paper.

170. To the person who shall discover to the Society a method of making Paper from the pulp, that shall be perfectly transparent, and of a substance and body equal to foolscap, that shall take and bear common writing-ink with the same facility and correctness as Writing paper generally in use;—Me *Silver Medal,* or *Twenty Guineas**

Certificates of the making such paper, an account of the process, and one ream of the paper, to be produced on or before the second Tuesday in March, 1822.

(INDIA PAPER, see page xxxiii.)

Chintz Patterns for Calico Printers.

171. For the best original pattern in a new taste, of light and dark-ground Chintz for garment work, or furniture, fit for the purpose of Calico-printers;—*the Silver Medal.*

To be produced to the Society on or before the first Tuesday in March, 1823, and a copy of the pattern for which the premium is adjudged, to remain the property of the Society.

Copper-plate Patterns.

172. For the best pattern, in a new style, fit for the purpose of calico-printers for garment-work or furniture ;-^*thc Silver Medal.*

To be produced to the Society on or before the first Tuesday in March, 1822, and a copy of the pattern for which the premium is adjudged, to remain the property of the Society.

Gloves.

173. To the person who shall make known to the Society a process equal or superior to that of the French, for preparing, dyeing, and finishing the skins, verified by actual experiments, and the communication accompanied with at least a dozen pair of gloves made from skins so prepared;—*the Gold Medal,* or *Forty Guineas.*

Certificates from competent persons, fully approving of the result of such experiments, together with the gloves and communication, to be produced to the Society on or before the last Tuesday in March, 1822.

• *Cat-gut.*

174. To the person who shall discover to the Society the best method of manufacturing, in the United Kingdom of Great Britain and Ireland, the intestines of sheep, lambs, goats, or of any other animals, into the article called Cat-gut, equally strong, clear, smooth, even, and free from knots, as the best Italian strings, and at a price not exceeding what they are usually sold for in England \—*the Gold Medal,* or *Thirty Guineas**

Certificates that not less than fifty pound weight have been so prepared by the claimant, with a full detail of the pro* cess, and samples of the articles of various thicknesses, to be produced to the Society on or before the first Tuesday in February, 1822.

175. For the next greatest quantity, not less than twenty-five pounds;—*the Silver Medal,* or *Twenty Guineas,* on similar conditions.

Hose for Tire Engines, Brew-houses, tyc.

176. To the person who shall invent and make known to the Society a method of making Hose for Fire Engines

Prewhouses, *he.* similar to those used on the continent, made of flax or hemp, or other flexible material cheaper than leather ;—*the Gold Isis Medal,* or *Thirty Guineas.*

A full account of the process used in manufacturing it, with certificates of its efficacy in practice, to be produced to the Society on or before the last Tuesday in February, 1822.

Thread for Lace.

177. To the person who shall invent or discover a method of manufacturing Thread from flax, of as fine quality as any used on the Continent;—*the Gold Medal,* or *Thirty Guineas.*

Samples of the Thread, not less than one pound in weight, and of the Lace made therefrom, together with certificates that not less than ten pounds in weight of each sort has been manufactured, to be produced to the Society, on or before the last Tuesday in March, 1822.

PREMIUMS IN MECHANICS.

Gunpowder Mills.

178. To the person who shall invent and discover to the Society the most effectual mode of preventing explosions in Gunpowder Mills;—*the Gold Medal,* or *One Hundred Guineas.*

Certificates and accounts of the method having been put in practice in one or more Gunpowder Mills in this kingdom, and that it promises, in the opinion of the best judges concerned in such works, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1822.

N. B. As an encouragement to persons to turn their thoughts to improvements of this nature, if any should be made on the present method of conducting the business of-Gunpowder-making which fall short of the total prevention of explosion; such bounty or reward will be bestowed on them as they may appear to merit.

Family or Portable Mill.

179. To the person who shall invent and produce to the Society, a mill for Grinding Corn for the use of private families, or parish poor; the construction to be simple, the mill to be easily worked, and superior to any hitherto in use;—*the Gold Medal,* or *Thirty Guineas.*

The Mill, and certificates of its having been used to good effect, to be produced to the Society, on or before the last Tuesday in February, 1822. Cheapness and simplicity will be considered as essential parts of its merit; and the Mill, or a model, to remain with the Society.

Machine for Raising Coals, Ore, \$c. *fyc.*

180. To the person who shall invent a machine for raising coals, ore, &c. from mines, superior to any hitherto known or in use; and which shall produce the effect at less expense;—*the Gold Medal,* or *Fifty Guineas.*

A model with a certificate that a machine at large on the same construction has been advantageously used, to be produced to the Society on or before the second Tuesday in February, 1823.

Improved Walking-wheel or Crane.

181. To the person who shall invent an improved Walking Wheel or Crane, on which the weight or power of any person or persons shall be applied with the greatest safety and effect, and so contrived that the power can be varied according to the greater or less weight to be raised or lowered;—*the Gold Medal,* or *Thirty Guineas.*

A model, with a certificate that the machine at large lias boon em ployed to good effect, to be produced to the

Society on or before the second Tuesday in March, 1622.

Machine for Raising Water.

182. To the person who shall invent a machine on a better, cheaper, and more simple construction than any hitherto known for raising water out of wells, &c. from a depth of not less than fifty feet;—Me *Gold Medal,* or *Thirty Guineas.*

Certificates of the performance of the machine, and a model of it, to be produced to the Society, on or before the last Tuesday 'in February, 1822,

Extinguishing Fires.

183. To the person who shall produce to the Society a method for preventing or extinguishing fire in buildings, superior to any now in use -,—*the Gold Medal,* or *Thirty Guineas.*

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the last Tuesday in January, 1822.

Boring and Blasting Rocks.

184. To the person who shall discover to the Society a more simple, safe, cheap, and expeditious method than any hitherto known or in use, of Boring or Blasting Rocks in mines, shafts, wells, &c.;—*the Gold Medal,* or *Thirty Guineas.*

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the first Tuesday in February, 1822.

Heating Rooms for the purpose of Manufacturers.

185. To the person who shall invent and discover to the Society, a method of Heating Rooms, superior to and cheaper than any hitherto known or in use, for the purpose of manufacturers j—*the Gold Jrledal,* or *Thirty Guineas.*

A model or complete drawing and description of the method, with certificates that it has been successfully practised, to be delivered to the Society on or before the last Tuesday in March, 1822.

Improved Ventilation.

186. To the person who shall invent and produce to the Society a mode of permanently Ventilating the apartments in hospitals, workhouses, and other crowded places, superior to any now known or used;—*the Gold Medal,* or *Fifty Guineas.*

A model of the apparatus, and a full account of the means by which the effect has been produced, with proper certificates to be delivered to the Society on or before the last Tuesday in February, 1822.

Ventilating Coal Mines.

187. To the person who shall invent and carry into practice a method of Ventilating coal mines so as effectually to prevent the accidents liable to arise from the accumulation of carburetted hydrogen and other gases;—*the Gold Medal.*

A full account of the process, with certificates of its efficacy, to be produced to the Society on or before the last Tuesday in February, 1822.

N. B, The Society will be very glad to attend to any communication, which, though not completely effecting the object, appears to offer an approximation to it. The Society wish particularly to refer candidates for this premium to the communication made by Mr. Ryan and published in the 34th vol. of the " Transactions/' and will consider themselves obliged to any person who will furnish any information with respect to the attempts which have been made to introduce Mr. Ryan's mode of ventilating coal mines into actual use, and of the success with which this method has been attended.

Preventing Accidents from Stage Coaches,

188. To the person who shall invent and discover to the Society a method of preventing accidents arising from Stage Coaches \—*tht Gold Medal,* or *Thirty Guineas**

Ample certificates of its efficacy, and a description of the method with models of the machinery used, to be produced to the Society on or before the last Tuesday in February, 1822.

N. B. The Society wish to impress strongly on the public the necessity of turning their attention to the above premium, from the number of accidents that daily occur; and suggest whether they might not in some degree be prevented, by an alteration in the manner of placing the luggage.

Preventing Accidents from Horses Falling with Two^Wheeled Carriages.

189. To the person who shall invent and produce to the Society a method, superior to any hitherto known or in use, preventing accidents from the falling of Horses with Two-wheeled Carriages, especially on steep declivities; —*the Gold Medal,* or *Thirty Guineas,*

A jnodel of the apparatus, and a full account of the means by which the effect has been produced, with proper certificates that the same has been used with success, to be delivered to the Society, on or before the second Tuesday in February, 1822.

*Improving Turnpike and other Roads**

190. To the person who shall discover to the Society the most effectual and cheapest method, verified by actual experiments, of combining[1] the materials ordinarily employed in making or repairing Roads, so as to form them of the hardest consistency by their cementing properties, or by an artificial mixture of earth, stones, &c. altered by heat, or any other mode, so as to form an even, hard, and durable carriage-road ;—*the Gold Medal,* or *Thirty Guineas.*

It is required that an accurate account of the method used, and every expense attending it, together with satisfactory certificates of its being effectual, be delivered to the Society on or before the first Tuesday in March, 182?.

Raising the Bodies of Persons who have Sunk under Water.

191. To the person who shall invent and produce to the Society, a cheap and Portable Drag, or other machine, superior to those now in use, for the purpose of taking up, in the best and most expeditious manner, and with the least injury, the bodies of persons who have sunk under water \—*the Gold Medal,* or *Thirty Guineas**

The drag or machine, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in March, 1822.

Preventing prejudicial effects to the Persons employed in point' ing Needles.

192. To the person who shall invent and produce to the Society a mode of obviating the prejudicial effects that attend the operation of Pointing Needles, by grinding them dry, during which the particles of grindstone-dust, and steel, being thrown into the air, and received with it into the lungs, occasion asthma, consumption, and other painful disorders ;- *the Gold Medal,* or *Thirty* Guineas.

A model of the apparatus, and a full account of the means by which the effect has been produced, together with proper certificates of its practicability and adoption, to be delivered to the Society on or before the second Tuesday in March, 1822.

Preventing Explosions in Steam engine and other covered Boilers.*

193. To the person who shall invent and discover to the Society a method of rendering covered boilers used for steam-engines and other purposes, safer than any now in use, and less liable to accidents from explosion;—*the Gold Medal, and not less than Thirty duineas.*

Ample certificates that the method has been found to answer its intended purpose, to be produced to the Society, on or before the last Tuesdaj in February, 1822,

An Original Screw.

194. To the person who shall invent and make known to the Society any mode of producing an original screw more perfect than any hitherto known; -—*the Gold Medal,* or *Thirty Guineas.*

A model, or complete drawing and description of the method, with a screw not less than twelve inches in length, to be produccil to the Society on or before the last Tuesday in February, 1822.

Working Drawings of a Steam-engine.

195. To the person who shall produce to the Society the best working drawings in plan, elevation, and section of a condensing steam-engine in its most improved state, with a full detail of its several parts, and an accurate description thereof;—*the Gold Vulcan Medal,* or *Thirty Guineas.*

The drawings and description to be produced to the Society on or before the first Tuesday in April, 1822, and if rewarded, to remain the property of the Society.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE COMMERCE OF THE UNITED EMPIRE.

Taking Whales by the Gun-harpoon.

196. To the person who shall strike and take the greatest number of Whales, not fewer than three, with the Gun-harpoon ;—*Ten Guineas.*

Certificates of the striking such Whales, and that they were actually taken in the year 1820, signed by the master, or by the mate when the claim is made by the master, to be produced to the Society on or before the last Tuesday in December, 1821.

Taking Porpoises.

197. To the people in any boat or vessel, who, in the year 1821, shall take the greatest number of Porpoises, not fewer than thirty, on the coast of Great Britain or Ireland, for the purpose of extracting oil from them;—*the Gold Medal,* or *Thirty Guineas.*

Certificates of the number, signed by the persons to whom they have been sold or delivered for the purpose of extracting the oil, to be produced to the Society on or before the last Tuesday in February, 1822.

Oil from Porpoises, or Sun Fish.

198. To the person who shall manufacture the greatest quantity of Oil from Porpoises or Sun-fish taken on the coast of Great Britain or Ireland, in the year 1821, not less than twenty tons;—*the Gold Medal,* or *Thirty Guineas.*

Certificates of the oil having been made from porpoises or sun-hsh actually caught on the coast of Great Britain or Ireland, and two gallons of the oil as a sample, to be produced to the Society on or before the last Tuesday in February, 1822.

Curing Herrings.

199. To the person who shall send to the Society the best sample of White Herrings (not less than a sixteen gallon barrel), with certificates that not less than fifty barrels, equal in all respects to the sample, have been cured in a British or Irish vessel or port, by the person by whom the sample has been sent to the Society;—*the Gold Medal,* or *Fifty Guineas.*

Samples to be produced to the Society, on or before the first Tuesday in January, 1822, with certificates that the conditions of the premium have been fulfilled; together with a full description of the process employed.

In the S7th and 38th volumes of the Transactions, will be found valuable communications from Mr. Denovan of Leitb, un the cure of British herrings, to

which the Society particularly wish to direct the attention of such persons as intend to claim this premium.

Exporting British-cured Herrings.

200. To the person who shall import into the Hamburgh or other continental market previous to February, 1822, the greatest quantity of white herrings cured in British or Irish vessels, not less than 500 barrels, in quality at least equal to the best Dutch herrings, and which in the Hamburgh or other continental market shall produce prices at least equal to the best Dutch *y—the Gold Medal,* or *Fifty Guineas.*

201. For the next greatest quantity, not less than 300 barrels;—*the Gold Isis Medal,* or *Thirty Guineas.*

Proper certificates and samples of the herrings to be produced to the Society on or before the last Tuesday in February, 1822.

The same premiums to be continued one year longer on similar conditions.

Curing Mackarel.

202. To the person who shall, before January, 1822, cure the greatest quantity of Mackarel, not less in number than ten thousand, in the best manner and to the satisfaction of the Society, the same being caught in the British or Irish seas, and cured in a British or Irish vessel or port;—*the Gold Isis Medal,* or *Twenty five Guineas.*

203. For the next greatest quantity, not less than five thousand;—*the Silver Medal,* or *Fifteen Guineas.*

A sixteen gallon barrel of the mackarel to be produced to the Society on or before the first Tuesday in January, 1322, with certificates that the conditions of the premium have been fulfilled, and that the whole were cured in the same manner as the specimens, together with a full description of the process employed.

The same premiums to be extended one year farther, on similar conditions.

N. B. Specimens of cured mackarel, which promise to afford a most valuable article of trade and food, even superior to herrings, have been sent to the Society, and have induced them to turn the attention of the public thereto, by offering the above premiums.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH COLONIES.

Nutmegs.

204. For the greatest quantity of Merchantable Nutmegs, not less than ten pounds weight, being the growth of his majesty's dominions in the West Indies, OM any of the British settlements on the coast of Africa, or of the several islands adjacent thereto, and equal to those imported from the islands of the East Indies;—*Ae *Gold Medal,* or *Fifty Guineas.*

Satisfactory certificates, from the governor or commander in chief, of the place of growth, with an account of the number of trees, their age, nearly *» the quantity of fruit on each tree, and the manner of culture, to be produced on or before the first Tuesday in January; 1823.

The same premium is offered for the year 1824.

kali for Barilla.

205. To the person who shall have cultivated, in the Bahama islands, or any other part of his majesty's dominions in the West Indies, or any of the British settlements on the coast of Africa, or the several islands adjacent thereto, in the year 1821, the greatest quantity of land, not less than two acres, with a Kali equal to the Spanish Kali for the purpose of making Barilla;—*the Gold Medals* or *Thirty Guineas.*

206. For the next greatest quantity, not less than one acre;—*the Silver Medal,* or *Fifteen Guineas.*

Certificates signed by the governor or commander in chief for the time being, of the quantity of land so cultivated, and of the state of the plants at the time of signing such certificates, to be delivered to the Society, with samples of the kali, on or before the second Tuesday in February, 1822.

The same premiums, on similar conditions, will be given for Barilla grown in 1822 and 1823.

*Destroying the Insect commonly called the Borer**

207. To the person who shall communicate to the. Society an effectual method of destroying the insect commonly called the Borer, which has of late years been so destructive to the sugar canes in the West India islands;—*the Gold Medal,* or *Fifty Guineas.*

The discovery to be ascertained by satisfactory certificates, under the hand and seal of the governor or commander in chief for the time being, and of some other respectable persons, inhabitants of the islands, or other place, in which the remedy has been successfully applied; such certificates to be delivered to the society on or before the first Tuesday in February, 1822.

Cultivation of Hemp in Upper Canada.

208. To the person who shall sow with Hemp the greatest quantity of land in the province of Upper Canada, not less than six arpents (each-four-fifths of a statute acre), in the year 1821, and shall at the proper season caus£to be plucked the summer Hemp (or male hemp bearing so seed), and continue the winter hemp (or female hemp bearing seed) on the ground until the seed is ripe;—*the Gold Medal,* or *One Hundred Dollars**

209. To the person who shall sow with Hemp the next greatest quantity of land in the same province of Upper Canada, not less than five arpents, in the year 1821, in the manner abovementioned ; *the Silver Medal,* or *Fifty Dollars.*

Certificates of the number of arpents, the method of culture, of the plucking of the hemp, with a general account whether sown broad cast or in drills, the expense, soil, cultivation and produce, to be transmitted to the Society, certified under the hand and seal of the governor or lieutenant-governor, together with 28 lbs. of the hemp, and two quarts of the seed, on or before the last Tuesday in April, 1823.

Cultivation of Hemp in Lower Canada.

210 — 211. Premiums exactly similar in all respects to those held out for the province of Upper Canada, are also offered for the province of Lower Canada.

Cultivation of Hemp in Nova Scotia and New Brunswick.

212 — 213. Similar premiums in all respects are also offered to the provinces of Nova Scotia and New Brunswick.

Importation of Hemp from Canada. Nova Scotia, and New Brunswick.

214. To the person who shall import to this country the greatest quantity of Marketable Hemp, not less than one hundred tons, in the year 1821, the pro* duce of Canada, or of one of the abovementioned provinces;—*the Gold Medal.*

215. To the person who shall import the next quantity, not less than fifty tons;—*the Silver Medal.*

Certificates, satisfactory to the Society, to be produced by the master of the vessel on or before the first Tuesday in February, 1822, to testify that such hemp was grown and prepared in Canada, Nova Scotia, or New Brunswick,,

Substitute for Hemp.

216. To the person who, in the year 1821, shall discover and produce to the Society a substitute for Hemp, equally cheap, durable, and applicable to all the purposes for which hemp is now used; —*the Gold Medal,* or *Fifty Guineas.*

A quantity of the substitute not less than one hundred weight, together with the proper certificates from the governor or commander in chief, if

raised in any of the British colonies, or from the Secretary of the Board of Trade, if raised in the East Indies, to prove that the same has been used with success, to be produced to the Society on or before the last Tuesday in February, 1822.

N. B. The premiums from No. 207, to 216, are all extended one year farther, on similar conditions.

Silk.

217. For the greatest quantity of silk proper for manufactures, not less than one hundred pounds weight, produced by any person in the Isle of France, Ceylon, or Malta, or islands near or adjacent thereto, in the possession of Great Britain, in the year 1820, from Silk-worms bred there;—*the Gold Medal,* or *Fifty Guineas.*

Specimens of th$ Silk, not less than one pound, with an account of the method in which the Silk-worms were managed ; the kind and size of the mulberry-trees from whence they were furnished with food, and particulars respecting the culture of the mulberry trees for that purpose, to be produced to the Society on or before the first Tuesday in March, 1822.

218. For the next greatest quantity, not less than fifty pounds, on similar conditions;—*the Silver Medal, oi Twenty Guineas.*

Satisfactory certificates from the governor or commander in chief of the district where the said Silk was produced, and of the several particulars abovementioned, to be delivered to the Society along with the samples required.

N. B. The same premiums, on similar conditions, will be given for Silk produced in the year 1821.

Cocoa Nut Oil.

219. To the person who shall, in the year 1822, import the largest quantity of Cocoa-nut oil, not less than fifty tons, and of the best quality;—*the Gold Medal,* or *Thirty Guineas.*

*t** Proper certificates, with the bills of lading, and samples of the oil, to* be produced to the Society on or before the last Tuesday in February, 1822.

1821.

This premium is proposed, particularly with a view to encourage the use of Cocoa-nut oil, in the making of gas for the purpose of illumination, such gas having been found much superior to those commonly in use.

Wool from New South Wales.

220. To the person who, previous to February, 1823, shall import into Great Britain or Ireland, the greatest quantity, not less than two tons, of fine wool, the produce of New South Wales;—*the Gold Medal.*

Proper certificates, with the bills of lading, and samples of the wool, to be produced to the Society, on or before the last Tuesday in February, 1823.

221. For the next greatest quantity, not less than one ton, on similar conditions;—*the Silver Medal.*

Fine Wool from New South Wales m

222. To the person who shall produce to the Society the finest sample of wool, the produce of New South Wales, superior to the best Saxon or Spanish;—*the Gold Medal*

Not less than 14 lbs. of the wool to be produced to the Society on or before the last Tuesday in February, 1823, together with certificates, that at least 5 cwt. equal to the sample has been imported by the claimant.

Extirpating the Stumps and Roots of Trees.

223. To the person who shall invent and discover to the Society the best method, verified by actual experience, of raising out of the earth and removing the stumps and roots of trees which have been left after felling the timber, so as to clear the land for the purposes of cultivation;—*the Gold Medal,* or *Fifty Guineas.*

Certificates that the method has succeeded with at least fifty trees of large girth, and a full description of the means employed, to be delivered to the Society on or before the last Tuesday in February, 1829.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH SETTLEMENTS IN THE EAST INDIES.

India Paper for Capper Plate Printing.

224. To the person who shall communicate to the Society the best account of the process employed in India or China for the manufacture of paper used in England for Copper Plate Printing, and known by the name of India Paper, together with an account of the materials from which such paper is made;—Me *Gold Medal,* or *Fifty Guineas.*

Specimens of the paper, not less than one ream, with samples of the materials in their raw or unmanufactured state, and satisfactory certificates signed by the Secretary of the Government or Board of Trade of the respective settlement, to be produced to the Society on or before the first Tuesday in March, 1823, or 1824.

Bhaugulpore Cotton.

225. To the person who shall import into the port of London, in the year 1820, the greatest quantity, not less than one ton, of the Bhaugul pore Cotton, from which Cloths are made in imitation of nankin, without dying;—*the Gold Medal.*

A quantity of the Cotton not less than five pounds weight in the pod, and five pounds carded, to be produced to the Society, with proper certificates, signed by the Secretary^f the Board of Trade of Bengal or BRnbay, or by the Governor ot the Colony whence the article is exported, on or before the last Tuesday in February, 1822.

Annatto.

226. To the person who, in the year 1821, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of annatto, not less than five-hundred weight;—*the Gold Medal.*

A quantity of the annatto, not less than ten pounds weight, to be produced to the Society, with proper certificates, signed by the Secretary of the Board of Trade of the respective settlement, that the annatto is the produce of such settlement, on or before the last Tuesday in February, 1822.

True Cochineal.

227. To the person, who in the year 1821, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of true Cochineal, not less than two hundred weight;—Me *Gold Medal.*

A quantity of the Cochineal, not less than three pounds weight, with proper certificates, signed by the Secretary of the Board of Trade of the respective settlement, that the Cochineal is the produce of such settlement, to be produced to the Society on or before the first Tuesday in February, 1822.

N. B. The premiums from No. 22S to 227 inclusive, are all extended two years farther on similar conditions.

BRITISH MARBLES.

THE SOCIETY considering that it would be beneficial to the Commerce of the United Kingdom to bring the British' Marbles into general use, and that Jhe most effectual method of accomplishing their object would be, *for the present,* to make them more generally known in the Capital, have cooit to the following Resolution:

Resolved, That specimens of British

Marbles be exposed in the Society's Rooms, in the Adelphi, for the inspeo tion of the public under the following regulations:

1st, That all the specimens be exact to a given size, vis. eight inches high, six inches broad, one thick, and polished on one face.

2nd, That a book be kept, containing the number of each specimen, and de* scribing the situation of the quarry, the name of the parish where situated, the distance of the quarry from a beaten road, and the distance of that road from water-carriage, with the name of the donor and proprietor. Any remarks on the qualities of the Marbles, or on the lime produced from them, will be gratefully received and preserved by the Society, as materials for future inquiries,

As the exertions of the Society can be generally beneficial only inasmuch as their views are seconded by the public, the Society request, that all proprietors of Marble Quarries will favour them with a specimen of the Marble, worked to the exact size above-mentioned, with the description of the quarry as above, that the same may be entered in the book to be preserved for the use of the public. By such arrangements, it is expected, that the interest of the proprietors of the quarries will be promoted, and the use of British Marble much extended. A variety are already exhibited in the Society's Rooms.

REWARDS BESTOWED BY THE SOCIETY DURING THEIR SESSION WHICH COMMENCED ON THE FIRST WEDNESDAY IN NOVEMBER, 1820, AND CLOSED ON THE SECOND WEDNESDAY IN JUNE, 1821.

IN AGRICULTURE AND RURAL ECONOMY.

1. To C. Fyshe Palmer, Esq. M. P. of Oakingham, Berks, for sowing 216 bushels of Acorns on 240 acres, *the large Silver Medal.*

2. To C. Fyshe Palmer, Esq. M. P. of Oakingham, Berks, for planting 280 acres with 893,420 Forest Trees, *the large Gold Medal.*

3. To C. Fyshe Palmer, Esq. M.P. of Oakingham, Berks, for planting 30,700 Oaks for Timber, *the large Gold Medal.*

4. To Thomas Wilkinson, esq. Fitzroy-square, for sowing S40 bushels of Acorns on 260 acres, *the large Gold Medal.*

5. To Sir W. Terapler Pole, Bart. Shute-hoitse, near Axminster, for raising 896,000 Oaks from Acorns, *the small, or Ceres, Gold Medal.*

6. To Henry Potts, Esq. Chester, for planting 194 acres with 528,240 Forest Trees, *the large Silver Medal.*

7- To Edward Dawson, Esq. Aldcliffe-hall, near Lancaster, for embanking 166 acres-of marsh laad from the Sea, *the large Gold Medal.*

IN POLITE ARTS.

Honorary Class.

1.—ORIGINAL.

1. To Miss Emily Coppin, Norwich, for an original Oil Painting of Fruit, *the large Gold Medal.*

3. To Miss Barnard, Bury St. Edmund's, for an original Painting of Flowers in Water Colours, *the small, or Isis, Silver Medal.*

3. To Miss Harmer, Sloane-street, for a Chalk Drawing from a Bust, *the large Silver Medal.*

4. To Miss Elizabeth Elford, Bickham, near Plymouth, for an original Water Colour Drawing of Flowers, *the Silver Isis Medal.*

2.—COPIES.

5. To Mr. James Watts Peppercorne, South Cottage, Vauxhall, for «& Historical Drawing in Pen and Ink, *the large Silver Medal**

* 6. To Mr. R. Hayter Jarvis, Long Acre, for an Historical Drawing in Chalk, *tip Silver Palette.*

7. To Mr. Edward Knight, Grand Hotel Chambers, Covent Garden, for a Landscape in Oil, *the Silver Palette.*

8. To Miss Emma Davis, Surrey-square, for a Portrait in Oil, *the small, or his, Silver Medal.*

9. To Miss Anne Beaumont, Newman-street, for a Portrait in Oil, *the large Silver Medal.*

10. To Miss Stephens, Dorset-square, a Landscape with Figures, in Oil, *the Silver Palette.*

11. To Miss Emma Maria Smith, Upper Conway-street, Fitzroy-square, for a Landscape in Pen and Ink, *the Silver Palette.*

12. To Miss Myddleton Biddulph, Russel Farm, near Watford, for a Portrait in Chalk, *the large Silver Medal.*

13. To Miss Hartman, York-street, Portman-square, for a Holy Family in Chalk, *the Silver Palette.*

14. To Miss Caroline Walter, Devonshire-place, Portland-place, for a Figure ia Chalk, *the Silver Palette.*

Class for Artists and Others.

1.—ORIGINAL.

15. To Mr. I. Wood, High-street, Whitechapel, for an Historical Painting in OH, Satan starting from the Touch of the Spear of Ithuriel, *the large Silver Medal.*

16. To Mr. Robert Oliver, South-street, Manchester-square, for a Landscape in Oil* *the small, or his, Gold Medal.*

17. To S. Mountjoy Smith, Great Marlborough-street, for a Drawing in Chalk from a Bust, *the Silver Palette.*

18. To Mr. T. S. Engleheart, Bayham-street, Camden Town, for a Chalk Drawing from a Plaster Cast, *the Silver Palette.*

19. To. Mr. W. Watts, High-street, Hampstead, for an Historical Painting in Oil, Ubald and the Sirens, (from Tasso), *the large Gold Medal.*

20. To Mr. W. Fairland, Princes-street, Blackfriars, for a Chalk Drawing from a Bust, *the smaller, or Isis, Silver Medal.*

21. To Mr. S. Nicholson, Liverpool, for a Landscape Composition in Pencil, *the large Silver Medal.*

22. To Miss Rose Emma Drummond, Rathbone-place, for an original Portrait in Crayons, *the small, or Isis, Gold Medal.*

'S3. To Miss Anne Eggbrecht, Frith-street, Soho, for a Chalk Drawing from a Bust, *the Silver Palette.*

24. To Miss Georgina Huntly, Newman-street, for a Group of Portraits in Water Colours, *the Silver Palette.*

25. To Mr. H. Courtney Slous, Bayham-street, Camden Town, for an Oil Painting of a Boar Hunt, *the small, or Isis, Gold Medal.*

26. To Mr. G. Presbury, John-street, Fitzroy-square, for a Chalk Drawing of the Ilissus, in the Elgin Collection, *the small, or Isis, Silver Medal*

27. To Mr. Penry Williams, Newman-street, for a Chalk Drawing of the Ilissus, in the Elgin Collection, *the large Silver Medal.*

28. To Mr. J. Eggbrecht, Frith-street, Sobo, for a Chalk Drawing from a Bust, *the small, or Isis, Silver Medal,*

S9. To Miss Cotton, Chicheley, near Newport Pagnel, for an Oil Painting ©f Flowers, *the small, or Isis, Silver Medal.*

2.—COPIES.

30. To Mr. F. Woodington, Queeir Anne-street, for a drawing of figures in Indian Ink, *the Silver Palette.*

31. To Mrss Caroline Vendramini, Brompton-row, for a Drawing in Chalk of an Historical Subject, *the large Silver Medal.*

32. To Miss Is. Murray, Paragon, Kent-road, for a Head in Chalk, *the Silver Palette.*

33. To Mr. I. Scarlet Davis, Southampton-row, for a Head in Pen and Ink, *the Silver Palette.*

34. To Miss Turner, Warren-street, Fitzroy-square, for a Portrait in Indian Ink, *the Silver Palette.*

35. To Miss Jane Drummond, Church-street, Soho, for a Portrait in fixed Crayons, *the large Silter Medal.*

36. To Mr. R. F. Cahusac, Cursitor-street, Chancery-lane, for a Pen and Ink Drawing of Two Dogs, *the Silver Palette.*

37. To Miss Welsh, David-street, Baker-Street, for a Painting of Flowers on Velvety *the large Silver MedaL*

38. To Miss Caroline Hanning Evatt, East Hill, Wandsworth, for a Copy in Oil of West's Tobit, *the small, or Isis, Gold MedaL*

39. To Mr. F. Y. Hurlslone, Great Queen-street, for an Historical Painting in Oil, *the large Silver Medal.*

40. TaMiss Charlotte Wroughton, Bedford-street, Bedford-square, for a Portrait in Miniature, *the large Silver Medal.*

41. To Miss Biffin, Strand, for an Historical Miniature, *the large Silver MedaL*

*Original Architectural Designs**

The subject, a Building suited to the use of the Society of Arts, &c.

49. To Mr. C. Ward, Store-street, Bedford-square, *the Silver Medallion.*

43. To Mr. Edward Taylor, Salisbury-street, Strand, *the large Silver MedaL*

44. To Mr. George Jackson, Lower-Brook-street, *the small, or Isis, Silver MedaL*

*Models**

1.—ORIGINAL.

45. To Mr. C. S. Smith, Norton-street, Fitzroy-square, for a Group of Two Figures, *the small, or Isis, Gold MedaL*

46. To Mr. T. Smith, Norton-street, Fitzroy-square, for a Single Figure, *the large Silver Medal.*

47. To Mr. T. Carline, Shrewsbury, for a Single Figure, *the small, or Iris, Silver MedaL*

46. To Mr. C. F. Bielefield, St. Martin's Lane, for a Bust, a Portrait, *the small, cr Isis, Silver MedaL*

49. To Miss Anne Wyon, Vauxhall Walk, for a Composition of Flowers in Wax, *the small, or his, Silver Medal.*

2.—COPIES.

50. To Mr. J. Preece, Upper Mary-le-bone-street, for a Copy in Plaster of the Laocoon, *the Silver Palette.*

51. To Mr. C. Delatre Theakston, Winchester-street, Pentonville, for a Copy in Plaster of the Laocoon, *the small, or Isis, Silver Medal.*

52. To Mr. Frederic Mace, Queen's-row, Pimlico, for a Bacchanalian Figure, *the large Silver Medal,*

Medal Die Engravings.

53. To Mr. Ben. Wyon, Vauxhall Walk, for a Group of Two Figures, *the small, or Isis, Gold Medal.*

54. To Mr. A. S. Firmin, Strand, for a Head, *the small, or his, Silver Medal.*

Etchings and Engravings.

55* To Mr. W. De la Motte, Royal Military College, Bagshot, for an Etching of a Landscape, *the small, or Isis, Silver Medal.*

56. To Mr. James Bromley, Trevor-square, Brompton, for an Etching of a Landscape, *the Silver Palette.*

57. To W.Bromley, Esq. A. R. A.f Trevor-square, Brompton, for a finished Historical Engraving, *the large Gold Medal.*

58. To Mr. George Hayter, Wimpole-street, for an original Etching from a Pic* ture by Titian, *the large Silver Medal.*

59. To Mr. J. Bromley, South-street, Chelsea, for an Etching of an Historical Subject, *the large Silver Medal.*

60. To Mr. T. F. Ranson, Judd-place, West, for a finished Engraving of a Portrait, *the small, or Isis, Gold Medal.*

61. To Mr. George Steart, for Improved Tablets for Drawing on, *the small, or Isis, Silver Medal.*

IN MANUFACTURES.

1. To Mr. W. Salisbury, Brompton, for Matting made of the Typha Latifolia (or Bullrush), *the small, or Ceres, Silver Medal.*

IN CHEMISTRY AND MINERALOGY.

1. To Mr. W. Bishop & Co., Pistyll, near Holy well, for the Discovery of Mill-stone of a superior quality, in Halkin Mountain, Flintshire, *the small, or Isis, Gold Medal.*

IN MECHANICS.

I. To Mr. N. H. Nicholas, Lieut. R. N. Temple, for a Semaphore, *the larite* ***Silver Medal.***

g. To Mr. P. Barlow, Royal Military Academy, Woolwich, for his Instrument to correct the local Variation of a Ship's Compass, *the large Gold Medal.*

3. To Mr. B. Rider, Redcross-court, Borough, for a Machine for Cutting Tips for **Hats,** ***Ten Guineas.***

4. To Mr. C. Brandt, Jennyn-street, for a Spring Crutch for a Pendulum, *the* ***small, or Vulcan, Silver Medal.***

5. To Mr. £. Baker, W hi tech apel road, for a Bullet Mould, *the small, or Vulcan,* ***Silver Medal.***

6. To Jos. Goodwin, Esq. Carlton Palace, for a Spring Cross for Horses, *the small,* ***or Vulcan, Silver Medal.***

7. To Mr. G. Witty, Frances-street, Holloway, for a Fire Escape, *Ten Guineas.*

8. To Henry Earle, Esq. George-street, Hanover-square, for a Bed for Patients under Surgical Treatment, *the large Gold Medal.*

9. To Mr. James Story, Theobald's-road, for a Portable Oven, *the small, or Vulcan,* ***Silver Medal.***

10. To Mr. Jacob Perkins, Fleet-street, for a Method of Ventilating the Holds of Ships, and Warming and Ventilating Apartments, *the large Silver Medal.*

II. To Mr. Jacob Perkins, Fleet-street, for Instruments to ascertain the Trim of a **Ship,** ***the small, or Vulcan, Gold Medal.***

12. To Ben. Rotch, Esq. Furnival's Inn, for an Arcograph, *the small, or Vulcan** ***Silver Medal.***

13. To Mr. S. Lake, Alfred-place, Bedford-square, for a Double Door Hinge, *the* ***small, or Vulcan, Silver Medal.***

14. To Mr. James Allan, Blewitt's-buildings, for his Method of dividing Circular **Arcs,** ***the large Silver Medal.***

The Thanks of the Society were voted to J. C. Curwen, Esq. M.P. for a Communication on Draining; and to George Reveley, Esq. Queen's-square, Bloomsbury, for a Commuuication on the Use of Soap instead of Oil in setting Cutting Instruments on a Hone; which were ordered for publication in the next volume of Transactions of the Society.

%• Since the last DISTRIBUTION, One Hundred and Thirty-nine **New** Members have been Elected.

PAPERS

IN

AGRICULTURE.

N° I.

RAISING OAKS FOR TIMBER.

The large GOLD MEDAL *of the Society, the premium offered, was this Session awarded to* CHARLES FYSHE PALMER, *Esq. M. P. for planting* 30,700 OAKS FOR TIMBER. *The following communication has been received on the subject from Mr.* PALMER.

Wokingham,
February 1821.

SIR;

OBSERVING that a premium has been offered to the person who shall have raised, since the year 1816, the greatest number of Oaks, either from young plants or acorns, in order to secure a succession of oak timber in this kingdom, I beg leave to state to your Society, that in the month of February 1816, I planted, on the forest land near Wokingham, not calculated for the purposes of husbandry, 700 oaks, above five feet in

height, and at the distance of several yards from each other; also 10,000 oaks, which had been three years bedded* That in the month of October 1M7, I planted 23,000 oaks, above two feet in height, and standing in tines about five feet apart, the ground having been previously prepared by the instruments described •yme in the- accompanying communication; and th.t in February 1818 I planted out 7,000 four years old plants.

I am, Sir,

I. *Aikin, Esq.,* *&c. &c. &c.*

Secrttcti y, &c. S'c. CHAULEB FYSHE **PALMER.**

CERTIFICATi;

i

WE whose names are hereunto subscribed, do hereby certify that we are well acquainted **with** the plantations, and that we believe the foregoing statement to be true and correct.

Tr THOMAS MonitEs, *Minister.*

J. WI:BU.

W. LANK.

JOHN ROBERTS.

EDWARD HOIINE.

W *jl* **TJIICKET.**

JOHN CHTTRCHMAV.

WILLIAM LANK, **JUB.**

En WARD SMITH.

JOHN Bit OWN.

N° II.

RAISING OAKS FOR TIMBER.

The small or CERES GOLD MEDAL *was (Ids Session presented to* Sir *William* TEMPLER POLE, *Bart. of Shute-house, near Axminster, Devon, for having raised* 896,000 *Oaks from acorns.*

A CERTAIN time being fixed by the Society for the reception of claims for the several premiums offered for planting, it would be manifestly unjust towards those claimants who have complied with this condition, to admit as competitors with them, those who, from inadvertence or any other cause, have failed in this respect.

Sir W. Temple Pole was unfortunately in this situation, his first communication not having arrived till three weeks after the appointed time. Under these circumstances, the Committee, to whom the matter was referred, came to the following resolutions, which were adopted by the Society :—

" It is the opinion of this Committee, that Sir W. Templer Pole's claim for raising oaks, though otherwise entitled to the highest premium, cannot *receive* it, his communication not having been made within the prescribed time; but in consideration of the importance and extent of his plantations, they recommend to the Society to present him with the Gold Ceres Medal.

" Th^y farther tecommentl to the Society to instruct the Secretary to write to Sir W. Temp>ler Pole, expressing the liig!i sense the Society entertaii i of the public spirit which suggested anil carried into cscciu ion his hig hly important and valuable plantations, and lamenting that an informa!ity respecting the tiine of sending in the claim, shlould have prevented them from aivarding to him the highest premium, wlidb they Feel to be pre-eminerjtly duc to his exertions."

The tallowing communication s have been received from Sir W. T. lMcon the subject:

Shute HQUPO, nrai Ax milster, De**conshirc,**

SIR; February 19th, 18.1.

I re-.pectin!!y offer myself a candidate for the Gold Medal advertized by the Society *a*f Arts, for raising Oaks sincc 1816.

I beg leave to observe, that tin ee years since, I planted, in the richest garden ground, about 98 bushels of prime acorns, collected from the est and bfin formed oaks ii my pi rk, which are the largest in this county ; that I thereby found employ ment fir many w!o were almost starving for want of w orit, and clitit I can pn>luce certificates fr om sun eyors a udnursery-me n, that T have, at th< most moderate c imputation, at the leas t 500,000 trees i i the l inest condition, tl lough I should spe ik within compass, if I stated them at rhree times that nber.

Allow nic to bi'g for tii e form of the necess;iry certificate, and to express my hope that you will i y this letter bef re the Society.

I am, Sir,

2. &c.

WILLIAM TEMPLER POLE, *Bart.*

Shute near Axminster,
SIR; February 21St, 1821.

I beg leave to transmit you a cert&cntc of my having planted such a number of oak trees, as I flatter myself will entitle me to the Gold Medal offered by tl;e Society of Arts, a premium I should greatly esteem, and which could not fail to encourage my future exertions.

I am, Sir,
&c. &c. &c.
W. TEMPLER POLE.

CERTIFICATES.

February 21st, 1821.

Wethcundersigned do hereby certify, that to the best of our judgment and belief, there are now growing in the nurseries of Sir William Templer Pole, Baronet, in the parish of Shute, and comity of Devon, *at* least 89b\00i' prime oak trees of nearly three years growth, from acorns; that the trees are in a very thriving state, kept perfect! j free from weeds, and fenced in a very secure manner; that lie procured every acorn from trees fit for the largest ship timber in his majesty's navy, and that we verily believe Sir WiUiom Templer Pole has more oak in his nurseries than any gentleman or nurseryman in the -west of England. We also ceriiiy, that on an average he has planted out upon his estate annually at least 30,000 forest Irees for fifteen years past; that this year he has planted out above 46,000, and that he has above 50,000 trees of sorts ready to go out in IS22.

(Signed) RICHARD PHIPPEN, *Nurseryman and Planter.*
•ToUN REWELL.
SAMUEL SAMPSON.

N° III.

PLANTING FOREST TREES.

***The** large* GOLD MEDALO///;-? *Society, the premium offered, was this S-ession awarded to* CHARLES **FYSHE** PALMER, ***Esq., M. P.,** of **Wokingham,** Berks, **for planting 280** acres **with** 893,420 FOREST TREES. *The following communication has been received on (he subject from Mr.* PALMER.

SIR; March, 29!i, **1830,**

ENCOURAGED by the appt<bation which my former exertions in planting **Forest** Trees met from your putriotic Society, and ambitious of again meriting tlu> **honourable distinction** of its notice, I take the liberty of b}ring before the Socicty, in addition to the usual certificates, some details of **the** process I have adopted^for converting what was a barren and **unprofitable** portion of forest into thriving and **valuable** plantntio>is.

Tlie two ploughs which I used in 1816 to prepare the forest land for the reception of plants, were so constructed-as to require their being worked at the same time; and as **the** accidental failure in tne of **the** plonghs frequently suspended **the** labour of both teams, I applied myself during the Sum-

mer of 1816, to the construction of other implements, by which the labour and expense have been reduced to one-fourth, and I have been enabled to carry on my work as extensively with half the number of horses required in the preceding year.

It had always been my object, as a planter, to remove and clear away the heathy surface of the forest land, and to loosen the ground beneath it to such an extent as would allow the tender fibres of the roots to extend themselves, without obstruction, until the plants attained a size and strength sufficient to force their way into the soil.

For this purpose I constructed a cutter or shaver of a triangular form, two feet in breadth, and armed at the point and sides with the best and hardest materials that Mr. Galloway of Holborn could manufacture. To this instrument I fastened two turn-boards, and the beam and handles of a common plough, and with the power of four horses I have been able to clear off the heathy surface with great ease and expedition, and to leave a clear space of two feet in breadth.

My next object was, to loosen the Interior of the ground that had been thus pared and cleared from the incumbrance of heath and of its fibrous tangled roots, and to prepare it for the reception of plants. For this purpose I constructed a very strong plough, without any turn-board; and having lengthened the chief or standard to fifteen inches, I attached a very strong ploughshare, with fins *an* each side, extending about eight inches, and worked it with six horses, such as are commonly used for agricultural purposes. I have been able to make this instrument penetrate the soil to the depth of fifteen inches, and to proceed in thoroughly loosening the ground at a slow but regular pace; and as a proof that this process was not imperfectly performed, it may be proper for me to state, that all my plants were put into the ground at

eighteen pence per thousand, the price commonly paid by nurserymen.

This mode of planting, and the construction of the implements which I have used during two successive years, in preparing many hundred acres of waste land, I beg leave to submit to the notice of the Society, and to point out the advantages immediately resulting from them.

The first, that the ground having been well pulverised in the first instance, the plants, in case of failure, can be replaced with little expense of labour,

Secondly, the young plantations are thus secured in a great degree, from the destructive effects of fire, by which both myself and my neighbours had greatly suffered.

The trees in each line stand at the distance of three feet apart, and the different lines at five feet from each other.

Number of Trees planted on 250 Acres of Forest Land, not calculated to repay the Expense of Tillage, in the Parishes of Wokingham and Finckampstead, Berks.

Scotch Fir	566,400
Norway Spruce	110,000
Larch	08,700
Willow	66,200
Sycamore	48,000
Oak	30,200
Ash	3,200
Birch	700
Chesnut	20
	894 420

CHARLES FYSHE PALMER.

CERTIFICATES.

March 29th, 1820.

WE, the undersigned, do hereby certify the plantations above described to be in a healthy and thriving state,

THOMAS MOORES, *Miller of Wakingham.*
JAMES WEBB,
EDWARD HOHKER,
WALTER LANTJ,
A own CHITTMMAN—*Inhabitants of the Town and Parish of Wokingham.*

In order to convince the Society that the ground on which my plantations have been made is, notwithstanding the depth or rather the looseness of the soil, wholly unfit for cultivation, I beg leave to have to lose a certificate from Mr. Smallpiece, the commissioner for making the inclosure, and another signed by the principal inhabitants of Wokingham. I also subjoin a letter from Mr, Walter, shewing the result of an attempt made by him to bring a portion of this forest land under culture.

Guildford, April 23th, 1821.

I hereby certify, that the land planted by Charles Fyshe Palmer, esq. in the parishes of Wokingham and Finchampstead, in the county of Berks, is not fit for cultivation.

B. SMALLPIECE, *Commissioner for Inclosing the above Parishes.*

SIR; April 22nd, 1821.

WE, whose names are hereunto subscribed, beg leave to certify to you, for the information of the Board of the Society of Arts, that the lands which have been lately planted with oak. firs, and other forest trees, by Charles Fyshe Palmer, esq. in the parishes of Wokingham and Finchampstead, were

late part of the waste lands of Wimtsor Forost; and with the exception of i\ few small parcels, arc wholly unfit for the purposes of cultivation. By much the greater part is considered not to exceed in value from five to six pounds }er acre for the fee simple. *One* hundred acres, part of which is included iu the said plantations, were purchased at auction at something less than live pounds per acre.

JOHN BOIERTS, *of Wokwghaniy Solicitor.*
EDWABB HoitNE,
WM. LAKE— *Churchwardens of* 1)okingham.
PATL. IIoLTON,
THOMAS CIIEAK'ER,
P. BBOWKE—*Member* of the Corporation of Wbkingliar,*
JOHN CHURCHMAN, *a n Inhabit<m t of* U'oking-*hanu*
AV.B. TiIICKRY, *Town Clerkof Wokiighma.*

DEAR^Ul; Hoiyport, Jiay 3, ifl21.

1 HAVE been fiivoured with your letter of inquiriis relative to my farming the heath-laud at Wokingham, purcliased under the !nelosure /;ct, and situate adjoining to that you have planted, and I should haw answered them earlier, but havc been from home.

You arc iware that my purchase consists of 80 acres of land, of about th'e averag:e quality of the Heath. 1 selected five acres of the best •f my whole quantity, and indeed as good as :tny of the Heath, if I except narrow slips adjoining the old inelosures, which for time out of mind have been trodden and manured by the cattle going thither for shelter both from heat and cold. These five acres I first t/enehed 18 indies deep, theni plowed ;itiii sowed with carrots; the expense

of trenching, plowing, and sowing, was about 10s. per acre, and seed about 6d. The whole produce of the five acres might be about ten bushels.

I then chalked the land at an expense of 4l. per acre, and planted potatoes, about ten bushels to the acre, the cost of seed and planting amounting to about 1l. per acre, the produce of which was brought away in a small cart, probably about 20 bushels, from the five acres. In some few instances the potatoes were as large as an egg, but in general from the size of a walnut to that of a pea; and in many spots, where there was a vein of sand, they had not vegetated at all. I then trenched ten acres more, and limed it, at the expense of 5l. per acre, and sowed turnips, but the crop was not worth turning sheep into; and last year I sowed rye, and sold the crop standing at 1l. per acre, but grew so weary of my ill success, that I have now planted the whole with seedling larch, which I flatter myself will, by their growth, repay me the money laid out in attempting cultivation.

I do, however, think, notwithstanding the little prospect there may be of cultivating with success a large portion of this heath land, that some spots may be found, and this piece of mine amongst the number, which might yield a return, provided they were so situate as to be well manured and chalked, and trod with cattle; but the money which must necessarily be sunk in the operations, would more than purchase the fee of the land in its improved state, without taking into calculation the cost of erecting buildings, which are indispensable to the improvement of the land to any extent.

I am, Sir,

&c. &c. &c.

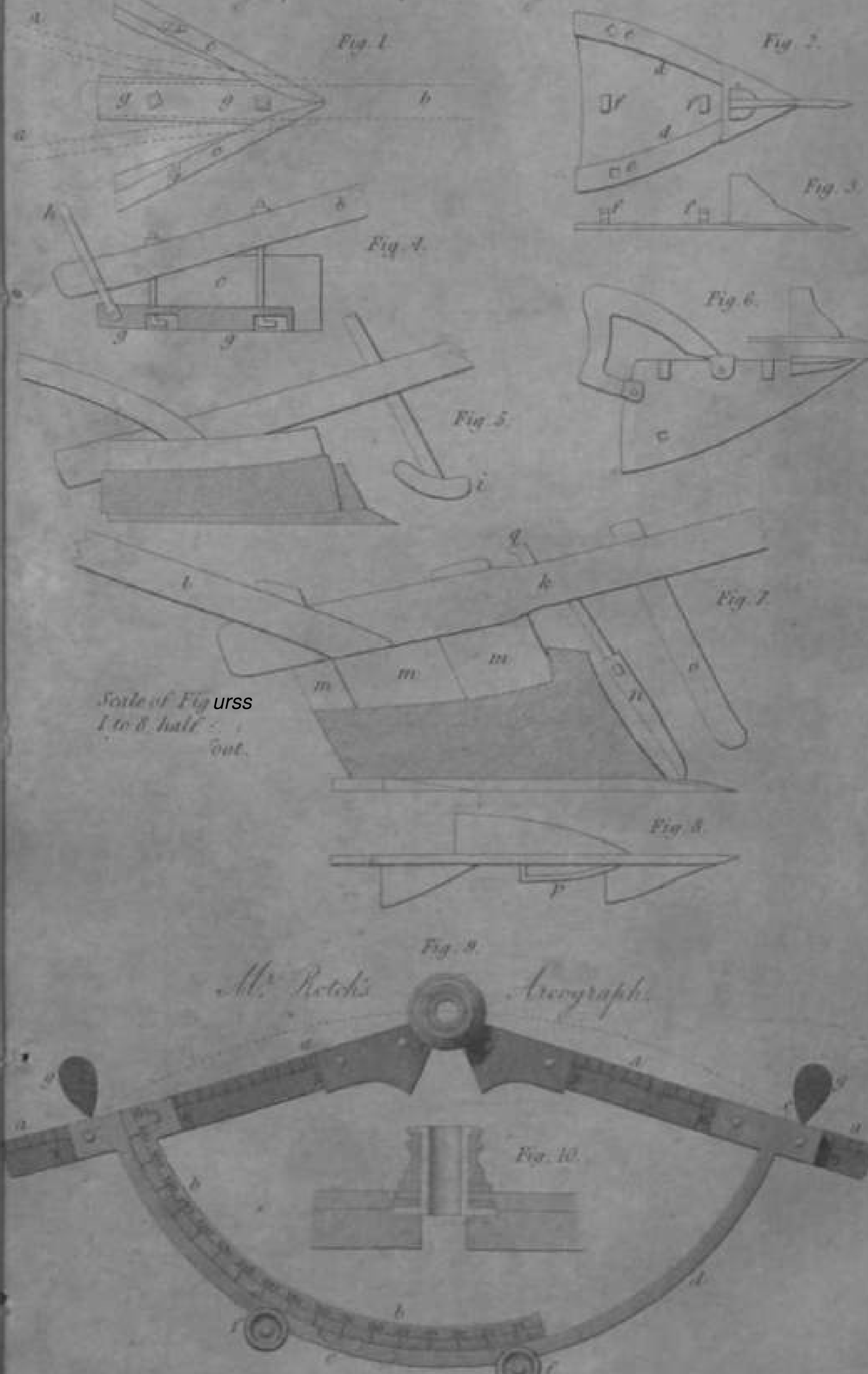
H. WILLIAMS.

To Charles Fyshe Palmer, esq.

Reference to the Engravings of the Instruments used by C. F. Palvur, esq. in breaking up Land for Planting Forest Trees, Plate I.

Previous to grubbing up the earth to a considerable depth, the heath and turf were pared off the surface by a plough, the wood-work of which consisted of a beam and handles of the usual construction, shown by dotted lines in the plan or bird's-eye view, fig. 1 (a *a* the handles, *h* the beam), and of two turn-furrows *c c* two feet three inches long, nine inches wide, and two inches thick, the lower edges and front with iron; the fore part of the beam is supported on two cast-iron wheels, twenty-two inches diameter. The draught of the horses (sometimes four at others six being employed) is applied on the top of the beam immediately over the points or fronts of the turn-furrows. The cutter, fig. 2, is formed of a flat plate of iron *d d*, about three-eighths of an inch thick, having the cutting edges forged separately, and rivetted on it. On the fore-part is fixed an upright cutter, preceding the turn-furrows, shown in the section, fig. 5. The cutter is attached to the wood-work by four screw bolts, one passing through each turn-furrow, and retaining it at *e e*, the two others passing through the beam, and terminating at the lower end in hoops, forming a right angle, as seen in fig. 4, on to which are slipped the two eyes *f f*, and the nuts are then made tight: *g g*, in figs. 1 and 4, represent a piece of wood *b* ing between the turn-furrows, and immediately over the cutters; this piece has two mortises in its under surface to allow the application of the eyes *f f* to the hooks on the screw bolts. The piece *g g* is fastened to the turn-furrows, and is connected to the beam and to the handles by two iron bars; the lower portion of one of them is seen at *h*, fig. 4. This plough was used for paring the heath and turf from the hard grounds; on the lighter soils another

Instruments used by C. F. Palmer, Esq.^r^ in breaking up Land, for Planting Forest Trees. Pl. 1.



A. Aikin, del. T. Bradley, sculp.

instrument, not differing materially in the wood-work (except in *h*ing it rally lighter) was used; affixed to this is a cutter, formed as described in fig. 6, the lateral and anterior edges made cutting, and the whole attached to the wood-work nearly as described in fig. 1. In order to prevent the cutter from sliking too deep into the earth, or becoming clogged with the loose soil, it was preceded by a curved piece of wood, *i*, fig. 5, eleven inches by three inches, attached to a stem passing through a mortise in the beam, by which its depth could be regulated at pleasure. The shaded part in fig. 5 shows how much of the turn-furrows were cased with iron.

After the surface had been pared by one of these instruments, the ground was loosened to a considerable depth by the plough, fig. 7; it consists of a strong beam *k*, and handles *l*, the former six inches square at the lower end, and of a pitching, formed wholly of two-inch stuff, contained in the three pieces *m m m*, and cased with iron, where shaded with diagonal lines. This pitching is preceded by a tuch and coulter of the usual construction, but of large dimensions. On the under side of the pitching is fixed a cutter, fig. 8, formed of a bar two inches by one inch, having two fins rivetted or bolted to one side of it, and one fin to the other, the outer edges of the fins being made cutting, and the inner about a quarter of an inch thick. The strap *p* is merely for the purpose of attaching it to the wood-work. The draught is applied to the iron stud *q*, and the beam of this plough is also supported on two wheels.

The cutters actually used in the operations may be seen in the Repository of the Society.

N° IV.

PLANTING FOREST TREES.

The targe SILVER MEDAL, ***the*** *second Pre mium offered, was this Session awarde<l to* UKKRY POTTS, *Esq. of Chex;er, for* ***rr plat*** *ting 194 Acres witk* 5^8,940 *Forest Trees. The following* ***torn-*** *mutticatitm* ***has*** *been r'he ived on subject front-* *Mr.* POTTS.

SI

I BEG leave to transmit to you an account of a plantation made by me, between the months rf October, 1817, and April, 1818, on some mountainous land in the parish of Llanferres, in the county of Denbigh, containing one hundred and ninety acres, which I shall tcel obliged by your laying before the Committee of the Society for the encouragement of Arts, Manvtfactures, and Comnvrce.

The land in question consists of a ridge of limestone TCKks, running nearly north and south, and sloping from the summit towards the east a!id west. Between the rocks there are large tracis of good red soil, consisting of about one hundred and twelve acres, well adapted for the growth of deciduous forest treej, though, from their elevation, not capable of improvement by the plough. -The remainder of the plantation consists of rocky and uneven ground, in which there are, however, interspersed many considerable patches of soil suited for planting, and tlu: crevi**oes** and fissures of the rocks appear (jm!ging

from some plantations in the neighbourhood belonging to me, formed on similar sites) to be also favourable to trees.

T his plantation was made by Messrs. Arch:bald Dickson and Suns, of Il ean-burn, near Ha wick, North Britain. In the more favourable situa; ihe plants were put duwn at the i! of tour feet from each uthcr, and were of riptions, vi,

One-fourth transplant

if Beeti nd Elms.

One-fourth, one and two year transplanted Scotch 1

lalf transplanted Larches of different si/

TV larger trees were all pitted.

In the more exposed and rocky plac* about three feet and a half apart, or as dose to each other the nature of the ground would allow of, and tally two years old seedling larch am; chiefly nicked in. The number of trees planted was—

.400	Ouks, 9 to 15 inch
6,100	Plant., H to 2 feet.
4,400	Ditto, 18 inch
	..tchEl
9,000	
20,860	
900	S . 7 to 12 inches.
960	Birches, 12 to 18 inc!
960	S 15 to 21 inci:
•4,000	E years old,
»HK)	Ditto - 1 year -
120,600	I 18 inch
52X	6 b
'0	Scot
.000	I.

Th.: seasons have been favourable for the growth of trees since this plantation was made, and the whole appear to be in a verj thriving and promising state.

I have taken grt. at care to preserve this plantation froi injury by sheep and cattle. On three sides it is protected by stone walls of five and six feet in height, and 314 roods (or rods) in length. On the sides most exposed to trespass of that description, the walls for 212 roods are six feet high, 125 roods of th<. loftier walls bei ng wel I plai>tered on the outside to prt vent sheep getting any footing on the project; ng stones. Wit Inn tb< walls I have plante d good qt ucksets at 6 inches apart, which have beea properly weeded, and are grnnr- ing well. On t; e fourth side of the plantation, which adjoins to cultivated lands, it is well protected by good hazlc and fences.

: you a certificate from Messrs. A. Dicks
Sons, ' bers of trees planted, and their
thuru

I transmi. ees furnished by them ; m and
.is to the kinds and nun. Rev. Ellis Wynne, gentlem
present appearance, and from my bailiff, confirming their ac- count as to the number of tx also fro

o planted over four acres (.*n
ident in the parish of L f L the pi
the plantation and the Scotch firs, set at about
In the Spring of 181H, I als and a lf apart. This
Ian ntation is inc , in the parish o , five feet no
irs old transplanted larch and quickset hedge, ed
thi osts and nf four or (bur feet and a hi the other sides.
'ofied with a stone wall high, on
the mi plantations at Maes y Safn, i plac protect he
by p< parish, amounting a three loot 20 acres, to be carefully
filled ransplanted oaks, and other forest trees. F.y-
aid other
up with t

this pui; Mr, John Rutgers, of Chester, nurseryman, supplied me with 19,Gi00 plants; the remainder were taken out of my own nurseries. These trees have in general succeeded, and are doing well.

Between the month of October, ISIS, and April, 1819, I replanted two woods belonging to me, which had been cleared by a fall of timber. One of these woods, called Coed y Felin, is in the parish of Llauferres, and consists of nine acres, some of the old timber having been left for ornament, I think that about six acres were replanted. This wood is well sheltered, and trees of considerable size are now growing upon it. The plants I put down were chiefly oak, beech, sycamore, and larch, two feet high, and planted about four feet asunder. These trees are now growing very well. The other wood, so replanted, is upon a farm called Maes y Groes, in the adjoining parish of Kilken, and county of Flint. It consists of several dingles, containing together 25 acres, well sheltered, and particularly favourable to the growth of oak trees. The most valuable timber having been cut down about six years since, before the farm came into my possession, the fences were much neglected, and cattle suffered to brouse the young shoots rising from the stools of the trees fallen, and no young trees had been planted to replace those that had been cut down. In this state I found it, and I immediately proceeded to repair the fences, and to caust the young saplings to be preserved, and the underwood cleared away, so as to allow of the wood's being regularly replanted. This was done with oajis, from two to three feet high, set at the distance of nine feet from each other, and the intervals filled up with birch, sycamore, and beech, of about the same height, at four feet and a half apart, as nurses to the oaks. I calculate that the quantity of land entirely replanted may be about 18 acres. The young trees are very thriving. The

fences round the two last-mentioned plantations are of hazel, thorn, &c. and are made secure against trespass by cattle.

I send you herewith a certificate from Mr. John Rogers, of Chester, nurseryman, of the number of trees furnished by him to me between the months of November, 1818, and February, 1819; and my bailiff Thomas Ellis's certificate, speaks as to their having been properly planted out, and as to the number of plants taken from my own nursery, and the present condition of the two last-mentioned plantations, and of the fences around them.

Though these two plantations were not made at the same period of the year 1818, as that formed by Messrs. Dickson and Sons, and may not in strictness come within the terms of the Society's offer of a premium for the planting of Waste Lands, nor be considered as entitled to that or any other premium, I trust I shall be excused for having mentioned them. I also take the liberty of adding, that I continue my efforts for the improvement of my property and the face of the country, by covering the unproductive land with timber. I have, in the course of the last year (1820), inclosed and planted about nine acres of a well-sheltered dingle, in Llanfenes, with two-year-old transplanted oaks, at the distance of eight feet from each other, with transplanted larches and Scotch firs, intermixed, at the distance of four feet apart, as nurses; and in the years 1819 and 1820. I also planted about 25 acres (being part of a large tract of moorish, and totally unproductive land in the same parish, which had been inclosed with stone walls) with two-year-old seedling Scotch firs and larches, intermixed with a few seedling oaks and alders. Some acres of the land last mentioned had been planted about the year 1817, but the trees had in general failed; which I attribute to the circumstance of the plants used being rather too large, and more particularly to the mode of planting them,

which was by making pits for the trees. These pits formed reoeptacles for the water during the winter months, and the loots of the trees rotted. That seedlings planted by me were *naked* in, and seem likely to succeed.

Thanking you, Sir,

A. Aikin, Esq. &c. &c. &c.
Secretary, &c. &c.

HENRY POTTS.

CERTIFICATES

To the Honourable the Society of Arts, Commerce, and Manufactures, Adelphi, London;

I, Archibald Dickson, the younger, of Hassendeanburn, near Hawick, in the county of Roxburgh, nurseryman, do hereby certify, that in the month of November, 1817, I, together with Archibald Dickson, senior, and James Dickson, my co-partners, contracted with Henry Potts, of the city of Chester, Esquire, to plant for him with forest trees, 180 acres" of land, in the pariah of Llanferres, in the county of Denbigh ; 112 acres of which appeared to be well calculated for the growth of deciduous timber, and the remainder chiefly adapted for larch and fir trees. The terms of our engagement were, that on the above-mentioned 112 acres, the trees should be planted at the distance of four feet apart from each other, and on the remainder, at the distance of three feet and a half, or as near as the nature of the ground would admit of. I also certify, that in the month of December, 1817, and in the course of the following spring, we actually planted for him thereon

17,400 Oaks, 9 to 15 inches.
6,100 Planes, 1½ to 2 feet.
4,400 Ditto, 1£ to 18 inches.
7,660 Scotch Elms, 12 to 21 inches.

9,000 Beeches, 9 to 15 inches.
20,S60 Ashes, 12 to 24 inch-es.
900 Silver Firs, 7 to 12 inches.
960 Birches. 12 to 18 inches.
900 Spanish Chesnuts, 12 to 21 inches.
38.000 Scotch Firs, 2 years, transplanted.
15,000 Ditto - 1 year, ditto.
120,1[illegible]00 Larches transplanted, 9 to 18 inches.
Tii,*00 Ditto - - fi to 12 inches.
151,000 Scotch Firs, 2 years seedlings.
120-000 Larches - 2 years, ditto.

528,240

And I further certify that in the month of November, 1820, I viewed the plantation so formed; that the trees appeared to be growing well, and that all vacancies occasioned by death had been properly filled up; and that there are now growing and in a thriving state in the said plantation, at least the number of trees above specified. The walls and other fences round the plantation appear to be well and substantially made. Witness my hand this 1[illegible]*hh* day of January, 1821. ARCHIBALD DICKSON, jun.

To the Honourable the Society of Arts, Commerce, and Manufactures, Adelphi, London;

I, Thomas Lewis* of Glanrafon, in the parish of Llanferres in the county of Denbigh, esq. do certify, that I am well acquainted with the large plantation in the parish of Llanferres aforesaid, made by Henry Potts, of Chester, esq. in the Spring of the year 1818, consisting of 180 acres of land, or upwards. That it is surrounded on three sides by a stone wall, and on the other side by a sufficient live wood fence, and the trees are completely secured from depredation. That I

have seen the same several times in the course of the last Autumn, when the plants seemed to be in a very thriving state, and the plantation promises to become very profitable. And I further certify, that I have several times lately viewed two woods belonging to Mr. Potts, called Coed y Felin and Maes y Grot's Woods, which have been lately replanted by him. That the young trees which have been set in those woods, as well as in various other plantations belonging to Mr. Potts, at Nant Stabal, Maes y Safn, and elsewhere in the parish of Llanferrea, appear to be very thriving, and are properly secured from trespass. Witness my hand, this 19th day of January, 1821.

THOMAS LEWIS.

To the Honourable the Society of Arts, Commerce,
and Manufacturer, Adelphi, London;

I, the Rev. Ellis Wynne, clerk, rector of the parish of Llanferres, in the county of Denbigh, do certify, that I have several times, in the course of the last Summer, viewed the large plantation in that parish, made by Henry Potts, of Chester, esq. in the year 1818, amounting to *about* 180 acres, and that the trees therein grow well, and seem likely to form a very thriving plantation. The whole is surrounded by stone walls, or sufficient hedges, and the trees are effectually protected from trespass. Witness my hand, this 17th day of January, 18*A*-

ELLIS WYNNE, *Rector of the Parish of Llanferres.*

To the Honourable the Society of Arts, Commerce,
and Manufactures, Adelphi, London;

I, John Rogers, of the city of Chester, nurseryman, do certify, that in the months of February and March, in the year 1818, I furnished to Henry Potts, of the same city, esq.

the following forest trees, which were sent to h;s estate in Llanferrcs, in the county of Denbigh:

8,700 Scotch Firs.
2,300 Laich.
1,300 Oaks.
500 Sycamoi e.
2,000 Spruo Firs.
1,500 Bevch.
500 Aid*rs.
300 Birch.
2,000 Larch IVs.
500 Ash.

19,600

And in the month a November, 1818, and Jnuary and February, 1819, I :ilso supplied Mr. Potts with the undermentioned Forest Trees, which were also sent to his estate at Llauferres.

1>,250 Larch.
6,000 Oaks.
1,050 Beech.
200 Scotch Firs.
200 Sycamore.
50 Ash.
50 Birch.

19,800

Witness nty hand, this 16th day of Januarjtt|8S1.

Jo RS Rc'GERS.

To the Honourablt[1] t:e Society of Arts, Commerce, and Mauufactures, Adelphi, Lond*;;

I, Thomas Ellis, of Llanferres, in the county of Denbigh, bailiff or agent to IIcnry Totts, of th* city of Chester, esq.

do hereby Certify, that I was directed by Mr. Potts to look after the workmen employed by Messrs. Dickson and Co. in planting for him a tract of land in Liddesdale, in the Spring of the year 1818. That the plants used on the better part of the land were transplanted deciduous trees, with Scotch fir and larch of the like description intermixed, and they were set at the distance of four feet from each other. That the plants used in the more rocky and exposed places were chiefly two-year-old seedling Scotch fir and larches, and were planted at the distance of from three feet to three feet and a half apart, or as near to each other as the nature of the ground would admit of. And that I verily believe that there were about three thousand trees used for each statute acre of the land planted. That these trees were all healthy and well rooted, and were very well planted. And I do further certify, that all vacancies occasioned by death or accident have been regularly filled up, and the whole plantation is now in a thriving and promising state.

I also certify, that the fences round the said plantation are good and substantial, two sides thereof having been secured by stone walls six feet in height, being in length two hundred and twelve roods, one hundred and twenty-five roods whereof are well plastered on the outside as a protection against sheep. The third side is fenced by a stone wall five feet high, and of the length of one hundred and two roods; and that the fence on the fourth side where the plantation adjoins to the ancient inclosed lands is well made with live wood, and is a sufficient defence against cattle. And that strong quickset plants were set within the walls round the plantation, at the distance of six inches from each other, which have been properly weeded, and are growing well. And I further certify, that between the first week in January, 1817, and the first week of April, 1818, I planted for Mr. Potts four acres of land, at Nant

Stabal, in Utanfcirres, with two-year-old transplanted larch and Scotch firs, at the distance of *from* four to four feet and a half asunder. This plantation is well protected from cattle by ft stone wall and a hedge, with posts and rails set on a three-feet wall. I also within the same* period filial up the vacancies in several newly-made plantations belonging to Mr. Potts, at Maes y Safn, Nant Stabal, Pant ryd ynog, and elsewhere, in the parish of Llanferres, containing at least twenty acres, by carefully replacing *the* trees that were dead, with transplanted oaks, beech, and other forest trees, of which I received nineteen thousand six hundred from Mr. John Rogers, of Chester, nurseryman, and the remainder were taken out of Mr. Fotts's nursery, at **LJanferres.** 1 further certify, that all these plantations are well secured from trespass by cattle, and the trees I planted have in general lived, and are doing well. And I further certify, that in the winter of the year 1818, 1 rcccived from the said John Rogers, nineteen thousand eight hundred forest trees, which, with twenty-five thousand oaks, beech, hirth, and other trees taken out of Mr. Fotts's nursery, in Llanferres, •were planted by rat, or imder my direction, between the month of October, **1818,** and the month **of April,** 1SH), in two woods belonging to Mr. Potts, the timber in which had been cut •down, and the underwood cleared away. That in one of these woods called Cocii y Felin, in Uaianferres aforesaidj containing nine acres of land; the plants used were oak. ash, elm, beccb, and larch; and they ware planted about four feet from each other ; but as the trees in part of this wood were leii standing for ornament, the whole wood was not replanted, **bui I verily befieve** that there were at least six acres entirely replanted. That the other wood on Maes y **Groes** farm, in the parish of Kilken, consisting of about twenty-five acres, the young saplings which had arisen from the stools of oaks fallen about six years since, before the

farm came into Mr. Potts's possession, were carefully pruned, and the underwood cut away, so as to allow of the land being regularly replanted. In some parts a few old trees remained, with a considerable number of saplings, but I believe that the whole quantity of land replanted by me here was at least eighteen acres. This was done with oaks, two feet high, set at the distance of nine feet from each other, with larches, beech, and sycamore, intermixed as nurses, making the distance from tree to tree four feet and a half. I have frequently gone over these woods, and replaced such trees as have died or been accidentally injured. I have seen them this day, and do certify, that the whole are in a thriving state, and likely to make a valuable plantation of oaks. The fences have been carefully attended to, and are all in good condition. I also certify, that in the month of January and February, 1820. I inclosed, by Mr. Potts's direction, nine acres of land in a well-sheltered dingle, near Brynrodin, in the parish of Llanfeirres, particularly calculated for the growth of oaks, with stone walls and strong quickset hedges and banks, and planted the same with two-year-old transplanted oaks, at the distance of eight feet apart, with larches, Scotch firs, and beech between them, at four feet distance, and that these trees are all growing remarkably well. Also in the years 1819 and 1820, I planted for Mr. Potts about twenty-five acres of land, near Pant Dû, in Llanferres aforesaid, on a spungy moist bottom, with two-year-old needling larches and Scotch firs, with a few oaks, and alders intermixed. These trees are well protected from cattle by stone walls, and set in likely to succeed. Witness my hand this 15th day of January, 1821.

THOMAS ELLIS.

N° V.

SOW! NG ACORNS.

The large GOLD MEDAL, *beins the prem turn offered, was ti is Session vote I to* THOMAS WI L-KI NSON, *Esq., of i itzroy Square, London, for* So w: 40 Bus H ELS o F AcoRxs ott 260 *Acres. The foil owing mm tit ication has been receivcd on, the subject fro m Mr.* WILKINSQJ N.

8, Fitz toy Square,
SIR; January Stli, Ifl 21.

As a candidate **for** the **GoU** Medal offer < \ by the Soci ety of Arts, &c., for **sov** ing aco ins, I bog leave to **transmit** a c.r-tificatcof my having plar.-ed 120 acres of land wit b aeon s, in the months of October, November, and December 1813, agree-ably to **the** conditions of the Society, and shall feel highly flattered should tli ey deem a jt worthy of the premium.

I purchased the estate, consisting of 2,600 acres, in the Spring of that year, and t he part which is p&u ted is chiefly covered wit !i heath, bilberries, and other mountain ber ries, with some furze, fern, &c.; the whole is very much encum-bere o the neig to the

e, was
d **with** large loose stones **peculiar** I hbourhoad, with which the wall, as described in the **appendix** cer-tificat built, to iuclose part of the land planted, from the £ '.flies-hill, whidx is **considered** the highest ground

I likewise at the same time .planted 140 acres, in addition to the 120, which are not included in the certificate, for the reasons stated in the append:x.

Any further information upon the subject, in addition to the certificate and appendix, which the Society may thmk ni> -cessary, will with pleasure be communicated, by Mr. Samuel Smith, of No. 10, (Jray's-inn-squxure, who has the mans ge- ment of the esfci te, and under whose direction and *ham* ediate insi>ectiou the whole was carried into execution.

A. Jikin. Esq. &e. &e. &e.
Secretary, &c. &c. Tno>IAS WILKINSON.

CEILTIFICA1'E.

Gatten,
September 20th, : 1.

W ::, the undersigned, do hereby certify, that Thomas WSkuuoi , Esq. plante1 upon his Ga[1].ten estrite (on the south- east side of the Stiperstones-hifl), in the parish of Ratling- hope, and county of Salop, in the months of October, No- veniber and December IS18, 120 acres of land with Acorns ; that there are now growing upon the said lands com- derably more than 300 young oak plants on eac; acre, which lu»\e been effe dually preserved in order to raise timber, and are now in a healthy and thriving state (specimens arc sent) ; that the said lands are properly and securely fenced, and are unfit for husbandry. The soil varies considerably, but is chicHy of a loamy texture.

JAS. SMITH, *Coppice Green, near Shifnal,*
WM. JVKSON, *Pulverbatch, near Shrewsbury,*
London.

Appendix to Certificate.

Gatten,
Se[ilembcr aotfi, 1820.

In adiition to the 120 acres ofland planted with acorns by TIit>s. WilUnseu, Ksq., upon his Gattcn estate (on the south-cast side of the Stiperstones-hiU), in the parish of Ratling-hope, and county of Salop, in the'months oi' (October, November, and December 1S18, and ibr which he is a candidatc Ibr the Gold Medal, given by the Soci*ty of Arts, &c. he planted 140 acres more, upon the same estate and nt the iame time, making together 260 acres planted with acorns ; but the 140 acres being a good deal covered with underwood of hazlc, birch, alder, some oak, &c. : it cannot be certified that there arc now growing 300 young oak plants on every acre, as they cannot be seen, except in the bare places **where** they ap-l^ar **in** great plenty ; and there can be little doubt that there are many more than that number, as the whole of the land was **planted at** int«rvals, of from two feet s be **indies,** to three feet asunder, in tl;e following manner :

The acorns wert dibbled in by a comp;my of men, <ach having a pointed hatchet in his hand to inake a hole in the ground with, and a pocket banging before to carry the a/orns in. The men proceeded in regular order, as close as they could conveniently walk, making a hole in an oblique direction at every step, putting an acorn into it, and placing *he* foot firmly upan it to cover it.

An overs:er walked behmd the men, to see that they performed their work projicrly, and at about every 30 yards placed a stick in the ground with a white mark on the top, m the **line*** here the last man went, which served as a guide to the first man in returning, showing him how far was planted ; as soon as he (the first man) had passed the stick, on his

return, the overseer again removed it into the line of the last main.

The men planted, upon an average, about 14 quarts pet day each. There were 210 bushels of acorns planted upon the 260 acres of land; the cost of the acorns was 3s. 3½d. per bushel; planting 3s. 8½d. per bushel; average cost per acre, including acorns and planting, 6s. 5½d.; men's wages 2s. 0d. per day.

To prevent the depredations of vermin, the aconrs were moistened with water, and well dried with common sulphur, previous to their being planted.

All the land planted is quite unfit ibr the purposes of husbandry, being chiefly steep sides of hills, and boggy dingles, covered with heath, &c. and full of large loose atones; it is very well adapted for the growth of oak (being principally of a loamy texture), and both the oak trees and stools growing there before, and the young plants, have a very healthy appearance, and thrive well.

To secure the above lands from trespass, stone walls, 5 feet 6 inches high, have been built to the extent of 1,900 yards, and strong fences with deep ditches made, 9,000 yards in length. The wet and boggy places have been drained by open ditches, to the extent of 14,000 yards.

JAMES SMITH, *Coppice Green, Ski/nat.*

SAM. SAUNDERS, 10 *Graifs'Inn-Sijuare, London.*

No VI.

SOWING ACORNS.

The large SILVER MEDAL *of the Society, being the second premium offered, was this Session awarded to* CHARLES FYSHE PALMER, *Esq. M. P., of Wokingham, Berks, for* SOWING 216 BUSHELS OF ACORNS *on 240 Acres. The following communication has been received on the subject from Mr.* PALMER.

Wokingham,
February, 1821.

SIR;

As a premium has been offered by the Society for the Encouragement of Arts, Manufactures, and Commerce, "for having set between the first of October 1818, and the first of April 1819, the greatest quantity of land with acorns," &c. &c., "in order to raise timber," I beg leave to state, that in the Autumn 1818, I collected 216 bushels of acorns (each bushel containing about 8,000 acorns), which were planted in the months of October, November, and December of that year, and in the Spring of the next year, in the following manner, on forest land, not capable of husbandry:

The ground was, in the first place, loosened to a proper depth by means of instruments of my own invention, and which are particularly described in my communication on

planting forest trees, which accompanies this paper. The acorns were then set a yard asunder, in lines, partly by means of the dibble, and partly by means of the spade, which latter mode I am on the whole disposed to prefer, as by thus raising the ground sufficiently to insert the seed, it becomes imbedded in a soft poroxis medium, peculiarly favourable to the progress of the root in its most tender state.

The great extent of the plantation obliged me to employ two men with guns, and several boys stationed in different places, in order to frighten away the rooks and other birds, the depredations of which, when continued through the Winter and Spring, added to other sufficiently obvious reasons, induces me to recommend the planting of acorns in the spring only, as at that season the attention of the rooks will be divided between the farmer and planter, and is at all events the necessity of guarding the land from these depredators, will not exist during more than two months. The plants have come up in vast abundance, are healthy and thriving, and if properly thinned from time to time, will probably become fine timber, notwithstanding the incorrigible barrenness of the soil as regards agriculture produce.

I find no difficulty in preserving acorns through the Winter, by mixing them with dry sand and cinder dust, and spreading them about eight or ten inches deep on a dry floor: during the severity of the frost I cover them with straw, or any other long litter.

I am, Sir,

A. Jaikin, Esq. &c. &c. &c.

Secretary &c. &c. CHARLES FYSHE PALMER.

CE ilTIFICATE.

WE whose names are hereunto subscribed, do hereby cert ify, that we are well acquainted with the plantations in question, and that we believe the foregoing statement to be true and exact, ami that there arc not fewer than 300 young oaks on each acre planted.

THOS. MO HUES, *MrttisU* r.
J. WEBB.
W. 1 ANE.
JOHN KOBEK TS.
E. Hoaxi:.
J. B- TRICK Y.
JOHN CUT RCHMAN.
E. SMITH.
J. Brown.

N° VII.

EMBANKING LAND FROM THE SEA.

*The Ian*e GOLD MEDAL, *the premium offered, was this Session presented to* EDWARD DAWSON, *Esq. of Udcliffe flu*ll, *near Lancaster, for* EMBANKING 166 ACRES OF MARSH LAND FROM THE SEA. *The following communication has been received from the candidate on the subject.*

Aldcliffe Hall, near Lancaster,
November 10th, 1820.

SIR;

I I[illegible] leave to present a claim to the Society for tiie Encouragement oj Arts, &c., for the prewLum oilered in No. 34 of their Usi of rewards published this year. I tram:nit the certitlcates required *hy* the Society, and hope they will be deemed *tx:*tisfactory.

Ti[illegible]e inclosure, the consideration of which I have ihe honour to submit to the Coinmittee, (onsists of 166 acres, 3 roods, 8 pcrchps of land, known by ihe name of Aldcliffe Marsh, ab-ut two miles distuit from the mouth of the river Lune, and ont mile from Lancaster. It was, with the exception of about three acres, swarded over, and has heretofore been attached *a*s a sheep pastarc to the different farms on the inanor of Aldcliffe; it was estimated at a low rent, as it was in a great measure overflown by the spring tides, and being intersecied by a deep pool. the sheep were frequentiy surrounded by thu[1] waterj^^*CAM** equently lost.

My first operation was, to convey the land waters from this pool into the I.tine, which was done by opening for them a new channel **through** part of the old inclosures, **from** nine to twelve feet deep, and 246 yards in length. This cut was walled and **covered with** stone, "and terminates with u hewn culvert of the same material, four yards in length, **and two feet** square.

On the Sth of May last, the embankment was commenced. It runs **parallel** with the Lune, which is in that part about a mile and a **half** in breadth at high water. The highest tides are with a south-west wind, which causes them to set in **with** considerable violence. The length of the embankment is .^,010 yards; for the first 200 **yardg** at the north (or higher) end, I satisfied myself with a slope of 5 horizontal to 1 perpendicular ; in the next 1,400 yards, the slope is 6 to 1, and where the pool formerly discliarged itself, it is for 300 yards 7 to 1; thi remainider being on higher ground, is 0 to 1 ; its height averages about 8 feet 6 inches, the greatest perpendicular height \vning 14 feet 6 **incJ**es; the n hole of the insult slope is 2 to 1. It is entirely composed 6f sand, with tht exception of the deep part, which is formed of clay, the sand being there worn away by the violent reflux of the tide. **Its** contents are as follows :—()9,4^5G cubic yards of sand, covered by 53,078 superficial yards of sods or turf 4 inches thick, employing 3,824 horses, and 5,843 men, supposing it had been completed in one day.

In order I o give employ mem to the poor of this neighbourhood, I contracted with five dilferciit persons; the whole was completed in August, many difficulties retarding it, from the unusual quantity of ruin during the Summer months. On the 29th of May, i violent storm of wind raised the tide, **and** swept away 1,800 yards of material, which would have totally discouraged **the** contractors, who *hu*^ no property, and could

not have sustained the loss, had I not reimbursed them. I am thankful to say the high tides in Septe;nber and October have not mnde the slightest impression, and the whole of the work carries with it every appearance of stability. I apologize, Sir, for the length of this communication ; **the** desire expussed in the rules of the Society, that a detailed account should be given of works oi'tlm kind, must plead my **excuse**.

I am, Sir,

&c. &c. &c.

EDWAIU.. DAWSON.

The Equinoctial tid*s in September, were the highest in the last twenty-four years.

CERTIFICATES.

November tOlh, 1820.

THIS is to certify, that Edward Dawson of AJJeliiFe Rdld, has, during **thi** Summer of the present year, effectually inclose11 and secured from the overflow of the tide, all that tract oi' land, near Lancaster, called Aldeliffe Marsh.

It. ATKINSON, *one of His Majesty's Justices of the Peace, for the County Palatine of Lancaster.*

November 10th, 1820.

I DO hereby certif}, that Edward Davson, of Aldeliffe Hall, has, during the Summer of the present year, inclosed and effectually secured from **the overflow** of_the sea, all that tract of knd? uear Lancaster, known by the name of Aldeliffe Marsh.

THOS. **BOWES,** *Deputy Lieutenant for the County of Lancanter.*

N° VIII.

EXPERIMENT ON DRAINING.

The Thanks of the Society were this Session voted to JOHN CHRISTIAN CURWEN, *Esq.* **M. P.** *(a Vice-President of the Society) for the following communication, detailing the successful result of an* **EXPERIMENT ON DRAINING.**

London, January 28th, 1821.

DEAR SIR;

INCLOSED, I have the honour to transmit for the Society's paper on Draining; if it should be considered as worthy of the attention of the Society, I shall be greatly flattered.

I have left the country in great distress, and numbers of poor people out of employment. I hope to have the honour of paying my respects to you soon. I disposed of the rice you sent me into various hands. I have planted the wheat in my own garden.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.

Secretary, &c. &c. J. C. CURWEN.

Workington Hall, January 17th, 1821.

The encouragement given by the Society of Arts, for the improvement of Agriculture, and every useful undertaking, emboldens me to submit to them the details of a work recently executed on my *am*

In the present state of the country, more important service cannot be rendered it, than suggestions for the profitable application of capital to labour.

Draining has universally been allowed to be the first and most essential step towards the permanent improvement of land. Fully as all writers are agreed upon this point, the cost that it may profitably be expended to accomplishing this desirable object, is by no means ascertained; nor till a few months ago, should I have ventured to have estimated its advantages, as I feel myself now justified in doing. A recent occurrence brought this point strongly under my observation.

It may appear strange, that after twenty years assiduous attention to Agriculture, I should not have formed a pretty correct estimate of the injury sustained from the want of a proper drainage of spring and surface water on any one crop; but so in truth was the case.

A field of 40 acres on the Schoose farm, was last year cropped with Swedish turnips; the land was winter fallowed, and in the highest state of tillage, so as to admit of the turnips being sown in the latter end of April, previous to the long-continued wet, which proved so destructive to the turnip crop in the north of England: it had 30 tons of good dung per acre. The crop averaged on 38 acres, 32 tons and a quarter per acre, that is, twenty-six of bulbs, and six and a quarter of tops; the produce of two other acres scarcely reached twenty tons. The same management was the same throughout. It is a strong clay, by no means applicable to the growth of turnips; but the season afforded no other or more proper for the purpose. These two acres had by some means been overlooked, when the rest of the field had been drained. The injury arose partly from springs, and partly from the surface-wet resting upon the land. The value of Swedes in common years, is 10s. a ton for the bulbs; in the present year they would have sold at 15s.

The loss, therefore, on 12 ton of bulbs, was eighteen pounds, besides the tops, which at SU. 6d. a ton, would have amounted to 1/. 10s., making a total of 19/. 10*.

Seventy-two rods of drains (seven yards to the rod) were immediately cut, the cost of which was 5*. a rod, or 18/.

Had the drainage been executed previous to putting in the crop, it would have been more than paid for by the produce of the present year.

That good often results out of evil, was never more fully exemplified; and with such a striking instance before me of the advantages resulting from completely freeing the land from water, I was powerfully stimulated to undertake the re-drainage of a field of eighty acres, adjoining the Schoose Farm-buildings, and within less than half a mile of the town of Workington.

I was still further excited by the daily and hourly applications for labour, arising, I fear, from the decreased and decreasing capital of the farmer.

The scale of labour has annually been declining, which cannot but be a matter of deep regret to every friend to the country.

The nation has witnessed scenes of great distress during the years of scarcity; but these bore no comparison to the present times.

The hope of the privations being temporary, gave courage to bear up against them: but now the future has nothing to invigorate exertion, or inspire fortitude. Numbers are daily forced into the ranks of pauperism against their will. Industrious habits are destroyed, and with them that providence and fo^Pbugjtt^iich is the basis of the happiness and respectability of the wV jfclasses. In order, not only to continue in employment! poal hands, but to extend it to the employing of others, at a season when the active labours of the year are nearly

closed, I determined on nndertaking the re-draiinage of Walriggs, a field of eighty acres, which had been drained about 18 years *h*efore, in a mainner then considered to be effectual.

The main-drains, as far as they go, were well done, and these have been made available in many instances in the present drainnge. They all run into the ditches which snrroiind the whole, from which there is a considerable fall on every side of the field. The collateral drains were only twenty inches deep, set with three stones, in the form of a triangle, having about eight inches of cover upon the top. A drain of 20 inches was then thought to be sufficient, and all that was aimed at, was to cut off the springs, no regard being paid to carry off the rain-water, which is so injurious to clay land.

Subsequcnt experience has shown that, in mov instances, the stratum which holds the water is at so great a depth, as to be below the bottom of such shallow drains; that to do the work effectually, die drain must reach the stratum where the wet re*ts.

The importance of deep ploughing was not hcretofor known, or provided I-or.

Five years ago 11is field was deep ploughed; it had been foreseen, that in many instantes the plough was Likely to come in contact with the head of the drains: this did hapi)en, and the consequence has been to render the land as wet, or near]y so, as it was before am thing was done to it.

Fifty out of the eighty acres were greatly injured by water. The annexed plan wili point out the manner in wtiich the work has been executed. It was commenced in November, and was finish*vd* the second week in January. jv

The cvtting was lett, as it requires practice to keep the drain the iexact width. Bad h*nds are apt to increue thr dimensions. md thereby greatly augment the expense of filling,

which is the expensive part of draining. Gathering and getting stones was done by the day, and employed a number of women and children, besides the persons occupied in the quarries, which were for#n;itely near at h:tnd. The depth of the drains is from 3½ feet to four ;eet; the breadth, twenty inches at the top and twelve inches at the bottora. The drains have a cavity at the bottom of six inches, being set with two side stones, and a cover, and then filled with stones to the Iop, the six inches next the top being filled with sinail stones, that in case the plough should strike into them, no injury is done *b* the drai*i*. The drains are filled to within ten inches i of the surface. It required a solid yard of stone to fill a roil of a ven yards; in weight above two tons.

To furnish such an enormous quantity of stom> as eight hundred and : rod fifty-nim , was an undertaking of no small difficulty. and could not have bitn executed in the time, had mt other substitutes been found. In coal countries there are strata known I:y the name of sill or schistus, and rattler, which is a mixture of coal and schistus. Sill is a substance that will not bear t xposure to the atmosphere, but rattler does not fall, aid is very light in comparison to its bulk.

Recourse was had to these substances, and many hundred cart-loml* of both were collected from *a* the caal-banks; the remainder was gathered from the ground, and obtained from the quarries.

	s.	d.	
The cutting? filling, and setting was	1	3	a Rod
Collecting stones, supposing two gathered to each rod	0	8	
Two Carts from the quarries	1	0	
Leading	2	**0**	
Cutting the drains by the plough ...	0	**1**	
	5	0	

The distance the sill and rattler had to be led, so increased the cost of cartage, as to make their cost equal to that of stones.

	/.	*.	d.
Cutting and filling 859 rods of 7 yards, at 1s. 3d.	53	13	9
3,436 cart-loads of stones for filling, at 10d. a cart	143	3	4
Carting the above, at 6d.	85	18	0
Filling, at 1d.	14	10	6
	297	5	7

Fifty acres of the field have been benefitted by this drainage. The general quality of land deciding the value at which it would be estimated to let, it was considered as worth 40 shillings an acre: from its locality, I conceive I am within bounds, when I rate it as worth from 50 to 55 shillings. The expenditure of two hundred and ninety-seven pounds, has added sixty pounds to the value of the field, which is obtained at five years purchase, or a little less for interest. It is to be observed, the horse-work is valued as if it had been hired; the real cost of that part, done at such a season, is not, to a farmer, one-half. My object was to put the cost at the highest point, more strongly to enforce the advantage resulting from the practice, as it thus leaves nothing to object to.

This field had in the last course 30 tons of manure; it is strong clay. First crop, potatoes, product 26 hundred stone per acre; sown with wheat and clover; both these crops were admirable. The oats this last year are calculated to produce 60 Winchester bushels per acre; it is now preparing for green crop again, and to have 50 tons of manure per acre. Admitting the green crop to profit three pounds per acre by the drainage, which is only half what was lost at average prices this year on the Swede crop, this on the 50 acres would be one hun-

drcd and fifty pounds ; calculating it to yicld throe **Winchi**s-ter bushels per acre more of wheat, at 7A[1], per busli el, this **would** be fifty-two pounds ten shillings and ten-pence per acre ; for the clover for two ye;irs 50/. more, making a probable increase of produce, without any extra expense, of 252/. 10*. Thus, in a five years course the whole expense will, in all probability, be repaid, and an annual permanent increase of rent, to the amount of 60 per cent, gained.

Wet is more destructive to pasture than it is to grain and green crops; and as pasture is the most material object near to towns, draining, in such situations, is a more profitable improvement than in any other situation, and will consequently justify a greater expense.

When once dry land is well laid down to pasture, the improvement is permanent. If flooded with v ater, it cmiot remain for any length of time in pasture, but must be again brought under tillage. On wet soils, improvement is almost labour in vain—costly at all times, but now ruinous.

Should the Society deem this undertaking as meriting their attention, it will be highly gratifying to me, who owe them many and great obligations.

The ambition of meriting the honour of their rewards, •'irst directed my attention to agriculture, and I trust the *t**sult has not altogether been without its advant ages to the public.

I am, Sir,

&c. &c. &c.

JOHN (.'UBISTIAN 1 URWEN

PAPERS

IN

POJJTE ARTS.

N° i.

DRAWIIS G-PA*VVM* FOB AUT1-TS.

The smalt o< Isis Silver Medal was this Session voted io Mr. i George Steart, of the Montalt Paper-Mills, Coonth Don n, near Haih; for his LINO-STEREO **TABLET** s, *or* **^OLI D LIXEN TAU-**LETS FOR 0 a IN A ON *v, & Cnllowing co \u-munication has been re< eived from Mr. S. on the subject, and sjecimens of his Tablets, both plain* ***and*** *tatted, are placed in the Repository of the Soetety.*

De Mon**tail** I[J]aper Mills, Coomb Down,
SIR; 3ath, Feb. 12th, **1819.**

I BEG you will !:iy bet ore the Society of Arts, &c. the six dozen Lino-Stereo Tablets inclose I, invented and maim-factured by me, for their inspection. If the SCKety should be pleased to conMiki my improvements in an article at pre-

sent in great request worthy their patronage, I shall feel much pleasure in receiving it, and also in communicating any further information if required.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.

Secretary, &c. &c. GEORGE STEART.

The Tablets are of two sorts, *rough* and *smooth*; the former finished with a grain or tooth, the more effectually to receive the full touch of a pencil, chalk, or crayon, for which kinds of drawing they are principally intended; while the latter have a much more level surface, for painting in water-colours, or for other delicate works.

The Tablets will be sold to the public at the usual prices charged for the *pasted* card boards. I have already manufactured many thousand dozens for that purpose.

The extra-stout Drawing-Papers, or Card-Boards, as they are usually denominated, are always made by pasting several sheets of paper together, in the manner of a common paste-board, and afterwards bringing them to a smooth face by pressing and rolling. The pasting is a dirty operation, and the occasion of many defects, some of which are fatal to the degree of perfection and neatness required in good drawing-board; for it often happens that, let the workmen be ever so careful, the boards are contaminated by a portion of the paste being left on the surface in handling the sheets: and although this may at first escape the eye of the Artist, yet it will be discovered, perhaps when too late, in finishing a picture. But a far more serious accident than this frequently occurs, which it is impossible to foresee or avoid: for after the artist may have spent many days and even weeks upon a favourite drawing, having occasion perhaps several times to re-wet a particular part of it, in order to produce a desired effect in the

finishing, the adhesive qualities of the paste are destroyed, a separation of the sheets takes place, and blisters rise upon the surface, to the ruin of his labours. It has been often remarked, also, that drawings made upon pasted boards, and exposed in rooms where fires are seldom kept, have very soon been spoiled, whilst a print or a drawing on a single sheet of paper in the same situation, has remained quite perfect. This is readily accounted for, from the great tendency of paste to mould or mildew. A fourth great defect, is, that the far greater part of the drawing and writing papers now in use in this country are of a hollow or spongy texture: this arises from their being made of an indiscriminate mixture of linen and cotton, the greater elasticity of this latter preventing its fibres from closely uniting with those of the flax: the consequence is, an irregular surface, and a porous spongy substance, very different from that which an adherence to the good old-fashioned practice of using fine linen rags only in the manufacture of superior papers would produce. Another serious evil is, that some manufacturers having recourse to the aid of chemistry for bleaching or whitening rags of very inferior quality, by means of the oxymuriate of lime, supply a drawing-paper sufficiently fair to the eye, but which, as it retains a part of the muriatic acid, speedily destroys the fine and delicate tints laid upon it.

The Lino-Stereo Tablet is entirely free from these objections, for the following reasons:—1st, It is not composed of several sheets pasted together, but is moulded from the pulp, of any required thickness, in one entire mass; thus the risk of pasting is avoided, and no separation of the component parts can possibly take place, though wetted ever so often. 2dly, Instead of being compounded of linen and cotton, it is wholly and solely manufactured from the best and purest white linen

rags, most carefully selected; and consequently without the aid of the oxymuriate of lime, or any bleaching process whatever.

De Montalt Mills, Bath,
March -illi, 18S0.

SIR;

Ix compliance with your favour of the 28th ult. I herewith transmit some samples of the grey and other tinted Tablets, manufactured from linen rags, previously dyed in the pulp, which I shall thank you to lay before the Committee of Polite Arts for their inspection. I believe the colour^ are permanent , having made many experiments to prove the stability of the colouring materials. The whole were manufictured last Summer, and I regret I cannot at present send more samples, from the circumstance of the stock being nearly all disposed of.

I am, Sir,
&c. &c. &c.
GEORGE STEARNS.

In describing the manufacture of the Lino-StCTeo Tablet, it may be necessary, in the first place, to point out the requisite materials, or utensils, and then explain their uses, confining myself to the technical phrases employed by manufacturers in Paper Mills, in order to be more clearly understood.

The Utensils.—1. A mould of the required dimensions, similar to those used for making paper, but considerably stronger, and well supported by additional bars underneath, so as to enable it to carry, or bear a considerable weight or pressure on the face of it, without bagging; with a deckle from 1½ to 2 inches in depth, to retain the fluid pulp on the face of the mould. 2. A mould to regulate the required thickness of the sheet or tablet; 3 or 4 of these deckles, of different depths, will be wanted for thinner or thicker substances.

2. A second mould or compresser, in every respect like the first, but so much smaller, that it will fall into and fill the deckle upon the face of the first mould.

3. A light press, very similar to a napkin press, large enough to admit the mould and its compresser, which is to be placed in the most convenient station, near the vat; or in lieu of it, a weight suspended by a pulley over the bridge, laid on the vat; but I consider the press most desirable,

4. A set of felts of the very finest manufacture possible to be procured, of the required size, are indispensibly necessary.

5. A pair of rolls or cylinders of large dimensions, such as are used by the rollers of fine metals, made either of iron or brass, fitted up with the greatest truth, and highly polished on the surface, must also be provided, exclusive of all the other requisites in a well-conducted paper manufactory.

The Process.—In selecting the raw materials for the manufacture of the Lino-tablets, great care is taken to reserve the *best and purest white linen rags only,* rejecting all muslins, calicoes, and every other article made of cotton. The linen rags are then carefully sorted, overlooked, and cleansed, washed, and beaten into pulp in the usual manner practised by paper manufacturers of the first class.

The pulp being ready, and diluted in the vat by the proper proportion of pure water, the workman dipping his first mould into the vat, takes it up filled with pulp to the top of the deckle, and holding it horizontally, and gently shaking it, causes the water to subside, leaving the pulp very evenly set upon the face of the mould; having rested it for a moment or two on the bridge of the vat, the compresser with its face downwards, is now carefully laid upon the sheet or tablet, and both together placed in the small press close at hand, where it is submitted to a very gentle pressure, in order to exclude a great proportion of the water remaining in the sheet;—it is

then withdrawn, the com; the presser and the deckle are both taken off, and another workman couches it, by very dexterously turning the mould upside down and pressing it pretty hard with his hands on one of the fine felts previously laid upon a very level pressing plank, by which means the tablet is left on the felt. The mould is then returned to the vatman, who repeats the process as before. The coucher in the mean time lays another felt upon the sheet or tablet just couched, whereon the second sheet is to be laid in the same manner, and so on, till all the felts are occupied, over which another level plank is placed, and the whole drawn away on a small rail-road waggon to the great press, where it undergoes a pretty severe pressure.

The tablets will now be found to have sufficient adhesion to bear handling with care, and are separated from the felts, and placed one upon another, so as to form packs; these packs are to be submitted again to the action of the press, till more water is expelled, then are parted sheet by sheet, pressed and parted again, and this is repeated as often as necessary, taking care to increase the pressure every operation, until the face of the tablets is sufficiently smooth; they are then carefully dried, sized, picked, sorted, &c. carried to the retUing-mill, and several times passed between the polished cylinders, to give them their last finish. The above is the process for the plain or white tablets. In making the tinted tablets, the following additional particulars are to be attended to:—

The rags are cleansed, washed, and beaten into half stuff in the usual way, the water being drained off, the pulp is put into a vat with a solution in water of acetate of alumine, or sulphate of iron, as a mordant or ground to fix the colour, according to the colour intended to be made; the whole is well incorporated, and suffered to remain for half an hour or more, when the colouring tincture, previously prepared, is added; after which

the whole being returne;l to tlie engine is beaten in to fine pulp, and then wrought inio tablets.

The dyeing n:aterials I chiefly make use of are Mang:;ve hark, Qmercitron bark, best blue Aleppo galls, sulphate of iron, and acetate of nlumine. A due combination of tinse matt rial* produces a great variety oi'dnibs, greys, sand-colours, &c and I belie v: more jjeimaucnt or fixed, than can be produced by any other mcains.

The advantages to be obtained by this mode of manufacture over all othets, are gufficicntly explained in my iormer letter.

I an». sir,

A. Aikin, Esf. &c. &c. &c.

Secretary, &c. &c. GEORGE STEART.

N° II.

The small or VULCAN SILVER MEDAL *was this Session voted to* BENJ ROTCH, *Esq. of Furnival's Inn, for an* ARCOGRAPH. *The Instrument has been placed in the Repository (if tle Society.*

SIF March 21, 1821.

I HAVE tO *heg* you will do me the favour to submit the Instrament sent herewith, and which I have called an Arcograph, to tlie Society of Arts, hoping they will find it worth their coiisideration.

I am Sir,

&c. &c. &c.

BENJ. ROTCH.

This instrument resembles in use the cyclographs of Mr. Nicholson and others, being intended for the purpose of describing, on a given chord, circular arcs, the centers of which are beyond the limits of the drawing-board, &c. and which therefore cannot be obtained by means of the compasses. The instruments above alluded to, however, are not capable of indicating the measurement in degrees of the arcs which they describe. This very desirable improvement is effected by the addition of a graduated quadrant, the divisions of which show on inspection the magnitude of the arc contained between the extremities of the chord line; that is, between the points at the blocks *g g* (Plate I, fig. 9), against which the limbs of the instrument work.

a a, *a a* are the two limbs, made either of wood or metal; to one of these is attached the brass quadrant *b b*, divided into 180 parts; attached to the other limb is an arc *c d e*, rather exceeding a quadrant; at *c* a fiducial edge is formed, and a point is marked at 90 degrees from the extremity of *d*; so that when the point *c* and zero on the graduated quadrant, coincide, the two limbs *a a*, *a a* are in a strait line: on the outer edge of the quadrant are two projections, with steel screws, on which work the nuts *f f*, the shoulders of which clamp the arc *c d e* to the quadrant *b b* in any position. It is evident that when the limbs are placed at an angle of 90 degrees, the point of the intersection, when made to traverse between the blocks *g g*, would describe a semicircle, and if placed in a strait line, the same point would only describe a strait line, or no portion of a circle; therefore the quadrant being formed into 180 divisions, the

tity of the arc drawn by the instrument. The arc *f d e* is jointed near the fiducial edge, for the purpose of turning out of the way of the blocks when the limbs approach towards a right angle. Fig. 10 is a section of the joint on a larger scale;

the axis is a tube for receiving the pen or pencil, with a flanch at the lower extremity. On this axis turn the two portions of the joint attached respectively to the limbs of the instrument, and the whole is surmounted by a collar, on the top of which the hollow axis is rivetted, and this rivet binds the whole together, by means of the flanch at the lower extremity of the axis. The blocks *g g* must not be so thick as to prevent the socket or tube which receives the drawing pen or pencil from passing over the

PAPER

r\

MANUFACTURES.

MATTING HADE OF THE TYPHA LATIFOLIA.

77/c small or (CERES MEDAL *of the Society was this Session voted to Mr.* WILLIAM SALISBURN, *of Brompton, for* MATTING, *and other articles made oftl*e TYPHA LATIFOLTA *(greater Cat's-tail). Specitm*ns *of the trticki are placed in the R<positoiy of the Socie iy,*

THV, material of which matting, and the rush-bottoms [as th<y are crillcd) of chairs, are usualy made, {% ilu* scirjus lat!ustris, known in some parts of England by the n;imc bull-rush, and in Durham and Northumberland by that of polecive- It grows naturally in deep **slow streams,** ai;d is pirticularly abundant in the neighbourhood of \cwport Pagnel, in Buckinghamshire.

The demand for this articlc, however, in the New-port

Pagnel manufactories is considerably greater than that district can supply, and in consequence large importations of the scirpus are made from Holland. Hence in time of war the article is often scarce, and at an exorbitant price.

Prior to the Winter of 1817, Mr. Salisbury, induced by a laudable desire of opening new sources of industry to the unemployed poor, attempted, in various ways, to apply the leaves of the typha latifolia (flag, or greater cat's-tail) to the same purposes as the scirpus. For this purpose he was allowed, by the overseers of the parish of St. George's, Hanover-square, to employ some of their paupers in collecting about 2½ tons of the typha from the marshy grounds about Little Chelsea and Clapham, and afterwards in manufacturing a part of it into mats, baskets, hassocks, chair-bottoms, &c.

Samples of these various articles were laid before the Society in December 1817, and it appeared that with equal skill in manipulation equally neat work might be produced from the scirpus and from the typha. It being, however, a matter of considerable importance to ascertain the relative durability of the two articles under similar circumstances of ordinary wear, the following experiment was made:—A piece of the best Dutch matting at 2s. (viz. a yard, and a similar one of Mr. Salisbury's manufacture were laid down side by side in the Society's premises on the 13th December 1817. Their relative situations were occasionally changed, in order to equalize, as nearly as possible, the wear to which they were exposed, and on 27th March, 1821, they were taken up and examined by the Committee of Manufactures. On minute inspection, they appeared to be about half worn out, and there was no very perceptible difference in the condition of each.

With regard to the relative expense of procuring and preparing the two articles for manufacture, the Society possess no

very certain data, as the use of the typha was at first set on foot chiefly in order to employ those parish poor who would otherwise have been idle. Two guineas were paid by Mr. S. for liberty to cut as much of the typha as he pleased from about ten acres of swampy land, near Hammersmith. The matting has been sold at from 9*d.* to 15*d.* per yard, and between 1,000 and 1,500 yards have been disposed of during the last three years.

The typha abounds in all marsh ditches and uncultivated swampy ground in every part of the kingdom, whereas the scirpus is found in quantity sufficient for manufacture only in certain districts; hence the former must be much more accessible and cheaper than even the setrpius of home growth; and the Society indulge the hope, that by giving this notice a place in their annual volume, the knowledge and the use of so abundant and cheap a material may be extended throughout the kingdom, and may form a means of domestic employment to the younger members of poor families.

P \ i P E R

IN

MINER A LO< >' Y.

FLINTSHIRE MILL-STONES.

The smaller, or ISIS GOLD MEDAL, *was this Session voted to Mr.* W. BISHOP *and Co. of Nant y Moch, near Holywell, Flintshire, for their Discovery and Introduction to actual Use of a* MILL-STONE *of superior quality, found in* i *Hulfi in Mountu in, Flintshire.*

alities which fit a stone for grinding corn, especially wheat, are hardness, to prevent it as much as possible from ing down by the constant friction to which it is exposed, gree of tenacity, to prevent the grinding surface from scaling or chipping off, and a cellular structure, in order to increase the quantity of cutting surface, the walls of the ng at the same time thick enough to resist the strain

The advantages hence resulting are, that the flour is in no material degree contaminated by the mixture of earthy particles ded from the stones, the grinding is expeditiously per- formed, the bran is completely disengaged from the flour, and the flour itself is very little heated by passing through the mill. This latter circumstance is of great importance, it being

found, by experience, that flour over-heated, or *killed*, as the technical phrase is, will never produce bread so light as that which is ground cool,

In some parts of the valley of the Seine and of the adjoining districts in which the fresh-water limestone occurs, a siliceous rock, in detached masses or blocks, of various size, known on the spot and in commerce by the name of *Buhr*. It is a substance intermediate between hornstone and chalcedony, and possesses, in a eminent degree, the qualities which peculiarly fit it for grinding wheat. All the fine flour required for the supply of the metropolis and of the other large towns in this island is prepared by means of millstones of French buhr, a circumstance which, besides rendering us dependant on foreigners for so essential an article, is the occasion in time of war of enormously enhancing the price, and subjecting our millers to great inconvenience.

The northern shore of the Isle of Wight is the only district in this country in which the fresh-water limestone has hitherto been found, but it does not appear to contain any buhr-stone. The entrochital chert or hornstone (vulgarly called *screw-stone*) which occurs interstratified with the mountain limestone in Derbyshire, as it resembles buhr-stone in quality and texture, has occasionally been made trial of for a grinding-stone, but always unsuccessfully on account of its fragility and softness.—&c.

In the year 1816 Mr. Thomas Hooson, of Flint, observed on Halkin mountain a bed of remarkably fine Porcelain *clay*, which, on exposure to the potters' fires was found to assume a more delicate whiteness than any substance of a similar nature hitherto found in this kingdom; and seeing also other substances which he thought likely to be useful to the potters, he obtained a lease from Earl Grosvenor of all clays, rocks, and stones (except lime-stone) within his lordship's liberties; and subsequently, with a view to an extended trade, formed his

present partnership with Mr. Richard Fynney, Mr. William Bishop, and Mr. James Whitehead, established under the firm of the "Welsh Company at Nant y Moch, near Holywell," where they have erected works for preparing the clay, which is called "Cambria," for sale, by separating it from a white siliceous sandland rock, frith which the bed is forrod mixed to a depth at present unknown, but which has been proved as deep as 26 yards. The sand, when separated, is used for glass-making; and the white siliceous rock, now called "Rock Cambria," is ground down and used in the composition of China and earthenware, instead of ground flint, or is mixed with it. For this process of grinding, several thousand tons of chert are annually consumed in the Staffordshire potteries, and much is supplied from Halkin mountain. In quarrying this chert, some of it in the state of vesicular entrochital horn-stone was raised, which, when used together with common chert, indicated such a superiority by its expeditious grinding and its little wear, and showed such a proximity in appearance (after having been worked) to the French burr; that its use for grinding wheat was considered probable; and this led to the first application of the vesicular Halkin rock as a buhr-stone.

Halkin Mountain (called "Alchene" at the Conquest, according to Pennant) is a range of high uncultivated land, in Flintshire, the mineral property of the right honourable Earl Grosvenor. On the inland side it runs parallel to the boundary hills of the vale of Clwyd; and on the north-east stretches from Holywell for about four miles till nearly opposite Northop, in an angle of about twelve degrees with the river Dee, and averages about a mile in breadth. It is composed of mountain limestone, with the usually accompanying rocks, and abounds with large veins containing lead ore, blende, and calamine, with some appearances of copper; it also affords a rock of a whitish

quartz, well adapted for certain kinds of mill-stones, for vvtnci: (according *b* all our old historians) Flintshire has been famous. But these quarries had been neglected for many years, till lately re-opened by the discoverers of the still more valuable buhrs, and promise to regain their celebrity as grey stones for grinding oats, &c.

The buhr-stone itself, or entrochital horn-stone, is found near the middle of the eastern ridge of Halkin mountain, and on the west side of the ridge, **into which** it penetrates with a dip of about one yard in six. Its present appearance presents a bed of about four yards thick, **bet*** DOT two layers of a compact siliceous slaty chert, covered with a shivery siliceous shale It dips esstwardly, like all the other strata on the mountain, which consist of lime-stone rock and chert. **Thebuhr-stratum** is principally of the same quality as the small **mill-stone** sent herewith, and attested by Dr. Traill (certificate, No. 1); but rotten masses sometimes occur, and hitcks are occasionally found of too close a texture for the miller; and some few are quite solid. Still the cora!ite structure pervades the whole: the entroehites being perfect and entire in sbme instances, while in the chief parts of the bed the casts alone remain; thus leaving the rock vesicular, and in this respect differing from the nature of the pebuhr, in the French which appear to have been caused by corrosion, their edges being rusty and irnpure, whereas those in the Halkin buhrs are of pure flint, and exceedingly sharp and hard.

The quarry from which all the buhrs hitherto used have been procured, now presents a fore-breast of forty yards, and is of the same quality and thickness as at first, but has a thicker covering of shale as it dips into the hill. At the distance of a mile to the north-west, a second quarry is now opening, and appears similar in every respect to the former; and from fragments of buhr here and there found, with pieces

of shale and of chert, half concealed in the mountain turf, traces of the same stratum may be observed from the one quarry to the other. About half a mile to the south-east of the main quarry, in the same chert-formation, the buhr-stone is also seen to crop out; and in the valley at the foot of the ridge, where a thick bed of limestone forms the upper stratum, with a sub-stratum of chert, the miners, in their search for lead-ore, have met with the buhr-stone at the depth of 160 yards from the surface.

In order to prove the Halkin buhrs, the discoverers had some made into mill-stones, which they set up in a neighbouring mill in the borough of Flint; some were had by a millwright, and afterwards sent to a mill at Dunham-on-the-Hill, mixed with French buhrs; and one large buhr was shaped into a millstone, and put up at a mill at Ysceifiog.

They considered it would require much time to prove the real character of the buhrs, and that it would be useless to endeavour to make sales till this proof could be satisfactorily made, and therefore they took but little trouble in circulating the object of their discovery for nearly two years, when finding that the stones at Flint mill were highly approved, and found to be a substitute for the French buhrs, they turned their attention to the subject.

They were advised to lay specimens of the buhrs before the Society of Arts, &c. immediately, lest they might be anticipated by some other person in their pretensions to the premium offered, and they accordingly ventured to do so, in February 1820 (under the name of Flint Buhrs), but not

having then had sufficient trial made of them, they were not in possession of certificates sufficiently extensive on which to rest their claims to the notice of the Society.

As, however, they are now able to adduce proofs that the Ilalkin buhre are fully equal to the French, and in some cases are declared to be actually superior to them, they I rust that the Society, in looking to the national importance of the discovery, will \ass over the trouble that was last year so unintentionally occasioned, and again take the matter into their consideration.

They efore the Society companying ce es and letters on the subject; and in order how th they have not been selecting a few, and with- g any less favourable to t es, they beg to state very sale ip to the er yet lit of i add a short review of the particular certifi cted with each case, observing at the same time that no nfavot nsatisfactory trial has yet occ So rs got on the discovery of tl stated) conve up ab ate conuci t Mr. Evans's m ie borough of Flint, who certifies e used them nearly two years occasion for ae of the bul- lly as grey-s LC quarry were thr e used them seldom more a e freq as he found them answer the p y way of comparir with the French stones, he took six measures of wheat, and ground one-half on the Hi stones, and one-half on the French stones; there was very slight difference in the flour, w as in fa the French; bu rted into millstones, aud put out three years ago :; tfl, in tl that " l illy wheat, but cl tones, in which *V.* d; it at first l i for wheat, but afterwards ad raoi neatly, mr- pose ; and. 1 ig then dkii somv it he did nuts *t* hich w TOUT of

I request permission to lay b the nc- rtificat to E :tt ! hoklir heir hoj the .lit of i made by them id of the 1 ir, and to ate conuci t one i liable or ui urml. ae of the bul- LC quarry were

other. Bread was made from the two kinds of flour, but no one could distinguish between the two. *We* then had the Halkin stones regularly fatted and cracked as French, and fuss found them **ever** since equal to the French stones in every respect whatever."

Others of the buhrs, got about the winning time, were visited more cautiously by a millwright, who made a Large pair of millstones of Halkin and French buhrs, fixed in akernatively, and these were set up more than three years ago at the Horn-mills, near Dunham-on-the-Hill, in Cheshire. Mr. John Peers, the present tenant of this mill, entered on it nearly three years ago, and he states that "the stones were in a rough state, and required six months to **get** them to a **proper** face, when they ground wheat as well as the best French stones, and have ever since continued to do so; that he prefers the Halkin and French stones mixed **to** those of French buhrs entirely, as they grind faster, and as well, and are full as cool as the French; that he uses them for all purposes, and considers them equal in every respect, and superior in some respects to the French buhrs."

A large buhr got about the same time, was sold to Mr. John Edwards, the occupier of a small mill at Ysceifiog, in Flintshire; he states "that from various causes the buhr was not used till about twelve months ago, when he shaped it into a millstone of three feet six inches diameter; that he has no French stones, but used this as a runner over a blue stone for grinding wheat, and found the flour of good colour, and the bran broad and light; that the stone would bear the finest cracking, and continued to improve and harden till he left the mill in November last."

The next sale was to John Dumbell, Esq., of the Mersey Mills, Warrington (said to be the largest establishment in the kingdom, and containing twenty-two pair of millstones),

and he certifies that "in March 1820, he received a quantity of Halkin buhrs, which he had forthwith made into millstones, and these were so much approved, that in May 1820 he had buhrs for a second pair; that the two pair of Halkin millstones have been regularly at work ever since, and continue to give great satisfaction to the bakers and flour-dealers; that he conceives they are precisely the same kind of stone as the French buhrs, and cut the grain like them, and are like them in resi iect to oatinea!. . ch n eith LT French noi Halkin stones are used to advantage; and he considers the discovery of **great** national importar ce." Messrs. Hurstfield and Passand (now the occupiers of some large mills at Lymm, near WaiTiHgton, but who w^ere lately foremen to Mr. DumbelU and have been practical millers nearly tairty years), state "that they made the Hal kin stones which were set up at the Nler;ey Mills, where there are nine pair of French stones at work; tbat tbiy made an experiment with some wheat, by grinding some on the best French pair, and some on the Halkin stones in order to compare the flour, in which there was scarcely any perceptible difference, though the preference was given in favour of the Halkin stones by a corn and fiour dealer, to whom the samples were shown; that bread was made from each, but no difference could be perceived; that at first they thought the Halkin stones not quite so hard and tough as the French, but they found them continue to improve, and to become as good as French; that they have seen all varieties of millstones, and made all sorts of millstones, but never saw any buhrs to come in competition with the French, except the Halkins, which they are satisfyed will answer every purpose."

In corroboration of these statements, a sample of the bran (sifted in its rough state out of the flour), is respectfully submitted to the Society.

In May 1820 a Halkin millstone was sent to Mr. Pratt,

of Saredon Mill (a large concern near Walsall, in Staffordshire), and set to work in his mill at Dudley. Mr. Pratt has had a very extensive practical experience for more than thirty years, and in October last he wrote that "it had been applied for several weeks in grinding wheat, and that it ground equal to French stones, and better than some of them; but he had it for grinding barley, &c., and was so using it, and found it answer remarkably well for that purpose; that the face and dress keep good, and for a great length of time; and that in the Spring he would have a pair of Halkin stones to grind wheat." Upon application to Mr. Pratt for the result of his further experience, he writes again on the 26th February, that "he gave a just report of the good qualities of our Halkin millstone in October last, and entertains the same opinion to the present day; but that it had been grinding barley, &c ever since, and he never before met with any stones to wear hard grinding so well, and continue the dress so long."

In June 1820, Mr. Stephens, the owner and occupier of a steam mill in Harrington, Liverpool, having a desire to try the Halkin buhrs, obtained a buhr, which he broke into several pieces, and fixed them into different parts of a pair of French buhr millstones, and he certifies, that "they have since worked to a good face, and crack as well as the rest of the stones, and as far as his opinion can be formed by such a circumstance, he considers the Halkins equal to the French buhrs." He states also, "that he has, at the request of the discoverers, taken out one of the pieces of Halkin buhr from his millstones," which they beg to offer to the attention of the Society as a convincing proof of the toughness and hardness they manifest after a few months' wear, being in this respect also like the French buhrs.

In August 1820, a pair of Halkin millstones, of five feet diameter, were sent to Messrs. Pilling and Co.'s large mills, at Mirfield, near Leeds, who have not yet given any written

report of the stones ; but Mr. Goodwin of Liverpool (a mutual friend of Mr. Pilling, and of the proprietors of the quarry), states, that he lately had a conversation on the subject at Mirfield with Mr. Pilling, who stated " that the steles were not quite so uniformly porous as the sample bihr, and had rather chipped in feeing; that they mended of this every time they were faced, and were evidently tougher the last they worked."

[iV. *B.* It is intended to send up Mr. Filling's own report, by way of supplement, as soon as it can he procured.]

In September 1820, a pair of Hnlkin millstones was put up at the Aughtou water-mill, near Onnskirk, **Lancashire,** occupied by Mr. Richard Rawsthorn, sen. who lias been a practical miller all his life, and is 74 years old, and he statts, that " they answer better than French, for they grind cool, and make fine Hour, cut bran thin and broad, and crack as fine as any French stone."

In September 1820 a Halkin millstone was also put up at a new windmill at Knotty Ash, near Liverpool, and Messrs. Marr, the tenants, declare, that ** they laid down a pair of French bnhrs, and a short time after laid down a French and Haitian ; that the latter work equally well as the French; stand cracking as well, have been dressed four times, and still improve; soften the wheat as well or better than French stone, and cut very broad bran, and preserve the flour as well as any French stone."

In October 1820 a pair of Halkin millstones were sent to Messrs. Hudson and Co., of the King's Milk, Leeds. By a letter from them it appears the stones are not yet in use, so that no positive proof can be had of their grinding, but they say " that their millers who have prepared the stones for work from which they can form a good opinion of their qua-

licies in compa;ison with Frei ich bul rs), give them a favourable opinion that they are likely to an-vw r."

In Novernber 1820 a pair of Ha!km *xn.* illstones were consigned to Richard Robinson, Esq. of the Phenix Iron Works, Dublin; but they wen delayed for a long while by stress of weather, and have not yet been put to WOT] ; Mr. Robinson, however, says, that "they hi.ve undergone a very close examination by s• ime of the first millwrights and millers, who all agree that they appear equal to tl.e French bulirs, and in some instance •ftj sup' rior," alluding (it is supposed) to the e luabihty of the pores.

In J1 ecember last, Richard Sankey, Esq., banker in Holywell, Flintshire, a ud own r of a large windmil I there, h:. ving a pair of F (inch millstones whi ch did not give entire satisfaction, i move i the runner, and ; 3 Hal kin I millstone in lieu of it, and !UJ certifit s, that "his tenants like the work done by these better than by the other pair of French stones in the mill; tl at they clean the bran better, that the flo ur *k* soft a ml of good coiou r, and the stone 1 eeps its face well, and gives satisfaction in all respects."

The (liscoverers beg permission to declare further (and are ready to do so on tneir oath if desired), that the several certificat cs abo\e mentioned have been given voluntarily .urn full :y, an*, l that the several persons giving them have no concern i or in; erest in the quarry; and that up to the end of the last year, no Halkin buhrs or millstones have been disposed < f in any instance except those before mentioned; namely,

Mr. Edward Evans, Flint Mill, Flintshire.

Mr. Peers, Horn Mills, Dunham-o'-the-Hill, near Overton, Cheshire.

Mr. John Edwards, Yscelfoig, Flintshire.

John D umbel I, Esq., Mettey Mills. Warrington, Lancashin\

Mr. **Pratt, Saredon** Mil[1], near Walsal, Staffordshire.

Mr. Stephens, Steam Mill, Hill street. Harrington, Liverpoi

Messrs. Pilling and Co., Mirfield Mills, near Dewsbury, Vorl.si:ire.

Messrs. IIuJ:on and Co., King's Mills, near Leeds, Yorkshirc.

Mr. Rawsthorn, Aughton Water-Mill, near Onrskirk, Lancashire.

Mr. Marr, Knotty Ash Windmill, noir **tiverpo**ol.

Richard Uobinson, Esq., Phœnix Iron Works, Dublin.

Richard Sankey, Esq., Dunker, Holywell, Flints'-ire.

They have therefore ofiered to the Society all the evidence which it is possible to produce, and trust that when the \arious tcstimonia"s (collected from different sources and from persons who have had no communication with each other. thoujh all agreeing in a [iprobation) shall have been compared. tlie Society will be pleased to honour the HalJtin Buiers with their sanction.

W. Bishop & Co.

The several sampW all;ded to in the pnceding report are placetl in the Repositorj' of the Soci>:ty.

CERTIFICATES,

From all the persons named in the preceding statement accompanied the communiejitio:i of Messrs. Bishop and Co.; of ti-hich the following, as being the most important, are subjoined :

N° I.

Liverpool,
March 3rd, 1821.

I SAVE this day examined the small millstone, of Flint buhr-stone, measuring 14 inches in diameter, which is about to be sent to London for the inspection of the Society of Arts, and hereby certify, that it is a fair specimen of the rock in the quarry on Halkin mountain, which I visited last year; a vast quantity of stone of a quality equally excellent with this specimen, may be procured from Mr. Bishops quarry on Halkin, in Flintshire.

THOS. STUART TEALL, M. D.

N° II.

Mirfield Low Mills,
March 7th, 1821.

SIR;

AFTER having tried your Halkin buhr-stones, for a fair and sufficient time, we are now enabled to lay before you a candid and faithful report of their quality; and this we shall endeavour to do, with as much brevity as is consistent with the importance of the subject.

The perfection of grinding consists, in reducing grain to a requisite *degree* of fineness, with the least pressure; or, in other words, to make the best and the greatest quantity of flour, out of a given quantity of wheat, with the least pressure. But, the mere good quality of a stone cannot effect this; for we must now call in the aid of art. And here it is that the great art of a miller consists, the putting of work into stones, or the obliquity and disposition of the furrows, every thing else compared with this being only trifles. And, indeed, when we consider that an accurate knowledge of this is grounded upon the doctrine of central forces, which constitutes an important branch of the Newtonian philosophy, we

need not wonder, that so few understand the real principles *of* corn grinding. We hove, how•ver, reasons to be iicve, that we have considerably impru ved it.

From these observations it appears, that though the quality of the stones may be equally good, tke*i effects produced will be different, according as the work is scientifica lly put in or otherv ise; but, if the work and \elocity of the stones be the same, we cai clearly ascertain the qua!ity of them, by the effects produc d.

We will i ow apply these nhservations to the stones in question. After twice or thrice taking them up, we were afraid that they would not stand the crack we 11; but this fear was soon • dispelled, as w « now find that they WCJ: exceedingly little, ami tli at the crack stands as fine as a hair. *Te* now proceeded to ascertain the quality of i.he bran compared with our French stones, and for this purpose, wt sifted the meal from every pair of stones as it came from the mill-eye; the bran thus re-ained in the sieve, we |>laced by itself, and by this means we had an opportunity of comparing the whole together. This we have repeated n< less than forty times, and the result has always been, <>' viously from the vea y first glance, that the bran produced from the Halkin buhxe, was not only cleaner, but of a more uniform cut; and this has not been perceived by millet s alone, but by every person that has accidentally come into the mill.

This we thinl is quite re suffii ient to prove the superiority of the Halkin bubrs; but, that every possible doubt might be removed, we had recourse to the following experiment:

We selected the best French stones in ihe mill, made by the late Mr. Gardiner of Liverpool, who was very famous for his Icnowlcdgi of French buhrs; and, that the experiment might be the more accurate, we did not grind a quarter of wheat on each pair of stones. as it is impossible to start it from che

wheat that precedes and succeeds with that degree of nicety that is required, without running the stones empty and thereby injuring them very considerably. But we weighed 480 pounds of meal;, ground by each pair of stones, from the same wheat, weighing 57 pounds the bushel. These two parcels, after remaining a week, were weighed again, to see if any accession or diminution of weight had *tdk*-n place; but the weights were precisely the same as before. The two parcels of 480 pounds each were then dressed, and the result was as follows:

Flour from the Halkin Buhrs	300 pounds.
Flour from the French Buhrs.	384?
Difference in favour of the Halkin Buhrs	G

Now, in this experiment, the velocity and work of the stones being the same, the quality of the huhrs may be as justly inferred frotn the effects, or quantity of flour produced, as any ether cause in philosophy from its effects.

We remain, Sir,

&c. &c. &c.

J. & W. PILLING.

PAPERS

IN

MECHANICS.

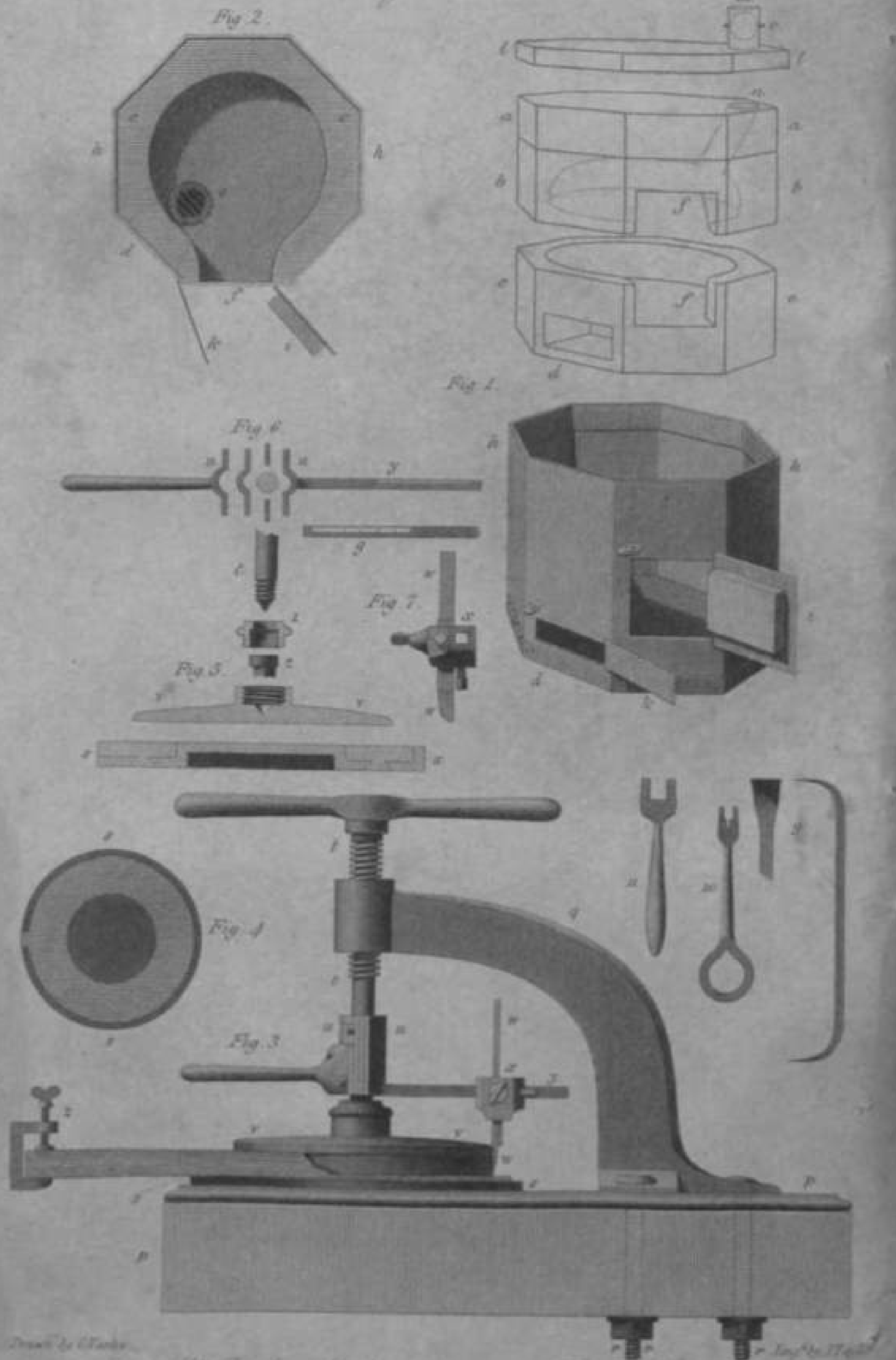
N° I.

MACHINE FOR CUTTING TIPS FOR HATS.

The sum of TEN GUINEAS *was this Session given to Mr.* BENJAMIN RIDER, *of Red-Cross-court, in the borough of Southwark, for a* MACHINE FOR CUTTING TIPS FOR HATS.

THE top of the crown of a hat, unless capable of more resistance than the other parts, would be peculiarly liable, from its exposed situation, to be beaten in and damaged, especially at the edges. In order to give the requisite strength in the cheapest and most effectual manner, the manufacturers are in the habit of fixing on the inside of the hat, beneath the top of the crown, two or more round pieces of stiff paper or pasteboard, which, in the language of the trade, are called *tips*. These tips are generally made by laying the hat-block on a sheet of paper or pasteboard, and by means of a pencil carried round the edge of the block, describing on the paper a circle of the proper size, which is afterwards cut out by a pair of

Mr. I. Storys Portable Oven



Mr. Roders Machine for cutting Tips for Hats

scissars. This method possesses the advantage of perfect simplicity, but consumes a considerable quantity of time; and as the tips thus made are never perfectly round, the support which they afford to the hat is unequal.

By Mr. Rider's machine, several tips may be cut at once of any required diameter, and of a truly circular outline. The price charged by the inventor for tips so cut is (exclusive of the cost of the paper or pasteboard) one penny per dozen. Leather for the tops of caps may be cut in the same manner, and the machine may no doubt be applied to various other similar uses.

The following CERTIFICATE was communicated by Messrs. Eveleigh, Hat-manufacturers.

To the Committee of Mechanics, Society of Arts—

Union-street, Southwark,
Second Month, 8th, 1821.

ESTEEMED FRIENDS;

We have made use of the tips for hats, cut by the machine of Benjamin Rider, and we so highly approve the same, that we are making arrangements to use none other in future.

We are very respectfully,

FRANCIS & SAM. EVELEIGH.

Reference to the Figures of Mr. RIDER's *Machine for Cutting Circular Tips for Hats, Plate* III, *drawn one-sixth of the real size.*

Fig. 3 shows a side elevation, *p p*, a strong wooden block, to which the iron arm *q* is firmly screwed by three screws,

r r r; *s s*, a circular iron plate, let into the block *p p*, about half its thick uess, having a circular ring of [Mjwter melted in it, to make a soft surfm:e to receive the point of die kii;fe (shown iu fig. 4, and iu se4pon fig. 5); t f, the screw which presses down the pasteboards to be cut, on the noec of which, a gauge-plate, *v v* (suited to ihe size of the tips), is hung I y the hollow screw nuts, shown separated in fig. 5; *u u*, a tube formed of two semi-cylindrical pieces, or saddles, which carry the handle and square arm j /, and are fitted by screws, to move easily on the cylindrical part of the screw *t* (shown separated in fig. 6), by which means the knife tp *w* is kept steady, and obliged to advance perpendicularly through the pasteboard, while it revolves round the screw *t* as a centre; *x*, the sliding block on the arm y, which carries the knife *w*, and fixes it to cut tips of any required diameter, shown also in.fig. 7, a !c being let into the arm^, to regulate the diameter of the tip; *z*, a clamp (two of which should be \ujed) to hold the pasteboards to»gether, till a!: the circulnr Ips are cutout of them; 6g. 9, a scraper to take the burs off the surface of the pewter; 10 and 11, keys to turn the nuts and screws; fig. 5, 1 the nut, which goes easily over the cylindrical part of the screw *t*, and is kept up by the nut 2, which goes into the nut 1, and screws on to the screw *t*; and the nut 1 having a screw on the outside, screws into the neck of the gauge-plate *v v*, whereby the gauge-plate hangs on the nose of the screw,/, so as to rise and fall with it); the conical point of the screw *t* comes through the nut 2, and this point enters the answering centre of the gauge-plate *v v*, while pressing it down on the pasteboards) secures its being concentric with the screw *t*: there is sufficient shake in the nuts 1 and 2, to enable the jiluw-iknife to keep correctly close to the gauge-plate *v v*, and to cut the tips perfectly cle:

N° [I.

PORTABLE OVEN.

The small or Vulcan SILVER MEDAL *was* ***tlus*** *Session voted to Mr.* JAMES STORY, *of Theobald's-road, London, for a* PORTABLE OVEN. *The following co•timui ication has been received from Mr. S. and a model of the Oven is placed in the Repository of the Society.*

L

15, Theobald's road, late Swallow-street,
SIR; May 19th, 1821.

PERMIT me the honour of requesting you **to be i** he medium of conveying to the Society for the I Incouragement of Arts, Manufactures, and Commerce, my most grate'ul thanks for the distinguished token they have been pleased to bestow of their approbation of my humble efforts, in the oonstruction of the Portable Stone Oven. I have also to request that you will do L. e the favour of stating my perfect acquiescence in all those terms which are contained in your letter of the 30th ult. I have the pleasure of inclosing the statement of the advantages attending the use of the oven in questio ML

uiuJ

I am, Sir,

A. Aikin, Esq., &c. &c. &c.
Secretary, &c. &c. JAMES STORY.

The common dimensions of my portable stone oven arc j the **following,** 2 feet 6 inches wide, 2 feet 3 inches high. It is composed of Reygste firestone, cased with iron. It requires no separate compartment for the fuel, which must be placed in the cavity of the oven, and be renewed from time to time, till the sione is heausJ white hot internally. This will take place in an hour and a half, and will employ about a peck of coals, the oven being previously cold. If it still remains warm (for it will be a long time in growing quire cold), the consumption of fuel will of course be proportionably less. When the oven is become sufficiently hut, the door of the ash-pit and the chirmey are to be closed upT and the bi>ad, &c. to be introduced.

The weight of the orcn is 6 cwt., aijd the price charged for it is 20/.

It was used by Captain Parry, on board the **Heels,** in the Winter 1819-SO, as appears by the annexed

CERTIFICATE.

Lumlon,
SIR; January 11th, 1821

In reply to your letter of the 8th instant, desiring to *know* my opinion of the ;>ortable stone oven, embarked on board the HecUj on t]e late expedition to the Polar regions, I have to acquaint yem, that it was constantly used during the Winiterof 1S19-20, upon the main .hatchway of the Heela's lower-deck, answering the purpo.-e of baking the s!ip's coninany's bread, and of warming the dock in part during tllat periled. It is, t\ierefore, my intention, should no better mode be offered by the numerous persons now applying for

that purpose, to use the ovens in question, in the same manner as before, on board the ships now equipping for the Polar seas.

I am, Sir,

&c. &c.

W. PARRY.

Reference to the Engraving of Mr. STORY'S *Oven,*

Plate III.

Fig. 1 shows the oven taken out of the iron case, and the parts separated; *a a* and *b b* are two fire-stones, which are cemented together and form the dome of the oven; in consequence of this arrangement, if one or both of them crack from the heat, the fractures will most probably not coincide, and the part will not fall to pieces; *c c*, the lower part or floor of the oven, having an ash-pit at *d* to admit air to the fuel through the grate *e*, fig. 2; *f f*, the mouth; *h h*, the iron case which holds the stones together, and into which they are cemented; *i*, the door lined with stone; *k*, the door of the ash-pit; *l l*, the iron cover, with a chimney *m*, coinciding with the opening *n*, in the stone *a a*; *o o*, a damper in the chimney *m*.

Fig. 2, a plan of the iron case *h k*, and of the floor *c c*. The parts are drawn to $\frac{1}{12}$ of the real size.

N° III.

METHOD OF CORRECTING THE LOCAL VARIATION OF A SHIP'S COMPASS.

THE large GOLD MEDAL *compUte Set of the Transactions of the Society were this S(.s$ioit voted to Mr.* PETER BARLOW, PROFESSOR *at the Royal Military Academy, Woolwich, for his improved* APPARATUS FOR ASCERTAINING THE LOCAL INFLUENCE OF A SHIP'S GUNS, &C. ON THE COMPASS. *The following communication has been received from the committee on the subject, and a Model illustrative of his apparatus, is placed in the Repository of the Society.*

Royal Military Academy, Woolwich, November 13th, 1820.

IN a mercantile nation like Great Britain, every attempt to improve the practice of navigation, and to diminish its dangers, is entitled to the favourable consideration of the public, and when those attempts are successful an individual has succeeded in developing any new and useful principle, the more that principle is known, the more rapid will be the consequent improvement. As the Society of Arts, &c. is ever ready to sanction with its approbation and to encourage with it

ward every useful invention or discovery, I feel very desirous of submitting to its notice a method which I have proposed for correcting the local attraction of a ship's guns, and other iron on *the* compass; a subject which has for some years engaged the attention of the most able navigators and philosophers of this country.

That the guns, ballast, and other iron in vessels of any description, and particularly in ships of war, should have an influence in disturbing **the** natural direction *of* the compass, seems now so obvious, that we are astonished it did not long ago attract the attention of the many able English navigators, whose names do honour to the country which gave them birth ; yet so fur was this from being the case, that when, the circumstance was first noticed by Mr. Wales, in one of his voyages with captain Cook, neither the one nor the other of these intelligent observers was able to account for the anomaly they had detected. They found that with the ship's head on different points of the compass, the needle pointed in different directions, deviating as much as E°, 6° or 7°; but the cause of the anoxnah remained unaccounted for, till captain Flinders at length discovered it to be caused by the local attraction of the iron of the vessel, and to be dependent as to quantity and direction on the dip of the needle.

The more recent observations of Mr. Bain, who has published a very useful work on the subject,* and uf captain.- Ross and Sabine in their voyage of discovery towards the North, have confirmed, in a great measure, preceding deductions, and have shown the great necessity of devising some method of correction. In Baffin's Bay, the local attraction was so considerable, as to cause a deviation of nearly 50°, according as the observation was made with the ship's head pointing to the

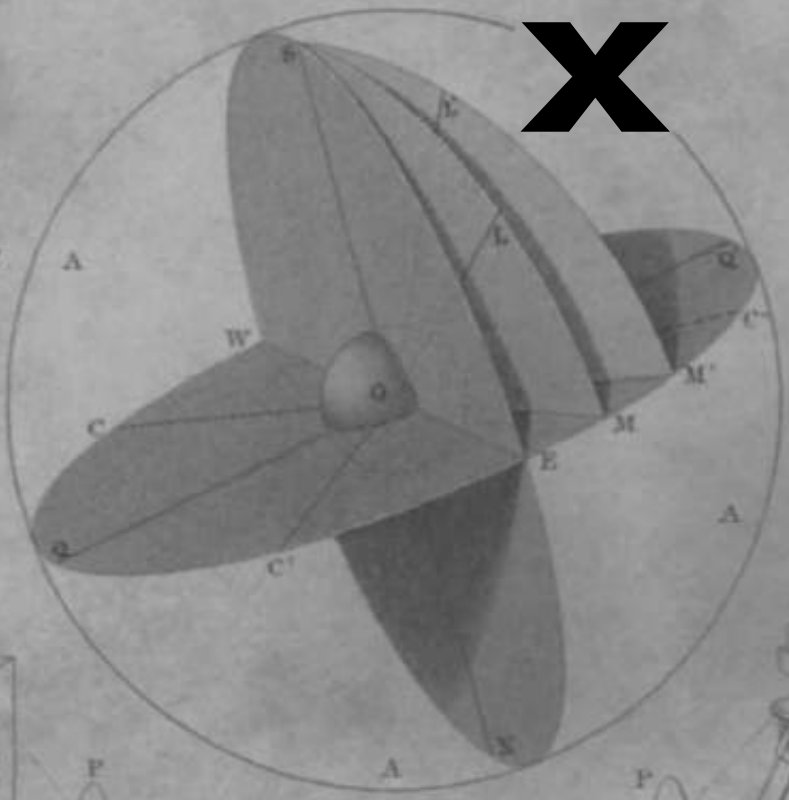
* Bain "On the Variation of the Compass."

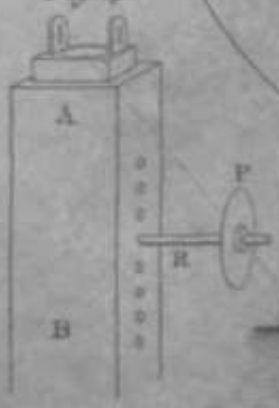
east or west. Hence there no longer remained my doubt, that the law laid down by captain Flinders is, generally speaking, correct, viz. that the quantity of local attraction depends upon the quantity of the dip, and that the effect is also produced in opposite directions, accordingly as the vessel is in the southern or northern hemisphere of the globe; but at the same time these observations demonstrated, that the ratio of this increase or decrease, which he had assumed was entirely erroneous.

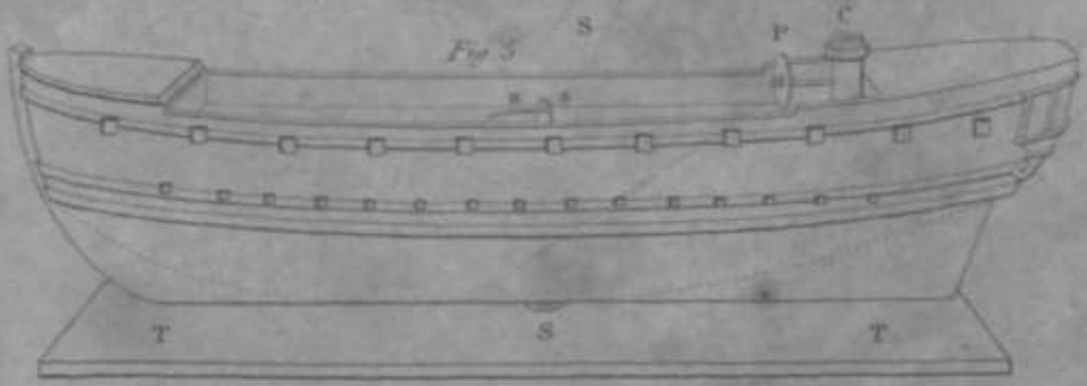
At the same time, however, that these observations demonstrated the inadequacy of captain Flinders's rule, they did not answer the purpose of establishing any new rule more accurate. Indeed, every one had deceived himself by assuming the east and west points to be those of greatest attraction; whereas, as will appear in this paper, those points, in certain places of the earth, are actually points of no attraction; up to this time, therefore, every thing was inaccurate and uncertain, both as it related to the determination of the quantity of deviation, at different points of the compass, and at the same points in different parts of the earth.

In this state of the inquiry, I commenced a series of magnetical experiments, in the beginning of the year 1819, and was so fortunate as to discover two important facts, which promise to throw considerable light upon this hitherto mysterious subject. The one is, that in every mass of iron there is a *plane of no attraction*, viz., a plane, in which a compass being placed, *the iron has no effect upon the needle*. This plane passes from the magnetic north point, to the south, and in this latitude inclines to the horizon, at an angle of 19° 24′, being the complement of the dip. The other is, that the attraction of iron on the compass depends wholly on the surface of the former, and is independent of the mass or quantity. I also discovered other laws of action founded upon

Illustrations of Mr. Peter Barlow's [illegible] ascertaining the influence of the Ships Iron on the Compass. Pl. 1







these two, which are explained in my "Essay on Magnetic Attractions," a copy of which I have done myself the honour ransmitting with this memoir, begging for it the &c ept- ance of the Society of Arts.

Th- nature and properties of the plane of no attraction, an J of tit e other laws which result from this fundamental fact, will *IK* I est illustrated by referring to fig. 1, Plate II. In this figure O is supposed to represent an iron ball and A A A a sphere within its influence, the points S Q N Q′ being in the meridian. The line N S′, contained in the plane S E N W, denotes the natural direction of the dipping needle in these latitudes, its inclination from the horizon being about 70½°. Now, conceiving Q E Q′ W to represent a circle or plane passing through the centre of the ball and perpendicular to th'. axis N S, it will be the plane of no attraction, which has this remarkable property, that if lines be drawn e, the lines O C, O C′, O C″, and placed any where in those lines, or in short in any point of the plane Q E Q′ W, it will be uninfluenced by the in it, as, for exampl eserve its natural magnetic direction. But a com- pass be : the compass is removed out of this plane, the needle 11, and will pr is found to deviate from its original bearing, its south end ••t)on *as* being drawn towards the ball when the compass is placed below the plane Q E Q′ W, in the north end when it is above ; in all these cases the quantity of deviation follows a determinate law, Suppose two other planes in the sphere A A A, each pas *Mig* through the centre of the ball, and each perpendicu ilaitov Q E Q′ W, of which let M O S L, M′ O S L′, represent quadrants. Now supposing a compass placed in each of these pla es, somewhere in the lines O L, O L′, but equidistant from O, then the tangent of the deviation of the compass in O L will be to that in O L′, as the rectangle of the sine of twice the arc L M, and the cosine of the arc E M, is

to the rectangle of the sine of twice L' M', and the cosine of £ M' (E being the east point of the horizon), so that the deviation being known for any one situation, it may be computed for any whatsoever.

Having established the above laws, by the tiiost satisfactory experiments, I next ascertained the law for different distances, finding it to be very accurately as follows; viz., the tangent of the deviation is inversely proportional to the cube of the distance, the angular position being the same.

And when different iron balls arc employed, the tangent of deviation is directly proportional to the cube of their diameters. But what is the most remarkable is, that notwithstanding the above law seems to indicate that the tangents of deviation are as the masses, yet balls and shells, whatever may be the thickness of the latter (provided it be not less than ^ of an inch), having the same external diameter, give the same results.

The power of attraction, therefore, resides wholly on the surface, and the law becomes, *the squares of the tangents of deviation, are directly proportional to the cubes of the surfaces.* Lastly, I ascertained that all those laws which were deduced from experiments on balls and shells, have equally place in iron bodies of the most irregular forms, and ultimately in ships of war carrying the usual equipments of such vessels.

Hitherto I had proceeded on the foundation of experimental results, and had carefully abstained from advancing any thing which might be considered hypothetical; but seeing the beautiful uniformity and simplicity of the laws above stated, I could not refrain from concluding, that the remarkable fact of the plane of no attraction being perpendicular to the direction of the dipping needle, was not accidental or peculiar to these latitudes, but that the same had place in every part of the world; and it was on this ground I proposed the method which I have

endeavoured to explain for correcting the local attraction of vessel*. It is clear, however, thus, tad ependent of observations in other parts of the world, this conjecture, however reasonable and pmbable, could not l* received amongst the estvtblished principles of magnetism; and I therefore esteem myself hig My fortunate in having lately found that Air. P. Lecount has been carrying on a course of experiments, in some measure similar to my own, on board H. M. S. Conjuereiii; and by attentively observing the various phenomena presented by iron bodies on the magnet, in his passage from St. Hi-!.na to JiYgland, he has most satisfactorily demonstrated, the accuracy of n> deduction relative to the varying position of the plane of no attract!* in different latitudes, but at the *tame* time wholly independent of any thing I had done, and indeed without being aware that such a work as mine had ever been published.*

One serious difficulty, however, still remained; namely, that all such laws had reference to the dip of the needle, which it is perhaps impossible to ascertain at sea, while the vessel is in motion; and I was therefore led to seek for some method by which this difficulty might be avoided, and it is this practical and mechanical principle which I am desirous of explaining to the Society of Arts; not in its original, but in its improved form. Since the aft of the vessel and the compass maintain the same relative situation with respect to each other during the voyage, and since all the action of the iron may be considered, like that of every other attraction, to be reducible to one centre, or, in the language of mechanics, to "one resultant," it is obvious, that the effect produced by the distributed iron, is the same as that which would take place in a single large globe of iron, with the centre should

fttvi. of whii

* See Lecount "On the Polarization of Iron."

coincide with that centre of attraction. And since a small ball of iron at a small distance, will produce precisely the same effect as a larger ball at a distance proportionally greater; if we consider a line to be drawn from the compass to the centre of attraction of the vessel, and if we fix in that line, but nearer to the compass, a small ball or plute of iron, the action of the latter will be the same as that of the former (the distance being properly adjusted); and being so in one situation, it must continue so in all, because the line joining the centre of attraction with the pivot of the needle will be constantly fixed, as regards the vessel itself, at all times and in all parts of the world.

To be a little more particular in my description, let C (fig. 2 Plate II.) represent an azimuth compass in a certain situation in thevessel, viz.oneselectedfor making observations on the sun's amplitude and azimuth,* and let S be the centre of attraction of the iron of the vessel; let also P represent a plate of iron, having its centre in the line joining S and C, which let DS suppose to be fixed at such a distance, that its action on the compass may be the same as that of the iron at S; then it is obvious, since the plate, the compass, and the vessel all move together, that it will continue in all directions of the vessel and in all parts of the world, to produce the same effect as the distributed iron, whatever changa may take place in the dip, and in the magnetic intensity. This, then, constitutes the principle of my method of correction, i iz.

IVhtn a vessel has received on board her guns and §tores, let iier be warped round point by point, to ascertain tlie quan-

* Formerly azimuth and amplitude observations, were matle in any part of the vessel, but since the effect of the local utiraetioo has been known, navigators are acquiring Uie habit of taking them at a certain fixed pi ce.

tity of her local attraction,* and let the situation of the plate be determined (by the directions that follow), so as it may produce the same effect as the iron of the ship; and consequently, so that when the **plate** is applied, the effect may be doubled. This being done, let the plate be laid aside, and when at any time it is desirable to ascertain the effect of the guns, *&c.* on the compass, let it be applied to its assigned situation, and observe how many degrees, &c. it attracts the needle out *of* its prior direction, and just so much will the guns have drawn the same from its true magnetic bearing before the experiment. This being ascertained, and the course of the vessel corrected accordingly, the plate is to be removed and laid aside, till some new circumstance renders its application again necessary.

These directions, however* must be considered as only applicable when the plate is attached to the binnacle compass, as I have proposed in my Essay; when it is applied to the azimuth compass (the improvement to which I wish to draw the attention of the Society), the directions are then somewhat diilorent, although the principle is the same.

Before I describe these, I should observe, that having laid the above proposition before the Admiralty, and my communication being by that board submitted to the Secretary of the Board of Longitude; and Sir George Cock burn, Mr. Croker, and some other gentlemen belonging to the Admiralty, having done me the honour to be present at a series of *my* *experiments on the 24 pounder above mentioned, orders were immediately given for trying them on board some of H. M. ships. It was in consequence of my experiments on board H. M. S. Leven, and profiting by the practical and theoretical knowledge of her officers, that I changed the application of the

See Note t.

pen from the binnacle to the azimuth compass, as being more susceptible of nice observation, besides possessing other advantages, not to be obtained in the former case.* **The** following are the directions which I left with captain Hnnholnlew and the other officers of that ship \ for **ttstng the pi**ate:

When an azimuth, or amplitude of the sun, or any other heavenly body, is taken for the purpo.se of **determining the** variatton, the observation is to be made as asual, and immediately repeated again with the plate attached, and the di;fereuce in the two bearings will be the local attraction.

For example: Suppose the first observed bearing to be 67°, and! the same with **the** plate attached 70[1] 30'; then

° '	° '
70 30	**67 0**
67 0	**3 30**
8 30 local attraci**ion.**	63 30 correct azimuth.

Again: Let the amplitude, by observation, be 13* 30', but with the plate only 10* 3tf ; then

° '	° '
13 30	13 30
10 30	†3 0
3 0 local attraction.	Itt ;>0 true compass amplitiu:e.

At other times, to find the local attraction, take the bearing of the ship's head or of any other part oi the vessel by the azimuth compass; then observe the same again with the plate attached,

* See Note 2.

and the difference will be the local attraction, it being understood that, in all cases, when the first observed bearing is diminished by the plate, the difference is to be added to the first bearing; and when the first angle is increased by the plate, the difference is to be subtracted.

These are all the directions which are necessary for using the plate, and I trust they are such as cannot be misunderstood by any seaman, entitled to be considered as a practical navigator.

Similar experiments were made by order of the Admiralty, on board H.M.S. Conway, captain B. Hall, and the same directions given; but as this vessel is now upon a long and interesting voyage in the southern hemisphere, it may be some considerable time before I hear from her able and scientific commander.

From the Leven I have already received the most satisfactory account, by a letter from Lieut. Mudge (who, with the other officers of that ship, took the greatest interest in the subject), an extract of which I have annexed to this memoir.

It now only remains for me to describe the nature of the plate and the mode of* adjustment. As to the plate itself, it consists only of a circular piece of iron, having a hole and socket in its centre, for placing it upon its pin; or it may consist of two thin plates screwed together, having a thin piece of board between them: this, however, is only for the sake of correcting slight inequalities, and for giving it some thickness without increasing its weight, in order to prevent its being bent by any fall or blow. A plate of twelve inches diameter, and weighing about four or five pounds, is sufficient for correcting the local attraction of any ship in the navy, its distance from the pivot varying from thirteen to sixteen inches, according to the power of attraction in the vessel.

* See Note 3.

The best method of determining the proper situation of the plate is to proceed as below:

First, warp the vessel round point by point, and on each point take the bearing of an object on shore, while a person on shore, from the same spot, is taking the bearing of the compass on board; by which means it is obvious the local attraction at every point will be ascertained; for, independent of the latter, the bearings at each observation ought to be diametrically opposite, or differing by 180°; and what the difference exceeds or falls short of this, is due to the action of the iron on board.

This being determined, let *a* log of wood (A B, fig. 4) having no iron about it, be taken on shore, and let holes be bored in it at 8, 9, 10, *&c.* inches from its top, to receive the brass horizontal rod R, which is to carry the plate; this pin being inserted in one of the holes, and the compass set on the top of the log, place the plate on the pin, at any distance (as shown in the figure); now turn the log about point by point, and by removing the plate from the pin at every observation, ascertain the deviation produced by the iron; then, if these deviations, at every point, be the same as those found to obtain on board, the plate is properly adjusted; but if this should not be the case (as is the most likely to happen), shift the height and distance of the plate, and try the same again, and after a few trials, the exact position will be determined, so that the deviations on board, and on shore, agree with each other.* This being done, measure very accurately the depth of the centre of the plate below the pivot of the compass, and its distance from the vertical passing through the centre; then centre a hole to be bored, and a socket to be introduced into one of the legs of the tripod used for the azimuth compass on board, so that when the brass pin is inserted, as drawn in fig. 2, the centre of

* See Note 4.

the plate may be at the same depth !x?low, and distance from the vtirtical passing ^through the **pivot** of »ine compass, as was determined on shore, and it will be the fixed >i mat ion required The plate and pin are of course both mineable, and are laid aside except at the time of making the observations above described.* It only remains to add, that as it is important that the place of observation in the vessel should be constantly the same, it will be advisable to have three small holes made in the deck lor Hxing the position oj the ;'eet of the tripod.

If, as may sometimes happen, the observations cannot be made from this fixed station, it will he to no purpose >mploybg this plate; and all that can be done will be to repeat the observation again in the proper place the first opportunity.

L'\tract of a Utter from Litui MUDGE, o///. *M. S. Leven, to Mr.* BARLOW, *Royal Military rfcadeiry.*

II. M. S. Leven,
Di ZAR SIR; T«i eriffe, Santa Cruz.

I CANNOT resist the pleasure the writing to you affords me, and I trust if you should think my communication rather **premature,** you will cxcuse it, and attribute it to the pleasure I derive from your invention carrying me beyond my bounds. I shall state in full detail all the circumstances which relate to yi>ur plate anil compass,* as 1 think yon will be **pleased** to hear how admirably it his succeeded in every respect.

I have found in every instance, that, with **the** assistanee

J See Note 5.

*The compass here alluded to, is one made by Messrs. Gilberts

148, Leadenhall street.

of the plate, the true variations are very closely determined, which is of course a great object. I have a register of the whole, which I shall send on our return.

"In consequence of our finding an extraordinary error in the two compasses by which we steer, occasioned by local attraction, I have made a point of comparing them with your plate and compass on every point we steered and of registering their difference. In some instances I have found the deviation by the starboard compass 8°, and greatest when the ship's head is south, which appears from the mass or quantity of iron which is abreast of the compass, and perhaps the centre of attraction when a compass is placed there, may lie in the side abreast; but it matters little, as your plate has. and I make no doubt will always detect the error. I shall relate a circumstance where we detected such an error in one of the compasses, arising from local attraction, that might have been the cause of the ship being wrecked had we been amongst shoals or rocks.

On the 22nd of May, at noon, we were in latitude 41° 46' N., and long. by Chronometer 9° 53' W.; taking this as our departure, we sailed by the starboard compass S. 46° W. 183 miles; this placed the ship on the 23rd, allowing the variation 21° W. in latitude 38° 58' N. and longitude 11° 26' W. Whereas the observations at noon for latitude, and sights in the morning for longitude, gave lat. 38° 39' N., and long. 10° 58' W; so great a difference in 24 hours was attributed to a current, till I compared the starboard or steering compass with the one with your plate, when I found no less than 7° error, to be subtracted from the course steered, making the true course S. 17° W. instead of S. 24° W. which had been taken as correct; by allowing the 7° which we found subtractive from the course, our latitude was, by reckoning,

38' 41' N., and long. 11' 02' W. which agree with observation as close as we can ever expect it to do under any circumstances,

I believe me, Sir,

&c. &c. &c.

T. M. Mudge.

Such is the present state of this method for correcting the local attraction of vessels, which is generally useful, must be rendered public, and nothing will more facilitate this object, if it should meet the approbation of the Society of Arts, than giving the present memoir a place in one of the volumes of its transactions; and I am in hopes, when the importance of the subject is considered, it will not be deemed unworthy of such a distinction.

Peter Barlow.

Note 1.

The method of warping a vessel about, under different circumstances, will suggest itself to any practical navigator; at the same time, it may not be improper to describe here the process as it was practised on board his Majesty's ships Leven and Conway, which differs, in some respects, from the method usually followed, namely, that of taking the bearing of a distant fixed object. The objection to the latter is, that the swinging of the vessel will always produce a greater or less parallax, which it is impossible to estimate correctly.

Extract from a Report to the Admiralty, relative to the Experiments made on board H. M. S ***Levcn,*** *By* PETER BAHLOW.

April 19th, 18!O.

THE Lcven having dropped down to Northfleet on the 15th instant, I went down on the 17th, for the purpose of making a series of observations before the guns should be brought on board; these observations were conducted as below :—

First, finding that there would be great difficulty in warping the vessel round in the tide way of this place, I proposed and it was agreed to proceed in the **following** manner :

I toot on shore an excellent azimuth compass, by Messrs. \Y. and J, Gilbert, which I had procured for the purpose, as also a theodolite by Schmalealder. With the azimuth, the bearing of a distant object was taken, and found to be N. 35° 50' E., and the theodolite was then adjusted to the same reading, viz. 35" 50' from zero, by means of which the zero of the theodolite was brought to the true magnetic north, and consequently the bearing of any object might now be determined without any farther reference to the needle. Is will of course be understood that the theodolite was fixed immediately over the spot where the azimuth compass was first erected.

The latter instrument was now taken on board, for the purpose of the experiments, while Lieut. Mudge remained on shore to take the bearing of the pedestal,* or pillar, on board with the theodolite.

The ship now beginning to swing to the tide, the word was given " look out ;* at which signal Lieut. **Vidal,** at the

* Captain Bartholomew had ordered a pedestal to be erected just before the mizen-mast, as a fixed situation for taking his azimuths during the voyage.

azimuth compass on board, kept by Mr. Mudge, on shore, in the line of the sights, while another gentleman kept in the same way, Mr. Yidal in the field of his telescope. Being thus prepared, the word " stop"* was given, at which, eacli registered the bearing of the other, at the same instant. These bearings, independent of the local attraction of the vessel, ought to have been diametrically opposite, and consequently the difference between the two leadings, was the error due to the attraction of the iron on board.

The first observation being registered, the word " look out"[1] was again given, and then the word " stop," and the same was repeated as often as possible while the vessel was swinging, Lieut. Boldy taking every time the bearing of the ship's head, by the ship's azimuth compass at the capstan. The advantages of this method are, that both bearings, viz. on board, and on shore, are made to depend upon the same compass, and thus the errors arising from the use of different needles are avoided, as are also those arising from the parallax of a distant object while the vessel is swinging, a source of error which must have attended all former observations of this kind.

The only thing actually necessary in this case is a fine free azimuth card and needle: these are commonly served out to the navy are so sluggish, that it is impossible (while there is no motion in the vessel) to depend upon their settling within 2°, or ½° of the true magnetic north.*

The experiments above referred to were made before the guns were got on board; but the same were again repeated on the 16th of April, after they had been all shipped. The following are the results of both series of observations:—

* A reference to fig. 3 may render this description a little more intelligible, by supposing V the vessel in the river R R, and T the station of the theodolite on shore.

Experiments on board H. M. S. Leven, (at Northfleet,) April 17th and 19th, 1820, by P. BARLOW and the Officers of the above vessel.

GUNS NOT ON BOARD.			GUNS ON BOARD.			
No. of Experiments.	Bearing of Ship's Head.	Difference in Bearing or Local Attraction.	No. of Experiments.	Bearing of Ship's Head.	Difference in Bearing, or Local Attraction.	Local attraction owing to the Plate.
1	N 77° 0' W	− 2° 32'	1	N 71° 0' W	− 2° [illegible]	—
2	N 68 30 W	− 2 25	2	N 64 0 W	− 2 07	2 20
3	N 57 0 W	− 1 37	3	N 57 0 W	− 1 39	-
4	N 47 0 W	− 1 54	4	N 47 0 W	− 1 45	-
5	N 32 0 W	− 1 12	5	N 31 0 W	− [illegible] 39	1 30
6	N 29 0 W	− 1 0	6	N 24 0 W	− 1 10	1 0
7	N 14 30 W	− 0 12	7	N 13 0 W	− 1 19	-
8	North.	+ 0 15	8	N 6 0 W	− 0 17	0 40
9	N 5 0 E	+ 0 54	9	N 4 0 W	+ 0 8	-
10	N 16 0 E	+ 1 32	10	North.	+ 0 24	[illegible]
11	N 32 0 E	+ [illegible] 48	11	N 5 0 E	+ 0 1[illegible]	-
12	N 45 0 E	+ 2 25	12	N 13 0 E	+ 0 29	0 40
13	N 52 0 E	+ 2 26	13	N 23 0 E	+ 0 46	1 [illegible]
14	N 67 0 E	+ 3 15	14 *	N 37 0 E	+ 1 27	1 30
15	N 74 0 E	+ 3 6	15	N 50 0 E	+ 2 32	-
16	N 83 0 E	+ 2 31	16	N 72 0 E	+ 2 23	2 10
17	East.		17	N 80 0 E	+ 2 51	-
18	S 81 15 E	+ 2 34	18	S 86 0 E	+ 2 11	2 30
19	S 75 30 E	+ 2 30	19	S 65 0 E	+ 2 54	2 30

The rapidity and force of the tide at Northfleet, prevented our warping the vessel about point by point, which is doubtless the best way. This, however, is easily practised in Portsmouth Harbour, where the above experiments were again repeated by the officers of the Leven, and the plate ultimately adjusted to the latter results, which as I am informed by Lieut. Mudge, somewhat exceeded the above.—The following experiments were made according to llic iutu-r wclbiRl, on bi ard 11. v b y order uf I lie Aiiuiiraltr.

Experiment I o» *the Local Attraction* ••(' *II. M. S.* CONWAY, *Portsmouth Harbour, July H&th* 1820, *by Captai* it BASIL HALL, *and Mr*. IJAHLOW, *ofth e Royal Milit try Academy.*

Dip, 70° 30' 3.

No. of Mean Observation.	Direction of Ship's Head.	Observed Bearing of the Station on the Shore, from the Ship, by Capt. Hall on Board.	True Bearing of the Station on Shore, from the Ship, as observed by Mr. Fallows on Shore.	Local Attraction.	No. of Mean Observation.	Direction of the Head.	Observed Bearing of Station on Shore by Captain Hall.	True Bearing observed by Mr. Fallows.	Local Attraction.
1	S b E	N97° ' 0'E	N 93°40'E	+1° 20'	17	SS E	N 97 0'E	N 97°15'E	—0° 15'
2	South.	96 0	94 3	+1 57	18	SE b S	93 50	96 22	—0 32
3*	S b W	93 20	92 37	+2 23	19	S E	94 10	95 16	—1 6
4*	S S W	95 10	93 19	+2 51	20	S E b E	93 20	94 24	—1 4
5*	SW b S	94 S	91 0	4-3 S	21	E S E	91 0	92 30	—1 30
6*	S W	94 2	90 47	+3 15	22	E b S	89 30	91 52	—2 22
7*	SW b W	93 35	90 13	+3 20	23	E«t.	87 50	91 15	—2 25
8	W S W	93 30	88 32	-f4 58	24	E b N	85 0	89 5	—4 5
9*	W b S	92 10	87 32	+4 38	25*	E N E	83 20	86 34	—3 14
10	West.	-	-	-	26	N E b N	82 10	95 31	—3 21
11	W b N	88 0	84 05	+3 55	27	N E	82 15	84 58	—2 43
12	W N W	86 35	83 12	+3 23	28	NE b N	83 0	85 13	—2 13
13	NW b W	85 «O	82 27	+2 33	29	NN E	85 50	88 4	—2 14
14	N W	83 25	81 46	+1 39	30	N b E	84 40	85 47	—1 7
15*	NW b N	U 1?	82 7	+2 10	31*	North.	83 0	83 7	—0 7
16*	NN W	83 35	82 5	+1 30	32*	N b W	82 28	81 38	+0 50

1. All the numbers in the preceding Table marked thus,* are those in which two or more observations were made at the same point, and the mean of the two taken. In the others, we had not an opportunity of making more than one observation.

2. Where the apparent, or observed easterly bearing exceeds the true easterly bearing, the error or local attraction is marked + (plus); and when the former is *less* than the latter, the error is marked — (minus).

3. With the ship's head at west, the object on shore could not be seen.

NOTE 2.

IT may be proper here to offer a few remarks on the advantage which will, I conceive, arise from attaching the plate to the azimuth instead of to the binnacle compass.

In the first place, as there are always two binnacle or steering compasses placed abreast of each other, they must necessarily be situated either very considerably out of the fore and aft line of the vessel, or be placed so near as to influence each other's direction.

For these reasons, these compasses seldom agree with each other; viz. in the latter case, in consequence of their mutual action, and in the former, on account of each being exposed to a different system of local attractions. Therefore, to render the method which I have proposed in my Essay effective, two plates must be employed, viz. one to each compass. Moreover the motion of the vessel renders exact observations on these compasses very difficult, if not impracticable. Whereas, with a good azimuth compass, the nicest ob-

vation may be made, anil the slii it de ions tl tected ; to which we may also add, that the direction of the needle being, with this tnstnxment, determined by observation on a distant object, as, for example, the Sun. no error will arise from a change in the direction of the course during the obsiTvatkm; while in the other case we have no mark of direction but the *tubhrr-Um,* which is, we 1ay sa\, in nearly a continual state *oi'* oscillation, from the corresponding motion of the ship itself.

Note 3.

Is my Essay I ha*.e described the plate as being *double,* and those which I have sent out in the Lcven and Con way are of that kind. But I have since found that a single plate may be vevy safely employed, provided we give U sufficient thickness.

The double plate was employed by me in consequence of observing, that in very thin sheet iron, certain parts omuii.ed a degree of partial magnetism ; and by using two plates, and ascertaining their strong and weak points of attraction experimentally, and combining them accordingly, viz. the weak point of *one* in contact with the strong point of the other, these paidal actions were ueutraliied. But by using iron, weighing about 6 lbs. to the square foot, the double plate may be dispensed with, the partial action in sheets of this thickness producing no anomalous cflect upon the needle, at the distance at which tht*y arc placed in the experiment.

Note 4.

[y reference[1] Eo the clircctions for fixing the plate, so that it may give the same errors as the shiji at every poi it of the comi ass, it may be proper to observe, that i i the trials by which ti is is effected, it will be sui; icient to attend to these **deviations** at t iree points only, besides the nor til ami south; for i the deviations caused by the plate, are the same as those given by the v ssel a: any three points i; one semicircle (besides those corresponding to the meridian), they mu>; necessarily be the same at *c*ery poi *nt.* It will, however, be proper to ma!e choice of t iirce points, at some distance from each other, that the chang. may! >e reiul ered the more obvious. I generally use the East, NE. by N., and SE. by S.; for if we take points nearer to tiie north or south, the devi-lions are too iuconsider-bio to render the increase or tier rease arising from a change of position sufficiently i bvious. It will in course be the same if we use the West, NW. by N., and SW. by S. for this purpo^e.

After ill, however, this is by far the most difficult part of the process for persons wholly unacquainted w ith magnetical experiment i, and the best wny in si ch case, nil] be **to** pur**chaa** a plate already correcled, thst is, a plate whose effet t has been experin entally deter nined for Tarious posir ons and distances. Then, having warped the vessel abo at point by point, and determined its local attraction, it will only be necessary to select from the table delivered with the plate, the series of deviation agreeing with those of the vessel, and opposite to that series are placed the proper distance, height, and positions which the plate ought to have, in regard to the compass to which it is to be applied.*

* Plates, with the requisite Tables, may be had of Messrs. W. and J. Gilbert, Mathematical Instrument-makers, 118, Leadenhall-street.

It is only necessary to observe, that the table alluded to will only answer while the dip of the needle, at the place where the experiments are made on the ship, and at that place where the plate is adjusted, are the same or nearly so. In order to ascertain how far any correction was necessary in this respect for the various British ports, I solicited permission of the Honourable Commissioners of the Navy, to be allowed a small vessel in order to visit our various naval stations and there to ascertain the actual dip of the needle by experiment. This permission was most readily and courteously given by that honourable board, to whom both on this and on other occasions I am highly indebted; and Commissioner Cunningham, of Woolwich yard, having received directions to appoint a vessel; he, in the most handsome manner, though necessarily with some personal inconvenience, appropriated to this service the Thomes long-boat, a vessel possessing every accommodation that could conduce to my convenience and comfort.

This provided, I visited all our naval establishments in the Channel, and ascertained the dip of the needle at each, as well as at several other prominent points; but I found the difference in the dip so very small as to render any correction for it perfectly unnecessary; consequently, the plate and table alluded to above, will answer for any port in the British Channel. Whether there be any sensible increase of dip in our northern ports, is a question which can only be answered by means similar to those above described, that is, by actual experiment.

The instrument which I employed in making these observations was an excellent dipping-needle, constructed by Mr. Jones, Mathematical Instrument-maker to the Ordnance, who very obligingly favoured me with the loan of it for the above purpose.

Note 5.

Some readers will perhaps form a better idea of the principles of the method I have endeavoured to describe, by the representation and description of the model which I have the honour of presenting to the Society, and at which figures 5, and 6 are an elevation and plan. T J is a table, in which is fixed an upright spindle S *s,* which passes through the vessel, and about which it may be turned in any direction at pleasure; D is a brass plate fixed on the deck of the vessel, and divided according to the points of the Compass, the North and South points being fore and aft. H is a hand, or index, moveable on the spindle; C is the compass, P the correcting plate, and R the rod by which it is attached to the pedestal of the compass. The dotted line passing downwards from C is that in which the centre of attraction of all the guns, and of the other articles of iron contained in the model falls, and in this line the centre of attraction of the plate P *m* is also situated, and at such a distance from C that its power on the needle is equal to that of all the other iron at a greater distance in the same time. Now, to illustrate the nature of the correction by the model, turn it about on its pivot till the compass shows north, that is, till the lubber-line in the brass compass box and the north of the card coincide; the vessel is then in the meridian, and the moveable index on deck must be set also to point north.

Turn now the vessel on its spindle, till the hand is directed to any other point (as, for example, East): then, if there were no attraction from the iron on board, the COMPASS would show East also; but it will be found to point about E. ½ N., which shows the attraction at that point to be about 5½ deg.;

and in the same way the attraction at any other point DO may be observed, the plate during such time being removed; and if at any *of* those points the plate be applied, it will be found to double the quantity of the error.

To illustrate its application in **real** practice, turn the vessel about (having first adjusted it), till the apparent course by compass, is east, or any other proposed point, without regarding the index on deck; and now, to find the true course, **apply** the plate, and observe how many degrees, &c. it *attracts* the needle, which in the model, at east, will be found about **half a point**, so that the **apparent** course by compass will be now E. ½ N., the attraction of the plate having drawn the north end forward about 5½ deg. or a half point. The iron of the vessel had **therefore** done the same before the plate was applied; consequently, the true course was E. ½ S., and by looking to the index on deck, it will be found that this is actually the course shown. The same will be the case at any other point except that the quantity of attraction will be different, being most at those points towards the east and west, and less as we approach the meridian. In other parts of the world, however, the east and west will be the points of least attraction, **and** the greatest will IK at the N. E., N. W., S. E. and S. W, ; but still the plate will always continue to give the **same** attraction as the vessel, therefore in all places furnish a ready method of correction.

The accurate action of a model is seldom to be expected, and **less** perhaps in Magnetical experiments than in any others. I was therefore very agreeably surprised to find how very correctly this model answered all the conditions which I had found to obtain in the **largest** vessels.

It will be seen in the summary given in Note 1, that the power of attraction, or rather the tangent of the angle **of**

deviation, at different distances, is reciprocally, as the cube of those distances, and that the tangents of the angles of deviation, are also proportional (directly) as the cube of the like linear dimensions of similar masses; if, therefore (as in the model), the magnitudes of the masses are proportional to the general dimensions, the deviations ought to be analogous, and even equal to those in a vessel at large; and a few experiments on the model will show that this is not merely the case theoretically, but that practically the agreement is much closer than could possibly have been anticipated.

N° IV.

IMPROVED BULLET-MOULD-

The small or Yui.c.v N SILVER MEDAL *was this* ***Session*** *voted to Mr.* **EZEKIEL** BAKER, *of* ***Whitechapel-Roadi*** *London, for an* I.UPROVJ-D MOULD AND NIPPER FOB BULLETS. *Tlie following communication has been received on the subject from Mr.* B., *and the Instrument has* ***been placed in*** *tl Rej nmtory of the Society.*

34, Whiiechapcl-road,
SIR; Feb. 8, 1821.

I TAKE leave to request you will lay before the Society, for ihe Encouragiment of Arts, &c. a new invented Bullet Mould, which, after infinite labour and very considerable expense, I have brought to perfection; and in claiming the merit of the invention, I trust **the** following explanation of the improvement will be satisfactory to the Society:

First, The mould lias a much larger countersink on the top. and of course holds a greater quantity of melted lead, which, as it sinks in the mould, prevents that hollowness which is generally found in balls case from moulds in the usual way, and consequently renders them far superior.

Secondly, The steel-cutter on the top of the mould is a considerable imprtvement on the old cutter, as will N" instantly seen by cutiing off the castable, or neck of a ball,

with each of the cutters. My invention consists in taking off the castable quite clean at once, and at the same time preserving the globular shape of the ball; consequently, the labour and time which were formerly devoted to nipping and trimming, or filing off the exuberance, are now by this method entirely saved, and the ball at one motion is made quite perfect. The double advantage of cutting the balls true in so expeditious a manner, and rendering the bulls themselves more perfect, must be instantly perceptible, and I trust will meet the approbation of the Society, who must be aware of the essential importance of the invention to all fire-arms, but more particularly so to rifle barrels, which require the greatest accuracy.

Thirdly, Against the cutter is placed a semi-circular cup to hold the ball, which renders the process of cutting off the neck more easy and expeditious.

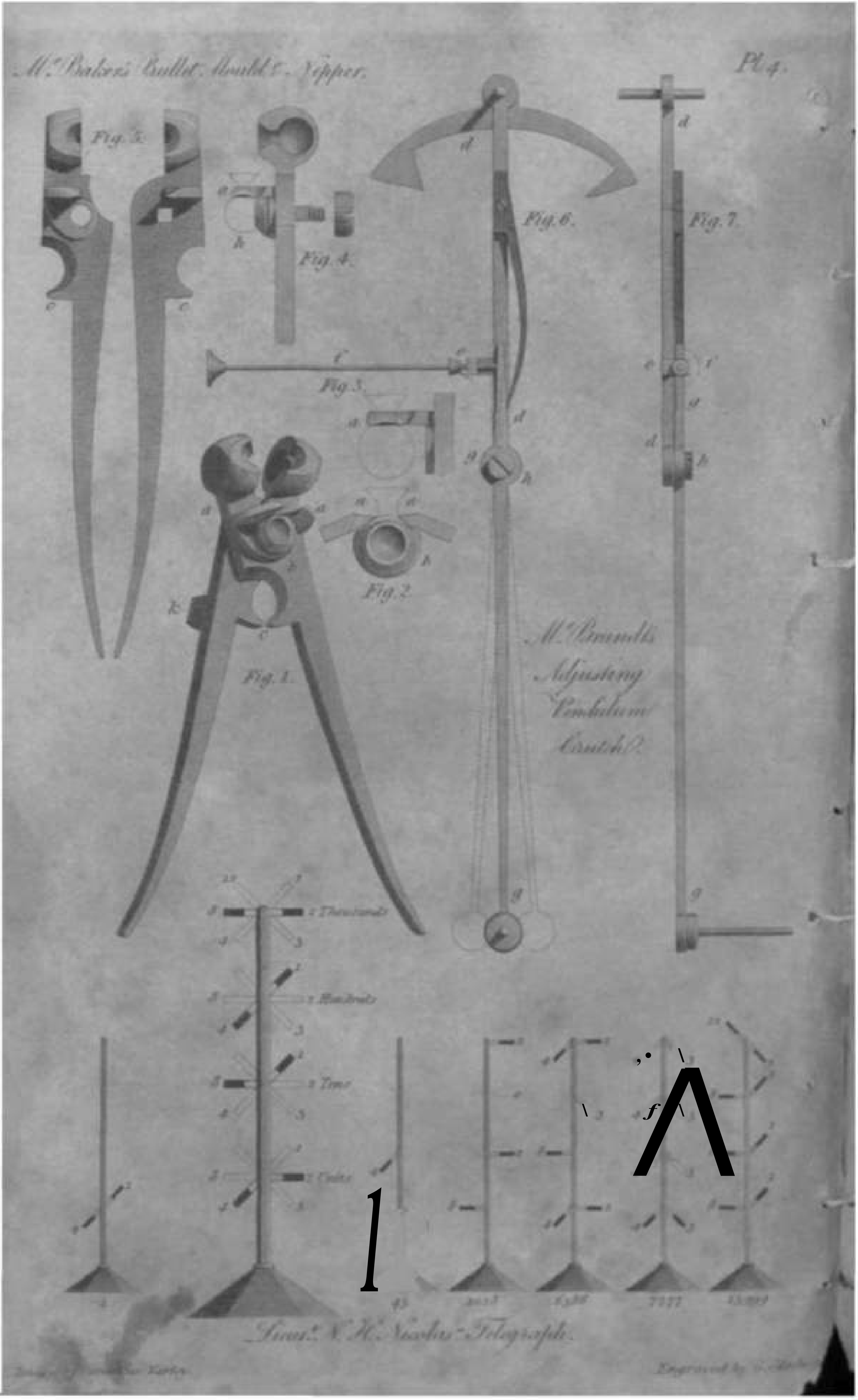
Fourthly, Under the mould is placed a solid stud, for the purpose of being screwed in a vice, when opportunity offers, by which the balls will be cut easier, and much faster than when simply held in the hand.

Having thus briefly described the new mould, and explained the advantages of the invention, I have to request you will submit it to the inspection of the Society, as I am most anxious to receive their approval before I offer it to public notice. I will not detain you longer by recapitulating the advantages I should individually have experienced by an earlier discovery, nor the labour and expense which would have been saved by its adoption, but shall be happy to furnish any additional information that may be required by the Society, and have the honour to subscribe myself,

Sir,

A. Aikin, Esq. &c. &c. &c.

Secretary, &c. &c. EZEKIEL BAKER.



Mr. Baker's Bullet Mould & Nipper.
Pl. 4.
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7.
Mr. Brundt's Adjusting Pendulum Crutch.
Thousands
Hundreds
Tens
Units
Lieut. N. H. Nicolas's Telegraph.

Reference to the figures of Mr. BAKER'S *Bullet-Mould and Nippers*, Plate IV.

FIG. 1, the bullet-mould entire; *a a*, the nippers of a curvilinear figure; *b*, a spherical depression, formed in the head of the screw-rivet which connects the two halves of the instrument, and correctly concentric with the axis of the rivet. The nippers and rivet are placed so near to each other, that the globular tool employed to form the depression, at the same time forms a hollow of similar curvature on the face of the nippers. This construction is more obvious in figures 2 and 3, in which the dotted lines represent the ball with its castable; *c* are nippers on the old plan.

Fig. 4 is a lateral view, showing the great width of the countersink through which the lead is poured into the mould, and also the screw-rivet which forms the axis of motion.

Fig. 5 represents the two halves of the instrument detached from each other.

It is obvious, that when the *a*stable is removed by means of the common cutter, which may be considered as a plane acting in the direction of a tangent to the spherical surface of the ball, a portion of the castable will be left behind, thus rendering a greater degree of windage necessary, and, in the same proportion, shortening the range of the ball. This defect appears to be avoided in the use of Mr. Baker's new cutter, which acts in an arc of a circle, of which the middle of the ball itself may be considered as the centre.

\> V.

IMPROVED SEMAPHORE

The large SILVER MEDAL *of the Society was this Session voted to* NICOLAS HARBIS NICOLAS, *Esq. of the Inner Temple, for an Improvement on the* VERTICAL SEMAPHORE, *and for his method of adapting a shifting Key to Telegraphic Communication for the purpose of insuring Secrecy. A Model of Mr. N.'s Semaphore has been placed in the Repository of the Society.*

THE vertical Semaphore of Lieut. Nicolas is represented in the lower part of Plate IV. It consists of a vertical pole, to which are attached four pairs of arms, or wings, placed at equal distances from each other. Each arm, by means of cords, or appropriate machinery, is to be made capable of remaining in a vertical, oblique, or horizontal position, the value of each position or number indicated thereby, being that marked in the engraving. The lower pair of arms shows units, the next above shows tens, the next hundreds, and the

upper pair thousands. In the three lower pairs only nine changes are required; and these, as is manifest from inspection, require only five positions. Thus, to display figure 1, the right arm is elevated to the position marked I, and the left arm is dropped behind the mast, so as to become invisible: in a similar manner 2, 3, and 4 are displayed. Nos 5, 6, and 7 require the exhibition of both arms, the left one being in the position 4, and the right one brought into the position 1, 2, or 3, as required. N° 8 requires the exhibition of the left arm alone, and N° 9 requires both arms. The upper pair, by means of six positions, indicates all numbers from one to sixteen, so that a single exhibition of this semaphore will give the entire series from 1 to 16999, being a range amply sufficient for all telegraphic purposes.*

The Shifting Key.

The utility of a secret mode of communicating a message by telegraph, must be so obvious, that it would be needless to point out *its* advantages.

The idea on which the following method is founded, was suggested by the secret cipher used by Buonaparté; and as that was proved to be efficacious, it is hoped that the arrangement of one on a similar plan, adapted for telegraphic purposes, will not be entirely without utility.

* Although this invention is no doubt original with Lieutenant Nicolas, yet it is but justice to Colonel Macdonald, to observe, that precisely the same principle of indicating units, tens, and hundreds, by separate pairs of arms, on the same mast, is contained in fig. ix. in that officer's Treatise on Telegraphic Communication, published in 1817.

It is to be remarked, that the figures in any part of the Table may be changed, by placing the Ui;es on sliding pieces of **paper,** like **a** perpetual almanack ; but it would perhaps be sufficient, if **the index** Hneoflarge figures should alone be *n.*oveahle. If the others nre so, ***a***ure must be taken, that the same figure is nov repeated within any two horizoutal lines.

Table.

1 2	I 6	2 7	3 8	4 9	5 *
3 4	i *	2 6	3 7	4 ft	5 9
5 I>	i S	2 *	3 6	4 7	5 8
7 8	I c	2 9	3 *	4 6	5 7
9 *	i 7	2 8	3 9	4 ft	5 6

In using this table. any number may be the key, andean be changed at pleasure.

Suppose the key, for example, -to be the day of the month, multiplied by 172, the day the 93rd, and the figures of the Table in regular rotation. The real key wUl become 3784, and it is to be thus used:

Let the real numbers to be signalized be G7G4—5S98—fig—1048—385—4391- Trme being the first figure of the key, refer to that figure in the perpendicular line of index

figures in the table; then look for the figure six, the first of the message, in the line of small figures parallel to the former, and the figure immediately below the first figure of the message, is to be noted down. The next figure of the key 7, and the new of the real number 7, being referred to in the same manner, the corresponding figure will be found to be five, which is also to be noted down, and so on, till the key is finished, when it is to be begun anew, and continual till the message is concluded. The most simple way of ascertaining the fictitious numbers is the following:

Key.....	3	4	3	7	8	4
Real Numbers.....	3	7	6	4	5	3
Fictitious Numbers, *i.* e. the numbers to be signalized.	2	5	4	8	9	3

37	8437	843	7843	784	37
20	1048	385	4391	5398	20
65	8081	349	6351	9324	65

It is to be particularly remarked, that as the introduction of the cipher in the table, would be frequently attended with inconvenience, it is altogether omitted, By attending to the following rule, confusion will not only be prevented, but the arrangement will be more complicated to those who might attempt to decipher a communication without possessing the key. Whenever the omission occurs, the real figure is to be placed amongst the fictitious ones; and in deciphering a message, the omission will indicate that the figure signalused is the real one. In the example, figures so circumstanced are marked thus*.

To decipher a message, the order of reference must be inverted, by looking for the figure 2, the first of the fictitious number, in the line horizontal to the figure 3, the first of the key in the index perpendicular line of figures, and *that* under

the 2, is to be noted down as the first of the message intended to be conveyed: thus,

Key	3784	3784	37	8437	[illegible]	7843
Numbers signalized	2548	9324	60	8081	349	6351
Real Numbers . . .	6764	6398	20	1048	385	4391

I am, Sir,
&c. &c. &c.
NICOLAS HARRIS NICOLAS.

Inner Temple, Feb. 26,
1831.

N° VI.

SPRING CRUTCH FOR PENDULUMS.

The smaller or Vulcan SILVER MEDAL *was this Session voted to* Mr. C. BRANDT, *of Jermyn-street, London, for an* ADJUSTING CRUTCH FOR CLOCKS. *The following communication has been received from Mr. B. on the subject, and a Model of his Invention is placed in the Repository of the Society.*

62, Jermyn-street, St. James's,
SIR; Feb. 8, 1821.

I SHALL feel obliged if you will have the goodness to lay before the Society for the Encouragement of Arts, Manufactures and Commerce, of which I have the honour to be a member, a model of an adjusting crutch for clocks; it is my invention, and the simple, easy, and correct manner by which you may set

a clock in beat, has flattered me that it would be worth the Society's consideration. The difficulty of putting common clocks in beat, is occasioned by the necessity of bending the crutch, which can never be correctly done, whereas this is done by one simple adjusting screw.

I am, Sir,

&c. &c. &c.

CHARLES BRANDT.

Reference to the Figures of Mr. BRANDT'S *Adjusting Crutch,* Plate IV.

THE stem of this crutch is formed of two lengths *d d* and *g g,* figs. 6, and 7 loosely bound together, by means of a screw A, the insertion of which is at the lower extremity of the upper piece, and about half an inch below the upper extremity of the lower piece. This latter, therefore, may be considered as a lever, of which the screw is the fulcniip. A moderately strong spring is secured to the upper piece of the stem, so as to act at d, on the short arm of the lever, and tending to throw it out of a vertical position. A mill-headed adjusting screw *f* passes through the nut e, and thus acts on the lever in a direction opposite to the spring, enabling the artist to obtain precisely the degree of obliquity required to put the clock into true beat.

N°. VII.

SPUING CROSS FOR HORSES.

The small or I'm'ran SILVER MEDAL ***was (his*** *Session vc'ted to* **JOSEPH GOOD**WIN, ***Esq. second*** *Cl**erk of the Stable**s to his Majesty,* ***for a*** SPRING CROSS, *or* BftEA]: FO *R'* EfoRSES. ***The following communication*** *it as been received fro*n Mr. G. on the subject, and* ***the*** *M.achine ha**s been placed in*** ***the*** *Repository of* ***tht*** *Socie///.*

Carllon Palace, April 30,

srit; '21.

THE SocUty of Arts, &c. **having** been pleased to consider the in.provem lent I have suggeste*X* to the Colt^Breal.er's Cro»ss worth a place in their valuable volume, I **lend** you a brief account of the advai itages I consider to arise from its use, viz. an important auxiliary to the Colt-breaker, in *a>:* veying to the animal the first rudiments of mouthing and **bit!** ing, and, in some instances, in improving those mouths that have been rendered i.nsensible to i the proper use of the bridle.

A< cross to obtain these ends is an old inventio o, though lot in general use with colt-breakers ; the method adopteil by them, is to fasten the bridle reins on the saddle with a cir-

angle, thus confining the head to a fixed point; and, to lighten them sufficiently, the nose is brought in with the head drawn towards the breast; in this restrained awkward position the colt fixes his mouth on the bit, bearing hard on it without any change of position for a considerable time together; but on any little relaxation or movement of the mouth, he relapses into the same state again in a few seconds; in this way the mouth is rendered callous and insensible to the proper use of the bridle, and the head is brought too low, and, for the most part, disposed to bear hard and heavy on the hand of the rider or driver.

In order to obviate these inconveniencies, the cross rein was brought into use; by means of it, the reins were confined at any convenient height above the saddle, which had an advantage over the brdinary method in being able to raise the head and neck to any desirable height. The reins, however, being still a fixed point on the cross, the colt invariably resumed the inconvenient position of the old method. In order to counteract this inconvenience, springs fixed to the cross have been considered a useful expedient; although their employment has been very limited, and in the only instance uhich has come to my notice was but little calculated to answer the intended purpose. Under these circumstances, I resolved on bringing the machine into a more suitable form. Having done so, if through the medium of the Society, it should be found as useful generally as it is considered in this establishment, the end I have in view will be obtained.

I wish, however, to be understood, that I do not, in proposing the use of the Spring Cross, anticipate that it is calculated to supersede the skill of the riding-master, it being admitted, that by his aid and delicate handling of the reins, the highly cultivated and sensible state of the horse's mouth, and all

those pliant airs and graceful motions of the body, are only to be obtained.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.
Secretary, &c. &c. J. GOODWIN.

---

lirfircncc (• the Figures of Mr. JOSEPH GOODWIN's, *Spring Cross, or Break for Horses*, Plate V.

FIG. 1, a front view; fig. 2, a side view, and fig. 3, a *bird's-eye* view: *a a*, the upper arms of the cross, perforated by loops to allow the play of the reins which pass through them *to* the springs *c c*; *b b*, guides through which the lower part of the reins pass to the springs *d*; *e*, a central spring (with a guide staple *f*) to hold the bearing rein; *g g*, the lower ends of the cross to which the girth-bands are fastened. Fig. 4 is a section of the arm *a*, to show how the sides of the perforations or grooves are rounded, to prevent the reins from clinging. In the lower figure the cross is represented as fixed on the horse, from inspection of which it is evident, that though the horse can incline his head freely in any direction, he can remain at ease only in that position in which he is required to carry himself.

The figures 1, 2, and 3, are one-twelfth of the real size.


Pl. 5.
Fig. 1
Fig. 2
Fig. 3
Fig. 4
Mr. Joseph Goodwin's Spring Cross.

N° VIII.

BED FOR SURGICAL PATIENTS.

77/*; *lay* ge Go>LI) **MEDAL** I*of the Society was this SI:ssion voted to* HE s u v KAHLE, *Esq. of George-street, Hanover-aqua re, Assistant Surgeon at Bartholomew*a Hospital, for* < BE• FOR PA-TIENTS UNDER SURGICAL TREATMENT. 77ff *folio iving communication has been received from Mr.* E. *and a Model of the Bed has bee n plated in* ***the Repository of*** *the Socie* ***ty.***

28, Georgosireet, Hanover-square,
Feb. 4th, 1821.

SIR;

You will oblige me by submitting the appwra!us which ii will accompany this letter, to the inspection of the members of your Society. It was originally constructed for fractures of the thigh bone, especially when **broken** at its neck, close to the hip joint, but it has since been adapted to other affections. It will be right here I* state, that such accidents are by far the mo*, difficult to treat of any that occur to the human body. and an apparatus has long been wanted, capable of}'re-serving the Hmh in a state of perfect rest, and maintaining the broken extremities of the bone in close apposition. On no subject, perhaps, is there greater difference of opinion among enlightened surgeons, than the best position and most

approved method of treating fractures of the thigh. This diversity of sentiments is a sufficient proof, that perfection in this department has not yet been attained; but if any additional testimony were required, the numerous unfortunate cripples we daily meet in the streets, would afford abundant evidence. The fact is generally admitted, that no apparatus has hitherto been constructed, to which very material and valid objections may not be made, in particular cases, and under different circumstances, a detail of which, would be quite foreign to the objects of this Society. After premising thus much, it will appear bold in me to suggest any new plan of treatment; yet I flatter myself, that on a careful examination and fair and candid trial, the machine now submitted to your inspection will prove a practical and important improvement. One principal object requisite to the perfect union of broken bones, is uninterrupted rest, and this cannot be obtained in fractures of the upper part of the thigh, where the patient is obliged to be disturbed whenever he obeys the dictates of nature, an objection to which every apparatus hitherto constructed, is more or less liable. This appeared to me, at a very fearly period of my professional career, to be so great a defect/that I endeavoured to obviate it by inventing a bed for that purpose, for which I received an honorary medal from your Society. Further experience has enabled tee to make great improvements, and to render it far more simple, less expensive, and more efficacious. The early fruit of my labours having been fostered by the Society of Arts, I think it but right to offer it to their consideration in its present more mature state. To enter into any discussion on the nature of different fractures, and of the causes which give rise to difficulties in their treatment, would be out *of* place here; but avoiding as much as possible all technical term|^ I may briefly state the principal objects desiruble

to be attained in the treatment of fractures of the thighs. In the first place, the pelvis should be immovably fixed ; for so central is the hip-joint, that the slightest motion of the trunk is immediately communicated to the upper part of the thigh-bone. Secondly, the position should be the least irksome possible, as patients are often obliged to remain in the same position, without moving for many weeks, or even months together. The position itself should be such as to keep the limb extended to its proper length, and to preserve the fractured part in close opposition, without making any undue pressure on any part, by which painful excoriation and ulceration are often produced. Next, the foot should be supported, so as to prevent it from turning out, from its own gravity or from the pressure of the bed-clothes; and lastly, it is particularly desirable, that the limb should be so placed as to afford every facility to frequent parison with the healthy limb.

The trials to which I have already submitted the accompanying apparatus will warrant me in stating, that it will be found to fulfil all these indications. In the first place, the pelvis will, from its own gravity, remain fixed at the bottom of the angle formed by die superior and central inclined planes, and the aperture made in the central parts, readily admits of the patient relieving himself, and being properly cleansed, without the least movement of cither trunk or extremities. Should it be desirable in young persons, or under any particular circumstances, to secure the pelvis more firmly, it will be easily accomplished by two broad straps brought from the edge of the aperture, and passed round the upper and inner part of the thighs, which should cross each other behind the pelvis, and be fixed to buckles at the outer sides of the mattress. This addition will however be rarely required, except in fractures of the neck of the thigh, bom. Next as to position, certainly, that on the back in a gently-inclin-^ plane, with

the thighs and legs half bent, and the whole equally and firmly supported on a level surface, is the one which can be the longest endured; and here I may mention, that at the time of my writing this, a patient I have been for eight weeks recumbent on one of my beds, who has never once complained of the least uneasiness, but on the contrary, has been perfectly cheerful and happy. Next, the knee being bent over a double inclined plane, affords the best means of making permanent extension, by placing a fulcrum under the ham, and making a lever of the leg, whilst the foot is securely fixed to the foot-board. Thus all the advantages arising from the bent position, namely, the relaxation of the most powerful muscles, and the permanent extension afforded by the straight position, are united, without the patient being subjected to the inconveniences of either, and without the aid of splints or bandages to the broken limb. The gradual curve fonned by the mattress, is exactly adapted to the natural arched form of the thigh-bone, and is the least likely to cause any derangement in the length or direction of the broken limb. The fixing of both feet prevents the possibility of moving the pelvis, which a patient is apt to do when one is left at liberty. The juxta position of the limbs affords constant opportunity of minutely comparing them, and of observing whether they exactly correspond. The apparatus for fixing the feet, at the same time supports the bed-clothes and maintains the whole limb in its proper position.

I have stated that this apparatus was first constructed for fractured thighs, but I have since employed it, with marked advantage-, in *avi'r.* diseases of the spine; and it is particularly adapted to diseases of the hip-joint, aVul many *a*ther injuries and diseases, where permanent rest is essential to perfect recovery. In applying it to cases of diseased **ipiw**, I have added a trap-door and moYeablc portion of mattress to

the upper inclined plane, similar to the one in the central portion, which is destined for the evacuation of the faces. The exact situation of this upper aperture, must be regulated by the individual case to be treated, as disease may occur in any part of the spine. This addition will be found most useful in enabling surgeons to apply leeches, and dress issues or setons without at all disturbing the patient, and thus interrupting the reparative efforts of nature. For the additional comfort of those who are capable of mental recreation from study, I have added a swing table and reading desk, which will support a book over the patient's head, without any effort on his part. In constructing this bed, I have as much as possible studied to combine simplicity and economy with convenience and utility. The whole apparatus I have had made by Mr. Cook, of 8, Denmark-street, St. Giles's, for five guineas, and it is probable, that when more have been made, they may be manufactured at even a lower price. In conclusion, I shall take the liberty of strongly recommending its adoption on ship-board, where so much difficulty must necessarily attend the proper treatment of complicated accidents, and gun-shot wounds, when the slightest motion must *often* renew and render fatal hamorrhages, which might perhaps be restrained by uninterrupted rest. When the apparatus is not wanted for any accident or disease, the inclined planes may be let down, and it will then form a small commodious bed, not occupying more space than a common hammock. I beg to apologize for the length of this letter, and

I am, Sir,

&c. &c. &c.

HENRY EARLE.

P. S. I have declined sending any testimonials in favour of this apparatus, excepting from those medical gentlemen

who have either employed it themselves, or witnessed its application in different cases. I may however state, that I have shown it to many of the most respectable men in the profession, who have all expressed themselves well satisfied with its simplicity, and the prospect it afforded of being extensively useful.

DEAR SIR; Gower-Street, March 1, 1821.

I HAVE had great pleasure in examining the bedstead with a double inclined-plane, and have since seen it practically applied to an important case of diseased spine; it appears to me to accomplish the very essential purpose of absolute rest in such cases, as well as those of fractures and other diseases of the upper part of the thigh and pelvis, more completely than any contrivance we have yet had the use of; but the particular advantage it appears to me to afford, is that of allowing the necessary applications to be made, and the necessary discharges removed without disturbing the patient, or the parts whose recovery depends on complete rest,

I remain, Sir,

&c. &c. &c.

T. COPELAND.

Dartmouth, Feb. 28th, 1821.

DEAR SIR;

II.

ALLOW me to express my real and candid opinion of your invention, the double-inclined plane bed. The principle on which it is constructed, and on which it acts, is most excellent for fractures of the bones of the pelvis, for fractures of the thigh, cert. per femoris, diseases of the hip-joint, as well as diseases and injuries of the spine. It cannot indeed be exceeded whenever uninterrupted rest is required, as by means of the

trap-doors, the aJviue and vesical discharges pass off without trouble or inconvenience, sine minimâ aut lecti aut vestis inquinatione; ami if sctons or issues arc required in any part of the back or neck, they can be dressed and kept clean by the same contrivance, without the slightest motion nf the patient's body, which is certainly the greatest desideratum in all such caKcs. When any of the above accidents happen, and , patients arc placed on a common bed, the fractured limbs are necessarily disturbed whenever the call* of nature occur, to their great injury, oftentimes preventing a nice ooaptation of the broken ends of the bones, and thereby frequently causing great deformity of the limb ; all this your improved apparatus most completely obviates. It is therefore my decided opinion, founded not only on the instance in which I witnessed youi application of it to a near relative of my own, but on the experience which I have since had in my own practice, that when once these beds shall be made known to the faculty, their use will become general.

I remain, Sir,
&c. &c. &c
W. J. HUNT.

D!AR11R ; us wick-square, mb March, 1881.

I HAVE no hesitation in expressing my decided approbation of your apparatus, for the treatment of fractures oi the fe**our,** the efficacy of which I have recently witnessed in a case of the most unfavourable description. It appears to me to afford perfect security against shortening of the limb, and tha: too with very *iv*le inconvenience to the patient; which can be said of tin other apparatus, or]lan of treitmcut that has cooie under my observation.

I re**main, £**ir,
&c. &c. &c.
G. DARLING.

28, George-street, Hanover-square. Oct. aoih.

DEAR SIR;

As the volume of the Transactions has not yet gone to press, I may perhaps be allowed to address a second letter to you on the subject of my invalid bed. It may perhaps be satisfactory to the members to be apprised, that since my first communication, it has been extensively employed In the wards of St. Bartholomew's, and has essentially contributed to the recovery of several complicated accidents, and compound fractures of the leg and thigh. Iu diseases of the spine, requiring the use of issues, it has been employed with advantage at the same institution; and at the present time, there are four cases of this description under treatment. It has also been adopted by several other hospitals, and by many practitioners. In my own private practice, I have likewise found it afford the greatest comfort and security; and in one case of diseased spine, by adapting the apparatus to a very easy chariot, I was enabled to remove a patient who had beea ten months confined to bed, a distance of one hundred and eighty miles in two days, without her experiencing any inconvenience. To prevent any possible mistake, I shall subjoin some directions to be observed by persons employing this apparatus.

I am, Sir,

Secretary, HENRY EARLE.

Directions for using Mr. Earle's Fracture-bed.

DURING long confinements to bed, particularly when it is necessary to preserve the same position for weeks and even months together, it is of essential importance to the comfort

of the patient, and often to the gratification of the practitioner, that great attention should be paid to render the bed as permanently level and smooth as possible. This I consider of so much consequence as to merit the attention of the surgeon, who ought never to place a patient under such circumstances on *any* bed, until he has himself minutely examined it. To some gentlemen this may possibly appear unnecessary; but I can practically assure them, that this little preliminary trouble will very often save them much subsequent anxiety and vexation, and mainly contribute to the happiness and comfort of their patient.

In constructing this apparatus, I have bestowed considerable pains in endeavouring to alleviate the sufferings of persons labouring under complicated accidents and diseases; in doing so, however, I have by no means exempted the surgeon from that part of his duty which I have above alluded to, and in the employment of this bed, I would particularly call his attention to the following directions: The mattress should be either of horse-hair, or well stuffed with the best wool, and should be nailed round its edge to the upper division of the frame. A blanket and sheet should be separately strained over the mattress, and carefully sewed all round its edges: this will prevent any subsequent wrinkling, and by sewing first the blanket, and then the sheet, it is obvious that the latter may, if necessary, be detached without at all disturbing the former. The whole apparatus is made narrow, both to facilitate the operations of the surgeon and nurse, in dressing or cleansing the patient, and to prevent him from shifting from the central aperture. Half a blanket, and a single breadth of sheeting will in all cases be sufficient; and in fitting them to the central aperture, as well as the spinal opening when used, it is far better only to make a cross cut from the four corners thus ✕ than to remove any part.

The loose edges should then be turned down, and hewqd at the lower part of the opening. By this plan, any hasdness of (he edges of the aperture wilJ be avoided.

If the cose about to be treated be u compound fracture, and there is a probability of profuse discharge, it will be well to add sonu- oil silk, or a draw sheet, under the part affected. If the case be a disease of the spine, the trap-door and mtr-eable pad should be accurately adapted to the pu t, before *the* patient he placed on the bed. In fractures of the lov er extremities, the length of the limbs should be taken, and the central portion and foot-board lengthened or shortened accordingly. In eimplicated cases, where both upper and lower < xtremities are injured, the addition of the shelf for supp**art** of the arm will be found a great comfort. This **was** employed with advaritage in the case of Turner. who committed the forgery on the Dank of England, who fractured hid elbow and hip-joints. The position best adapted lor fractures of **the** thigh, is shown in the right di • ision of figure 1. The same will be found best for afi'ections of ihe spine and hip- • oints.

The position shown iu ures fi^., nd 6, wnb the lower division horizoatal, is the one in which 1 have pl toed compound fractures of the leg.

In lincturcs **of the knee-pan,** it may be **elevated,** *as* shown iu the It h division of fig. 1, and by the dotted lii es in fig. 2, in order to relax the po>verful muscles in front of the thigh.

In placing a pati ent on this apparatus, care must be taken to fix him with tin- nates directl- opposite the cent; al opening, and ti e nurse should be directed to be Tcry rari ful to introduce the proper utensil, so as to come in contact with the patient. It occasionally happens, thai at first patients experience a difficulty in performing their natural functions in the **lecunik-ii** position: this will soon be overcoune, by raising **the u**pper division a little. Iu i some rare instances, **I haw**

Pl. 9.

Mr. Henry Earles Bed for Patients under Surgical Treatment

Fig. 1.

Fig. 2.

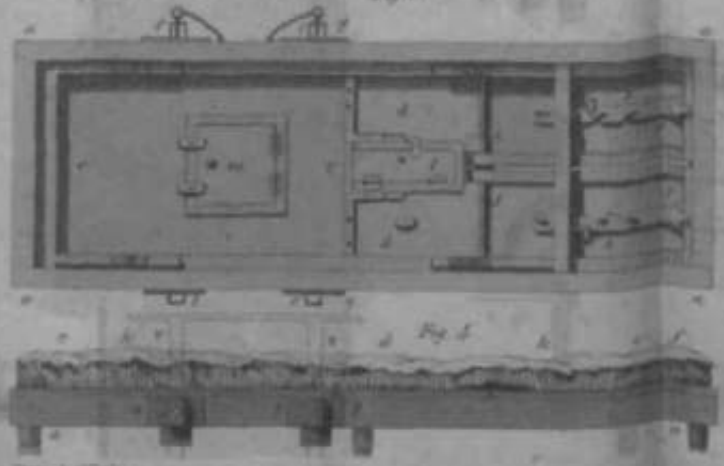


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

found it necessary at first to employ a catheter; but this difficulty is far greater when miy other apparatus is employed, and, generally speaking, the proper employment of this bed will obviate it altogether.

Description of Mr. EARLE'S *Bed for Invalids,* *Plate IX.

THE apparatus consists of a strong fixed frame *a* o, which is rabbeted, as shown at *h* 4, figs. 1 and 2, to receive a moveable one of the same length, but about 3 inches narrower. The movable frame is divided into three parts, connected by joints; the superior one *c c,* is the longer, and is intended to support the head and trunk. The middle division *d d,* which is shortest, is adapted to the thighs, and is capable of being lengthened, or shortened, as seen at *w* ar, figs. 5 and 6. The inferior one *e^ff^ is* intended for the legs. This latter part is divided up the middle, for the convenience of varying the position of either leg, as shown in fig. 1. The right division *e,* is the proper position for fractured thighs; the left division *ff,* for fractures of the knee-pan. The moveable frame is connected with the fixed one, by means of the iron pivots *f* o, which turn in the sockets, which are screwed to the outer frame, at the junction of the upper and middle divisions. Different degrees of elevation may be given to the different divisions by props, one *h* A, under the upper, the other *i i,* under the middle division. These props work in racts at the bottom of the rabbet 6 b_t of the fixed frame *a a.* The two portions of the inferior division c (, / /, are maintained in their different elevations, by means of the wooden upright- *at* props

* N. B. The letters of reference are the same in all the figures.

s s, which are fixud to the upper frames, by hinges formed with two staples or iron rings. These props are notched at one side, at given distances, and can be dropped upon the screws, which are fixed to the inside of the fixed frame, as best seen in %. 3. The whole moveable frame is boarded over, and should he boreU with numerous gimblet holes to admit air, ami prevent the perspiration irom rotting the bedding. A well-stuffed hair or wool mattress *k k*, figs. 1, 2, and 4, is fitted to this, which is nailed to the edge of the upper and middle divisions, but left free at the lower division, to enable the apparatus to be **fitted** to limbs of different lengths. The central division *d* <i, has along narrow trap-door /, 'about 3¼ inches wide, and a loot long, which can be let down lor the admission of the proper **utensils,** figs. 7 and 8, fitted to the opening. The **mattress at** this part has a corresponding vacancy, which is filled up, when not used, by a pad adapted to the opening. A similar trap-door and moveable pad may be made in the superior division **at** M, for the convenience of dressing is **toes** or **wtons** in vases of. diseased vertebrae, where the slightest motion of the body should be avoided, The situation of the latter opening, and its length, must vary according to the part affected in the individual to whose case it is adapted ; but it should not exceed six or seven inches in width, for fear of taking off* too much of the support of the body. **When** the spine is in a very tender state, the firm pad should be exchanged for a softer one, made with feathers. The rest of the apparatus consists of two pieces of wood *u* a, shaped like the soles of the feet, through which an iron rod *o* o, passes, which is affixed, by two thumb-screws, to two upright* which rest by a broad base on the edge of the inferior division *t f*, and are confined in their situation by screws, which fit into iron pi ites, **with** holes at the interval of one inch, to adapt it to legs of different lengths. To these foot-

boards the feet are firmly 6xed in fractures of the lower extremities, and in most cases this will supersede the use of splints. A reading-desk *q,* and swing table r, have been subjoined ibr the additional comfort of patients. These are attached to the upper frame, in the same way as the uprights of the foot-boards. The reading-desk will support a book over the patient's head, without any effort on his part, as seen in figs. 1 and 2. On each side of the fixed frame, in figs. *» 5, and 6, iron sockets (f, are affixed to receive the uprights « «, which support the shelf *v* r, which is intended *to* support the arm and fore-arm, in case of a complicated injury to the upper and lower extremities: this may be raised to different elevations, and retained by pins passing through the uprights into the iron socki:s.

Fig. 1 shows the apparatus complete, with the reading table. The trap-door for the spine is left open, and the ;wo portions of the inferior division are placet! at different clevattons; that on the right side is the position for fractured thi*^hs, that on the left for fractured knee-pans.

Fig. 2 gives another view of the apparatus, showing the situation of the central opening, and the inferior division in the horizontal position, adapted to fractures of the Itg.

Fig. 3 shows the under side of the apparatus, with a view of the whole mechanism by which it is worked.

Fig. 4 shows the apparatus when not in action.

Fig. 5 gives a view of the upper surface, and shows the mode by which the central division may be lengthened or shortened.

Fig. 6 gives an outline of the frame in the position for tYsecturcd legs, with the addition of the shelf for fractured arms.

Fig. 7, the utensil adapted to the size and angle of the central opening.

Fig. 6, urinal for men, particularly in cases of paralysis of the bladder, accompanied with incontinence of urine.

Fig, 9, side view of the upright which supports the foot-board.

N° IX.

ORTHOMETER AND PLEOMETER.

The small or VULCAN GOLD MEDAL *was this Session voted to Mr.* JACOB PERKINS, *of Fleet-street, London, for his instrument for ascertaining the Trim of a Ship more accurately than can be done by the methods usually practised. Models of the instruments are placed in the library of the Society,*

69, Fleet-street,
February 20th, 1821.

SIR;

IF the Society of Arts will have the goodness to examine two instruments (one of which is denominated an Orthometer, the other a Pleometer), calculated to facilitate the sailing of ships, &c. I shall take great pleasure in submitting them for their inspection.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.
Secretary, &c. &c. JACOB PERKINS.

As the construction of both these instruments is the same, differing only in the relative proportion of the parts, one description will serve for both. The instrument is in fact a mercurial level, consisting of a horizontal tube turned up vertically at each end, to the height of about three inches. This tube or syphon is filled with mercury, so that the fluid rises up about an Inch in the two legs, to each of which a float is fixed, farming one end of a lever, as the index does the other end, which is so adjusted that the two indexes are in the same horizontal line when the mercury stands at the same height in both the legs; but when the mercury is unequal, then the indexes are, the one higher and the other as much lower than the horizontal line. Two instruments of this kind being fixed against the side of a ship's cabin, one in the same line with the keel, and the other at right angles to it, will show by changes in the relative position of the indexes, the angular changes in the position of the ship itself, occasioned either by the distribution of the cargo, or by the impulse of the wind on the sails.

The instrument is suspended by two points, out of which is fixed; the other is capable of being raised or lowered by an adjusting screv. As however, from the pitching and rolling of the ship, the mercury would be in a state of constant and violent oscillation, so as to render any accurate observations impossible, the inventor has obviated this difficulty by fixing a perforated screv upon the middle point of the horizontal part of the tube, by means of which the bore in that part can be diminished to any required degree, so as to render the instrument insensible to individual and sudden changes in the position of the ship, while it continues to indicate the averagv inclination of the vessel.

When the vessel is at sea, and sailing to the most advantage, the adjusting screw of the instrument is to be turned till

the two indexes are brought into the same horizontal line, and this adjustment will ever after continue to indicate the trim of the vessel, as long as no material change in the quantity and position of the cargo takes place. Hence by mere inspection of the instrument so adjusted, the master will know whether his ship is or is not sailing to the most advantage.

The instrument placed in a line with the keel of the ship is denominated by Mr. Perkins an Orthometer, that placed at right angles to the keel a Pleiometer.

Reference to the Figures of the Instruments. Plate VIII.

Fig. 1. front view of the Orthometer; a a, front plate which protects and covers the machinery; *b*, screw pin on which the Orthometer is made to swing; *c*, adjusting screw for raising and depressing that end of the instrument to which it is attached; *d*, an aperture cut in the front plate, showing the two indices and the graduated arcs on which they traverse; *e*, the square head of the stop-cock, for regulating the passage of the mercury; *f f*, screws for fixing the floats when the instrument is not in operation, and to prevent the escape of the mercury.

Fig. 2, top view of the Orthometer; *m m*, the back plate in which the machinery is fixed.

Fig. 3, section of the Orthometer; *m m*, the back plate; *g g*, floats resting on quicksilver in the vertical tubes *f h*; *i i*, horizontal connecting tube; *j j*, the indices or hands; *e*, regulating stop-cock; *k k*, fulcrums for the index hands; *l l*, screw pins for uniting the lower and upper parts of the instrument; *d*, index plate for denoting the trim of the ship.

Mr. Perkins's Orthometer.

Pl. 2.

Fig. 1.

Fig. 2.

Fig. 3.

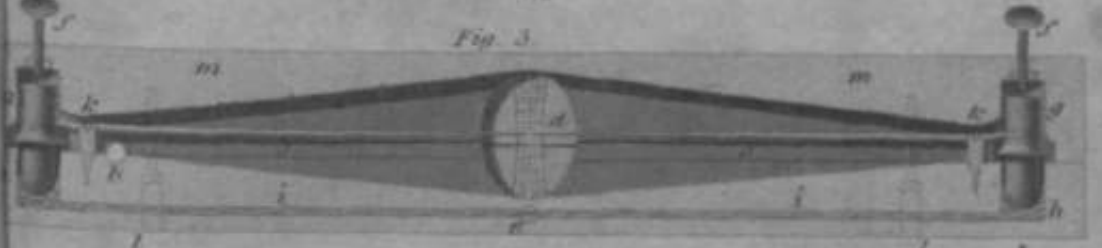


Fig. 4.

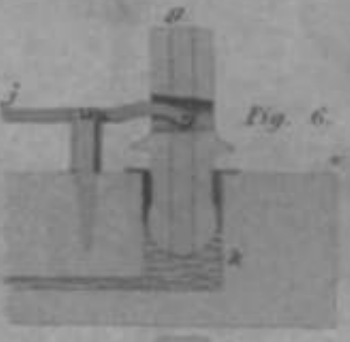
Fig. 5

Mr. Perkins's Thermometer.

Fig. 7.

Fig. 8.

Fig. 6.



Figs. 9 & 10.

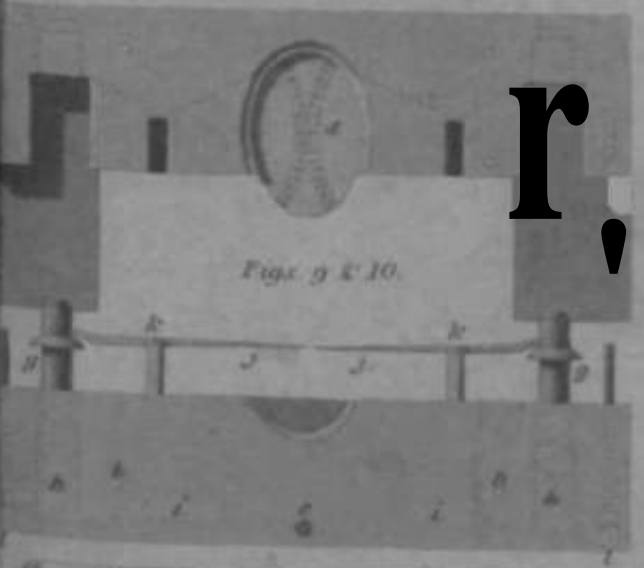
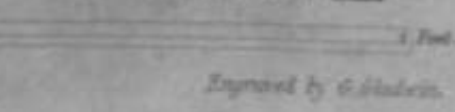


Fig. 11.

Fig. 12.



1 Foot.

Drawn by J. Thomson.

Engraved by G. Hudson.

Fig- ^> section showitig, on a l.arger scxlc, the regulating stop-cock, *c.* The perforation is made conical to allow of more accuracy in its adjustment.

Fig. 5, bottom part of fig. 3.

Fig. 6, section, on an enlarged scale, of part of the Orthometer, showing one of the index hands j, :md floats *g,* resting on the quicksilver in the vertical tube *h.*

Fig. 7, front view of the Pleometer; *a a,* front plate* *h by* screw pins to t ix the instrument to its plact ; e, re^ulating stop-cock ; *d d>* index plate showing the careen of the ship.

Fig. 8, end view of the Pleometer.

Figs. 9, and 10, view of the Pleomcter, the upper and lower parts of the case inclosing the machinery being separated ; *g g,* floats for raising and depressing the index hands *j j* j *kh*$_y$ vertical tube containing quicksilver; r, regulating stop-cock; *t t*$_t$ horizontal tube connecting the vertical tubes *k h; k* A, fulerums for the index hands ; *d,* index plate; */ I,* connecting screw _pins.

Fig. II, section of one end of the Pleometer, and of part of one of the index hands on a larger scale*; g,* the float resting on the quit ksilver in the vertical tube A ; these floats are hollowed to admit the rods *n* to play therein, and preserve the parallelism of the motion of the floats in the vertical tubes *h h.*

Fig. i2, screw of the regulating stop-cock *c,* full size ; o, conical apeiture, through which the quicksilver flow B in its passage from one vertical tube A to the other : by turning the screw more or less, the flow of the mercury is regulated so as to partake of the mean motions of the vessel, but not to be continually agitated thereby ; and, by turning the screw *t* a little more upwards than is shown in fig, 4, the small conical hole will be entirely closed, and the flow of the mercury prevented.

N° X

FIRE-ESCAPE.

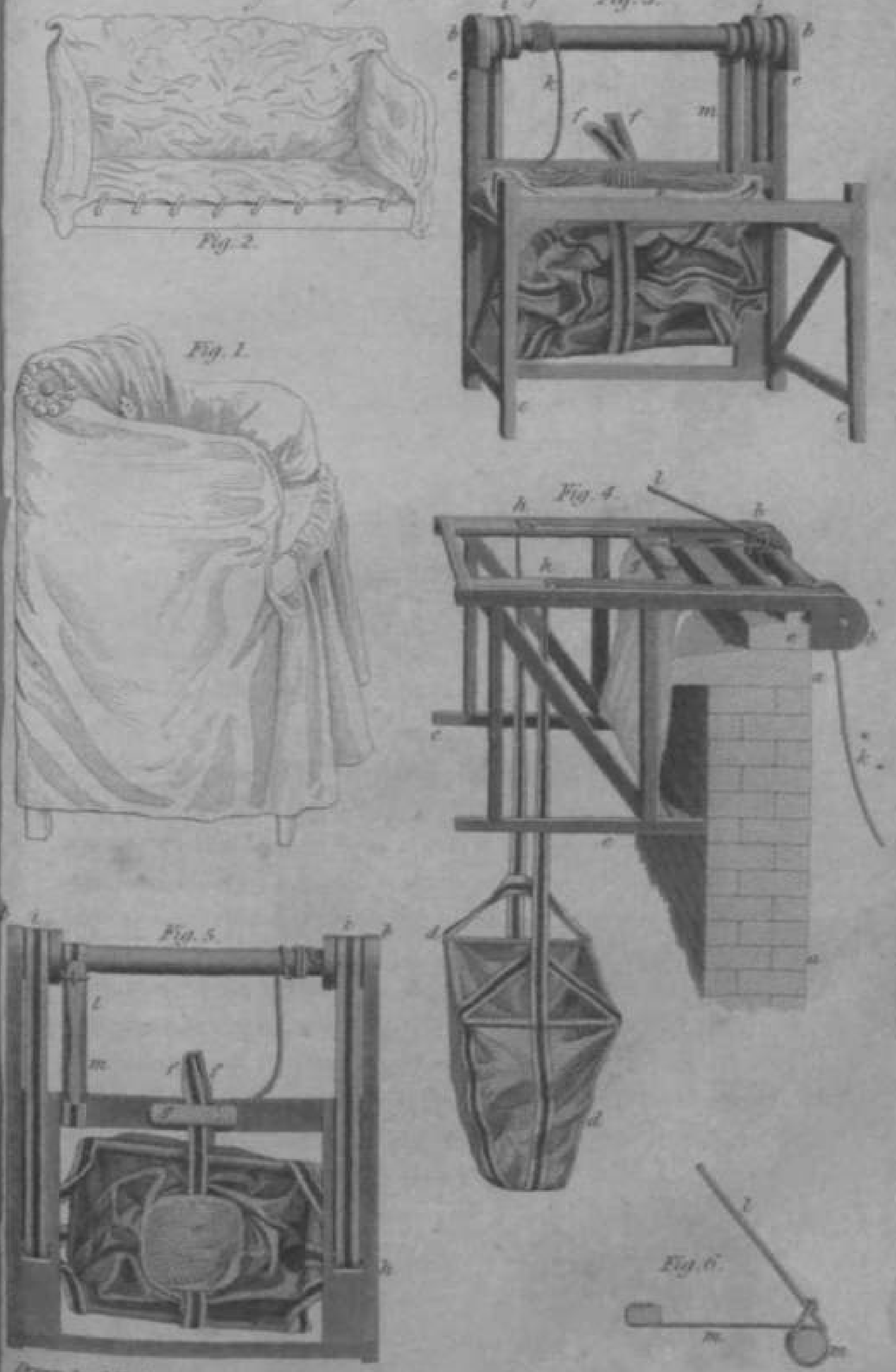
The sur *EN GUINEAS was this Session given to Mr.* GEOR<E ADAMS WITT v, *of i'rances Place* ***ffolloicay, for*** *a Machine to fa* ***effitate*** ESCAPE FROM A HOUSE ON FIRE. ***A m****odel of the Machine is placed in the Reposit<yy of the Society.*

Mr. WITTY's fire-escape reset:bles, when folded up$_T$ a small settee, being furnished with arms, cushions, and a cover, all of which are easily remove a!ilc, and have nothing to do with the machine when used as a fire-escape, Implemei:ts of this kind are generally unsightly, and not applicable to any ust except that for which they were primarily intended; the natural con-se<jiience of which is, that they are put out of the way and neglected, so that when wanted on a sudden emergency, they would prol/ably not be forthcoming. It is this consideration which has iml uced Mr. Witty to convert his lin-escape into an elegant and convenient article of furniture, tlle nutural]osi-tion of which would be the recess of a window in a bed-chamber, wlich is the]recise place where .n case of fire, it would be most convenk ntly used. Plate VI, fig. 1, exhibits the in-strument in this state.

Fig. 2 is the seit (without tl:e cover) as removed from the

Pl. 6.

Mr. G. M[illegible]y's Fire Escape



Drawn by C. Varley. Engraved by G. Gladwin.

chair fig. 3, which is uoi ready to be put out of the wind ow; fig.4represent- it hanging on the nindo* cill, like the pain^crs macliine ; *a a,* section of the wi ndow cill and wall; *b b* and *t* c, the chair or machine; the top *b* £, which hooks on the window cill, ha» iron points at *t* c, which, sticking *n* the cill, preven: the r>ssibility of an• aocidi nt moving it ; *d d* is the bag shown hanging in its plac*, fig. 4, but packed upin figs. 8 air 5, by means of two straps//, which aft fixed at the bottom of the bag, and squeeze tightly urn!er the springing piece of vood *g;* these are pushed ou t and the bag falls between the frum- in:o its place,as fig. 4; the ba^Ukept open by being made fast to a strong frame, and well secured by gir:h-web, which passes under it, and by which it hangs; these webs go over rollers at *h* h_y and pass on to the end of the upper roll er *i i,* vhereji sufficient quai tity is coiled round to reach fronj the top oi the house to the bottom. When a person gets tnt y the bi ig, it begins to descend, as in fig. 4, and as the web uncoils its-elf from the rollers r *i,* it causes Ihe flexible rope *k* to wind round the mi dle part of the roller t *i;* a person within the room lays hold of thu rope to pre\ent the IOO rapid descent, and if that is not cnoti gh, the handle of the br< ak or regulato» / is raised by him, Fig. 6 shows the roller tin section, with the web m m_t wrapped raund h, and tightened by the lever *l* of the breal ; the rope *k k* is folded up, and lies at the b.ck of the chair undci the sec:, as in fig. 3, when not in use.

In case of alarm of fire, tal e off the seat and cover by the two arms and throw it entirely away from you, it then appears as ilg. 3 ; pull the chair over tow ards you as it stands, and lift the scat part through the window, the top *b b* which contains the roller i i catches withinside the cill of the window-frame, as fig. 4 ; the chair adjusts itself instantly on the same principle as the painter's machine, and requires no kind

1

of fixing or fastening whatever, but is perfectly ready for a person to descend, which may be done from a four-story window to the street, in half a minute from the time of getting out of bed. To rescue a family, one person will manage it for the whole. Observe, on putting the machine out, a rope *k* falls at your feet, which winds on the roller as the bog descends; when one person is down, draw the rope, and the bag ascends for another, or two or three chSdren may descend at once ; each descent occupying aboul^peminute, afamily of twelveperxonsmay be saved in as many minutes: at the right-hand end of the roller the break or regulator, by merely lifting which, you will prevent the too rapid descent of a great weight; but this is not of importance, as the same may be done by the rope, but not so easily as not affording so much purchase on the roller. "When all are down but the person who conducts the machine, he will enter the bag, taking the rope *k* with him, and let himself down; after which, should any one appear at the window, he may. while in the street, draw the bag up to them and let them down ; should the bag ever be destroyed after the first descent, the rope (which is a patent one) may be thrown out, and being held by a person at a distance, a descent may be iit tempted by sliding down it; and should both fail, in the greatest extremity four persons might sit on the machine outside the window, thus affording time to bring fire-ladder tor their relief. In many of the awful calamities that have happened by fire, it is to be lamented thye has been no means I ig women and children. The construction of the escape-chair will be found so secure, that the most aged or helpless person that can be got through the window, may be saved by it; and so simple in its opcratiou, that arty grown person, male or female, will find no difficulty in die use of it,

Frances-p Holloway. GitofccE ADAMS WITTY.

face,

N" XL

STOVE FOR VENTILATION.

The Thanks of the Society t.rn *this Session voted to Mr.* JACOB PERKINS *of Flut-street, London, for his Method of* WARMING AND VENTILATING ROOMS.

Tnis communication may be considered as a continuation and improvement of that, by the same candidate, which gained the large Silver Medal of the Society, and is inserted in the last volume of the Transactions, p. ?>0. The principal improvement indicated in thatcommunica:ion is the introdu<tion of an abundant supply of external air, which, by a very simple apparatus, is brought in contact with the outer surface of the stove, and .is thus raised to a moderate and agreeable temperature before it is poured into the rom n.

In the present plan the horizontal air-trunk remains as before; the stove itself has undergone -••••• modifications, ecabling the operator to produce at plat sure an ascending or descending draft through the fuel, by nvans of the latter of which, the &mokc is wholly consumed. The chimney of the stove is surrounded by a vertical air-trunk, fitted with valves in the proper places, by means of which the heated air Jttay be distributer at plcasure to one or more upp<r floors.

This plan, which theoretically appears very sound, has been carried into practice, on a large scale, with perfect success, at a printing-office in the Old Bailey, in the occupation of Mr. T. C. Hansard, where the ordinary means of producing the required heat, by two fires in each room, had proved insufficient.

The moderate original cost of the apparatus, the considerable saving in fuel, and its very general applicability to workshops and drying houses of every description, have induced the Society to give it a place in the present volume.

Reference to the Engraving of Mr. PEACOCK'S, Warming and Ventilating Stove, Plate VII.

FIG. 4. section of the stove; *i*, the mouth in which the fuel is put: *k*, the lid or valve to shut it; *l*, the grating hinged at the back, and held up in front by the iron button *m*; *n*, the ash-pit, which is quite close, all but the opening *o*: this is opened and the lid *k* shut while lighting the fire; but when this is done, and the flue *p p* has become warm enough to produce a draught, the valve *o* is shut, and the valve *k* opened more or less, to supply or regulate the draught, by which means the smoke is effectually consumed; the lower part of the flue *p* is spread out at bottom nearly as wide as the stove (as seen in the plan fig. 5); *q q* is an air-trunk supplying fresh air from the outside of the house; this is directed by an iron screen *r r*, so as to impinge on the flue of the stove and be effectually warmed as it passes in; *s s* is a hood or trunk surrounding the flue; this draws in much of the fresh air, and conducts it, still hot, through the ceiling into the next floor by the opening *t*, as shewn by the Arrows; above this opening is

M.r S. Lake's Hinge. M.r J. Perkins's Stove. Pl.1.

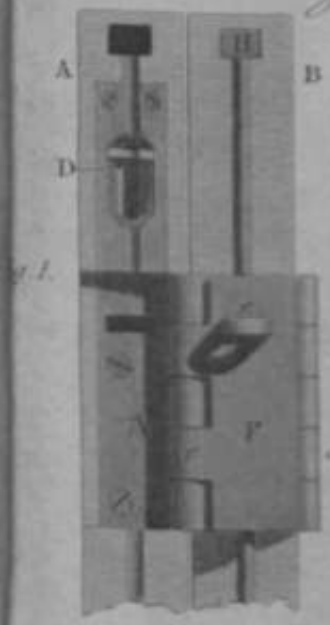


Fig. 1.

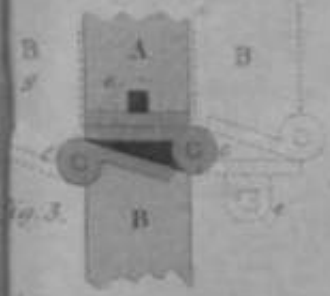


Fig. 3.

Fig. 2.

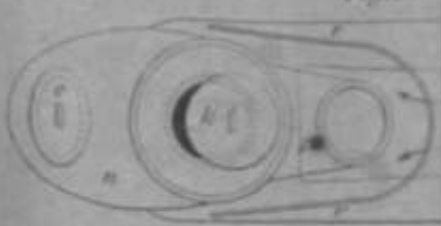


Fig. 5.

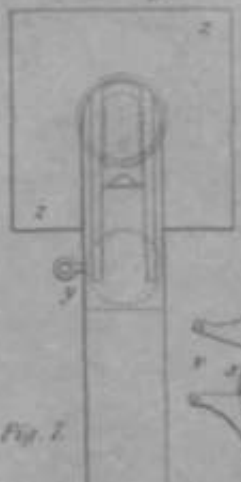


Fig. 7.

Fig. 8.

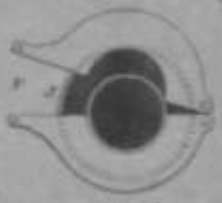


Fig. 6.

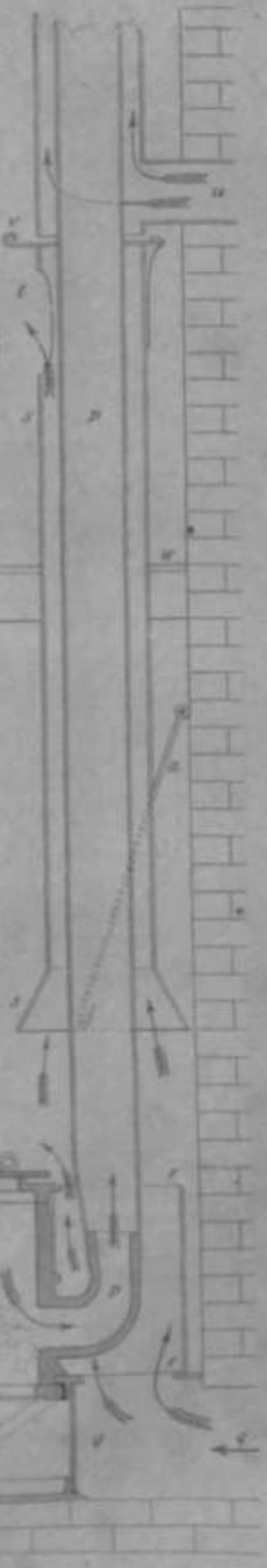


Fig. 4.

a register r, to stop the air from continuing its course to tha third floor; or, if there is too much in the second, to let a portion escape to the third floor (a bird's Eye view, fig. 5, shows this register partly open); when the register r is closed another current of fresh air comes in from without through a second **air-trunk** u, and continuing its ascent, comes out warmed at *s* *, fig. 7, into the third floor; *w w*, fig. 4, is the floor of the second room, and *x x*, fig. 7, the third room floor, *y* is a grating or partial thtmper; it prevents the passage of lighttl shavings or paper into the **chimney,** and is shown separate, fig. 8; *z z*, an iron plate through which the elbow passes into the **chimney ; then** is an opening in the elbow, with a sliding cover; *a a,* figs. 4 and 7, are hooks of iron rod to bear the weight of tin trunk *s s*.

N° XII.

DOUBLE DOOR-HINGE.

The small or VULCAN SILVER MEDAL *of the Society was this Session voted to Mr.* SAM. LAKE, *of Alfred-Place, Bedford-Square, for a* DOUBLE DOOR-HINGE, *a Model of which is placed in the Repository of the Society.*

MR. LAKE was employed by Sir J. Lubbock to make a door of communication between two rooms, so as to answer the following conditions: that the door be hung on a single jamb or post, that it be divided into two leaves, so that the outer one,

when necessary, may be folded back flat to the inner one, by turning either to right or left at pleasure, and that the leaves may, on occasion, be fastened together so as to act as a single

W.

These conditions are fulfilled by Mr. **Lake's** Door-hinge, and the same contrivance is obviously applicable to a window-

srhuttcr.

Reference to the ***Evgrsviag,*** Plate **VII,** Figs. 1, S, 3.

A D, the middle style of a double-margined door; F, the hinge having two joints e e, and consequently three flaps, by which the door will fold on either side, as represented by the dotted lines B on one side, and B *g* on the other side (fig. 3) ; D, the bolt which, when pushed down, shuts into the staple « on the middle flap, and thus fixes one of the joints : the hinge then acts as one on the common construction, and will fold only on the side B *g ;* then, by sliding the bolt H (fig. 2) on the top of the door, the double hinge is prevented from acting, the two leaves are secured together in the same plane, and the door opens as a single one, moving only on the hinges attached to thedoor-p< st.

Figs. 1 and 2 are elevations; fig. 3 •> a horizontal sec*.,ion through the top of ***thf*** hinge,

Figs. 1 and 3 are ½ of the real size.

N° XIII.

SETTING CUTTING INSTRUMENTS.

The Thanks of the Society were this Session voted to GEORGE REVELEY, *Esq. of Queen-square, London, for a communication on the use of Soap instead of Oil in* SETTING CUTTING INSTRUMENTS ON A HONE.

Queen-square, Bloomsbury,
January 8th, 1821.

oil*I

I BEG to communicate to the Society of Arts, for the benefit of the public, a new method of setting razors by substituting soap instead of oil. Not having any oil to set my razor, it occurred to me to try the soap I was washing with, called palm soap, and I found it completely to answer my purpose, that I have constantly used it ever since, instead of oil, both for razors and pen-knives. It sets quicker, gives a good edge, and removes notches with great facility; it is a more cleanly material, oil being liable to drop on and soil anything it comes in contact with; dust will frequently get into oil, which will spoil the edge, and in such case it must be changed. It is as cheap or cheaper than oil, a small square of palm Map costing only three pence, which will last for a great

length of time. The operation is performed as follows: having first cleaned your hone with a spunge, *smy.* and water, wipe it dry ; then dip ihc soap in some clt.n soft water, nid wett:ng als*0* the hone, rub the square of soap lightly over it, until the surface is thinly covered nil aver ; then pro*ceed to set in the usual way, keeping the soap suffu iently moist, and adding from time to time a little more soap and water if it should be necessary. Observe the soap is clean and free from dust before you 1 rub it on the hone; if it should not be so, i is eas'v\y washed clean ; strop the raaor after setting, and also again when you put it by, and spunge the hone when you have dane •with it.

I ;un, 5ir,

A. Aikitu £ *sq.* *&c.* &c. &c.

Secretery, &c. &c. GEO. REVEI.EY.

Queen-square, Bloomsbury,

SIR; **February £tlh, IS**21.

I HEREWITH send Certificates respecting mymethodofsetting razors, which also includes workmen's tools; the £ut thereby estibtishcd of setting qutcker, ia important, as one-fourth in time gained by those who are employed in setting a considerable number of razors, &c. is an object both as to convenience and in saving expense ; the excellent state in which it keeps the lmin\ is alt" an object both in respect to cleanliness* and the advantage of its surface beiing kept in a better state for action than when oil is used. With respect to nov<elty, I *avjg* can say I never beard of any eme It having used it, or received any infonn«'jtion from any one on the subject of setting •with soap previously to my making the cotnn;unication to the **!?ocicry, nor can I learn, on inquiry, that it is known to** the

public. You will have the goodness to communicate the contents of this letter, and also of the certificates, to the chairmen and the gentlemen of the Committee of Mechanics.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.

Secretary, &c. &c. GEO. REVELEY.

CERTIFICATES.

SIR; 9, **Bonrell-court,** Queen-square.

I HAVE tried Mr. Reveley's discovery, and am of opinion that the use of soap for the setting of razors, is preferable to that of oil, because they are set quicker, and I think much better; *besides,* the operation of setting may be performed with a greater degree of cleanliness.

I have set the razors in the following manner: those marked X are set with palm soap, those marked \ with common soap, and those marked / / with oil.

A. Atkin, Esq. WM. WEST, *Razor-maker,*

Secretary, &c. &c. *and Working-cutler.*

SIR; Poultry, February 22th, 1821.

AFTER repeated trials of Mr. Reveley's method of setting razors with soap and water, instead of oil upon the hone, I am of opinion that it is much more cleanly and ijuicki,r in producing the required edge, and certainly better calculated for the travelling case of an amateur of that useful art.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.

Secretary, &c. &c. W. H. PEPYS.

GENTLEMEN; sir, Hollwn, Feb. 43n, 1821.

Being an invalid prevents me the honour of attending your Committec this eveuiug, on the subject of Mr. Kcveley\ employment of soap instead of oil for setting razors, &c.

Aftor having i;ade repeate J triaU of this new mode of setting razors, I am in candour bound to give it my support; for many purpascs it is equal, and in some t think it is superior to the finest oil commonly used for setting cutlery, and edge tools in general.

I am. (Gentlemen,

&c. &c. &c.

RICHARD LLNG.

55, Southampton-Row,

SIR; Feb. 8th, 1821.

Tom the convenience-and advantage which I derive from your kind communication, as to the use of soap in lieu of oil, I beg you will be pleased to accept my sincere thanks, I have almost daily sone fresh instance of its utility. My workmen assure me, that in Ketting th cir tools, they can do it both quicker and better than with oil.

And in point of cleaniiness there is certainly no comparison between the one ntitl the otl[1]er. Until you kindly infbmed me of t:iis use of soiip, our oil-stone had been a continual nuisance, pcrp*tually c!auhing and injuri ng one article or anothi r; but by the adoption of your plan, all this inconvenience has been complete!;. remo od.

By wit'.ely communica ling this truly useful discovery, I am convinced, Sir, you would be rendering an essential benefit t o a great number of mechanical trades and would have many thankful acknowledgments from those who arc at present unacquainted with it.

I am, Sir,

&c. &c. &c.

ISAAC FREWER, *Saddler.*

In addition to the preceding letters and certificates, it is only necessary to *stnt%* that both Mr. West and Mr. Pepys made trial of Mr. \\cveley's method in presence of the Committee and to their entire satisfaction.

The saving, in point of time, observed by all who have made comparative trials of oil and soap, will probably be accounted for from the following considerations: If a blade of steel is drawn along a dry hone, certain parts of the hone will be found to be covered by a thin film of steel, abraded from the blade, and adhering so firmly to the hone, as to prevent its action in the parts thus covered. Having removed the film of steel by means of a pumice stone, and dropping a little oil on the surface of the hone, it will now be found that the abraded particles of steel are suspended in the oil, which thus becomes discoloured, while the whole surface of the hone continues to act on the oil, except where, from the irregularities of the stone or the oblique position of the blade, a thin stratum of oil happens to be interposed. In this case, the tenacity of the oil preventing it from yielding readily to pressure, the blade is apt to slide a considerable distance before it again comes in contact with the surface of the stone. The tenacity of soap and water is by no means equal to that of oil, though capable of holding the abraded particles of steel suspended in it, hence the quantity of effective cutting surface of the hone is increased.

N° XIV.

CUTTING THE DIVISIONS ON CIRCULAR ARCS.

The large SILVER MEDAL *was this Session voted to Mr.* JAMES ALLAN, *of Blewitt's Buildings, London, for his method of* CUTTING THE DIVISIONS ON CIRCULAR ARCS.

In the Session 1800-10, Mr. Allan received the Gold Medal of the Society for his Mathematical Dividing Engine, in which, besides other peculiarities of construction, his method of cutting, correcting, and equalizing the teeth of the rack, which forms the periphery of the circle, attracted particular notice and observation, not only on account of its novelty, but because it seemed better calculated than any other mode hitherto practised, to insure the utmost possible accuracy of division. A description of this method, with an explanatory plate, is inserted in the 28th Vol. of the Transactions of the Society. The soundness of the judgment thus pronounced by the Society, was most satisfactorily and agreeably confirmed by the Board of Longitude, who, after a very careful examination of the instrument itself, and of its performance, as compared with that of the most celebrated dividing Engines, granted to the ingenious inventor, in 1820, the sum of one hundred pounds, as a testimony of their approbation.

The Society, concurring with the earnest desire of the inventor (now unfortunately no more), to give to the public all the peculiarities of construction by which his Dividing Circle is characterized, have now completed their purpose.

The present paper therefore contains a description of the apparatus attached to the cutter, by which the necessity of bounding arcs for regulating the length of the divisional lines, is avoided; and secondly, of the apparatus for stopping the tangent screw, so as to prevent the possibility of any overrunning of the teeth composing the circular rack, and therefore of obviating any inequality from this source in the divisions cut by the engine.

In the usual way of dividing circular limbs of mathematical instruments, the cutter is moved by the hand of the artist, and therefore, to insure the proper length of the lines, three bounding concentric arcs are first described, within which the lines are placed. But even this precaution is not sufficient, unless a magnifier is attached to the cutter, so as to enable the artist to see its point while he is moving it. The consequences of this are, first, a great attention on the eyes from the constant use of the magnifier, and secondly, a great loss of time, not to mention that, as the longer divisions necessarily pass through the intermediate bounding arc, the point of intersection is destroyed, and the other parts of the line, and the cutter is liable to have its point injured by the kind of trip thus occasioned.

The cutter of Mr. Allan's engine is placed in a kind of cradle-frame, the motions of which are limited by stops actuated by pressing the fingers on two small treadles, by means of which, the length of the lines is regulated with the utmost precision; while an equal depth in the lines is insured by placing ring weights on the cutter, so as to supersede the necessity of pressure by the hand. This contrivance, though

new in its application to the division of arcs, appears to have been in part and occasionally made use of by the late Mr. Harrison, in dividing right-lines.

CERTIFICATES.

10, Newcastle-street, Strand,
March 14th, 1821.

SIR;

In compliance with your *wish,* I send you my **opinion** of your new method of cutting mathematical divisions, which I have no doubt is superior to any other hitherto in use; I feel myself justifiable in saying; thus much, in consequence of the satisfaction the Theodolites and Sextants you divided for me have given. I do not mean your lines of division, tain, so nearly in their true places; that has already very justly been noticed and rewarded by the Society of Arts, and Board of Longitude; **the** present business is your method of cutting those lines, which, in my opinion, does not admit of a question; for every person must, and does **know**, that when a point cuts lines with a weight or load upon it) the lines will have a greater degree of equality and sameness than **when** done by the guess and pressure of the hand; the good effect of which is, that the minutes and seconds are much easier read than when there is any inequality in the cutting. I consider likewise that your omission of circular lines is an improvement, because your lines are so exactly of a length that they become a guide themselves, which in point of effect has a more delicate and mathematical appearance, the circular lines being of no other use than a boundary to the divider.

I remain, Sir,
&c. &c. &c.
J. Coulless, *Mathemaiical Instrument-maker.*

SIR ; London, May 2IH), 1820.

HEAHIXC you intend to become a candidate for an additional honorary premium from the Society of Arts, on the subject of your improvement of Mathematical Instruments, I have much pleasure in being able to state, from very considerable experience, the superiority of your method of dividing the limbs of sextants, circles, *&c.* with uniform delicacy of line, and without circular sweeps.

Your Sel£correcting Dividing Engine had formerly insured equal division, and your application of equal pressure in cutting the degrees and minutes, makes every line, and all the lines throughout, of such uniform strength, that I never found any dimculty in reading off the arch to a greater nicety than the vernier was cut to. Thus, in an instrument made to show the arch to 15 seconds, I seldom had any difficulty in ascertaining whether it was one-half, or one-third that quantity more or less ; and in your pocket sextant with tangent screw, cut to 30 seconds, which I have used on many occasions, I could, by taking a mean of 5 sights, determine the sun's altitude, or the moon's apparent distance from the sun or a star to 10 seconds, or less.

Wishing you all the success which your various improvements richly met;

I am, Sir,

&c. &c Je

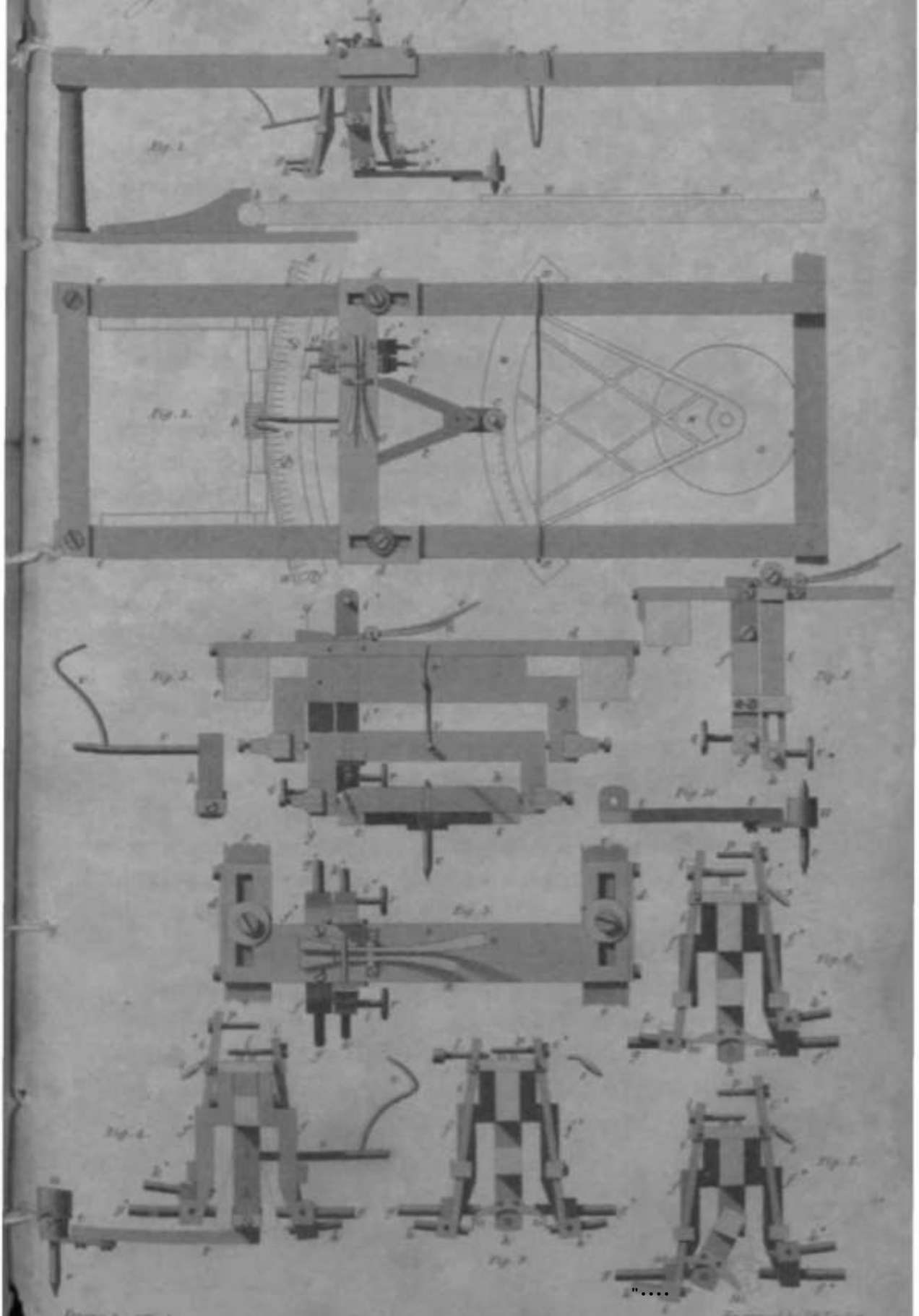
Jo, TAYLOU, *Chaplain of II.* if. *S. Spacer.*

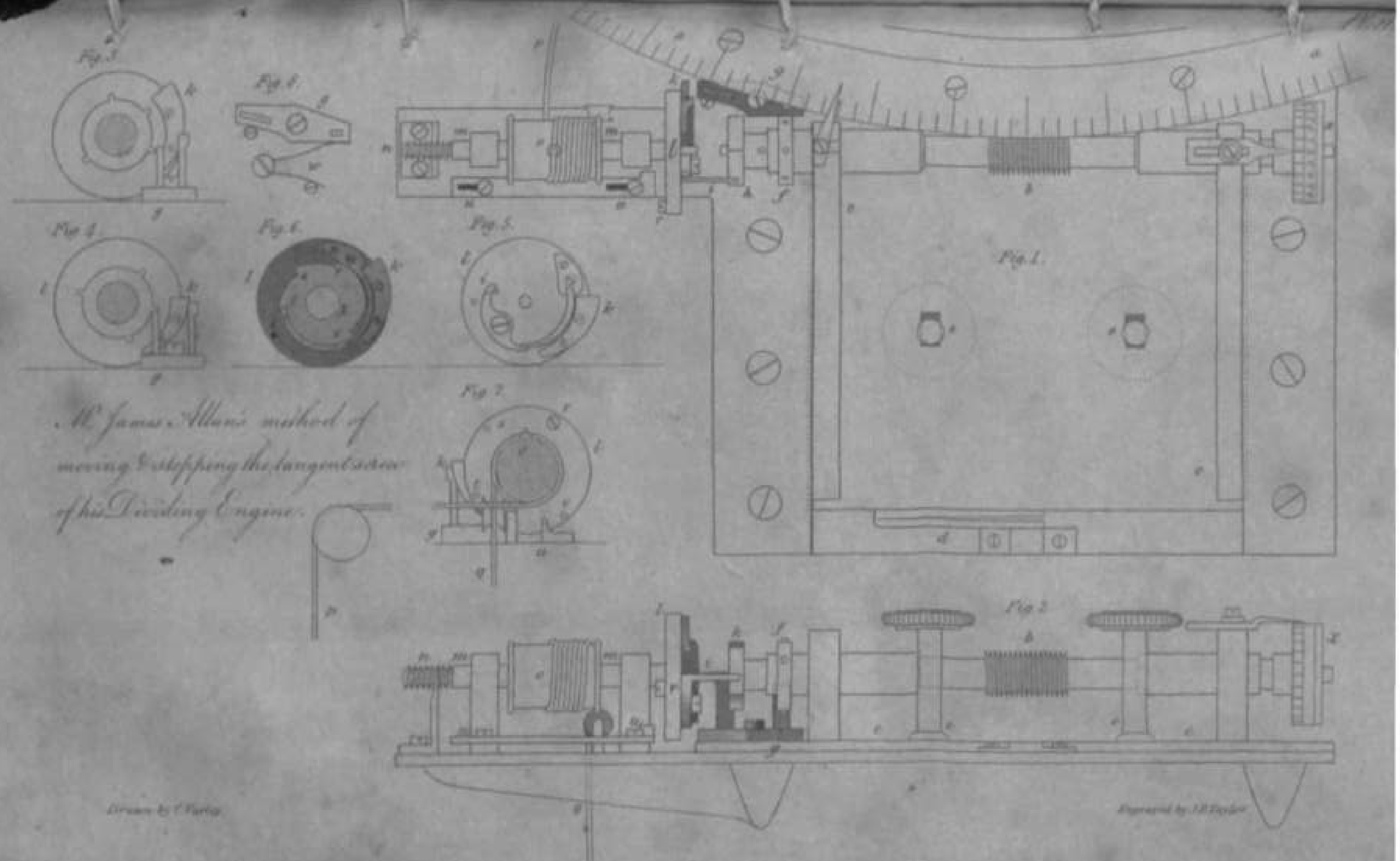
Reference to Mr. JAMES ALLAN'*s method of Cutting Mathematical Divisions, by which the concentric bounding circles are omitted,* Plate 10.

IN figures 1 and 2, *w w* is a sextant, in the act of being divided, it is laid on the upper surface of the dividing plate (part of which *da* It shows), its centre coinciding with that of the dividing plate; *b* is the tangent screw, which, actuated by a cord and treadle in the usual way, and forking in the teeth on the edge of the dividing plate, gives a definite motion to the latter at every descent of the treadle, equal to the required distance of the divisions on the sextant, which are marked by the conical pointed cutter *c*. This cutter is suspended in a sort of framing. secures the true radial direction of the lines marked by it; and the motion of such framing, or elbow-joint as it is termed, is limited by mechanical means, so as to govern, without the application of the workman's eye, the different lengths of lines required to mark the values of the angles they comprehend, as degrees, or minutes, or any quantity of either. The apparatus for this purpose is suspended from a flat bar *d d*, lying across two long bars *e e*, elevated above the dividing plate at one end, by turned pillars, and resting at the other on a transverse bar. The several parts are detailed on a larger scale, that is, one-fourth the real size, in the remaining figures. Fig. 5 is an elevation of the elbow-joint, supposed to be taken looking from the left hand (see figs. 1 and 2) towards the sextant. Fig. 3 is a plan, or bird's-eye view of the same, in which the elbow-joint is concealed by the flat bar before described *d d*, which, it will be seen by the grooves and screws in its ends, has the power of being moved in the direction of the bars *e e*, to accommodate the point of the cutter to the varying radii

Pl. 10.

M.r J. Allans method of cutting Mathematical Divisions.





Mr. James Allan's method of moving & stopping the tangent screw of his Dividing Engine.

Drawn by C. Varley.

Engraved by J. B. Taylor.

of the instrumcnt to be divided. Figs. 6, 7, 9, arc sections of the elbow-joint taken on a line, which may be imagined to pass through the letters *i i,* in figs. 3 and 5, and looking in tht same directton as in the elevation, fig. 1. Fig. 4 is a section taken on the line *g y,* fig. 5, and looking in the opposite direction. In fig. 5 it will be seen, that beneath the bar rf, are suspended three separate pieces of the general form i——I; the upper one is secured to the liar ; the two lower ones arc hung on screw pivots, so that the lowest has perfect facility of motion in the direction of the radius of the dividing plate, whether horizontal or atherwise, but not die least lateral shake To the lowest are attached two arms (((see figs. 5, 2, and 4), which meet in a point, at the extremity of which is fixed the cutter *c.* Fig. 10 represents the arms (*t,* and the cutter detached. These parts, comprising what is called the elbow-joint, ore in common use, and by the action of the pivot-joints, permit a limited, but amply-sufficient extent of motion in the cutter. The lengths of the lines are governed in Mr. Allan's engine by means of various stops, which limit the swing oJ the middle portion of the elbow-joint; in g. 1, fi his portie-a will tx seen to have reached the limits of its motion towards the right, ind in fig. 7 the sectiort of it ift described at its greatest reoen towards the left; in fig. 4, A is the same thing, but not in sectton, as will be understood from referring to the line *y y* in fig. 5, which will be seen to cut only the upper piece of the elbow-joint» aiid that in the thinnest part, **rhieh** will account for the different appearance exhibited * a fig. 4, from that ii the other sections. Against the sides of the upper \mce of the olbow-joint, and at its left extremttT, that is, immediately over the return of the middle portion, are fixed pieces *f* and *f,* one on each side ; their forms are best identified in the darkly-shatled parts of figs. 7 and 9 : in fig. 6, the lower part of

the left-hand one is omitted, for the suite of leaving the other ports mere distinct. Through the lower ends of the pieces *f f'*. pass two pins *g* and *g'* whose projections may be adjusted and fixed by thumb-screws, shown at y, in figs. 5 and 8. Tru pins *g*- and g^f limit only tht extreme motion of the gimbals ; the intermediate lengths are determined by puppets, *k ami k'* \assing through the lower ends of two inclined pieces, or tumblers *i* and/'. It must be mentioned, that although there arc two tumblers *i*, and *i'* ml two puppets *k* and *k',* only one of each 1B in action at a time, and either may be removed out of the way of the elbow-joint; as those Marked i' and *k',* aie seen to be, m all the figures, except fig. 9 ; with that e\ceptton, *i'* is described as greatly elevated, and retained by the pin », which passes through it, and hangs it on to the bar *d.* The tumblers *i* i' slide up and down in staples, the lower staple to each tumbler being screwed to the pieces *f f*\ and the upper uiies on the opposite edges of the har *d* (see fig. 8). A pair of metal horns *m m* are attached to the elbow-joint for the purpose of stopping against the puppets *k* k_s' whose projections are adjusted ami secured I by thumb-screws r, as described, to the pins £•§•'; tl;e inner extremities of *k k'* are nntclied. or stepped, so that as the Jiorns mm', which stop the gimiraU for the short lines, are received above or below the diameter, the length of the line is greater or less, by **exactly** the depth of the notch, or step; the requi-»te elevations of tile puppet k_7 for this purpose are given by two keys *n* and o, rcsemblin;,' flute keys, placed on the bar d_f which play against the under side of the screw pia /, in the head of the tumbler i; pressing the key », raises *k* to the height shown in fig. 6, wliile the key o would place it as shown by iLe dotted lines in the same figure ; thus two lengths of lines are obtained; nov let both keys drop, *k* will sink below the elbow-joipt, as in fig. 7, and the elbow-joint will

go on till it stops against the pin *g*, making a third length; but in order to permit this, an aperture is made in the tumbler *i'* immediately above the puppet *k*, through which the horn *m* passes (see figs. 7 and 8), the latter of which (fig. 8) represents one of the pieces *f*, and the tumbler *i*, with their pins, puppets, and thumb-screws as removed from their place in fig. 5, where the three screw-holes for attaching them may be seen. It must not be forgotten, that during this time, *i'* and *k'* have [illegible] out of action; the motion of the elbow-joint to the right having been in every case stopped by the pin [illegible] lengths of the divisions are required to vary only [illegible] because the variations in the present case (dividing a [illegible]) are on one side, which [illegible] the si[illegible] the centre; but in dividing [illegible] the remote [illegible] instrument, [illegible] elongate [illegible] the nonius for[illegible]wards the centre, to accomplish which, the pin *s* is to [illegible] tumbler *i'* a[illegible] the pin *p*, [illegible] falls upon the keys [illegible]; the pin *l*, in the head of *i*, being previously withdrawn, [illegible] will [illegible] the state of fig. 9; *g* is now the [illegible] stop to the left, and the lengths to the right are [illegible] out, the thumb[illegible] and puppet *k'* drop down, governed by *i'* and *k'*, precisely as already described, in the other direction by *i* and *k*. The motion is given to the cutter, in either case, by the handle *v v*; and the uniform strength of the lines is secured by using any number of ring-weights, as *u*, figs. 4 and 10, with which the cutter is loaded, and which communicate all the requisite pressure. The advantages of these modes of acting on the cutter, namely, by the handle *v v*, and the ring weights *u u*, are, that the hand of the workman is removed to a considerable distance, and the risk of communicating a lateral pressure, or a tremulous motion to the cutter, wholly avoided. A piece of wire *x* *

(see figs. 1 and 2) is suspend^ from the bars *e* «, and serves to rest the cutter in when out of action.

The pin /), in the head of the puppet /', and the thumb-screws <*f* and r, are omitted in some of the figures, to avoid confusion.

Reference to the Method of moving and stopping the Tangent Screw of Mr ALLAN'S *Dividing Engine*, Plate VII.

FIGS. 1 and 2, *a* «, part of the dividing plate; *b,* the tangent screw which gives motion to it; *c* c_f a sliding **plate,** which, acted on by the spring (/, presses the tangent screw against the rack, on the edge of the dividing plate; *e e,* screws which fix the plate c, in the place to which the spring impels it, and prevent any unequal action of the spring. Before describing the manner of actuating the tangent screw, it will be requisite briefly to explain what is the defect in the old method, which this invention is intended to obviate; and the engraving here given will assist this object, as far as the parts of Mr. Allan's machinery correspond with those generally used. In figs. 1 and 2, a long mandril is seen extending from « (a screw) at one end to *x* (a micrometer head) at the other; this axle, or mandril, *a* in two parts, that is, the different portions are detached from, and move independently of each other. The one part is a continuation of the tangent screw, and comprises all the part from *h v* < *x*; the other portion extends from *n u* >, and to this it is that the motion is first given from a treadle attached to a line *q*, passing several times round the barrel *o*, and then returning A a counteracting weight, attached to the other end of the

lit)' p, after passing over a pulley (see fig. 7). By means of a ratchet wheel and click, when this part of the axle is moved, by depressing the treadle, it carries the part containing the screw round with it; but when it returns, by the action of the counter weight, the click slides over the teeth of the ratchet, and the tangent screw stands still. Certain contrivances are attached to the mandril m m, which stop its motion at certain points, and consequently regulate the quantity of revolution communicated to the tangent screw; but it will be evident, that although the mandril m m cannot go forward without carrying with it the tangent screw, the latter can proceed without the Former; and this it is always inclined to do, in obedience to the impetus previously given to it, which the friction of the tangent screw will not in every case overcome. Hence arises an obvious source of error, which is avoided in the present contrivance, by placing the machinery (which stops the revolution of the mandril and the screw in their progress forward) in connection with the axle of the tangent screw itself.

Imagine now the part m m to be revolving, not by the descent of the treadle, but by the return of the counter-weight, in which case the driving-wheel / will move from *k* towards *r*; the motion will consequently be from *r* to *k*, when the treadle descends, and when the tangent screw is moved. Revolving then from *k* towards *r*, and the screw *n* working in an upright, seen in fig. 2, the whole mandril must recede towards the left, till at last it has receded so far, that the head of the screw *r*, in the back of the driving-wheel, strikes against the sliding bar *s s*, which is attached to the main frame of the instrument, and which having grooves in it, may be made to change its position, and to permit any determinate number of revolutions (limited only by the number of the threads in the screw *n*) to be made by the motions

m m, before the screw r shall come in contact with the end of the piece z, and stop what is here called the backward motion of the mandril, in distinction from the forward motion in which it carries with it the tangent screw. The movement, when the barrel o is impelled by the descent of the treadle, is communicated from m m to the tangent screw, by a pin *i*, called the driving pin, which takes into the ratchets of the wheel *h*; but it must be observed, that it is not merely necessary to limit the number of whole revolutions made; it is required most frequently to take portions of a turn, or any number of whole turns, and a certain portion of another, as a half, one-third, or two-thirds; therefore, three of the four teeth which are in the wheel *h*, divide it equally, and the fourth bisecting one of these divisions, the wheel is divided also into two. The wheel *f* has four pins, called stopping pins, projecting from its circumference, distributed exactly as the teeth in the wheel h, excepting that they are on the opposite halves of the wheel; or, for example, supposing that the pin which bisects one of the spaces formed by the other three, was at the extremity *f* (see fig. 1) of the horizontal diameter of the pin wheel, then the notch in the ratchet wheel, which in like manner bisects one of the spaces formed by the other three notches, would not be at A, but diametrically opposite, and for this reason, because the driving pin *i* always acts on the wheel *h*, at a tooth directly opposite to the stopping pin, which is made to terminate the motion of the screw forward. There is a piece *g*, partly concealed in figs. 1 and 2, and shown separately in fig. 8, which turns round a screw as a centre, has a spring *w*, which plays against one of its ends, and which has proceeding from its upper face (see fig. 2) two perpendicular projections, the right-hand one to receive and check the pins of the stopping wheel, the left-hand one (by means to be hereafter described) to cause the piece *g* to turn on

its centre, and advance the stop at the proper period, under the pins of the stopping wheel. Fig. 5 shows the wheel which carries the driving pin tl[illegible]ached; *i* is the driving pin attached to a piece moving on [illegible] centre, and retained in its place, that is, in contact with the ratchet wheel *h*, by a spring, which allows it to clear the teeth in returning; *k* is a snail screwed to the fece, and *y*>jecting [illegible]KYond the drcumfcrenci of the wheel. As Ui[illegible]e wheel *l* advances to the right, by the action of the screw n, t\[illegible]e snail *k* at last come> in contact with tho left-liantl p:ojection, from the piece g, ca[illegible]uses the latter to turn an its cet[illegible]tre, and advan[illegible]ccs the other projection, or the stopping piece under c»ne o[illegible]* the ;[illegible]ins of the stopping wheel *f*; fig. 4 describes the snail and the piece *g* exactly in this state; fig. 5 shows them just previous to the commencement of the snail's action. Which of those four pins in the wheel *f* shall stop the motion, and by consequence how large a portion of a circle shall have been completed, whether a half, or one or tvo-thirds, or v[illegible]hether no fraction shall \w *mc*\[illegible]uded, is determined as toll[illegible]ws: the sc[illegible]rew r, in the bai[illegible]k of the wheel *l*, which was [illegible]iescribed as limiting the returning motion of the mandril m m, > received into a hole, of which there are four in the wheel, and in[illegible]to either of which *r* may be inserted; these holes divide the circle like the stopping pins and ratchet-teeth alrea[illegible]dy described; they are shewn in fig. 7, *r*, *s*, *t*, and *v*, the screw being in *r*. It is evident that the alteration must be made *b*\ changing the situation of the s[illegible]rcw in t[illegible]hese holes, because the snail must necessarily finish its course in contact with the piece *g*, that is in the situation described in fig. 1 and in fig. 7; and in this latter figure it will be seen, that when the snail is so situated, the hole *v* has just cleared the piece *u*; if therefore the sc[illegible]rew wa- in this hole, the mandril «<[illegible]uld make whole revolutions; if placed in *r*, it would add a third; if in $_f$ a half, if in *t*, two-thirds; the value of these portions

Botanic Garden, Calcutta,
July 18th, 1819.

SIR;

I HAD the satisfaction to receive your favour of the 23rd December last, a short time ago, and I cannot better express the sense which I entertain of the honour conferred on me by your Society having elected me a corresponding member, in the room of my lamented friend and predecessor, the late Dr. Roxburgh, than by hastening to submit to their consideration the result of some inquiries directed towards a very interesting object of agriculture, I allude to a sort *of* mountain-rice, cultivated in Napal, at such elevations, and under such vicissitudes of climate, as to render it extremely probable that it may become acclimatized in the north of Europe. I received it during the last fortnight from Mr. Robert Stuart, resident at the court of the rajah of Katmandu, to whose indefatigable zeal and exertions this valuable discovery is entirely to be attributed. As all the information which I am able on this occasion to present to the Society is derived from his correspondence, I beg leave to subjoin some extracts of his letters to me on this subject, not doubting that I shall have it in my power, at some future period, to offer from the same source a more full account of the soil, temperature, and elevation of the countries where the grain is produced, and of the cultivation and nature of the plant itself. In the mean time I take the liberty to send you a sample of the rice, having previously satisfied myself of its goodness by soaking some of it in standing water, during the operation of which process it began to sprout in less than three days from its immersion. I have likewise addressed several of my correspondents who are residing at Allmorah, Sirinagur, and other countries contiguous to the Himalaya Mountains, on this important subject, and the information which I expect from them will, I trust, be superadded to the prospects held out from Napal, will ailbrtl

me ample matteT for future communications, which I hope may not prove unacceptable to your Society, notwithstanding the unpromising results of the experiments which were made some years ago under the direction of Sir Joseph Banks with a similar sort of rice, obtained by Sir John Murray from Sirinagur.

In the course of another month I propose doing myself the pleasure of transmitting to you, for the purpose of being laid before the Society, a quantity of the common Napal paper, produced from the bark if some sorts of Daphne, described by me in the 13th Vol. of the Asiatic Researches, about to be published, together with a sale of the dried entire stems of *urtica tenacissima* of Roxburgh (caloe hemp), in order that they may, if it should be deemed fit by the Society, be submitted to the operation of the ingenious apparatus of Mr. Lee, and of Messrs. Hill and Bundy, adverted to in the 33rd Volume of their Transactions, and in the 8th, 9th, and 10th numbers of the Journal of Science and Arts.

I cannot conclude this address without requesting, that you will assure the Society, that nothing will ever contribute more to my happiness than to be able occasionally to afford my humble mite to the grand object contemplated by them, and that I shall exert myself to the utmost, with a view of submitting from time to time, such matters as I may hope will not prove altogether unworthy of their consideration.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.

Secretary, &c. &c. N. WALLICH, *Superintendent.*

Extracts of Letters from M-. HOBEET STUART, resident at Nipal, to Mr. WALLICH, Superintendent of the Botanic Garden, Colatta, respecting Mountain Itict.

June j;th.

THS minister has ft jar of grain, which he tells me grows on the Snowy mountains, by which I understan1 him to mean, the mountains beyond the northern barrier of the valley, not those covered with perpetual snow. I hasten to forward :or your inspectio.1 a small pan.el of this, and beg of yew to let me know what yoi think of it. 1t resembles a si«cies of rice; it certainly is raised in i pretty cold climate. As it has just come in, I have not had time to mate mtnu:e inquiries regarding it; but if the information I may receive prove in any degree fiV tering, I will send you a good supply of it, together with .11 the particuiars that I can collect.

June 19th.

I HASTEN to communicate to you the few particulars which 1 have learned regarding the mountain rice, a parcel of which was forwarded to you. It is cultivared in considerable abundance, I am told, among the mountains of Jumlah, which are situated to the northward of the province of Dotee; and it was introduced from that quarter a few years ago, and sown among our northern hills. That which I have received was brought from the Jageer of Devie Bhuggut, a distance of four days journey from Katmandu. The seed is first steeped for three days in jars of tank or rain water, and then removed into bags of gunny or matting, where it is kept in a moist state till it shows signs of vegetation, when it is sown in kliets, previously prepared for thr purpose. They lay some stress on the use of

tank water, for steeping the grain in, alleging that the water *ui'* the *taoui* tain streams is to *ocoid* for the purpose; the same is to be used in occasionally sprinkling the grain to keep it moi it in the bags. When they have once succeeded in raising it a few inches from the ground, they consider themselves secure of tru crop, as a tall of snow does not then injure it. You will remark tbi this rice in ilif husk has a reddish tinge, which it preserves in some degree, I think, when boiled. It is large and fat; though sweet in taste, it is of so inferior a quality, that the people in this part of the country know little about it; and I have not evoi been able to learn from them tbe name given to it in the hills: the use of it, I fancy, is entirely confined to the inhabitants of them. It is, however, certainly worthy of attention, and i will not neglect any opportunity of getting more correct infonnation regarding it. The minister has politely oficircd to procure for me a small quantity of it from the Jumlah Hills; and I am about to send some people to the hills above Gossain-Than, where both rice and wheat are cultivated, in order to see if there be any difference in the grain.

Botanic Garden,
September 2nd, 1819.

SIR;

In continuation of my letter of the 30th July, I have the honour to inform you, that the indefatigable exertions of the resident at Napal, Mr. Robert Stuart, have brought to light some further interesting particulars respecting several kinds of grain produced on the stupendous mountains of the Northern Hindoostan, which I hasten to submit to the Society, in the annexed extracts of the letters from that invaluable correspondent.

As it may be interesting to the Society to be furnished with some particulars respecting the place whence two of the

sorts of rice, as well as the wheat, have been procured, I beg leave to submit to you the following account, which I received last year from my highly esteemed friend the hon. Edw. Gardner, late resident at the court of the rajah of Napal: "The general direction from Katmmndu of Gossain-Than, or, as it is more commonly called, Neel-Khaunt, is very little to the westward of north. Sitimvha, a village noted by Kirkpatrick in his account of Napal, is placed in his map almost at the foot of the Himalaya; and as Gossain-Than is said to be thirteen cuss beyond, or to the northward (or N. E. perhaps) of Itamcha, it is inferred, that it must be situated within the snowy range; from which circumstance the height or elevation of that place may be tolerably well estimated. The distance from Katmandu, which is calculated at forty coss, it is to be remembered is not the horizontal, which does not probably exceed one-third; the remaining two-thirds, or something less, being allowed for the windings of the (lathwnys, and the continual and very considerable ascents and descents, which constitute a road in these mountains. As an additional reason for supposing that Gossain-Than is situated within the range of the Himalaya, it appears to be nearly on the route to Keeroo (one of the principal passes into Thibet), which place is to the north of the Snowy Mountains, and is usually reached by a traveller from Katmandu, I believe, in less than ten days, difficile it takes seven days to get to Gossain-Than, which would therefore, to be about three days journey to the south of Keeroo, the probable distance of the Himalaya south of that place."

As soon as the rice which has been obtained from the Sean mountain head, the mountains of Jumlah, arrives here, it shall directly be transmitted to you; in the mean time I have thought it my duty not to defer addressing you this letter, together with the later dispatches to which it refers, not

doubtui g, that the hi;/ly meritortous mid successful researches of *my* excellent friend Mr. Stimrt, who has brought to iight such important ,1:ticles of intioducrion into the united 1.ing-<iom, will **meet** with the approbation of the Society.

I take this opportunity of informing you, that I have sent a quantity of common Napal paper in bundles, each containing 100 sheets, in a chest of dried specimens of plants.

I am, Sir,

A. Aikin, Esq., &c. &c. &c.
Secretary, &c. &c. N. WALLICH.

Extracts from Mr. ROBERT STUART'S *Letters continued.*

July 11th, **1319.**

I AM sorry that I cannot at this moment odd to tht information respecting the mountain rice; but I have taken means to procure w!at is nec«?ssary. It is little known to the inhabitants of the valley, and we labour under great di>advantages tin ;act under great difficulty), in getting correct information regarding any thing beyond our reach; I hope, therefore, that you will not attribute the delay to an[1], indifference on my part, either to the subject or your wishes, for I will take the earliest aid th> best opportunity of supplying **that** is wanting. That the rice is raiscd at a great elevation, in spots covered during some months with snow, I cannot doubt; and thr.t it grows in spite of sno*m* appcani probable from the foregoing circumstances. I mentioned, I think, in my fornaer letter, that the precarious part of the cultivation is in raising it fro;n the ground, lest frost ;inil si.ow shou id arrest and il estroy it; but that all anxiety is at an end, when it has fairly risen two or three inches high. A stall <\santity which I planted in our garden by wa y of experiment, has sprung up rapidly. I

have just transplanted it, and will see what sort of grain it will yield.

July 16th.

SINCE my last letter, forwarded on the 11th, I have had the pleasure to receive your letter dated the 1st and 2nd instant, with a paper containing an account of the experiments made in England, on the rice from Sirinagur. With regard to this subject, it appears to me, that the hopes entertained of success were too sanguine. Sirinagur, though certainly an elevated and cold climate, compared with Hindoostan, is still but the threshold to these countries, and cannot be spoken of in the same terms as the mountains of Hindoostan, called Jumlah, which form part of the continuous snowy range, or even to the spot from which the rice forwarded to you was procured. It is probable therefore, that the grain of the one may differ essentially from that of the other. I have no doubt of the accuracy of the account given to me, that it is raised on the elevated and snowy tracts alluded to; but in case of any mistake, or for fear the grain introduced into a milder climate should degenerate, the minister has promised to procure me some from Jumlah; but owing to the distance and the season, some time must necessarily elapse before I can receive it. Be assured I shall not relax from my endeavours to sift this question thoroughly, so that the fairest trial for the introduction of that grain to England may be given it.

July 21st.

I TOLD you I had sent an exploring party to Gossain-Than, and had given them orders to inquire, and procure some of the rice cultivated in that quarter, and also specimens of it in flower and grain. Two of the boys returned yesterday,

wH)I some young pines and other plants, and said the iiiU rice was not yet above a foot and a half above the .ground. They are, however, instructed to procure it, as well as the wheat raised b\ the Bhooteahs, which is represented to be different from any known here. You shall be informed of the resvlt.

August 2nd.

I HOPE in time, to gain more satisfactory accounts respecting this interesting article, and, at the same time, some fresh grain from the fountain-head, viz, the Jumlah Mountains. These seem to be a continuation of the snowy range, and are subsequently lost in the lower mountains of Dootee. By the account of the natives, they are perpetually covered with snow. They are laid down in the best maps between the 29th and 30th degrees of latitude, whereas Sirinagur lies somewhat above the line of 30. But the elevation of the former must be much greater, I imaLine, than the latter, and the climate vastly different; at all events, the trial is very well worth making. My people have returned from Gossain-Than, and have brought me small quantities of three different sorts of grain, two of rice, and one of wheat, raised in that quarter. No. 1 is the rice (mountain rice) formerly sent to yo No. 2 is rice from Gossain Than, which is sown in the month of July, and must consequently be subject to cold, if not to frost or snow, before it can come to perfection. No. 3 is rice from Gossain-Than, which is sown in the month of May. The rice khets (or fields) are made on the sides of the hills, partly in level spots, partly in terraces, and of course abundantly watered from above. No. 4 is wheat from Gossain-Than, which is about to be sown the end of this or the beginning of next month. It remains in the ground ten months, and is cut and collected in Jeth and Asser, that is in June. It remains stationary (or

its progress is scarcely perceptible), during the frosts; it springs up with the Spring, and comes to Maturity in the warm months. This is the account given to me by the people, and I give it to you in the same terms. It is of course imperfect, but it is the best procurable in our situation, and we must make the most of it.

August 17th.

The minister has not forgotten his promise to gratify me with specimens and supplies of rice from Jumlah; and I really think, from what I learn, we may be sanguine in our hopes of doing something with this supply, even should that which I before sent you fail. There are two kinds, and both different from that which I originally forwarded to you. I inclose a small portion of each, in order that you may distinguish the kinds, on the receipt of the heaves which I shall hereafter send to you. I have an immense quantity of it, and only wish I could provide you by wholesale. No. 1 is called Kala Marsee, and No. 2, Munsurra.

The former is esteemed the best rice, and is called the "Usl," or original grain of those hills. It attains a great bulk in the process of boiling, and is considered sweet and excellent by the natives.

No. 2 is also rice of good quality and colour; they both came from Jumlah, where, as I before observed, the hill rice is cultivated in elevated and exposed situations. The soil is spoken of as inferior to that of the valley, but still rich. The cold is sufficiently indicated, by the summits of the mountains being, I believe, perpetually covered with snow. I could learn no difference in the mode of preparing the khets, from that observed in this quarter; and in the general mode of cultivation, I have nothing to add to what I before communicated. The precaution of steeping the seed in standing

water, untill it commences to germinate, is still insisted on, mil they repeat that, if you succeed in raising the plants a few inches from the ground, no injury is to be apprehended from frost or snow.

V WALLICH.

Botanic Garden, Calcutta,
December 19th, 1819.

SIR;

I HAVE great satisfaction in announcing that my friend Lieut. W. N. Forbes proceeding to England on the Boyne, has been so obliging as to take charge of three sorts of rice from Gossain-Than, in Napal, a place of vast elevation, and the most rigorous Winter. There are three sorts or varieties, respecting which, however, I have hitherto not procured any information, except that the dark-husked grain is called Dhan Mooya; the palest sort Dhan Mokya, and that which is the intermediate in colour Dhan Sittara.

Secondly, specimens of five sorts of Daphne paper, manufactured in the vicinity of Katmandu, communicated by my indefatigable friend Mr. Robert Stuart, from whom I have also received the preceding grains.

Thtrii ly, specimens of Daphne paper, which have been sent to me by my highly esteemed friend Sir Robert Colquhoun, irom the province of Dhotee, to the eastward of Kemaon, where he is in command of the provincial battalion.

Fourthly, some papers of recent Sirinagur onion-seed,* also communicated by Sir Robert Colquhoun. Their produce is of a very large size, and superior flavour.

Fifthly, at the top of this box, as also occupying the whole of box No. 3, a number of panicles of a very interesting sort of Guinea-grass (*Andropogon cernuum* of Roxburgh—Sorg- of Wallich), with the seed, which was produced

* This seed has not been received by the Society.

this month in my garti[illegible]n fa[illegible] number of plan[illegible]ts, reared from seeds in Ja[illegible]luary [illegible]f this year, which I had reci[illegible]ived from my valuable assistant at Sylhet, the late M[illegible][r. M. R. Smith. In order to put you in possessi*[illegible]n of [illegible]he best information I can pa[illegible]sibly procure on this subject, I do myself the pleasure to give you the following extract from the manuscript *Flora Indica*, of Dr. Roxburgh :—

"This speci[illegible]ts or va[illegible]riety of sorghum, is the kind cultiva[illegible]ted by the inhabitants of the Monipare, Kachee, &c. mountainous districts, immediately east of Bengal. The grain is milk-white; son[illegible]e of it was sown i[illegible]n the Botanic-garden at Calcutta, in the early part of th[illegible]e rainy season of 1812, and by November the plants were from ten to f[illegible]fteen feet high, with sev[illegible]c-ral ramous stems fr[illegible]am the same root or g[illegible]rain of seed; all the joints of the lower half of the or[illegible]iginal si[illegible]ems, which are as thi[illegible]ck [illegible]n» a slender walking cane, throw out copiously verticils of roots; the low[illegible]at ones, near d[illegible]e soil, enter it, and give additional support and DO[illegible]urishment to the plants, which are of two or more years duration, if suffere[illegible]\ to [illegible]ri[illegible]main. The leaves are from twenty to forty inches [illegible]ong, [illegible]by two to three broad, soft and sriooth. The grain is the staff of life of those wild savage mountaineers, who inhabit the a[illegible]DOW[illegible]. [illegible]mentioned countries, where it is one of the few articles cultivated by th[illegible]cm: cattle are fond of the straw, or rather canes."

Three large bales, containing entire stems of the calooe hemp, noticed in my former letters, will be shipped by order of government, on the Hon. Com. Ship Carnatic, about to leave this port in a fortnight hence, when I shall have the plea[illegible]sure to address you more fully on this matter.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.

Secretary, &c. &c. N. WALLICH.

Botanic Garden, Calcutta,
SIR; January 20th, 1820.

I HAVE now the satisfaction of informing you, that the caloee hemp alluded to in several of my preceding letters, has been embarked in three large bales, by permission of government, on the Hon. Com. Ship Carnatic, which will leave Saugur Road in a couple of days.

Bales No. 1 and 2 contain each 2,500 entire stems of the caloee hemp-plant, (*Urtica tenacissima*, of Roxburgh—*Nivea* of Willdenow—*Romium majus* of Rumphius), cut during the month of July last.

Bale No. 3 contains the bark peeled off 300 entire recent stems, immediately after being cut in July last. I have likewise added in this bale about 200 entire stems of Roxburgh's *urtica pulcherrima*, a charming large shrub, or rather small tree, of very rapid growth and easy cultivation. Although the fibre of this nettle is far less strong than that of the other, yet, I have thought it not entirely unworthy of being brought to the notice of your Society, especially on account of the two last-mentioned properties, which it possesses in a very eminent degree, those of rapid growth and easy cultivation. The various interesting papers on the caloee hemp, published by the late Dr. Roxburgh, have so completely exhausted the subject of its cultivation and management, as to render it entirely unnecessary to trouble you with any detail in these respects. I shall, therefore, conclude by saying, that Captain Blanchard, of the Carnatic, has most politely taken charge of a small package, containing specimens of a superior sort of Daphne, or Set Burroon paper, manufactured at Lohoo Ghaut, in Kali-Kumaon, to the eastward of Almorah, by a jamadahr of captain M'Harg's battalion. They were sent to me by my friend Sir Robert Colquhoun, who commands at Al-

morah. In the hope that these dispatches may reach you in safety, and prove acceptable to the Society,

I am, Sir,

A. Aikin, Esq., &c. &c. &c.
Secretary, &c. &c. N. WALLICH.

Botanic Garden, April 15th, 1820.

SIR;

I BEG leave to inclose a bill of lading for a small box of **Mountain** rice, supposed to be from Gossain-Than, in Napal, (proceeding on the Essex, Capt. Marshon.) **The greater portion** below is called Hewjahkecwah, that above Hakoomarsevra. It was sent to me with a quantity of other sorts of rice, by my late friend Mr. R. Stuart, whose unexpected and untimely **death** it is now my mournful duty to announce to the Society. In that excellent young man this garden has lost a most valuable friend and contributor; and if, as I most anxiously hope, some of the dispatches of cereal grains, which I have had the honour of presenting to you since July last year, should be found of any value, it is to the **unremitting** zeal and attention of my lamented friend; that I feel indebted for such a success. It is, however, a source of great satisfaction to me, to be able to assure the Society, that my excellent friend, the honourable Edward Gardner, the resident at Napal (having lately returned to Katmandu) will feel happy and proud to promote the objects in view as much as it is in his power; and I take this opportunity of earnestly requesting that I may be honoured for that purpose with the specific desiderata of the Society; the more so as I am preparing for a voyage up to that highly interesting country.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.
Secretary, &c. &c. N. WALLICH.

Botanic Garden, Chelsea,
SIR; Nov. 6th, 1821.

Ten packets of Napaul Corn-seeds you were pleased to send me for trial last November, have produced a very pitiful return, but this in some measure may be ascribed to the very cloudy Summer we have had. In March we vegetated the five sorts of rice, all very well, except Jurmassee; of this there were only three plants succeeded. We followed your directions with one part of the seeds, and sowed the other part in pots, placed in pans of water; and it was in your way that Jurmassee vegetated: probably in that way debilitated seeds are less exposed to comiptive matter, than when put into the earth at first. I intend to try small seeds this way, as well as in pare sand, with little moisture, as I am assured, that old seeds coming in contact with putrid bodies in the mould, perish when the vegetating power is too faint to resist the deleterious matter. The Andropogon is a large tuft of grass, but does not yet show flowers. The wheat has produced very good seeds, but not to be compared with the worst of the cultivated sorts; but we expect a better return next year, having sowed these new seeds as they ripened last month. The rices did all very well while they remained in hothouse heat; in May we placed them in the green-house where they became stout healthy plants; and in the end of June we planted five sorts in a well-sheltered bason of nine inches of water, and 12 of mud, where the Zizania, or Canadian rice thrives well: the four other parts we planted in a bog.

Those in the bason of water grew, and promised well, till the beginning of August, when the weather became cloudy and cold; soon after they gradually became yellowish and sickly, and were all dead by the beginning of September: those that, thence I suppose planted in the bog never looked healthy

the >rater to be the more steady temperature, from its greater power of attracting and *n*taining the daily influences of the sun.

To the above I must ad*i, that I have made many trials of rice seeds from America, China, and Persia, but never -,uc~ cccded with any but one, brought from the higher parts of the river Missouri, in N. W. America, by Mr. T. Nuttall, in 1816. The two warm Sumruew if 1817 and 1818, had raised a hope of consigning it to the attention of the thrmtr ; but this expectation was blasted when at its height, for in 1819 the harvest was so bad, that we just saved seeds sufficient to so-, in 1820, when it totally failed.

I take the liberty of sending you a pot of a species sent me this last spring from Moscow, *where*, if I understand Dr. Fischer aright, it is cultivated as a corn ; but I did not try it in the open ground this year; and if I have better success next year, I shall be happy in communicating the result.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.

Secretary, &c. &c. WILLIAM ANDERSON.

SUPPLEMENT.

MR. NAPIER'S TRACING INSTRUMENT.

A DESCRIPTION and figure of Mr. Napier's Tracing Instrument are inserted in the 37th Vol. of the Society's Transactions, p. 6[illegible] On examining the description there given, some inaccuracies have been detected, the correction of which, in the opinion of the Committee, would be more satisfactorily made, by re-publishing the description so amended, than by a mere list of *corrigenda*.

[The reader is requested to correct a trifling error in the engraving of the instrument: the screw under fig. 10 is by mistake called *h*, instead of *p*, to which it may be easily altered with a pen; it will then agree with the other parts of the engraving, and with the references in the description.]

This instrument, which is intended for making copies of drawings, or prints, either direct, or in reverse, is described [see Plate 5, Vol. 37] in a plan, fig. 1, and an edge view, fig. 2, remarking, that in the former, it is prepared for making a direct, and in the latter, for a reverse tracing of the drawing, or print. It consists of a flat board, or frame B C D E, fig. 1, divided by a cross-bar X, into two portions, one of them, A, to receive the original, and the other, F, to contain the paper

for the copy. When, however, the tracing is to be the reverse of the original, the paper is fixed by the sliding springs M M, to the underside of the frame E! I K L, fig. 1, or HI fig. 2, which falls turning on the joints at D and E, immediately over the portion F, of the larger frame; the end I 1., supported by two screw-pins *i i*, to which, by means of nut, may be gi\en any requisite degree of elevation; the joints on which the frau e H I K L turns, may also be depits sed, or elevated by similar screws and nuts *i i i* (see the ami extremity H, fig. 2); at H and I are seen two of the nuts screws, which bind the ends of the springs M M, to the frame II I, wl ich latter, when not in use, falls back at a small froi n the perpendicular, and is therefore drawn foresh* rtened at II I K L, fig. 1.

The tract ing instrument consists of two long arms N N, O O, and four si horter, P, Q, R, S, forming together the two paralldograr s N O R S, and N O 1* ^> the \w. s comprised in thv latter, divided by equidistant holes, to idinit the alteration of its points of nv tion, and consequently to vary at pleasure the proper ions between the original and the tracing. Near the iin ersection of the arms R S is fixed the handle g, by which t he blunt-pointed pin *d* (shown also at *d h*, figs. 2 and 5) is guided over the lines of the drawing, or print. The pin *d* is not however fixed to the arms R S, or to the handle, but mo\es freely up and down in a tube placed at the junction of the Urn bs of the parallelogram, and forming the axis round which they move; this tube is described in section at fig. 5, together with t he piece projecting from its lower extremity, to which U applied, by a universal joint, the handle *g*. The pin is limited in its motion downwards, by its head *e*, and upv ards by the small cross pin *h*, and it is kept down to the paper by the spring *f*, attached to the limb R.

This spring, with a gentle and equable pressure, preserves

the ptuu in contact with the original drawing, notwithstanding the various degrees of elevation which are occasionally required to be given to the limbs of the parallelograms, either for maintaining the action, or the marking-pen or pencil *c*, or for overcoming any irregularities in the surface of the paper. The use of the spring will appear marc evident, from considering, that in using the instrument, u in fig. 1, for direct tracing, the hand of the artist must communicate to i me hither parallelogram a tendency to rise, in order that the marker at the opposite extremity may be kept applied to the paper; but while in use for reverse tracing, as in fig. 2, a contrary tendency must be produced; and it is plain, that without the intervention of the spring, the point *d* could not, under both circumstances, be maintained n CODU<t with the original. When it is required to pass from one part of the paper to another without marking, the handle need merely be acted on in a contrary direction, and the marker is immediately relieved. The pen or pencil is placed in a tube *c*, similar to that containing the pin *d*.

The joint placed beneath the intersection of, and supporting the two parallelograms, is constructed so as to allow the greatest facility of motion in all directions: it is shown in a plan, fig. 3, and a section, fig. 4, and its constituent parts are detailed in figs. 9, 10, 11, 12, and 13. The pieces figs. 9 and 13, stand at right angles to each other, and on opposite sides of the ring, fig. 12; and the return ends at *l m* n e being perforated, are applied by the screws T U V W to the ends of the radial arms *q*, *r*, *s*, *t*, fig. 12, the latter having concavities to receive the conical points of the screws, and thus forming altogether a universal joint; *u*, in figs. 4 and 10, is a spring, of which there are two, standing also at right angles to each other, the middle of the convex side of each spring bearing against the centres of the pieces *l m* and n *v*,

figs. 9 and 13, respectively, while the extremities of the springs play against the four cylindrical arms *q r s t*, radiating from the ring, fig. 12; these springs, by keeping the parts of the joint in a state of tension, prevent any shake in the centres of motion, and cause the instrument, when unbiassed by an extraneous force, to assume a horizontal position. In fig. 14, X is the cross bar of the main frame of the instrument; Y and Z are the nut and screw, by which the lower portion of the joint (the piece fig. 13) is clamped to it. N N and O O, fig. 8, are an edge view and plan of the central portion of the hinges, bearing the same letters in fig. 1, and to these are secured by the screws *k* and *p*, both received into one nut the piece fig. 9, which forms the upper portion of the joint; *w*, in fig. 4, is the section of the piece fig. 13; and immediately between the shoulder of the screw *p* and the piece *l m* is seen the section of the uppermost spring, nearly cut through, by the perforation for the screw *p*.

Figs. 6 and 7 represent the two moveable joints at *a b*, *a b*, fig. 1, which jwnnit the alteration of the size of the parallelogram, N O P Q, together with the screws, which passing through the holes in the limbs, retain them in their places but allow perfect freedom of motion round them as centres.

MR. HARDY'S TIME-KEEPER.

In the last Volume will be found a very detailed account of the Escapement, Train, and Pendulum of Mr. Hardy's Time-keeper, for which the large Gold Medal and Fifty Guineas were voted to him in the Session 1819-20. The subjoined account of the rate of going of two of Mr. Hardy's Clocks, one at the Royal Observatory Greenwich, the other at the Royal Military College, Sandhurst, will no doubt be both interesting and satisfactory.

Royal Observatory.

1820			1820		
Apr.	22 or 25	1.4 —	Aug.	26	1.4 —
	29	0.9 —		28	1.4 —
May	4	1.1 —	Sept.	2	0.9 —
	9	1.1 —		7	1.2 —
	12	1.0 —		12	1.3 —
	15	1.0 —		18	1.3 —
	19	0.9 —		29	1.0 —
	23	1.3 —	Oct.	3	1.0 —
	27	0.9 —		6	0.7 —
June	12	0.9 —		12	1.1 —
	25	0.9 —		17	0.8 —
	27	0.9 —		24	0.7 —
July	1	1.3 —		28	0.7 —
	6	1.2 —		30	0.7 —
	11	1.0 —	Nov.	2	0.9 —
	17	0.9 —		14	0.9 —
	24	1.1 —		17	0.8 —
	30	1.2 —	Dec.	7	0.9 —
Aug.	4	1.1 —		28	0.8 —
	8	1.4 —	1821		
	13	1.3 —	Jan.	29	0.5 —
	18	1.1 —	Mar.	15	0.5 —
	22	0.9 —	Apr.	9	0.6 —

Royal Military College, Sandhurst.

1820				1820.			
Feb.	17	0.6	+	June	23	0.	
	as	0.8	+	July	10	0.1	—
Mar.	1	1.0	+		17	0.2	—
	5	1.1	+		23	0.	
	8	0.9	+		27	0.2	—
	15	0.6	+	Aug.	1	0.1	+
	30	0.5	+		10	0.2	+
April	5	0.4	+	Sept.	1	0.3	+
	11	0.6	+		21	0.7	+
	20	0.3	+	Oct.	3	0.7	+
	as	0.			17	0.8	+
May	5	0.2	+		26	1.1	+
	11	0.1	+	Nov.	1	0.9	+
	21	0.1	+		4	1.1	+
	29	0.2	+		16	0.9	+
June	7	0.1	+		23	0.8	+
	12	0.2	+	Dec.	13	1.0	+
	15	0.2	+				

PRESENTS

p 1R E S E N T S

RECEIVED BY 'HIE soci ETY

FROM JANUARY 1821, TO DECEMBER 1821,

With the Names of the Donors.

*** The Presents from the two following Donors having been incorrectly uttered in the List contained in the last Volume, are reprinted, with the necessary corrections.

GEORGE REVELEY.

SPRAT's History of the Royal Society of London, 4to.

A Plan and View of the Chain find.ge erecting over the Menai at Bongor Ferry.

A Copy of the Declaration of the Independence of the United States of America.

WILLIAM WYON.

The Dies of the new large Medal of the Society, executed by him.

THE ACADEMY OF ST. PETERSBURGH.

Mémoires de l'Academie Imperiale des Sciences de St. Petersbourg, 5 Vols., 4to.

A. AINGPR,.

A Treatise on new Philosophical Instm: nents for vari*n_s purposes in he Arts and Sciences, with Experiments o a Light and Colouis, by David Brewster, LL.D., 8vo.

THE AMERICAN ACADEMY OF ARTS, &c.

Memoirs of the American Academy of Arts and Sciences, Part % oi Vol. 4, 4to.

TV E SOCIETY OF ANTIQUARIES.

Archaeologia, [illegible]

THE ASIATIC SOCIETY.

Asiatic Researches, Vol. 13, 4to.

JAMES ASPERNE.

The European Magazine, Vols. 78, 79, 8vo.

JOSEPH ATTERSOL.

A Sample of Sugar from Beet-root.

TiIE AUSTRIAN GOVERNMENT.

The Journal of rie Polytechnic Institution it Vienna, Vol. 2, 8vo.

TnE AUTHOR.

An Esc\y *m* the Politic;.l Economy of Nations; or, A View of the Intercourse of Countries, as influencing their Wealth, 8vo.

THE AUTHOR.

An Attempt to Analyse the Automaton Chess Player of Mr. De Kempelen. 8vo.

EZEKIEL BAKER.

Remarks on Rifle-guns, being the result of Fifty Years Practice and Observations. With Specific Remarks on Fowling Pieces, 8vo.

MAJOR-GENERAL BEATSON.

The Supplement to Major-General Beatson's System of Cultivation, 8vo.

JOHN THOMAS BARBER BEAUMONT.

An Essay on Criminal Jurisprudence, with the Draft of a New Penal Code. (A Pamphlet).

J. BISSET.

Twenty Medallions.

THE TRUSTEES OF THE BRITISH MUSEUM.

Engravings of the Ancient Marbles in the British Museum, Vols. 3 and 4, 4to.

RICHARD BROWN.

The Rudiments of Drawing Cabinet and Upholstery Furniture, &c.

M. I. BRUNEL.

Observations by M. Hachette, on the Electro-Mag-

netic Experiments of MM. Oersted and Ampère. (A Pamphlet.)

A. Burgess.

A Print of Lea Bridge.

William Crib.

Lexicon Technicum; or, An Universal English Dictionary of Arts and Sciences, &c. 2 Vols. folio.

T. U W. Dearn.

Hints on an Improved Method of Building; applicable to General Purposes, with Two Explanatory Plates. (A Pamphlet.)

Henry Earle.

On the Re-establishment of a Canal in the Place of a portion of the Urethra, which had been destroyed, 4to.

On Affections of the Meatus Auditorius Externus, 8vo.

Remarks on the Danger of Extracting Large Calculi, with the Description of an Instrument, intended to facilitate the breaking down Stones of considerable magnitude. 8vo.

The Editor.

The Magazine of the Fine Arts, No. 1, 8vo.

F. C. Frantz.

On the Management of Domestic Cattle, (*German*) 8vo.

Benjamin Golding.

An Historical Account of St. Thomas's Hospital, Southwark, 12mo.

PRESENTS.

T. HAYNES.

An Essay on the Soils and Composts indispensibly necessary in the Propagation and Culture of the more rare and valuable Ornamental Trees, &c. 12mo.

G. HAYTER.

1 A Proof of an Etching from Titian.

1

J. C. HERFIN.

Mémoire sur la Graisse des Vins.

THE HIGHLAND SOCIETY.

A Medal struck to commemorate the Victory of Alexandria.

THE HIGHLAND SOCIETY OF SCOTLAND.

Prize Essays and Transactions of that Institution, Vol. 5, 8vo.

ARTHUR HOWE HOLDSWORTH.

Remarks on the Steam Boat, addressed to Ship-Owners, Manufacturers, and Canal and Insurance Companies, 8vo.

THE HORTICULTURAL SOCIETY.

Transactions of the Society: Parts 2 and 3, Vol. 4, 4to.

JARDIN DES PLANTES AT PARIS.

Several Samples of Seeds.

CHARLES H. JENKINS.

Bonaparte, and the French People under his Consulate, 2 Vols, 8vo.

PETER LECOUNT.

A Description of the Changeable Magnetic Properties possessed by Iron Bodies, and the different Effects produced by the same on the Ship's Compasses, from the Position of the Ship's Head being altered, 8vo.

THE LINNEAN SOCIETY.

Transactions of the Society: Part 1, Vol. 13. 4to.

THOMAS MARTIN.

ZKTHMATA ΔIANOHTIKA; or, A View of the Intellectual Powers of Man, &c. royal 8vo.

A MEMBER.

The Method of Dividing Astronomical Instruments, by J. Bird, 4to.

Dr. Maskelyne's Account of the going of Mr. John Harrison's Watch, at the Royal Observatory, from March 6, 1766, to March 4, 1767, 4to.

A Perspective View of the Engine made use of for Sawing off, under water, the Piles which helped to support the Centers for turning the Arches of Westminster Bridge. (*Engraving, Folio.*)

Report from the COMMITTEE on the Highways and Turnpike Roads in England and Wales, folio.

S. AND G. NICHOLSON.

Nicholson's Lithographic Drawings, 4to, Part 2.

APSLEY PELLATT, JUNR.

Memoir on the Origin, Progress, k»U 111 provement of Glass Manufactures: including an Acc OUUt of the Patent Crystallo Ceramic, or Glass Incrustations, 4to.

JOHN PURDY.

Memoir, *Da--criptive and Expl MiMiny.* to accompany the New Chart of the Atlantic C•cean, and comj<rising Instructions, General and Particular, for the Navigation of that Sea, 8vo.

Memoir, Descri;tive and Explanatory, to i.ccomp;iny the General Chart of the Northern Ocean, Davis's Strait and Baffin's Bay, &c. 8vo.

.YAL SOCIETY.

Th< Philosophic• Trail sactions of the *h* oyal Society of London, royal 4to. Part \ for 1821.

PROFESSOR SILLIMAN.

The Am-riivm Journal of Scicno and Arts; Vol. 2; No. 1, of Vol. 3, 8vo.

JOHN SMITH.

A llanlk-rchief nlado from the Bark of a Tree, growing on the Banks of the Paragu ay River.

SIR JAMES EDWARD SMITH, M.D. F.R.S. P.L.S.

A Selection of the Correspondence of Linnæus, and other N«ural ists, 2 Vols., 8vo.

SOCIETY AT GENEVA FOR THE ADVANCEMENT OF THE AH Ts, &c.

Collection des Procès Verbaux des séances annuelles

tie la Société pour l'Avancement des Arts, remie à ses Bienfaiteurs et Bientai trices, 4to.

R. H. SOLLY.

Cobbett's Weekly Herister, Numbers 11, 12 and 15.

GENERAL THORNTON.

A Proof Print of the Portrait of Lioutenant-General Thornton.

DHASLITS WILLICH.

A Short Account of Lithography, or the Art of Printing from Stone. 8vo.

A CATALOGUE

OF THE

MODELS, MACHINES, SAMPLES, &c.

Received since the Publication of the Thirty-eighth Volume of the Society's Transactions.

In Manufactures.

SAMPLES of Matting made of the Typha Latifolia (or Bull-rush) from Mr. William Salisbury.

In Chemistry and Mineralogy.

Samples of Mill-Stone, of a Superior Quality, from a quarry in Hilton Mountain, Flintshire, from Messrs. William Bishop and Co.

In Mechanics.

Lieut. N. H. Nicolas's Semaphore. See page 104.

Mr. P. Barlow's Instrument, to correct the Local Variation of a Ship's Compass. See page 76.

Mr. C. Brandt's Spring Crutch for a Pendulum. See page 108.

Mr. E. Baker's Bullet [illegible] See page 162.

Mr. J. Goodwin's Spring Cross for Horses. See page 110.

Mr. G. Witty's Fire Escape. See page 130.

Mr. H. Earle's Bed for Patients under Surgical Treatment. See page 113.

Mr. J. Story's Portable Oven. See page 73.

Mr. J. Perkins's Instruments to ascertain the Trim of a Ship. See page 126.

Mr. Rotch's Arcograph. See page 49.

Mr. S. Lake's Double Door Hinge. See page 185.

MEMBERS.

A

LIST

OP

COMRIBiUTING MEMBERS

TO THK

SOCIETY

FOR THE

ENCOURAGEMENT OF

ARTS, MANUFACTURES, AND COMMERCE.

N. B. Those marked with * * pay Five Guineas annually; tl marked with * Three Guineas annually: those with P ;ire Perpetual Members; those with † have served the Office of Steward.

A

† ATHOL, John, Duke of, K. T. F.R.S. *Blair Athol Aberdeenshire*

* Alvanley, William Lord, *Waterloo-Hotel, Jermyn-street*

P Anspach, Elizabeth, Margravine of,

† Acland, Sir Thomas Dyke, Bart. M.P. *Killerton, Devon*

P Antrobus, Sir Edmund, Bart. F.R.S. F.S.A. M.R.I. *Hyde-park-corner, and Eaton-Hall, Congleton*

Abbs, Wm. Esq. *Pin Her*

Abingdon, Mr. L. J.

Ablett, Joseph, Esq. *Llenbeder-Hall, near Rut*

Abraham, Robert, Esq. 27, *Keppel-street*

† Ackermann, Mr. Rudolph, 101, *Strand*

P Ackers, James, Esq. *Lark Hill, near Manchester*

ActOD. Samuel, Esq. *Wil OH-i treet, Finsbury-square*
Adair, Alexander, Esq. *Pall-mall-co Hit*
p Adam, James, Esq. *Lower Milnthorp, Kendal*
† Adam. x' William, Esq. 43, *Welbeck-street*
Adams, Mr. DudU y,
Adams, Quinsey, Esq. *United States*
Agace, Daniel, Esq. 26, *Gower-street*
Agar, John Esq. 59, *Stafford-place, Pimlico*
† **A gar. Jam* F. II.** S. 5, *Hare-court, Tem vie*
P † Ainger, Mr. Alfred, 22, *Everett-street*
Ainslie, Henry, M. D. 25, *Dover-street*
Ainsworth. lti. hard, Esq. *Moss Bank, near Bolton*
Alderson, *YA>* ard, E **iq.** 13, *Turistock-street, Bedford-sq.*
AUtridge, *)* olin, Esq. 9, *Lincoln's Inn*
P **Alexander, i** Claude, Esq.
† Ale **caodcr, Dani** el, Esq. *Blackheath*
Alexander, E. N. Esq. *Halifax, Yorkshire*
AlcxaiH' er, Robert, Esq. 3, *Essex-court, Temple*
Allason, Mr. Thomas, 24, *South Molton-street*
Allen, Samuel, Esq. *Bayswater*
All. n, William, Esq. 7, *Leadenhall-street*
Alvarez, Joseph, Esq. 36, *Gloucester-street, Queen-square*
And erson, George, **Hs<|.**
P † An **Jrew, T. H.Eaq. 2** 1, *East-street, Red Lion-square ; •»d Moss Hall, Fi chit i,* (Chairman of the Co **nuniltet** of Agriculture)
An- erstein, John Ju **lius,** Esq. 102, *Poll-• tall* **1**
Annand, Alexander, Esq. 9, *Adelphi-terrace*
† Arabin, Septimus, Capt. R. N. 35, *Burg-street, St. James's*
Arding, Mr. James, 62, *Dorset-street, Salisbury-square*
Arkwright, Richard, Esq. F. H. S. *Cromford, Derbyshire*
Arnold, J. S. Esq. 31, *Golden-square*
Arnold, Mr. William, 21, *New-street, Spring Gardens*
Art): ar, Joh **11, Esq.** 6, *I. Albany*
Ashwell, M **r. Jauii** s, *at B. Donkin's, Esq. Grange-road, Bermondsey* **1**
Astbury, William, Esq. *Portugal-street, Lincoln's Inn Fields, and Islington.*
***t** Atcheson, Nathaniel, Esq. F. S. A. 35, *Winchester-street*
Atkins, John, Esq. (Alderman), 7, *Walbrook*
Atkinson, Peter, Esq. *York*
Atkinson, Thomas, Esq. *Old Swan-lane*
† Attersol, Joseph, Esq. *Covent Garden Chambers*
Anstine, Mr. George

B

P [illegible] j Beiifbrd, **John,** 1 Duke «f, V.P. F.S.A. F.L.S. F.H.S. *31, St. James's-square, and Woburn, Bedfordshire*

F Reverley, Algernon, Earl of, 8, *Portman-square*

Bre;, dalbane, John, Earl of, F.R.S. F.H.S. 21, *Park-lane, & Kelchburn-castle, Argyleshire*

P Bridgewater, John William, Earl of, F.R.S. F.S.A. F.L.S. F.H.S. *Grosvenor-tqvare, if Auhridge-park, Hertfordshire*

P Bristol, Frederick William, Earl of, F.R.S. *St. James's-sq.*

P Bucban, David, Earl of, LL.D. F.R.S.

Braybrooke, Richard, Lord, F.R.S. F.S.A. *Y.n.s.* 10, • *New Burlington-street*

P Bayntoi!. Sir William, Vice Admiral, K.C.B.

I[1] Brooke, Sir **Ricbard** Ue Cr1»et, Bart. F.R.S. ! R.I. F.H.S. *Great Oakley, near Kettering*

Belson, Sir Charles Philip, 50, *Park-street*

Buluier, Sir F. 283, *Strand.*

I

Itabbington. Mr. William

† Backler, Joseph, Esq. 18, *Newman-street*

† Bacon, Anthony, Esq. *Benham-place, near Newbury,* ***Btrki***

r† Bacon, John, Esq. F.S.A. 17, *Newman-street*

Badcock, Mr. J. *Pimlico Brewery*

Bagnold, Captain T. M. 7, *High-row, Knightsbridge* (Chairman of the Committee of Miscellaneous Matters)

P Bailey, Joseph, Esq. *Cyfartha, Glamorganshire*

BaiUy, Mr. William, 272, *High Holborn*

taker. **Mr.** Ezekiel, 24, *Whitechapel-road*

Baker, Mr. Richard

Baker, John, Esq. 10, *James-street, Westminster*

Baldwin, Robert, Esq. 6, *Queen-square, Bloomsbury*

Balme, Rev. Edmund, M.A. F.R.S. F.S.A. 15, *Russell-place, Fitzroy-square*

Bangley, George, Esq. 26, *Budge-row*

† Barchard, Mr. Robert, 4, *Fore-st. Lambeth, & Croydon*

Barclay, Mr. George, 19, *Strand*

Barker, Mr. Timothy William, 80, *Gracechurch-street*

P Barlow, Peter, Esq. *Royal Military Academy, Woolwich.*

V Barnard, Edward, Esq. *Deptford*

Barnard, Mr. Thomas, 72, *Strand*

Barnes, John, Esq. 5, *Norfolk-street, Strand*

Barnet, Richard Clemson, Esq. 62, *Mortimer-street*

Barron, Mr. Francis William, 476, *Strand*

Barren, George, Esq. 7, *Cecil-street, Strand*
Barrow, Mr. Samuel, *Vauxhall Wharf*
Barry, Charles Upham, Esq. *Gray's-inn*
P Barry, P. B. Esq. *Totterton, Notts*
Bartholomew, Mr. William
Barton, John, Esq. *Royal Mint*
p Bate, John, Esq. 15, *Russell-square*
Bati[illegible]s, Thomas, Esq. 11, *South-place, Kennington*
Bally, Robert, Esq. M. D F. R. S. F. L. S. 27, *Charlotte-street, Portland place*
Bauer, Mr. Andrew
Bayford, John, Esq. F. S. A. *Doctors' Commons*
Bayley, Mr. Joseph, 8, *Thayer-street, Manchester-square*
Baynes, Mr. Charles, 9, *Cook's-court, Carey-street*
P Bean, Nathaniel, Esq. *Bath*
P Bean, Captain Isaac, *Ditto*
Beauchamp, Mr. William, 25, *Grafton-street, Soho*
Beaufoy, Col. Mark, F. R. S. F. L. S. *Bushy, near Stanmore*
p Beaufoy, Henry, Esq. F. R. S. F. L. S. *South Lambeth*
† Beaumont, J. T. B. Esq. F. S. A. *County Fire Office, fit gent-street* (Chairman of the Committee of Polite Ar
Beavan, John S. Esq. 46, *Great Marlbro'-street*
Beazley, Charles, Esq. *Whitehall*
Beckwith, Mr. W. A. 58, *Skinner-street*
Bedingfeld, John, Esq. F. S. A. *Navy Pay Office*
Bedington, William, Esq. *Camphill, Birmingham*
Bedwell, Francis Benjamin, Esq. 69, *Lamb's Conduit-street*
Behnes, Mr. William, 31, *Newman-street*
Bell, Charles, Esq. 28, *Dean-street, Soho*
Bellamy, John, Esq. *House of Commons*
Bennett, James Samuel, Esq. *Lawrence Pountney-hill*
Bensley, Benjamin, Esq. *Nelson-square*
Benson, Arthur, Esq. 19, *Abingdon street*
† Benwell, Joseph, Esq. *Battersea*
p Berkley, John, Esq.
† Bernasconi, Francis, Esq. 20, *Alfred-place*
Bernasconi, Francis, jun. Esq. *Ditto*
Bevans, Mr. James
Bewick, William, Esq. 15, *Nassau-street, Middlesex Hospital*
Biggerstaff, Mr. William, *Durham-yard, Smithfield*
Binyon, Mr. Edward, 12, *Bell's-buildings, Salisbury-square*
Birch, Mr. Charles Lucas, 71, *Great Queen-street, Lincoln's-inn-fields*
Bird, Mr. G. *Hammersmith*
Bird, Mr. Stephen, *Kensington*

† Bish, Thomas, Esq. 9, *Cornhill*
Black, Mr. Alexander, 27, *Pall-Mall*
Blackburn, John, Esq. *Church-yard-court, Temple*
Blackburn, John, Esq. 189, *Piccadilly*
† Blackburne, John, Esq. M.P. F.R.S. 2, *Park-st. Westmins.*
P Blackett, John, jun. Esq. 20, *London-street, Mark-lane*
† Blades, John, Esq. 5, *Ludgate-hill*
Blades, John, jun. Esq. *Ditto*
Blake, Mr. Charles, *Quintero, Chili, South America*
Blake, Mr. Henry, 10, *Howard-street, Strand*
† Blake, Robert, Esq. 14, *Essex-street*
Blakemore, Richard, Esq. *Valeadra House, near Cardiff*
Blakie, Mr. James, *Three Colts-street, Limehouse*
Bland, Michael, Esq. F.R.S. F.S.A. F.L.S. 30, *Montague-place, Russell-square*
Bligh, Mr. Timothy, 11, *Great George-street, Westminster*
Bliss, Mr. J. K. 8, *Barbican*
Boatright, Mr. James, 41, *Bury-street, St. James's*
Bodkin, Mr. W. H. 8, *High-street, Islington*
Bogaerts, Mr. John, 56, *Poland-street*
Boileau, Mr. Etienne Marie, 49, *Skinner-street,*
Boissier, George Richard, Esq. 35, *Leicester-square*
Bolt, Edmund, Esq. 5, *Wormwood-street, Bishopsgate*
Bone, Henry, Esq. R. A. 15, *Berners-street*
Bonelli, Angiolo, Esq.
† Booth, John, Esq. 33, *Devonshire-street, Queen-square*
Booth, Felix, Esq. 3, *Russell-square*
† Borradaile, R. Esq. 14, *St. Helen's-place, Bishopsgate*
Borradaile, W. Esq. 34, *Fenchurch-street*
† Bostock, John, M.D. F.R.S. F.L.S. 22, *Upper Bedford-place, Russell-square*
Boswell, Mr. T. 422, *Strand*
† Botfield, Thos. Esq. *Hopton-court, near Bewdley, Worces.*
Botfield, William, Esq. *Decker-hill, near Shifnal.*
Bott, Mr. Thomas, 10, *Great Portland-street*
Bowden, Ambrose, Esq. *Navy-office*
Boyes, John, Esq. *Wansford, near Driffield, Yorkshire*
Braby, Mr. James, *Duke-street, Commercial-road, Lambeth*
Braby, Mr. James, jun. *Cornwall Road, Lambeth*
† Bradshaw, Joseph Hoare, Esq. *Lombard-street*
P Bradshaw, Sir Bt. Haldane, Esq. M.P. *Worsley-hall, Lancashire*
P Braithwaite, Mr. John, *New Road*
Braithwaite, William, Esq. *Oxhey-place, near Watford*
P† Brayah, Mr. Francis, F.H.S. *Grosvenor-street, West-Pimlico*

Ulrtl.

P† Bra n. ah, Mr. Timothy, M. R. I. *opposite the Wharf, Pimlico*
Brandt, Mr. Charles, *Jermyn-street*
r Brennan, Charles, Esq. 60, *Charing Cross*
Br;ce, Alexander, Esq. 17, *Euston-square*
P Brickwood, John, Esq. 79, *Mark-lane*
Brickwoo'J, Nathaniel, Esq. 1, *Crescent, Minories*
Brightlcy, Chai les, Esq. *Bungay, Suffolk*
Brine, Dr.
Broad wood, J ames, Esq. 33, *Great Pulteney-street*
Broad od, wo- Thomas, Esc *Ditto*
i Brockcdon, NVilliam, Esq.
Broaden, J ames, Esq. M. P. F.H.S. 115, *Park-street*
P† Brooke,, Will mm, Esq. *New-street-square*
Bn ooks, Mr. Jawus W. 11 0, *Strand*
Brooks, Mr. J ohn, *Stamford-street, Blackfriars*
Brow l, Burton, Esq. *Stamford-street, Blackfriars*
Brov\o, **Henn** , Esq. *Der »y*
Brown, Mr. j ames, *George-street, Portman-square*
Brow i, Mr. Richard, 4, *Wells-street, Oxford-street*
Brow i, Capt. Samuel, 8, *Billiter-square*
liruM a, Thomas, Esq. 4, *Pump-court, Temple*
Bt own, Thomas, Esq. 157, *Cheapside*
Bi own, Mr. Thomas, 30, *Goswell-street*
Bi own, Thomas Yeats, Esq. 19, *Manchester-street*
Bi owne, Barwell, Esq. 30, *Wood-street, Cheapside*
Brown < Mr. George,
I* Browne, J. H. Esq. *Weymouth*
Browne, Richard Lovell, Esq. 14, *Furnival's Inn*
Brov ning, Angelo, Esq. *Narrow Wall, Lambeth*
P† Brunel, Mark I. Esq. F. R. S. 4, *Lindsey-row, Chelsea*
Br utton, Robert, Esq. 55, *Old Broad-street*
Buck, George, Esq. 13, *Cumberland-street*
r *W* uckmaster, John, Esq.
Bull, Mr. S. T.
P Buller, John, Esq. 94, *Gloucester-place*
Bulmer, William, Esq. *Cleveland-row*
Bu-strode, Captain Augustus, 18, *Broad-street, Golden-square*
Bunning, D. J. Esq. 11, *Bernard-street, Russell-square*
Burbidge, Mr. James, 150, *Fleet-street*
Burchell, Basil, Esq. 43, *Queen-square, Bloomsbury*
Burdon, Alexander, Esq. *Norfolk-street, Strand*
Burge, J. H. Esq. 1, *Colebrook Terrace, Islington*
P Burgess, Mr. Wm. Robt. 107, *Strand*

Bui•e, Haviland, Esq. 24, *Stove-street*
Burke, J. F. Esq.
† Unmet, Robert, Esq. *Vauxhall*
Buifow, Rev. E. J. D.D. F.R.S. F.S.A. 70, *Euston-square*
Bur , Mr. Benjamin, 106, *Swallow-street*
Burton, Henry, Esq. *Mary-le-bone Park*
† Bui ton, Launcelot, Esq. 21, *Newcastle-street, Strand*
Bui y, William, Esq. 10, *Ludgate-hill*
P Butler, Mr. Thomas, 4, *Cheapside*
Butlin, Mr. John, 63, *Bread-street, Cheapside*
Butterfield, Mr. Wm. 173, *Strand*
But's, John, Esq. 74, *Lombard-street*
Bye, John, tjfj. 198, *High Holborn*

C.

* Chichester, Thomas, Earl of, **F. R.** S. F.H.S. M.R.I. *Stratton-street, and Stanmer, near Lewes*
Clarendon, Thomas Villiers, Earl of
P† Colchester, Charles, Lord, *Kidbrook, Sussex*
P Clarges, Sir Thomas, Bart. 26, *South-street, Grosvenor-sq.*
Clifford, Hon. Hugh, 3, *Portman-square*
Cuming Hon. General, John Leslie, F. R. S. F S.A.
*† **Cocao t.** Sir Nathaniel, (V. P.) 11, *Portland-place*

† **Caddrl!**, David, Esq. *Salisbury-square*
† Cadogan, Mr. John, *Water street, Arundel-street*
Cafe, T. S. Esq. 19, *Great Marlborough-street*
Cafe, Mr. Henry Smith, 48, *Great Marlborough-street*
Calder, Mr. James, *Little Knight Ryder-street*
Calverley, Thomas, Esq.
P Campbell, Duncan, Esq. 22, *Alfred-place, Bedford-square*
Campbell, Wm. Esq. *Cragie*
P† Capel, John, Esq. 32, *Russell-square*
Card, John, Esq. 29, *Fitzroy-square*
Cardwell, John, Esq. *Blackburn, Lancashire*
Carey, Mr. George
Carpue, J. C. Esq. F.R.S. 72, *Dean-street, Soho*
Carr, Mr. William, *Great Waterloo-street, Lambeth*
Carter, Mr. Charles John, 403, *Oxford-street*
Cartwright, Charles, Esq. *India House*
Cary, Mr. John, 86, *St. James's-street*
Caslon, Mr. Henry, 62, *Chiswell-street*
Caslon, Mr. William, 27, *Burton Crescent*
Cass, Charles, Esq. *Winchmore Hill*
Cass, Frederick, Esq. *Ditto*

P Cater, Richard, Esq.
Cattley, William, Esq. F.L.S. 71, *Lamb's Conduit-street*
P Chalmers, Alexander, Esq. *Throgmorton-street*
Chambers, Mr. Francis, 8, *Millman-street*
Chambers, Mr. Richard, *Cecil-court, St. Martin's-lane*
P Chantrey, Francis L. Esq. R.A. F.R.S. F.S.A. *Belgrave-place, Pimlico*
Chapman, Mr. Thomas jun. *Middle Temple Lane*
Chapman, Mr. William, 9, *Lincoln's-inn*
Chard, Mr. George, ..., *Poultry*
P Chard, Mr. James
Charlesworth, Rev. John, *Ossington, Notts*
Charlton, William, Esq. 15, *Salisbury-square*
Charrington, Nicholas, Esq. *Mile End*
Chawner, Thomas, Esq. 82, *Guildford street*
Cherry, Mr. Frederick C. *Clapham*
† Christian, John Giles, Esq. *Doctors' Commons*
Churchill, Mr. Samuel
Clark, Mr. Alexander
*† Clark, Richard, Esq. (V. P.) Chamberlain of London, F. S. A. *Bridge-street, Blackfriars*
Clark, R. H. Esq. *Ditto*
Clarke, Charles, Esq. 48, *Speldhurst-street, Burton Crescent*
Clarke, Frederick Arnaud, Esq. *Battersea Rise*
Clarke, George, Esq. (at Mr. J. Moss's, Druggist) *Stratford, Essex*
Clarke, Thomas Tuesdale, Esq. 34, *Upper Brook-street*
Clarke, William, Esq. *Tynemouth, Northumberland*
Clarke, William, Esq. 2, *James-street, Adelphi*
Clarke, William Tierney, Esq. *Hammersmith*
Clemence, Mr. John, Jun. 11, *Northumberland-street, Mary-le-bone*
Clement, Mr. Joseph, 19, *Prospect-place, Newington Butts*
Clerk, George, Esq. *Brentford*
Clissold, Augustus, Esq. 86, *Aldermanbury*
† Coates, Robert, Esq. 23, *Dover-street*
† Cobbett, Pitt, Esq. 14, *Bedford-street, Strand*
Cocking, Mr. Robert, *Maiden Lane, Covent Garden*
P Coggan, Captain, 1, *Little Bridge-street, Blackfriars*
Colby, Major Thomas, Royal Engineers, LL.D. F. R. S. E. *Tower of London*
Cole, J. F. Esq. 46, *Hans-place, Sloane-street*
Cole, Rev. T. H. A.M. *Warbleton, Sussex*
P Coles, William, Esq. 7, *Mincing-lane*
† Collinge, John, Esq. *Bridge-road, Lambeth*

Collinge, Charles, Esq. *Bridge-road, Lambeth*
Collingridge, Thos. Esq. *Liquorpond-street*
Collins, Mr. William, 227, *Strand*
P Colquhoun, James, Esq. 13, *St. Jawet's-place*
Coltman, W. B. Esq.
Combes, John, Esq. *Gas Light Company, Ratcliff's*
Compton, Mr. Henry, 135, *Fenchurch-street*
Conant, William, Esq. 11, *Portland-place*
Condell, William, Esq. 32, *New Bond-street*
Cony, Thomas, Esq. 10, *Grafton-street*
Cood, Mr. Thomas, 68, *Strand*
Cooke, Chas. Gomond, Esq. *Southampton-st. Covent-garden*
† Cooke, Henry, Esq. 37, *Bedford-square*
Cooke, Mr. H. 1, *James-street, Adelphi*
Cooke, John, Esq. *Fitzroy-place, Kentish-town*
† Cooke, John Kenworthey, Esq. 36, *Red Lion-square; and Stocks Staley-wood, near Manchester*
Cooke, Layton, Esq. 1, *Dean-street, Soho*
Cooke, Mr. William, *Mill-place, Greenwich*
Coombe, Bernard, Esq. *Newcastle-under Lyne, Staffordshire*
Coombe, Thomas G. Esq. *Ditto*
Cooper, Benjamin, Esq. 2, *Bream's-buildings, Chancery-lane*
Cooper, Mr. George, 36, *Piccadilly*
Cooper, Mr. George, 1, *Little York-place, Mary-le-bone*
Cooper, George, Esq. 7, *Copthall-court, Throgmorton-st.*
Cooper, Mr. John Thomas, 9, *Paradise-street, Lambeth*
Copeland, Mr. George, 32, *Noble-street, Falcon-square.*
Copland, Charles, Esq. 9, *Broad-street-buildings*
Copland, William, Esq. 29, *Great George-street*
P Coppens, B. M. D.
† Corbould, Mr. Charles, *Cary-lane, Foster-lane*
Corcoran, Bryan, Esq. 39, *Mark-lane*
Cornell, G. Esq. 17, *Buckingham-street, Fitzroy-square*
P Cornish, Hubert, Esq. *Exeter*
Cosser, Mr. Andrew, *Pedlar's-acre*
Cottam, Adam, Esq. *Whalley, near Blackburn*
Cottam, Mr. George, F. H. S. *Agricultural Repository, Windsy-street*
Cottle, Robt. Augustus, Esq. 70, *Aldermanbury*
Cotton, Richard, Esq. *Woodfield, near Bridgnorth*
Courthope, George, Esq. 24, *Bedford-square*
Coussmaker, W. K. Esq. 38, *Dorset-square, Regent's-park*
Coward, Mr. George, 2, *Hanover-street, Hanover-square*
Coward, Mr. John, *(abroad)*
Cowdry, Mr. William, 40, *Strand*
Cowell, George, Esq. *Water-lane, Tower-street*

Cowie, Mr. G. 31, *Poultry*
Cox, Char:es, Esq. *Beaufort-buildings*
Co>, John, Esq. 75, *Great Queen-st. Lincoln's Inn-fields*
Cox, William, Esq. *Dartmouth-row, Blackheath*
P† **Coxe, 1**Peter, Esq. 2, *Archer-street, Soho*
† Co\wtll, Ii enry, Esq. F. L. S. *Rolls-buildings, Fetter-lane* (Chairman of the Committee of Chemistry.)
Cr;=ce, Mr. Frederick, 59, *Great Queen-street*
Crace, Mr. Henry, *Ditto*
Cradock, Joseph, Esq. M. A. F. S. A. *Gumley, Leicestersh.*
Craig, Charles Alexander, Esq. **11,** *Great George-street, Westminster*
Cramp, Mr. William
p Craven, John, Esq. *Stamford-hill*
Crawford, Robert, **Esq. 1**6, *Old Broad Istnct*
Crawford, Matthew, Esq. 3, *fnner Temple*
† Crawshay, William, Esq. *George-yard, Upper Thames-street*
Crawter, Henry, Esq. *Thanet-place, Strand*
Crawler, Thonas, Esq. *Ditto*
t Cribb, Mr. William, 34, *King-street, Covent-garden*
Cri;pps, Captain John, 13, *Cleveland-row*
Cripps, John Martin, Esq. M.A. F.S.A. F.L.S. *Lewes, Sussex*
Crisbett, Benjamin, Esq. 58, *Aldersgate-street*
i niiiitHi, **L>eii|uintu, l**
Cn sby, Mr. Isaac, 7, *Drury Lane*
Cross, Mr. George, *Strand*
Crowder, William Henry, Esq. *Frederick's-place, Old Jewry*
p Crowe. Philip, Esq. 12, *Chatham-place, and Hartley, Coulsdon, Surrey*
Crowley, Mr. E. 73, *Gracechurch-street*
Cruckshanks, Mr. Alexander, *Quintero, Chili, South America*
Cubitt, Mi. Thomas, *Gray's-Inn-lane-road*
Cubitt, Mr. William, *Ipswich*
Cumming, Mr. George, *Rochampton*
Cumming, Mr. William David, 72, *Aldermanbury*
Cuppage, General, *Shooter's Hill*
† Curle, Mr. Charles, 6, *West Grosvenor-street, Pimlico*
P Curties, John, Esq. 39, *Devonshire-place*
Curtis, Mr. Samuel, *Camberwell*
** † Curwcn, John C. Esq. M. P. (V. P.) *Workington Hall, Cumberland*
Cuthbert, Mr. John, 5, *Bridge-street, Lambeth*
Cutler, Mr. John, 16, *Great Queen's-street*

D

* Dartmouth, William, Earl of, F. H. S. 12, *Berkeley-square, & Sandwell-Park, Staffordshire*

P De Dunstanville, Francis, **Lord,** i*. f///" *r Grosvenor-street*
D unity, I Ht. Lord, 18, *Pc o-k-lme*
Dundas, Sir David, Hart. *Richmond*

P Da Costa, Joseph Hippoliio, Esq. 7» *Lotim- Pinllimore-pla ce, Kensington*
Dal y, John, jun. Esq. 155, *Upper Thames-street*
Dal ton, Henry, Esq. F. U. S *Kmeith, Lincolnshire*
Dalloa, John, Esq. S /. *Mary-at-hM. Tower-street*
† : lampier, Edwai d, Esq.
† Daniel, Johi Frederick, Esq. F.R.S. 30, *Gower-street*
t> Daniel, Mr. • F. C. *Cottage, Stepney Green*
i[1] \ Daniel, John, Esq. *Parson's-green, F nlham*
D'A.rcy, Col. Joseph. I.H.S. 2, *Saville row*
Darke, Samuel W. Esq. 30, *Red Lion-square*
Darley, Mr. Robert, 11, *Tavistock-street, Covent-garden*
Davenport^ Mr Joint, A *ing's-arms-yard, Coleman-street.*
P Davidson, Mr. John, ju n. *Cork-street*
Davies, Mr• David, 80, *Charlotte-street, Fitzroy-square*
Davies, John, Esq. 34, *Surrey-street, Strand*
Da vies, John, Esq. *Mare-street, Hackney*
Davis, D.I>. M.D. 29, *George-street, Hanover-square*
Dawes, Henry, Esq. 33, *Trinity-street, Rotherhithe*
t Dawkins, James, Esq. F.R.S. F.S.A.
Day, David Hermitage, Esq. *West Hill, Rochester*
† Day, Thomas, Esq. 28, *Montague-street, Russell-square*
Day, William, Esq. *Isleworth*
V Deacon, Jain.s Henry, Esq. 19, *James-street, Westminster*
Deakin, Francis, Esq. *Birmingham*
D. an, James, Esq. 34, *Tavistock-street, Covent Garden*
Di ase, Wm. Henry, Esq. 5, *Earl-street, Dublin*
DeBoffe.Joln Charles, Esq. 6, *Percy-street, Bedford-square*
Delafield, Edward Harvey, Esq. *Kensington*
Dennington, Mr. James, 23, *Hermes-street, Pentonville*
† Dent, John, Esq. M.P. F.R.S. F.S.A. *Temple-bar*
P † Dent, William, Esq. *Battersea Rise*
De Renzy, Captain Geo. Webb, 10, *Adam-street, Adelphi.*
P Des Granges, Mr. Peter, 33, *Cockspur-street*
Devaux, Charles Pierre, Esq. 76, *Holborn-bridge*
Deville, Mr. James, 367, *Strand*
Deville, Mr. William, *Ditto*
P Dew, Dyer, Esq.
Dickins, Francis, Esq.
P Dickinson, Charles, Esq. F.R.S. F.S.A.
Dickenson, J. Esq. 13, *Finch-lane, Cornhill*
Dickson, James, Esq. *Kingston, Jamaica*
Dickson, Jonathan, Esq. *Holland-street, Blackfriars*

Dixie, Mr. Benjamin
Dodd, Mr. James, 3, *Caroline-street, Bedford square*
P Dollond, George, Esq. F.R.S. 59, *St. Paul's Church-yard*
† Donkin, Bryan, Esq. *Grange-road, Bermondsey* (Chairman of the Committee of Mechanics.)
Donne, Mr. William, *Warwick-square, Newgate-street*
Dorgan, Mr. L. 178, *Aldersgate-street*
Douglas, Admiral John, *Chichester*
Douglas, John, Esq. *Old Hull, near Manchester; and Gyrn, Flintshire*
Douglas, John, Esq. *Tuyford-Abbey*
Dow, Mr. ———, 8, *Postern Row, Tower Hill*
Dowding, Mr. Robert, 106, *Shoe-lane*
Dowler, Mr. Thomas
Dowley, Mr. J. a, *Houland-street*
Downer, Henry, Esq. 155, *Fleet-street*
Dowse, Mr. Charles, 47, *Chancery-lane*
† Dowson, Emerson, Esq. (Chairman of tiif Committee of Accounts) 69, *Welbeck-street*
Dowson, Joseph, Esq. *Ditto*
Doyley, Mr. John, 10, *Greville-street, Hatton-garden*
Drew, Mr. Thomas, 20, *Queen's-buildings, Brompton*
Driver, G. N. Esq. 13, *New Bridge-street*
Dryden, Mr. James, 113, *Wood-street, Cheapside*
P Dubois, William, Esq. *Stoke Newington*
Du Cane, Charles, Capt. R. N. 30, *Albemarle-street*
Duckett, George, Esq. F.R.S. F.S.A. F.H.S. 15, *Upper-Grosvenor-street*
Dudley, Mr. Thomas, 34, *King-street, Soho*
Duff, Arthur, Esq. 1, *New-court, Temple*
Dugdale, Richard, Esq. 41, *Great Marlborough-street*
Dunston, Mr. Samuel, 30, *West Smithfield*
Duntzfeltz, Frederick, Esq.
P Duppa, Mrs. *Upper Homerton*
P Dutton, John, Esq. 18, *Camomile-street*

E

P† Egremont, George, Earl of, F.R.S. F.S.A. M.R.I. F.H.S. 4, *Grosvenor-place, and Petworth, Sussex*
Eardley, Sampson, Lord, LL.D. F.R.S. F.S.A. 51, *Lower Grosvenor-street, and Belvedere, Kent*
Eardley, the Hon. Sampson, 7, *Hinde-st. Manchester-sq.*
Ellis, the Hon. George Agar, F.R.S. F.S.A. *Hanover-sq.*
Englefield, Sir Henry Charles, Bart. F.R.S. F.S.A. F.L.S. M.R.I. *F.R.S. Ed. &c.* 5, *Tilney-street*

Eagle, John, Esq. *Allesley, near Coventry*
Earle, Percival, Esq.
P Eaton, Peter, Esq. *Westford, Essex*
Eckersall, John, Esq. *Claverton, near Bath*
Edgar, Mr. Robert, jun. 33, *Fenchurch-street*
Edge, Mr. Thomas, 38, *New Rochester-row, Westminster*
Edkins, Mr. S. S. *Salisbury-square*
Edmiston, Mr. Abraham, 1, *Alfred's-buildings, Goswell-street-road*
Edmonds, James, Esq.
Edmonds, Mr. John, 43, *Dean-street, Fetter-lane*
† Edwards, Charles Augustus, Esq. *Isleworth*
Edwards, Evan, Esq. 66, *St. Paul's Church-yard*
Edwards, George, Esq.
Edwards, Mr. George, *Paul's Wharf*
Edwards, Hugh, Esq. 56, *Guildford-street*
P Edwards, John, Esq. *Lynn, Norfolk*
Edwards, Thomas, Esq. *Coleman-street*
Edwards, Thomas, Esq. *Gellyhare, near Newport, Monmouthshire*
Eddy, Mr. Thomas, *Oxford-street*
Egerton, Joseph, Esq. 5, *Great Cumberland-street*
Eley, Mr. Charles, *Paternoster-row*
Eley, Mr. Henry, *Ditto*
Elley, Charles, Esq.
† Ellicombe, Rev. Henry Thomas, [illegible]
Elliot, John, Esq. F.R.S. *Pimlico.*
P Elliot, Obadiah, Esq. *Spring Hill, Bromley, Kent*
Elliott, Mr. A. *Regent's Park*
Elliott, Mr. A. jun. *Ditto*
Elliott, Mr. John Hawkins, 59, *Cannon-street*
Elliott, Mr. W. *Regent's Park*
Emmett, Mr. John, *Hermes-street, Pentonville*
† England, Mr. Joseph, jun. 1, *Wilmot-street, Brunswick-sq.*
Entwisle, Henry, Esq.
P Errington, John, Esq.
Essex, Mr. Charles, [illegible] *Acton*
Evans, George, Esq.
P Evans, John, Esq. *St. Mildred's-court, Poultry*
Evans, Mr. John, *Pullen's-row, Islington*
Evans, Mr. Joseph, 25, *Northumberland-street, Strand*
P Evans, William, Esq. 49, *Weymouth-street*
Everille, Mr. Thomas, 67, *St. James's-street*
† Eversfield, Mr. J. 5, *Smith-street, Westminster*
P Ewbank, Andrew, Esq. 37, *Upper Grosvenor-street*
Eyre, Walpole, Esq. 7, *Montagu-place, Montagu-square*

F

P Farnham, John J. Earl of, Farnham, near Cavan, Ireland
† Falmouth, Edward Viscount, 2, St. James's-square
† Folkestone, William Viscount, 52, Lower Grosvenor-street, and Coleshill House, Berkshire
P F[illegible], the Hon. J. W. Major-Gen. F.R.S. F.S.A. M.R.I. 2, North Audley-street
Fowke, Sir Frederick, Bart. Lowesby, Leicester
Fanland, Mr. R. 4, Princes-street, Stamford-street
Fanshawe, Rev. John, Parsloes, Barking, Essex
Faraday, Mr. Michael, Royal Institution, Albemarle-st.
Farey, Mr. John, jun. 37, Howland-street
† Farnell, John, Esq. Isleworth
Farquhar, John, Esq. 65, Gloucester Place
P Farrer, F. Grose Spurgeon, Esq. Brayfield, near Olney, Bucks
Fawcett, Mr. John, 3, New Ormond-street
Fay, Mr. John G. 21, Lower Montague-street, Portman-square
Feltham, Mr. William, 9, Ludgate-hill
Fellows, Mr. M[illegible], Rochester-place, Newington Butts
Fenn, Samuel, Esq. 105, Newgate-street, & Laytonstone, Essex
Fenn, Mr. W. H. 25, Coleman-street
Fenner, Mr. Rest, 53, Paternoster-row
Fenning, Samuel, Esq. 6, St. James's-square
P Fermor, William, Esq. Tusmore, near Brackley
Field, Mr. Joshua, Cheltenham-place, Lambeth
Field, Mr. John, Bennet-street, St. James's
Field, Mr. John, jun. 12, Wigmore-street
Field, Mr. Samuel, Reading
P Field, William, Esq. (abroad)
Fielding, Jeremiah, Esq. Manchester
Finden, Mr. Thomas, 38, Upper John street, Fitzroy-square
Finn, Mr. Lawrence, 161, Strand
Firmin, Mr. Philip, jun. 153, Strand
Fisher, F. Esq. 55, Old Broad-street
Fisher, Mr. John
Fitz-Gerald, Maurice, Esq. 3, Percy-street
Fitz-Gerald, Maurice, Esq. jun. East Indies
Fleming, J. Esq. M.D.
Fletcher, Alexander, Esq. Homerton

Fletcher, John, Esq. *Chester*
Fletcher, Matthew, Esq. 77, *Guildford-street*
Fletcher, Samuel, Esq. 34, *Great Marlborough-street*
Flight, Mr. James, 101, *St. Martin's-lane.*
Flight, Joseph, Esq. 1, *Coventry-street*
Flindell, Mr. Thomas
Fonblanque, J. S. M. Esq. 3, *Brick-court, Temple*
Foot, Mr. John, 2, *Parliament-pl. Abingdon-street*
Vorbes, John, Esq. *Church-street, Stoke Newington*
Forbes, L. H. Esq. 6, *Coleman-street-buildings*
Fonestc r, Robert, Esq. *North-gate, Royal Exchange*
Forster, John, Esq. 18, *Carey-street*
Forster, John, Esq. *Bath*
Forster, William, Esq.
Forsyth, William, Esq. 25, *Fenchurch-street*
Foss, Edward S. Esq. 36, *Essex-street*
Foster, Thomas, Esq. *Clement's lane*
Fov ler, Mr. John, 73, *St. John-street*
Ft> x, James, Esq. *Plymouth*
Foxhall, Edward M. Esq. 71, *Baker-street*
Francis, Charles, jun. Esq. *Belgrave House, Vauxhall*
Franco, Jacob, Esq.
Frankleu, T. Esq. *Baglar House, Glamorganshire*
Franklin, James, Esq. *Dean's-place, Berkshire*
Freeman, Stephen, Esq. *Coventry*
Freeze, John, Esq. 17, *Mecklenburgh-square*
Freir, Chevalier Cipriano Riberio, F. R. S. F. S. A.
French, Mr. J. M. *Sweeting's alley*
Friend, Mr. H.
Fr; er, Edward, M. D. 53, *Upper Charlotte-street, Fitzroy-square*
Fuller, Mr. J- G. *St. James's-street*
Fullerton, WUlian> .. Esq. *Skeldon, Ayrshire*
Turbor, Tbou , Esq. *Stock Exchange*

G

Glenbervie, Sylvester Lord, F. R. S. F. S. A. 29, *Argyle-st.*
GranllcY, William Lord, 131, *Sloane-street*
Grevi**lie.** th. Hon. Robert, F. R. S. F. S. A. F. L. S. F.IKS. *Richmond Hill, Surrey*

† Gaitskell, Thomas, Esq. 229, *Bermondsey*
† Galloway, Mr. Alexander, 69, *High Holborn*
Galton, Samuel, Esq. *Dudston, near Birmingham*
Gardner, James, Esq. *Camberwell*
Garling, Mr. Henry, 13, *Little James-st., Bedford-row*

Garnett, Robert, Esq. 12, *Aldermanbury*
Garvock, Capt. John, 12, *South place, Kennington*
Gaskin, Mr. S. S.
† Gates, Mr. Thomas, 23, *Newgate-street*
Gautier, John Lewis, Esq. 37, *Old Broad-street*
Gay, Mr. Moses
Geary, Mr. Thomas
Geddes, Arthur, Esq. 26, *Craven-street*
Ghrimes, William, Esq. 40, *Ludgate-street*
Gibbons, Mr. J. 3, *Red-Cross-street*
Gibbons, Mr. John, 6, *King-street, Clerkenwell*
Giles, Peter, Esq.
Gill, Thomas, Esq. 125, *St and* {Chairman of the Committee of Mechanics}
Gillman, William, Esq. *Bank buildings, Cornhill*
Glanfield, Mr. J. *Deptford*
Glasier, William Richard, Esq. 11, *Park-st. Westminster*
Gledstanes, J. H. Esq. 11, *Regent-street*
Gold, Mr. Joyce, 103, *Shoe-lane, Fleet-street*
P Good, Mr. William, 20, *Coleman-street*
Goodwin, Charles, Esq.
P Goodwin, H. Esq. 21, *Lower East Smithfield, & Black*
Goodwin, Joseph, Esq. *Carlton House*
Gordon, Alexander, S. Esq. 35, *Ely-place*
Gorman, John, Esq. 1, *Spanish-place, Manchester-square*
Gosling, William, Esq. 5, *Portland-place*
Gossett, John, Esq. *Laycock-abbey, Chippenham*
Grant, Rev. Johnson, *Warrington*
Grant, T. Esq. *Bideford*
Granville, A. B. M.D. F.R.S. F.L.S. M.R.I. 8, *Savile-row*
† Graves, William, Esq. *War-office*
Gray, Mr. Samuel F. *Apothecaries Hall*
P Gray, Walker, Esq. 2, *Water-lane, Tower*
Gray, Mr. W. M.
Green, James, Esq. *Falcon Glass-house, Blackfriars Bridge*
Green, Mr. James, 9, *Colchester-street, Whitechapel*
P Green, Peter, Esq. *Crootham, Berks.*
Green, Mr. William, *Laytonstone*
Greenfield, Wm. Esq. 12, *Gray's Inn-square*
Greening, Mr. William, *Brick-lane, Old-street*
Greenwood, John, Esq. *Manchester*
P Gregory, Richard, Esq. 56, *Berners-street*
Gregson, Matthew, Esq. *Liverpool*
Grice, Mr. Wm. Hawkes, 3, *New Bond street*
Grimble, Mr. James, jun. *Elm-street, Gray's Inn-lane*
Grimshaw, Mr. John, *Sunderland*

Groom, Mr. John, 35, *Brompton-row*
p 1Grote, George, Esq. *Threadneedle-street*
p Guest, Josiah John, Esq. *Merthyr Tidvil*
Gullett, John, Esq. *Exeter*
Gumby, John, Esq. *Bordersley near Birmingham*
Gunnel, Samuel, Esq.
Guy, John, Esq. *Croydon*
p Gwilt, George, Esq. F. A. S. *Union-street, Borough*
Gwinnet, Theodore, Esq. *Cheltenham*

H.

•t Hurdwicke, Philip, Earl of, K. G. F. R. S. F. S. A. M. R. I. *St. James's-square*
* Harrowby, Dudley, Earl of, F. S. A. 39, *Grosvenor-square*
pf Heoniktrr, *Jv*hn Lord, F. R. S. F. S. A. LL. D. D. C. L. M. R. I. A. *Grosvenor-square*
Hanmer, Sir Thomas, Bart. F. R. S. *Hanmer, Flintshire*
Hirne, Sir William, *Maidenhead*

Back, Thomas, Esq. *Bear Garden Iron Works, Bankside*
Hague, Mr. George, *Manchester*
Hake, John, Esq.
Hakewill, Henry, Esq. 3, *Hinde-street, Manchester-square*
Hall, Captain Basil, R. N. F. R. S.
Hull. 1Humphrey, Esq. 15, *Albion-street, Blackfriars*
Hallett, William, Esq. *Farringdon, Berks*
Hamilton, James, Esq.
Hamilton, John, Esq. 31, *Berwick-street, Soho*
Hamilton, Robert, Esq. *Norwood*
Hamilton, Mr. Thomas, 65, *St. James's-street*
Hamlyn, Charles, Capt. R. N. 30, *Albemarle-street*
pt Hammerton, Charles, Esq. *White Friars Dock*
Hammett, James Esdaile, Esq. 21, *Lombard-street*
Hammond, J. M. Esq. 1, *Dover-place, Kent-road*
Hammond, J. W. Esq. 23, *Wood-street, Spitalfields*
Hancock, Samuel, Esq. 21, *Northumberland-street*
Hannam, Peter, Esq. *Northborn-court, Deal*
Hainmann, William, Esq. *Piazza Chambers, Covent Garden*
Hansard, James, Esq. 7, *Southampton-street, Bloomsbury*
Hansard, Luke G. Esq. 100, *Great Russell-street*
† Hansard, Thomas Curson, Esq. 11, *Salisbury-square, Fleet-street*
Harcourt, C. H. Esq.
Hardie, David, Esq. 22, *Southampton-row*
P Harding, John, Esq. *Pinhall, Devon*
Harding, Thos. Esq. 16, *Mount-row, Mount-st. Lambeth*

Hardy, Mr. Wm. j, *Weod-street, Coldbath-square*
Harris, IUv. John, *Islington*
Harris, *Mobert*, Esq. *Reading*
Harris, Safem, Ksq.
Harm, Mr. William *(abro ad)*
v Harrison, .Iam«s, Esq. *Little Moorfields*
Harrison, J. II. Esq.
Harrison, Mr. William, *Devizes*
Hartley, Thomas, Esq. *New Bridge-street*
Hatctiartl, Mr. Jame>. *Brewer-street, Pimlico*
HatcliHrH, Mr. Thomas, *Ditto*
II aught on, Richard. Esq.
Hawking*, James, Esq. *Albion-pl :«, Bhckfrtars*
Haycraft, W. H. J. Ksq. *Lewisham*
r Hayes, Charles, Eiq. *at Mr. Stewart's, Mitre-court, Cheapside*
Hay tics, George, jiifi Esq. *Swansea, Glamorganshire*
Hayward, Mr. J. P. 97, *Newgate-street*
Ht adeach, Mr. Charts, *Neurport-street*
Heales, G. S. Esq. 8, *Great Carter-lane, Doctors' Commons*
Heall, Charles, Esq. *Seymour-place, Euston-square*
Heat 11 George, Esq. *Euston-square*
t Heaver, Joi n, Esq. *Spital-square*
t Heaviside, John, Esq. F. R. S. F. S. A. 14, *George-street, Hanover-square*
J»t Hedgea, K, R. Etq, 30, *Dtan-street, Soho*
Hedges, R. W. Esq. 13, *Percy-street, Bedford-square*
Hcfler, Mr. George, *Carlisle-place, Lambeth*
Hriictimaii, Francis, hsn. 58, *Lamb's Conduit-street*
Hinder*on, Mr. Alexander, *Park-lane*
II endrie, Mr. Robert, 12, *Tichborne-street*
Henley, Mr. W. 10, *King-street, Golden-square*
Hennah, Mr. Hrnry, 23, *Arundel-street*
HetmeU, Mi. Robt. 3, *Lancaster-court, Strand*
IIfIIIiker, Captain-Major Jacob, R. N. 11, *Duke-street, Portland-place*
Herbert, Mr. Wm. 1, *Farm-street, Berkeley-square*
Hering, Mr. Charles, 9, *Newman-street*
Hertz, Abraham, Esq. 9, *St. Mary-Axe*
Hewitt, Mr. Henry, 5, *Cannonbury-lane*
Hewi Hewett, William, Esq. R. N.
>'ewitt, Mr. James, O
(i /flimiNNIJlS
H ibon, Mr. William, 9, *Great Distaff-line*
Hickman, Mr. William, *Rutland-place, Upper Thames-street*
Higdt n, George Byfield, Esq. *Denmark-hill, Camberwell*
Higgins, J. Esq. 29, *Throgmorton-street*

Hill, Mr. William, 5, *Charing-Cross*
Hilton, Nicholas, Esq. *Ironmonger-lane*
Hingeston, Mr. John, *South-street, Finsbury-place*
Hinxman, John, Esq. 70, *Great Russell-street*
Hoare, Charles, Esq. F. R. S. F. H. S. F. S. A. 37, *Fleet-street, & Luscomb, near Teignmouth*
Hobbyn, Thomas, Esq F. R. S. 125, *Sloane-street* (Chairman of the Committee of Colonies and Trade)
Hodgson, William, Esq. *Mark Field, Stamford-hill*
Hodges, Jeffery, Esq. *Clapham Common*
Holbrook, Mr. James, 10, *Pratt street, Camden-town*
Holden, Edward, Esq.
Holdsworth, A. H. Esq. *Dartmouth*
Holford, Charles, Esq. F. H. S. *Hampstead*
Holland, S. C. Esq. 13, *Russell-square*
Hollingworth, Mr. John, *London Dock Office*
Holmes, Mr. D.
Holmes, Mr. H. *Sunderland*
Holmes, Mr. William
Holtzapffel, Mr. J. J. *Charing Cross*
Hoinlriy, George, Esq. *Hirwain Iron-Yard, Earl-street, Blackfriars*
Hoinfray, Samuel, Esq. M. P.
Hooper, Mr. John, 113, *St. John-street*
Hop[illegible], H. P. Esq. 30, *New Norfolk-street*
Hopkins, Richard, Esq. 19, *Great Knight-rider-street*
Hopkins, Thomas, Esq. F. R. S. F. S. A. M. R. I. *Duchess-street*
Hopper, Thomas, Esq. 42 *Upper Berkeley-street*
Howard, Edward Edmund, Esq. 11, *York-place, Baker-street*
Howard, William, Esq. 115, *Old-street*
Howe, John, Esq. 4, *St. Dunstan's hill*
Howell, Edward, Esq. *Cheltenham*
Hornblower, Mr. William, 15, *White Hart-row, Kennington*
Hoy, Michael, Esq. *Walthamstow*
Hull, Mr. William, 3, *King's Arms-buildings, Wood-street*
Hullett, John, Esq. F. H. S. 102, *Leadenhall-street*
Hulme, Dr. *Ball Hays, near Leek, Stafford*
Hume, Joseph, Esq. (V. P.) M. P. F. R. S. 38, *York-place*
Hume, Mr. Joseph, 108, *Long Acre*
Hume, Robert Montagu, Esq. 16, *Castle-street, Holborn*
Hunter, Robert, Esq. 3, *Compton-st. Brunswick-square*
Hurd, Philip, Esq. *Temple, and Kentish-town*
Hutchinson, Henry, Esq. 20, *Bedford-row*
Herst, Robert, Esq. M. P. *Horsham Park, Surrey*

[lit st, Thomas, Esq. 390, *Strand*
Hutciiins, V William, Esq. 23, *Hanover-square*
Hutrhon. Tiioii us, Esq. *Warnford-court, Throg.mortcn-street*
Hutchons, Mr. James, 4, *Alsop's-place, Mary-k-bonc*
v **Hul** ton, Mr. Thomas, *Marsk*
Hyde, John, Esq.
H **1'ile, Wil** iam, Esq. *Willoughby House, Tottenham*

I.

p **licit-** ster, Henry Stephen, Earl of, *Bu riiagtcn-street*

p **Idle, John,** Esq. *Kentish-town*
Inj lis, James, Esq. 27, *Mark-lane*
Inglis, Thomas, Esq. *Northumberland Coffee-house*
Irel **tml. J.** Esq. 28, *Old Burlington-street*

J.

Jackson, Mr. George, *Rathbone-place*
Jar! son, John, Esq. 4, *Billiter-lane*
Jackson, Rtcln rd, Esq. 31, *Park-street* **&**
Jackson, Samuel, Esq. 4, *Great Pultency-street* **1**
Jackson, Mr. Walter, *Warwick-square, Newgate-street*
r Jackson, William, Esq. *Couzen-lane, Upper Thames-street*
† Jacob, Joseph, Esq. *Michael's Grove, Brompton*
Jago. **Mr. i** . H. 3, *Dyer's-buildings, Holborn, and 6, Chapel-place, North End, Fulham*
l' J ames, William, Esq. *New Boswell-court, and Warwick*
Jearrad, Charles, Esq. 27, *Adam-st, East, Manchester-sq.*
Jellico, Joseph, Esq. F.H.S. *Fryern Lodge, East Burnet*
Jenkins, Charles H. Esq. 40, C **r»flr//** en-street
Jennii gs, Henry C. Esq. 6, *Nottingham-street, Nottingham-place*
nnings, Mrs. *Ditto*
p **Jenn** our, Joshua, Esq.
Jenyns, Rev. George, 6, *Connaught-place, and Bottisham* **//a//, r«„(** *bridgeshire*
* **J** essup, William, Esq. *Farningham, Kent*
r Johnson, Mr. William, *North Fleet*
Johnson, Mr. Thomas, jun. 2, *Lant-street, Bo uourh*
r **J** ohnston, Mr. Robert, *New-street-square*
Johnston, Mr. Robert, 68, *Cornhill*
Jones C **harles,** Esq. 33, *Gower-street,*
Jones C **harles,** Edw. Esq.
Jon **es,** Mr. David, *Milbank*

Jones, Daniel, Esq. *Clarence-house, Kensington*
Jones, Mr. F. 5, *Ludgate-hill*
Jones, Janes, Esq. 41, *Smithfield*
Jones, Mr. James, 150, *High Holborn*
Jones, John, Esq. 44, *Portland-place*
Ji:es, Mr. Martin, *Belvidere-row, Lambeth*
Jones, Mr. Thomas, 62, *Charing Cross*
Jones, Thomas Morton, Esq. *Boston, Lincolnshire*
Jones, William, Esq. 26, *Parliament-street*
Jones, Wm. jun. Esq. 84, *Great Russell-street*
Jopling, Mr. Joseph, 24, *Somerset-street, Portman-sq.*
Jordaine, Mr. William, 4, *York-place, City-road*
Jorden, John Stubb, Esq. *Birmingham*
Joy, Mr. Robert, *Covent-garden-piazza*
A Jupp, William, Esq. 37, *Old Broad-stre**ti***

K.

Kirkwall, Lord Viscount, *Taplow-court, near Maidenhead*
W **Keith, C**eorge, Visc. G.C.B. K.C. F.R.S. M.R.I. 45, *Harley-street*
Kin^mult, Sir Robt. Bart. F.H.S. *Sidmonton-house, Southamfjton*

Kay, Richard, Esq. *Manchester*
Keane, Edward, Esq. 10, *Symond's-inn*
Keene, Samuel Browne, Esq. 23, *Red Lion-square*
Kendall, Edw. Aug. Esq. F.S.A.
Kendrick, Dr. James, M.D. F.L.S. *Warrington*
Kennion, Peter, Esq.
† Kent, Samuel Luck, Esq. *London Wall*
Kepp, Mr. Richard, 42, *Chandos-street, Covent-garden*
Key, William Cade, Esq. 30, *Abchurch-lane*
Kidder, Mr. John, 6, *Strand*
Kilman, John, Esq. *Recquet-court, Fleet-street*
Kinder, Mr. Charles, 1, *Cheapside*
King, Rev. Samuel, *Latimers, Bucks*
King, William, Esq. 47, *Gloucester-place, Portman-square*
Kingston, John, Esq.
† Kirkby, William, Esq. *Exchequer-office, Temple* (Chairman of the Committee of Miscellaneous Matters)
Kirkpatrick, Mr. Henry, 72, *Welbeck-street*
Kleft, Mr. William, 253, *High Holborn*
Knight, Mr. Joseph, 40, *Leicester-square*
Knowlys, William Cook, Esq. *Wood's Farm, near Slaughem, Sussex*

L

** Liverpool, Robert Banks, Earl of, V. P. K. G. F. R. S. F.H.S *Fife-house, Whitehall, C• mhe-koust, King-ston, & Walmer-castle, Kent*

P Leicester, Sir John, Bart. 25, *Hill-street, Berkeley-square, ami Tabley-hall, Cheshire*

LnUb ock, Sir John William, Bart. 25, *St. James's-place*

P Laun nt, Sir Francis

Lake, Mr. Samuel, 1, *Alfred-place, Bedf oid-squ are*

Lamb, Alexan **der,** Esq. 26, *Prince's-street, Bank*

Lambert, Jan es, Esq. 7, *Bedford-row*

Lam her **t, Johi** t, Esq. *America*

r Lambton, John George, Esq. M. P. 15, *Cleveland-row*

† Langd **ou, Mr.** \\William, 28, *Great Russell-street*

Langridge, W. B. Esq. *Lewes, Sussex*

Lark, Henry, Esq.

Lnvies, William, Esq. 3, *Tanfield-court, Tgnptc*

Lawrer William, 154, *Bond-street*

Lawrence, W. E. Esq. 9, *Trinity-square*

rsonby, Esq. 11, *Bedford-street, Bedford-row*

Pt Lawson, Ileni

p La«Miu, Jobnson, Esq. *Ditto* ncer-street, Northampton-

Lcadbeler, Mr. U uidrd, 4, *Spi mrt* 30, *Great St. Helen's*

P Leader. Hcor>, Lsq,

Leame, Mr. Hcdin es Thos. 4, *Lincoln's-inn-fields*

Lee, Adam, Esq. *Cotton Garden, Palace-yard*

Lee, Hcnr\, Esq. 30, *Chiswell-street*

Lee, **lit** nry, jun. Esq. *Ditto*

Lee, J. Esq. *Ditto*

† Lee, **J.** F. Esq. LL. D. *Doctors' Commons*

r Lee, Mr. Stephen, *Royal Society Chambers*

Lees, William, Esq. *Ordnance-office, Tower*

Lefevre, Charles Shaw, Esq. M. A. M. P. F. R. S. F. S. A. 4, *New-street, Spring-gardens*

Lefevre, Charles Shaw, jun. Esq. 99, *Great Russell-street*

Lefort, Mr. Col. *Church-court, Walbrook*

r Leigh, John George, Esq. F. H. S. *High Leigh, Cheshire*

Lekeux, Henry, Esq. *Dorset-street, Portman-square*

Le Mesurier, John, Esq. *Alderney*

Leslie, Edward, Esq. *East Indie House*

Lethbridge, Mr. J.

Lettsom, Samuel, F. Esq. 27, *Great George-street*

Levien, Mr. M. 26, *Lower Charlotte-st. Bedford-square*

P **Levien,** Solomoi, Esq. 12, *Elizabeth place, kmningto**
Levitt, Mr. Lewis. **31.** A/i *nories*
Lewfr, \V\ H. E sq. *Brewery /, Pm& co*
v L[1]ewis, Thomas, Esq.
f **I.ewis, Willi iiairmau of** F. L. S. *London* (C I **he** Committee of Colonies and Trade)
Lewis, Mr. William, 4, *Nassau-street, Soho*
r **LiddsII,\Vm. 1** Esq. *Kildygrange, near Pickering, Yorkshire*
I.i :r. Clia ncoln, N rles, 196, *High Holborn*
Lii-coln, Mr. Henry C., *Ditto*
Uncobic , Abraham, Esq. 33, *Highbury-place*
1 .in- lo, I. Esq. 6, C *kurch-street, Spitalfields*
Lintlsa y, Reverend John, *Dulwich College*
Llewellyn, John, Esq. *Pellagare, Glamorgan*
P Lloyd, William, Esq.
Llo **yd, Willi** m, Esq. 36, *Warwick-street, Gol kn-tqv.are*
Lock, Samuel, jun. Esq. 215, *Oxford-street*
Lockwood, Anthony, Esq. *Canada*
Lockyer, James, Esq. 41, *Cleveland-street, Fitzroy-square*
Long, Mr. Richard, 217, *High Holbc*
p L.oveden, Edward, L. Esq. LL. D. F. R. S. F. S. A. F. L. S. and F. H. S. *Buscot Park*
Lovell, Mr. George, 3, *Wilmot-street, Brunswick-tqmtrt*
Lovell, Mr. Thomas, 33, *Red Lion-street, Hitiborn*
L< w, Mr. Robert, 330, *Strand*
La we, George, Esq. *Derby*
Lowe, I. Esq.
Lowell, John, Esq. 35, *Pudding-lane*
Loyd, Lewis, Esq. *Lothbury*
† Lumley, William, Esq. *Lincoln's-inn-fields* (Chair nan of the Committee of Accounts)
Lund, Mr. Thomas, 57, *Cornhill*
Lynde, William John, Esq. *Bank of England*
Lynn, (George, Esq. 5, *Ranelagh-walk, Chelsea*

M

* Macclesfield, George, Earl of, F. R. S. F. H. S. 9, *Conduit-street; & Sherborne-castle, Oxfordshire*
Mansfield, Earl of, F. R. S. F. S. A. M. R. I. *Cam-wood, Middlesex*
r Manvers, Charles Earl, 13, *Portman-square, and Thoresby-park, Nott.*
Morley, John, Earl of, LL. D. F. R. S. M. R. I.
* Morton, George, Earl of, K. T. F. R. S. F. S. A. M. R. I. F. H. S. 39, *Wimpole-street*

P Jouutooi ris, George, Earl of, F.R.S. F.S.A. F.L.S. *5, Arlington-street; & Arley-hall, near Bewdley*
Milford, Richard Lord
Murray, Lord James, F.R.S. F.H.S. *(abroad)*
P Moncton, Hon. Edward, 46, *Portland-place*
Morgan, Sir Chas. Bart. M.P. F.H.S. 77, *Pall Mall; & Tredegar House, Monmouthshire*

† Maberly, Joseph, Esq. 23, *Bedford-row*
Macarthur, John, Esq. 11, *New-street, Shoe-lane*
M'Cormick, Wm. Esq. 17, *Upper Gower-street*
Mac Donald, Mr. Thomas,
P Margilray, Simon, Esq. *Suffolk-lane*
M'Gowan, Mr. Alexander, 16, *Windmill-street*
Mackenzie, Mr. Frederick, 46, *Frith-street, Soho*
Mackenzie, Mr. John, 30, *Bridges-street, Covent Gar dem*
† Mackintosh, Ewen, Esq. 8, *Regent-street*
Mackintosh, Robt. G. Esq. 2, *Crescent-pl. Burton-crescent*
M icklew, Edward, Esq. 81, *Piccadilly*
Macpherson, Richard, Esq. 76, *Lombard-street*
Magovern, Mr. P. 92, *Newman-street*
Magrath, Mr. Edward, 26, *Wood-street, Cheapside*
Mainwaring, Mr. John, *Chichester-rents*
Maitland, Ebenezer, Esq. *Clapham*
P Maitland, Ebenezer Fuller, Esq. M.P. F.S.A. *Norbury Park*
Malam, Mr. John, *Gas Company, Peter-street*
Mallcott, Mr. John, 12, *Newgate-street*
Malleson, Rev. I. P. B.A. *Cheyne-walk, Chelsea*
Mand• r, J. Riland, Esq. 50, *Cannon-street*
P Manley, Admiral, J. C. *Wallingford*
Mansfield, James, Esq. *James-street, Bedf ird- row*
Manton, Mr. William, 14, *South-street, Grosvenor -square*
Maples, Capt. I. T., R. N. 1, *Euston-place*
Marreco, A. J. F. Esq. 8, *Austin-friars Passage*
Marsack, Lieut.-Colonel, *Caversham-park, Reading*
Marsack, Edward Claude, Esq. 25, *Chapel-st. Grosvenor-place*
Marsden, Robert, Esq. *Bedford-square*
Marshal, Mr. John, 12, *Southampton-street, Strand*
Marshall, Mr. Thomas
P Martin, Henry, Esq. *Aspield-lodge, near Bury St. Edmond's*
Martyn, the Rev. Thomas, *Cambridge*
Maskall, Mr. R. S. 55, *Basinghall-street*
Maskall, Mr. W. H. *Mitre-court, Milk-street*
Mason, Mr. J. F. *Aldenham-lodge, St. Albans*

Mason, Philip, Esq. *Worcester*
Matthews, John, Esq.
Matthews, Mr. Luke *(abroad)*
Matthews, Mr. Samuel
P Maude, Thomas, Esq. 13, *Great George-street*
† Maudslay, Henry, Esq. *Westminster-road*
Maudslay, Thomas, Esq. *Ditto*
Mawley, Edward, Esq. 28, *Lower Thornhaugh-street*
Maxwell, Marmaduke Constable, Esq. *Everingten, Yorkshire*
P Mayne, John Thomas, Esq. F. R. S. and F. S. A. *(abroad)*
Mayor, William, Esq. 7, *Sebbon's-buildings, Islington*
Medland, James, Esq. *Union-place, Kent-road*
Meheux, John, Esq. F. S. A. 52, *Hans-place, Sloane-street*
Meikleham, Robert Stuart, Esq.
Mendham, Mr. Samuel, *Camberwell*
P Menzies, John, Esq. *Pittfoddles, near Aberdeen*
Merac, Mr. M. L. P. *Mr. Thomas's*, 26, *Change-alley*
† Meredith, George, Esq. F. S. A. 6, *Nottingham-place*
† Meredith, William, Esq. 3, *Harley-place*
Meule, Mr. J. G. 89, *Strand*
Merrifield, Mr. James, 7, *Princes-street, Bedford-row*
P Meyer, C. P. Esq. *Enfield, Middlesex*
Meyrick, Owen Putland, Esq. F.R.S. F.S.A. *Bodalgon, Anglesea, and Upper Harley-street*
Micklethwaite, Mr. Dennis, *Johnson's coffee-house, Blackfriars-road*
Middleton, Rev. John, *Melbourne, Derby*
Middleton, William, Esq. 61, *St. James's-street*
† Midgley, G. D. Esq. 49, *Strand* (Chairman of the Committee of Chemistry)
Miers, Mr. John, *South America*
Milburn, Mr. William, *Bombay*
† Mildred, Daniel, Esq. F. H. S. 21, *Finsbury-square*
Miller, Mr. George, 334, *Strand*
Miller, Giles, Esq. 12, *Goudhurst, Kent*
P Miller, John, Esq.
Miller, Mr. J. H. 107, *Swallow-street*
Miller, Thomas, Esq. 4, *New-square, Lincoln's Inn*
† Millington, John, Esq. 6, *Leigh-street, Brunswick-square*
P Mills, Abraham, Esq. *Ordnance Office, Dublin*
Mills, A[illegible]ft. ! Esq.
Mills, Mr. Joseph, 40, *Great Russell-street*
Mills, Samuel, Esq. 20, *Finsbury-place*
Mills, T. Esq. 20, *Ditto*
Minchin, Thomas, Esq. 9, *Norfolk-street, Strand*

† Minier, William, Esq. F.H.S. 3, *Aidphl-d rrace*
Mitchell, Mr. William, *Tyne Mercury, Newcastle*
p Mitchell, George, M.D. *Bertram-house, Berks*
Montague, Mr. George
Moody, James, Esq. 1, Vueen-sq MWt, *Bhom&bnry*
Moody, John Baker, Esq. *Hammersmith-terrace*
M Moore, Daniel, Esq. F.R.S. F.S.A. F.L.S. F.H.S. 8, *Lincoln's-* to (Chairman of the Committee of Correspondence and Papers)
p † Moore, George, Esq. F.S.A. F.L.S. M.R 1. 39, *Lower Thornhaugh-street, Bedford-square* (Chairman of the Committee of Correspondence and Papers)
Moore, Joseph, M.D. *Great Queen-street, Lincoln's inn-fields*
Moore, Peter, Esq. M.P. 73, *Gloucester-place*
† Moore, Thomas, Esq. F.S.A. *Hendon*
Moorman, Mr. Thomas, 16, *Old-street*
Morant, Mr. George, 88, *New Bond-street*
Morgan, Thomas, Esq. 13, *Savage-gardens*
Morris, Charles, Esq. 1, *Great Cumberland-place*
Morris, Joseph, Esq. 24, *Northumberland-street*
Morris, Mr. William, 34, *Whitcomb-street*
Morrison, James, Esq. 105, *Fore-street; and Bexley, Kent*
Moss, Mr. Thomas, *Lambeth*
Mott, Mr. George, 20, *Essex-street, Strand*
Mount, Richard, Esq. *Laytonstone*
Moxon, George, Esq. 40, *Cannon-street*
Mudge, Captain Richard, *East India House*
Mullens, Mr. James, 8, *Marchmont-street*
Mulready, William, Esq. R.A. *Kensington Gravel Pits*
Murray, Captain James, 35, *Soho-square*
Muss, Mr. Charles, 53, *Warren-street, Fitzroy-square*
Mutlow, Mr. Henry, 3, *York-street, Covent Garden*
p Myers, Thomas, Esq. 4, *Tilney-street, Mayfair*

N

p Norfolk, Bernard Edward, Duke of, F.R.S. F.S.A. F.H.S. *St. James's-sq., and Arundel Castle, Sussex*
**† Northumberland, Hugh Duke of, (V.P.) K.G. F.R.S. F.S.A. *Northumberland-house, Sion-house, Middlesex,* .1K-7 *Alnwick Castle, Northumberland*
† Northampton, Charles Marquis of, F.S.A. *Castle Ashby, Northampton*
Northesk, William, Earl of, *Rose-hill, Winchester*
Nepean, Right Hon. Sir Evan, Bart. F.H.S. *Loders, Bridport*

Neesom, Mr. William, 9, *Billiter-lane*
Nelson, John, Esq. *Doctors' Commons*
Neville, William, Esq 31, *Fleet-street*
Newby, J. W. Esq. 48, *Poland-street*
† Newcomb, William, Esq. 190, *Fleet-street*
† Newinrin, John, Esq. *Alton, Hants*
Newman, John, Esq. *Bridge-house, Tooley-street*
P Newton, Andrew, Esq.
Newton, Mr. James, 63, *Wardour-street*
Newton, Robert, Esq. *Norton-house, Derbyshire*
Newton, Mr. William, 66, *Chancery-lane*
Newton, Mr. William, *College of Physicians*
Neyva, Joseph da Silva Periera, 17, *Artillery-place*
Niblett, John, Esq.
Nicholas, Nicholas Harris, Esq. 7, *Farrar's Buildings, Inner Temple*
Nicholson, Esq. *Magdalen-hall, Oxford*
† Nicol, George, Esq. 58, *Pall Mall*
Nicol, Robert, Esq. 1, *Staple's-Inn*
Nimmo, A. Esq. *Ireland*
Nockolds, Martin, Esq. *Tring*
Nollekens, Joseph, Esq. R. A. 9, *Mortimer-street*
Nonnen, John, Esq. F. H. S. *Gottenburg*
Norbury, Mr. Joseph, 202, *Whitechapel*
† Norden, Mr. J.
P Norris, John, Esq. *Hamden-house, High Wycombe, Berks*
Northall, Mr. W. K. *Wolverhampton*
Northey, William, Esq. M. P. 27, *Bruton-street*
Northhouse, Mr. Wm.
Norton, T. F. Esq. *Aldersgate-street*
Noyes, Charles, Esq. *Board of Trade, Whitehall*
Nutter, James, Esq. *Cambridge*

O

Oakes, Miss —, *Mitcham, Surrey*
P Oakley, Benjamin, Esq. F. H. S. 36, *Tavistock-place*
O'Bryen, Dennis, Esq. *Craven-street*
Ody, Mr. John, 292, *Strand*
O'Kelly, Colonel
Oldenshaw, Mr. Robert, *Lower-street, Islington*
P Olive, Jeremiah, Esq. 44, *Baker-street*
Oliver, Mr. Robert, 3, *Bell's-buildings, Salisbury-square*
Osmond, Mr. Stephen, 17, *Little Tower-street*
Osorio, Abraham, Esq. *Chapel-street, Bedford-row*

Ostell, Robert, Esq. *Nelson-square, Blackfriars-road*
Overton, John, Esq. *Rainham, Norfolk*
Outhett, Mr. J. 10, *Vauxhall-terrace*
Owen, Mr. Thomas, 21, *Great Russell-st. Covent Garden*

P

P Portland, William Henry, Duke of, F. R. S. & S. A. *Piccadilly, Balsover-castle, Derby, &c. &c.*
** † Prudhoe, Algernon, Lord, F. R. S. *Northumberland-house*
Peel, Right Hon. Robert, M. P. 12, *Great Stanhope-street, May-fair*
* Pusey, Hon. Philip, 35, *Grosvenor-square*
* † Peel, Sir Robert, Bart. (V. P.) 16, *Upper Grosvenor-st.*
Prescott, Sir George, Bart. *Theobald's-park, Herts*

Packer, William, Esq. *Great Baddaw, Essex*
Paine, Mr. William, *Elliott's Brewery, Pimlico*
Pakenham, William, Esq. *Clerk of the Works, Tower*
Palethorpe, Mr. T.
† Palmer, Mr. H. R. *Mount street, Lambeth*
Papworth, John, Esq. 6, *Bath-place, New-road*
Parker, Mr. J. C. 25, *Whitcomb-street*
Parker, Mr. Samuel, jun. 35, *Argyll-street*
† Parker, Samuel, Esq.
Parker, Thomas, Esq. 37, *Berner's-street*
Parkes, Josiah, Esq. *Warwick*
† Parkes, Samuel, Esq. F. L. S. 30, *Mecklenburg-square*
Parkin, Mr. Richard, 40, *Bedford-street, Strand*
Parkins, William, Esq. *Adelphi Wharf*
Parminter, George, Esq. *Earl-street, Blackfriars*
Parsons, William, Esq. *High-street, Leicester*
Parvin, Mr. Richard, *Ash-terrace, Hoxton*
Paterson, Mr. William, 16, *Beckford-row, Walworth*
Patrick, Mr. John, 94, *Newgate-street*
Pattisall, Stephen, Esq. *Change-alley*
Payne, Joseph, Esq. *Aldermanbury*
Payne, Mr. William, 9, *Southampton-street, Strand*
Paynter, John, Esq. 64, *Coleman-street*
Peache, Mr. William, *Pedlar's-acre, Lambeth*
Peachey, General, *Yarmouth, Hants*
Peacock, John, Esq. *Bruton-street, Berkeley-square*
Peacock, R. Esq. 47, *Chancery-lane*
P Peacock, Mr. William, 18, *Salisbury-square*
Pearce, William, Esq. 5, *Craig's-court*
† Pearsall, James, Esq. 145, *Cheapside* (Chairman of the Committee of Manufactures)

Pea;son, Charles, L;$q.
† Pearson, Rev. William, LL.D. & F.R.S. *East Sheen*
Peckston, Mr. Thomas, 42, *Marsham-street*
*V*el, Jonathan, Esq. 30, *Bucklersbury*
Peel, Robert, Esq. *Manchester*
Petrce, Benjamin **Cnittell,** M. D. 40, *St. Mary-axe*
Peirce, Clement Anthony, Esq. 57, *New Bond-street*
Pellatt, Mr. Apsley, jun. 16, *St. Paul's Church-yard*
Pellett, Stephen, M. D. 49, *Weymouth-street*
Penno, John, K><j. T. iH. S. 10, *New-street, Spring Gardens, a,,d Stoke-park, Buckinghamshire*
Penn, Richard, Esq. *Secretary of State's Office*
P Pepys, John, Esq. 8, *Lower Berkeley-street*
t 1 Pepys, William, H. Esq. F. R. S. F. H. S. 24, *Poultry*
Percival, Richard, jun. Esq. 76, *Lombard-street*
P Perin, W. P. Esq. F.R.S. F.S.A.
Perkins, Mr. Angier March, 69, *Fleet-street*
Perkins, Jacob, Esq. 69, *Fleet-street*
Perry, Mr. Ebenezer, 39, *Spencer-street, Northampton-square*
Perry, James, Esq. F. H.S. 143, *Strand, and Tavistock-place*
p Perry, John, Esq. 62, *Montague-square*
, Philip, Esq. *Ditto*
Peter, William, Esq. 26, *Lower Cadogan-place*
P *Vt*tit, Louis Hayes, Esq. F.R.S. F.S.A. F.L.S. 9, *Lincoln's Inn*
Peto, Henry, Esq. 31, *Little Britain*
P Pettiward, Roger, Esq. F.R.S. F.S.A. F.L.S. F.H.S. 127, *Park-street, Grosvenor-square*
Peyton, Richard, Esq. 10, *Cook's-court, Carey-street*
Phillips, Charles, Capt. R. N. 30, *Albemarle-street*
Phillips, James, Esq. 49, *Brompton-row*
Phillips, Mr. William, 54, *High Holborn*
P Phillips, William, Esq. 23, *Cavendish-square*
Phillipps, Leonard, Esq. *Wandsworth-road*
Phillipps, Mr. Leonard, jun. *Portsmouth-road, Vauxhall*
Philpot, Benjamin, Esq. *Stamford-street*
Phipps, John, Esq. 19, *Buckingham-street, Strand*
Pieters, Rev. John, *Bromley, Kent*
Pillar, James, Esq. *Land Revenue Office, Whitehall*
P Pincent, Joseph, Esq. 3, *Castle-court, Birchin-lane*
Pinder, W. M. Esq. *West Indies*
Piper, Mr. Thomas, 42, *Little East Cheap*
Piper, Mr. William, 8, *Ditto*

Pistor, John, Esq. *Bristol*: *Hotel*
PHcairD, John, Esq. 3, *Jffrvifs-tqHi; St. Mar* jr *Ait*
Pitcher, Henry Jones, *Rookery, North) leet, Ke »t*
P† **Pftt.Thoma**, Esq. (V.P.) F.S.A. **F.H.S** 41, *Wimpole-street*
Pix, Thorn 35, Esq. *Peasmarsh, Sussex*
1*1.11)la, Jo.[1]-' pb, Esq. F.R.S. *British* i *.Museum*
Plait, James, Esq. lufiosirr// *court*
Phiuiplrr, E. 1 Esq. 4, *Ltmb's-buildings, Ttm*[ple]
Poland, Mr. 351, *Stra*[ltd]
Poland, Mr. Wm. Henry, me, *Cheapside*
Polhill, Edward,jui.. Esq. 30, *York-place, Portman-square*
Polhiil. J. Esq. 10, *Cavendish-square*
Poliaid, Robert, B. Esq. 4, *Blemell-house, Bro mpton*
Pon der, Mr. Stephen, 28, *Great East-cheap*
Poole, Moses, Esq. *Patent-office, 4, Old-sq. Lincoln's-inn*
Pool€, Hichan Esq. 12, *Gray's Inn square*
Pope, Mr. John, 96, *Oxford-street*
P Portu an, Edward, Esq. *Bryanston, near Rivndford, Dorset*
p Poller, Chriiluphcr, lisq.
Potts, Mr. James, lfA»/« *Cottage, Little Chelsea*
Pouchcc, Mr. **1^** J. ***Staniopi*** *-street, Clare-market*
Pourcin, Joseph, Esq. 51, *Oxford-street*
Powell, JohoC. Esq. IS. *Little St. Helen's-place*
P † Powell, Rd., M.D. (V.P.) F.S.A. 7, *Bedford-place, Russell-square*
P† Powell, Richard Jones, Esq. I, *Elm-cvurt, Ten,*[ple]
Powell. Thomas H. Esq. 14, *Paper buildings, Temple*
Powell, Rev. Mr.
Powmill, **Henn** Esq. 63, *Russell-square*
Poym!er, Thomas, Esq. 6, *Bishopsgate-street*
P Prado, Samuel, Esq. 21, *Grafton-street*
Pratt, Edward Roger, Esq. *Royston-house, Norfolk*
Presbury, Mr. Charles, 9, *New-street, Covent Garden*
† Preston, Richard, Esq. 6, *New-square, Lincoln's Inn*
Preston, Thomas, Esq. 19, *Nottingham-place*
Price, Mr. Charles, 221, *Strand*
Price, Henry, H. Esq. *Neath Abbey. South Wales*
Price, Samuel Evans, Esq.
Prickett, George, Esq. 5, *Seymour-place, Euston square*
Provis, Mr. John, jun. *Paddington*
Provis, Mr *W.* A. *Ditto*
Pullen, John, jun. Esq. 34. *Fore-street*
Pye, Mr. Charles, 2, *George-street, Euston-square*
Pyne, William, Esq. 2, *Canonbury-place, Islington*

Q

Quick, Mr. Samuel, 11, *Northumberland-st. Mary-le-bone*
Quin, Edward, Esq.

R

p His Imperial Highness, the Grand Duke Nicholas of Russia
Rexburghe, James, Duke of, 39, *Grosvenor-place, & Fleurs*
Also
of, (V.P.) M.A. F.R.S. F.S.A. 52,
Lower Grosvenor-street, & Longford-castle, near Salisbury
P† Romney, Charles, Earl of, (V.P.) F.R.S. *Mote Park, Kent*
p Kibblesdale, Thomas, Lord, D.C.L. *Gisburne-park, York*
p Rawlins, Sir William, 44, *Old Bethlem*

Ratcliffe, Mr. William, 9, *Brewer-street, Pimlico*
Rainbow, Mr. Joseph, M. 35, *Cannon-street*
Rainy, Mr. Alexander, 29, *Conduit-street*
Rainy, Mr. George, 105, *Swallow-street*
P Ramey, John, Esq. *Ormsby, Norfolk*
Ramsbottom, John, jun. Esq. *Windsor*
Ramsden, Mr. Richard, 7, *Brook-street, Holborn*
Ramshaw, Mr. James, 33, *Fetter-lane*
P Randell, George, Esq. *Bagnigge Wells*
† Read, General Henry, *Ramsbury, Wilts*
Ready, M. I. M. *Peckham*
Reaston, Francis B. Esq. 4, *Crown Office-row, Temple*
Reedall, Mr. J. H.
Rees, Mr. John, 45, *Cheapside*
† Reeve, Joshua, Esq. 3, *Chatham-place*
† Reeves, John, Esq. F.R.S. F.S.A. *Parliament-place*
Reeves, John, Esq. F. R. S. F. L. S. *Canton*
† Reid, John, Esq. 26, *Aldersgate-street*
Reid, J. R. Esq. 27, *Lower Brook-street*
Rentzsch, Mr. ——, *George-street, St. James's-square*
P† Reveley, George, Esq. *Aldenham Cottage, Herts*
Reynell, George, Esq. 42, *Chancery-lane*
† Reynolds, C. E. Esq. 96, *St. John-street*
Reynolds, Mr. John, 53, *Islington-road*
Reynolds, Samuel, Esq. *Bayswater*
Rhodes, Henry, Esq. 15, *Norton-street*
Rich, Robert, Esq. *Dockhead*
Richardson, Mr. Charles, *Piazza, Covent Garden*
P Richardson, Peter, Esq. 60, *Charing-cross*
Richardson, Mr. William, 72, *Mark-lane*

p Richardson, Wm Henry, Esq. 72, *Great Portland-street*
Riddle, Gabriel, Esq. 38, *Bow-lane*
p Rigaud, S. Esq. M. A. F. R. S. *Fellow of Exeter College, Oxford; Richmond*
Rigby, Mr. J. S. 8, *Charing-cross*
Rigby, Mr. Joshua, 8, *King-street, Clerkenwell*
p Ring, Thomas, Esq. *Reading*
Rivington, Mr. John, 62, *St. Paul's Church-yard*
Robarts, Mr. Hewy, 23, *Bedford-street, Strand*
t Robarts, Nathaniel, Esq. 1, *Charlotte-street, Bedford-sq.*
Robert, Mr. James, 136, *Long-acre*
Roberts, Col. R. E. F.R.S. F.S.A. 10, *Upper Grosvenor-st.*
Roberts, Mr. S. E. 91, *Fleet Market*
p Roberts, Thomas, Esq. 2, *Russell-square*
Roberts, Thomas, Esq. *Brook House, Chester*
Robertson, John, Esq. 7, *Walcot-place*
p Robinson, Charles, Esq. 36, *Highbury-place*
Robinson, David, Esq. Professor of Fortification, *Royal Academy, Woolwich*
† Robinson, George, Esq. *London-Dock-house*
Robinson, J.P. Esq. 29, *Lower Brook-street*
Robinson, Mr. Matthias, 64, *Red Lion-street*
Robinson, P. F. Esq. 29, *Lower Brook-street*
Robinson, Mr. T. C. 38, *Devonshire-street, Portland-place*
Robinson, W. T. Esq. 6, *Austin Friars*
Robson, Miss, *Isleworth*
Rodes, Cornelius, H. Esq. *Balborough, Derbyshire*
Rodger, Lieut. Wm., R. N.
Roe, Mr. Henry, *Southampton*
p Rogers, Edward, Esq. M. P. 8, *Charles-street, St. James's*
p Roget, P. M. M. D. F. R. S. 39, *Bernard-street*
Rolt, John Henry, Esq. *Deptford*
Rolt, John David, Esq. *Ditto*
Ronalds, Francis, Esq. *Upper Mall, Hammersmith*
Rooke, Mr. C. A. 10, *Little St. Andrew's-street*
Rooke, W. B. Esq. 18, *High-street, Mary-le-bone*
Roper, D. R. Esq. 10, *Stamford-street*
Roscoe, William, Esq. F.L.S. *Liverpool*
Rose, Mr. John, 9, *Thanet-place, Strand*
Ross, Mr. David, 2, *Warwick-court, Holborn*
Ross, Mr. David, 7, *Lombard-street*
† Rotch, Benjamin, Esq. 1, *Furnival's-inn*
Rothwell, Mr. 2, *Upper Thornhaugh street*
Rowe, J. P. Esq. *New River Head*
Rowe, Joshua, Esq. 17, *Grenville-street, Russell-square*
Rowed, Henry, Esq. *Belgrave-place, Pimlico*
Rowley, Mr. Thomas, 10, *Gray's-inn Terrace*

P , *Gloucester-place*
Rn, k, John, Esq. 19, *St. Dunstan's Hill*
† Rucker, Daniel Henry, Esq. F.H.S. 29, *Mincing-lane*
Runnington, James, Esq. *Hillsbury, Yorkshire*
P Rush, George, Esq. *Elsingham Hall, Bishops' Stortford*
Ruspini, The Chevalier, 20, *Pall Mall*
Russell, Mr. Geo. 50, *Stafford-place, Pimlico*
P Russell, Jesse Watts, Esq. F.R.S. F.S.A. 33, *Portland-place*
Ryan, Mr. James

S.

P† Sussex, His Royal Highness the Duke of, K.G. &c. (PRESIDENT), *Kensington-palace*
**† Stafford, George, Marquis of, (V.P.) K.G. *Cleveland House, and Trentham-hall, Stafford*
* Shrewsbury, Charles, Earl of, F.S.A. 7, *Stanhope street May-fair*
P St. Vincent, John, Earl of, K.G.B. F.R.S. *Rochetts Brentwood*
Simpson, the Hon. J. B.
P St. Aubyn, Sir John, Bart. F.R.S. F.S.A. F.L.S.
Shuckburgh, Sir Francis, Bart. *Pavilion, Hans-place, and Shuckburgh-park, Warwickshire*
P† Smith, Sir W.S. K.C.B. K.C. K.F. F.R.S. F.S.A. *Carr, near Dover*
† Stirling, Sir Walter, Bart. F.R.S. F.S.A. 106, *Pall Mall*
Sykes, Sir M.M. Bart. F.S.A. F.H.S. 23, *St. James's-place*
P† Shirley, the Hon. Washington, 110, *Park-street*
P Smart, Sir George, 91, *Great Portland-street*
Sadd, Mr. James, *Greystock-place, Fetter-lane*
Sale, James, Esq. *Sandwich, Kent*
Sale, Richard Cowlyshaw, Esq. 10, *Norfolk-street, Strand*
Samuel, Mr. George, 2, *Richmond-buildings, Soho*
Sanders, John, Esq. F.S.A. F.L.S. *Reigate*
Sangster, Mr. Samuel, 94, *Fleet-street*
Sargent, Mr. Thomas
Sass, Henry, Esq. 6, *Charlotte-street, Bloomsbury*
Satchwell, George, Esq. *Ordnance-office, Pall-Mall*
Saunders, James Ebenezer, Esq. 7, *Lower Thames-street*
P Saunders, John, Esq. *Cannon-street*
Saunders, Nathaniel, Esq. 133, *Upper Thames-street*
P Saunders, Thomas, Esq. 16, *Maid-lane, Bankside*
† Savory, Thomas, Esq. 136, *New Bond-street*
Scargill, Mr. John, 1, *Freeman's-court, Cornhill*
Scheer, Fred. Esq. *Pinners-hall, Broad-street*
Schmalcalder, Mr. Charles, 82, *Strand*

† Scholey, George, **Esq.** Alderman, *Old Swan-stairs*
Scott, Henry D. Esq. 6, *Fludyer-street*
Scott, Robert, Esq. *Stockwell*
Seale, Gregory, Esq.
† Selby, Henry, C, 1 Esq. 4, *Verulam-buildings*
Sellon, Mr. John
Sewell, **Mr. W. J.** 62, *Old-street-road*
pf Seymour, William, Esq. 19, *Margaret-street, Cavendish-square*
Shacktll, Mr. William. 11, *Johnson's-court, Fleet-street*
Sharpe, Mr. William. 1 Batley, Esq. 2, *Warwick-court, Holborn*
Sharpe, J. B. Esq. 6, *Queen-street, Cheapside*
† Shaw, Benjamin, Esq. 323, *Borough*
Shaw, **Mr. Gtorgi**, *Romford*, Essex
Shaw, John, Esq. 28, *Gower-street*
Shaw, John, Esq. 4, *King-street, Cheapside*
Shaw, Samuel, Esq. 16, *Brunswick-square*
Sheaman, Mr. J. 98, *Gracechurch-street*
Shears, Mr. Daniel, 4, *Ely-place*
Shirley, T. Esq. 10, *Lime-street*
† Shore, Offley, Esq. *Norton, Derbyshire*
† Shore, Samuel, Esq. *Meersbrook, Derbyshire*
P Shore, Samuel, Esq. jun. *Norton Hall, Derbyshire*
r Shore, Sidney, Esq. *Sherwood Hall, Notts.*
Short, Mr. John, *Woodland-house, Woolwich*
Shrewsbury, Mr. James, 26, *Litchfield-street, Soho*
Shuldham, Lieut. R. N.
† Shuter, T. A. Esq. *Thornas-street, Bfahjitld, Southwark*
Sich, Henry, Esq. *Chiswick*
Sidney, R. C. Esq. 5, *Mortimer-street*
Sievier, Mr. Robert Wm. 34, *Southampton-row*
Sills, Joseph, Esq. 36, *Queen-street, Cheapside*
Silvester, Mr. Richard Wm., 27, *Strand*
Simmons, Mr. Samuel, Jun. 8, *Cannon-street*
Simmons, William, Esq. *Wales*
Simpkin, Mr. Robert, *Custom-house*
Simpson, Mr. Charles, 15, *Mincing-lane*
Simpson, Mr. Joseph, *Eccleston-street, Pimlico*
Simpson, William, Esq. 15, *Nottingham-place, Mary-le-bone*
Sims, Mr. Wm. 406, *Strand*
Sinclair, John, Esq.
Singleton, Henry, Esq. 21, *Piazza, Charles-street, St. James's*
Skegg, Mr. Edward, *John's-street, Adelphi*
Skegg, Mr. Edward, jun. *Ditto.*
Skelton, W. Esq. *Stafford-place, Pimlico*

† Sketchley, S. E. Esq. 21, *Lowe'• Phiifimorepl. k'fntingtett*
Skynner, John, Esq. 4, *Lincoln'* Inn*
Slade, J. M. Esq. *Chatham*
Slade, Mr. Wi n. 2, *South-crescent, Alfred-place, Bedford-sq.*
Smaliboncs, Mr. Edward, *Bath-place, New-road*
P† Smart, George, Esq. *Pedlar's-acre*
P Smart, Mr John, *Kingsgate-street*
Smee, Mr. William, *Pavement, Moorfield dt*
† Smirnove, Rev. James, 32, *Welbeck-street*
Smith, C. Esq. /. *ittle Preston, Ferryl'ridge*
P Smith, Mr. C. H. *Portland road*
Smith, Charles Josephus, Esq *Little Preston, Ferry i Jft 'idsrf*
Smith, Edward, Esq. 6, *Green Lettuce-lane*
Smith, George, Esq.
Suiitli, Hem y, Esq. *Draper's Hall*
Sm*Ah,* Jantrs Scott, Esq. *Whitechapel Distillery*
pf Smkb. John, Esq. 76, *Cornhill, and Canonbury-lane, Isfinston* (Chairm inol'ti e Committee of Manufactures)
Smith, Jniin, Esq. A *ing's-arms-wharf, Pedlar's-acre*
Smitb, Mr. John, 49, *Great Marlbro'-street*
P Smith, J< hn Spencer, Esq. LL.D. F.R.S. F.S.A. *Voctr* Kent*
† Smith, Josbua Jnnni han, Esq. vldcru an, *Bennett's h ill. Do; tors' Commons*
Smith, Mr. J. 11, *George-street, Minories*
Smith, Mr. J. C. *Serle's place, Lincoln's Inn*
P Snilh, J. P. Es q. F. R. S. *Demerara*
Smith, Robert, Esq. F.R.S. F.S.A. 18, *Austin Fri*
p Smith, Robert Peter, Esq.
Smith, Thomas, Esq. 29, *Judd-place West, New Road*
Smith, Walker, Esq. *Little Preston, Ferrybridge*
Smith, William, Esq. M. P. F.R.S. F.S.A. F.L.S.
Smethurit, J. Esq. 53, *Upper Berkeley-street*
P Snodgra s, T: omas, Esq. M. R. I. 10, *Chesterfield-street, Mayfair*
Snow, Mr. John Rowe, 24, *Prince's-street, Leicester-sq.*
P† Solly, Richard Horsman, Esq. F.R.S. F.S.A. F.H.S. M.R.I. 48, *Great Ormond-street* (Chairman of the Committee of Polite Arts)
P Solly, Isaac, Esq. *St. Mary Axe*
P Solly, Thomas, Esq. *Ditto*
Sotheby, Mr. Samuel, 3, *Wellington-street, Strand*
Sowerby, James, Esq. 7, *Birchin-lane*.
† Sparks, Robert, Esq. 134, *St. John-street*
Sparrow, Robert, Esq. *Wallingham Hall, Suffolk*

Speer, Edward, Esq. *Savoy, Strand*
Spiker, Dr.
Splitgerber, J. C. Esq. *Church-court, Wallbrook*
P Spurrier, Isaac, Esq.
Squibb, George, Esq. *Boyle-street, Saville-row*
Stables, David Henry, Esq. 7, *Hatton Garden*
Stack, Captain George F. 54th Regt. 8, *Thayer-street, Manchester-square*
Stanbrough, Charles, Esq. *Isleworth*
Stanhope, J. S. Esq
Stanley, Mr. George, 21, *Old Bond-street*
Staples, Samuel, Esq. 1, *Furnival's-inn*
P† Stapylton, M. Esq. 4, *Devonshire-place, and Myton Hall, Burroughbridge, Yorkshire*
P† Steers, John Wm. Esq. F. S. A. 7, *Figtree court, Temple*
Stephens, James, Esq. *Camerton House, near Bath*
Stephens, Mr. Thomas, Jun. *Drury-lane*
Stephenson, Rowland, Esq. *Farley-hill, Berks*
Stephenson, Rowland, Esq. *Marshall's, near Romford*
Stewart, Mr. G. 116, *Jermyn-street, St. James's*
Stewart, John, Esq. *D.* 3, *Albany*
Stiff, Mr. Thomas, 18, *New-street, Covent Garden*
Stodart, Mr. Adam, 27, *Berner's-street*
Stone, Mr. James, 30, *Warwick-street*
Stone, Lieut. Valentine, R. N. *Golden-square*
Stone, William, Esq. *Deptford*
Storey, Mr. W. jun. *Mount-street*
Storr, Mr. P. *Harrison-street, Gray's-Inn-road*
Strutt, G. B. Esq. *Derby*
Strutt, Joseph, Esq. *Ditto*
Strutt, William, Esq. *Ditto*
Stubbs, Mr. Francis Perry, 50, *Long Acre*
Stubbs, Mr. John, 6, *Castle-street, Leicester Fields*
Stump, John, Esq. 7, *Cork-street, Burlington-gardens*
Sturch, William, Esq. 5, *Montagu-street, Russell-square*
Summerfield, Thomas B. Esq. *Vauxhall*
Sutherland, John, Esq. *Liverpool*
P Sutton, Robert, Esq. 7, *Castle-alley, Cornhill*
Swaine, E. S. Esq. *White-street, Finsbury*
Swann, Charles James, Esq. *Chancery-lane*
Sweet, S. W. Esq. *Albion-place, Blackfriars*
Swinney, Mr. Francis, 13, *Hyde-street, Bloomsbury*
Sykes, Mr. Luke, 51, *Bucklersbury*
Symmons, Mr. Henry, *Great Peter-street, Westminster*
Symmons, J. Esq. F. R. S. F. S. A. F. L. S. *Paddington-House*

T.

Teynham, John, Lord, *Linsted-lodge, near Sittingbourne*
Thoroton, the Rev. Sir John, *Belvoir-Castle*

Taber, Mr. R. W. 6, *Lower John-street, Golden-square*
Talmi, Thomas Mansfield, Esq. *Penrie-Castle, Glamorganshire*
Tapster, Mr. Thomas, 32, *Frith-street, Soho*
Tate, Mr. William, 18, *Salisbury-street, Strand*
Tatham, Thomas James, Esq. 27, *Bedford-place*
Tayler, Mr. George, *Scotland-Yard*
Taylor, Mr. C. *Salisbury-street, Strand*
Taylor, George L. Esq. 6, *Montague-place, Montague-sq.*
Taylor, Mr. James, at Messrs. James Graham, & Co.'s *Liverpool*
Taylor, John, Esq. *New Auditor's-Office, Whitehall*
Taylor, John, Esq. 10, *Bury-court, St. Mary Axe*
Taylor, Mr. Josiah, 59, *High Holborn*
Taylor, Philip, Esq. *Bromley, Essex*
Taylor, Samuel, Esq. *Morton, near Manchester*
Taylor, Mr. W. G. 62, *Bread-street*
Tebbs, George, Esq. 163, *Old Bond-street*
Teed, John, Esq. M. P. *Sidney-house, Plymplea, Devon*
Telford, Thomas, Esq. *Salopian Coffee-house, Charing-Cross*
Templar, James, Esq. *Stover Lodge, Devon*
Temple, George, Esq.
Tennant, Christopher, Esq. *Lloyd's Coffee-House*
Tennant, George, Esq. 37, *Great Ormond-street*
Tennant, Mr. James, *Russell-place, Fitzroy-square, and Stanmore, Middlesex*
Terrey, Mr. Thomas Leighton, 87, *Cornhill*
Test, Thomas, Esq. 7, *Leicester-place*
Thomas, H. L. Esq. 12, *Ditto*
Thomas, Rees Goring, Esq. 2, *Sergeants'-Inn*
Thomas, William B. Esq. *Chesterfield, Derby*
Thompson, John, Esq. *Duke-street, York-buildings*
Thompson, Mr. Joseph, 6, *Canonbury-lane, Islington*
Thompson, Lawrence, Esq. 19, *Great St. Helen's*
Thompson, Nathaniel, Esq. *Holloway*
Thompson, Richard, Esq. 8, *Walbrook*
Thompson, Mr. Robert, 6, *Canonbury lane, Islington*
Thompson, R. S. Esq. *Kirby-hall, near Boroughbridge*

p Thompson, Williau, Esq. *Leeds, Yorkshire*
Thompson, Mr. V m. 11, *Air-street, Piccadilly*
Thornton, i onis, **Edward,** Esq. 54, ***Juddstt***
p Tbornt on, Samuel, Esq. M. P. F. A. S. 6, *Gra/ton-strett*
Thornton, > tephen Esq. 5, *Harki y-street*
Tliomton, Tb< s. Esq.
Thorpe. George T. Eq. 41, *Wabur.:-place*
Tboyts, WtHiam, Esq. *Southampstead, Berks.*
Tbrupp, Mr. li . E. *George-street, Oxford-street*
Thwailc, William Or;. y, Esq.
Till, Kiclmrd, Esq. L 3, *Albany*
Tillett, Mr. Alexander, *Vine-street, Lambeth*
Tillocb, A lexander, Esq *L.* L. I). *Picket-street*
Timbertake, Mr. G- F. J M , Ox/mf -street
pfTodd,.! ames Ruddell, Esq. 11, *John-street, Ade* y;Ai
Todd, John Etlward. Esq. 36, *Bedford-place*
Tolly, Colonel
Tomkins, Mr. P. W. 53, *New Bond-street*
v Tomliuson, George, Esfj. *Cop-'hall-buildings*
t Tomlinson, Captain Nich jlas, R. N. 36, *Dorset-sqvarc, Regent's-park*
Tooke, Thomas, Esq. 12, *Ruxell-square*
n Too ke, William, Esq. (V. P.) F. R. S. 22, *Bedford-row*
Tredgold, Thomas, Esq. 20, *Bentinck-street*
Tr :ry, William, Esq. 8, *Church-lane,* **wfcf/A**
Tribe, Mr. J. i *Chatham, Kent*
t Trotter, Joi n. jun. Esq. 1, *Park-street, Westminster*
Tuck, Mr. Uob«! t, 4, *Westm orland street, M ry-{c~b<mt*
Tucker, Thomav Esq. *Gener* ;/ fV st-office, *Lombard-eet*
r Tui stall, larmaduke, Esq. 1. R. S. F. S. A. *Wydlife, Y*rk-shire*
Turpiii , Mr. James, *Commercial o,ni, Lambelh*
Turrell, Mr. 1 dward, 11, *Gee-stre Somers' T&tcn*
Tui tle, W. T. Esq.
* Tun on, Edmund, Esq. M. P. *Brasted-place, Kmt*
Twining, George, Esq. *Strand*
T« ining, Richard, Esq. 34, *Norfolk-street*

U

U•iderwood, Mr Henry
r I'wins, 1 houin , Esq. *Edinburgh*

V.

Villiers, **the Rt Hon.** J. C. M. P. 18, *North Audley-street*
Vernon, **!hi-1lui>.** G. *Sudbury-hall, Derbyshire*

Valle, Anthony Bart o, Esq. 21, *Haymarket*
Valpy, **Rev. !lkbani,D.D.** F. S. A. *Reading, Berks.*
Vanhagen, M **r.** Tliomas, 63, *St. Paul's Church Yard*
Vuri- y, Coraci ius, 18, *Carmarthen-^ reet, Totten ham-court-road*
Van; ham, Henry, Esq. ***CtO,*** *Tc oley-street, Southw* <'>*
Vaughan, Wm. Esq. F. R. S. 70, *Fenchurch-street*
Venables, William, Esq. (Ahlernun), *Qi- een Hithe*
Vernon, John, Esq. F. S. A. 3, *Tilney-street, Mayfair*
Verrall, Richard, Esq. 10, *Harcourt-buildings, Temple*
Vincent, George, Esq. 85, *Newman-street*
Vine, James, Esq. 8, *Grenville-street, Brunswick-square*
Vulliamy, Mr. B. L. 74, *Pall Mall*

W.

V, inchilsea, George, Earl of, K. G. P. R. I. R) I. S. F. R. S. F. S. A. *South-street, Grosvenor-square*
) Waterpark, Richard Lord F. S. A. *Doveridge, Uttoxeter, Staffordshire*
Y> illoughby de Broke, Henry Lord, 21, *Hill-street, Berkeley-s* ***quote***
Webb, Sir John, Bart. F. R. S. F. S. A.
Wynne, Sir Watkin W. Bart. M. P. F. R. S. F. H. *S. St. James's-square, & Wynnstay*
Wiel Major General Sir Francis, 23, *Cavendish-square*
Wilson, Sir Henry Wright, *Chelsea*
Willes, Sir Francis, 13, *Charles-street, Berkeley-square*
Wynne, Sir Wm. *Bath*
Walker, Sir Patrick, *Edinburgh*
Vagner, Mr. Charles, 43, *Alp* .* »..> *road*
Wainewright, Robert, Esq. 3, *Gray's-inn-square*
Waistell, Charles, Esq. 6, *Delancy-place, Camden-Town* (Chairman of the Committee of Agriculture)
Wakeford, William, Esq. *Andover*
Walcot, Wm. Esq. F. S. A.
Walker, George, Esq.
Walker, James, Esq. 35, *Finsbury-square*
Walker, John, Esq. F. R. S. F. S. A. F. L. S. M. R. I. F. H. S. 49, *Bedford-square; and Arna's Grove, Southgate*

Walker, Thomas, Esq. *Bury-hill, Notts.*
Walker, Thomas, Esq. 4, *John-street, Bedford-row*
Wtilk<<r. Mr. Win, />• *idge-street, Westminster*
Walker, William, Esq. *Stamford-hill*
Walker, William Jackson, Esq. 3, *Assembly-row, Mile-end*
Wall**on, John, I**Esq. 10, *White Lion-street, Spitalfields*
Wallis, John, Esq. *Bodmin, Cornwall*
Wallis, W. B. Esq. *Butt-street, Deptford*
Walsh man, Thomas, M.D. *Kennington*
Walter, John, Esq. 4, *Symond's-Inn*
Walters, John, Esq. 11, *Fenchurch-buildings*
Walther, Mr. Henry, *Castle-court, Strand*
Warberg, Olaus, Esq. F.R.S. *Copenhagen*
Warcup, Mr. William
Ward, John, Esq. 1, *Ludgate-street*
Ward, John, Esq. *Air-street, Piccadilly*
Ward, John, Esq. *Harncastle, Lincolnshire*
Ward, William, Esq. *Albany, & Trinity College, Cambridge*
Ware, Samuel, Esq. F.S.A. 5, *John-street, Adelphi*
Warin, Nicolas, Esq. 3, *Christopher-street, Finsbury*
t Warren, Mr. Ar ulirose, 10, *St. Chad's-row, Grays-Inn-rot!-*
Warren, Charles, Esq. 9, *Constitution-row, Gray's Inn-road*
Watson, John, Esq. *Preston, Lancashire*
Watson, W. H. Esq. *Whitchurch, Salop*
Watts, Mr. Richard, *Picket-place, Temple-bar*
Watts, Thomas, Esq. *Bart**hohmht** Hospital*
Waymouth, Henry, Esq. *Battersea Common*
Weald, Thomas, Esq. *Woodcott Farm, near Croydon*
Weatherby, Edward, Esq. *Newmarket*
Weatherhead, John, Esq. *Derby*
Webb, Mr. Benjamin, jun. *Addle-hill, Upper Thames-street*
Webb, Frederick, Esq. *Langham-place*
Webb, John W. Esq.
Webb, Mr. J. 24, *Miles-lane*
Webb, Mr. William, *Middle-Temple-hall*
Wedgwood, John Esq. F.L.S. F.H.S. *St. James's-square*
Weguelin, J. C. Esq. 16, *New Broad-street*
Weir, Mr. Edward, 66, *Wells-street, Oxford-street*
Weldon, Walter, Esq. 97, *New Bond-street*
Wemyss, Colonel
West, James, Esq. 15, *Wimpole-street*
West, T. T. Esq. *Clapton*
Westley, Mr. Francis, *Stationers'-court*

Weston, Samuel Charles, Esq. 17, *South Audley-street*
Wheeler, Mr. John, *St. Bartholomew's-hospital*
Whitby, William, Esq.
White, Edward, Esq. 4, *fnnci Temple-lane*
White, H. C. Esq. *Cannon-row, Westminster*
† White, John, Esq. *Cannon-row, and Westbourne*
White, Mr. Jonas, *Imperial Hotel, Covent-garden*
White, J. B. Esq. *Nine Elms*
White, Richard, Esq. 14, *Essex-street, Strand*
† White, Rev. Stephen, *Castor, Northamptonshire*
White, Mr. Thomas, 24, *Air-street, Piccadilly*
White, William, Esq. *Cannon-row, Westminster*
White, Mr. William, *Alfred-place, Finsbury*
White, Wm. Archibald Armstrong, Esq. *College-street, Westminster*
White, Mr. W. J. *Brownlow-street, Holborn*
Whitehead, John, Esq. *Bankside*
Whitehead, Henry, Esq. *Little Cadogan-place*
Whitehead, William, Esq. *Ditto*
Whitford, Edward, Esq. 5, *Mabledon-place, Burton Crescent*
Whitlaw, Mr. Charles, 52, *Great Queen-street*
Whitmore, William, Esq. *Dudmaston, near Bridgnorth*
Whitton, W. R. Esq. *Whallon, Manchester*
† Wigg, Francis, Esq. 11, *North-place, Gray's-inn-lane*
Wigg, Joseph, Esq. *Ditto*
Wiggins, Matthew, Esq. 95, *Sloane-street*
Wilberforce, William, Esq. M.P. *Kensington Gore*
Wild, Mr. John, 7, *Martin's-lane, Cannon-street*
Wilde, Thomas, Esq. 69, *Guilford-street*
Wildman, Col. Thomas, 32, *Montagu-square*
Wilkinson, Christopher, Esq. *Whalley, Lancashire*
Wilkinson, Jeptha Avery, Esq. *Chorley, Lancashire*
Wilkinson, Mr. W. A. 14, *Ludgate-hill*
† Wilks, Mr. Robert, 89, *Chancery-lane*
Williams, Anthony, Esq. *Old-park, Bush-hill, Enfield*
Williams, H. Esq. 6, *Cecil-street, Strand*
Williams, Mr. John, *Greenwich-road*
Williams, John Cupper, Esq. *Denbigh, North Wales*
† Williams, Mr. Llewellyn, *Brown's Coffee-house, Mitre court, Temple*
Williams, Mr. O. 3, *Queen's-head-passage, Newgate-street*
† Williams, William, Esq. M.P. *Birchin-lane*
Williamson, Mr. John, 175, *Fleet-street*
Williamson, Mr Richard, 14, *Moore-place, New Bethlem, Lambeth*

Wiilimolt, John, Esq. *Streatham Common*
P† Wil;is, Robert, M. D. *2, Tavistock-street*
P† Willis, William, Esq. ;6, *Lombard-street*
\\Vilson, Mir. D. *<, Mount-place, Mile-end*
P† **WllsOll, Mi** Edward, 128, *St<IK(1*
Wilson, Mr. Jacob. 6, *Welbeck-street*
Wilson, Jolio, Esq. *Loud water-house, Rickmansworth*
Wilson, Joseph* Esq. 30, *Milk-street, and Hi**zhbttry** hill, Islington*
P **Wilson, Lestock Peach,** Esq. 1, *BuUtroti-street*
P† Wiliion, Rich. Esq. (V.P.) F.S.A. *V.I .S. 47, Lincotn*-**lathfidd***
Wil>on, Richard Percy, Esq. *4,J, Lincoln's-inn-Jit Ids*
Wilson, Richard.. 1sq. *Make, Stqff"ord*
P† Wilson, Thomas, Esq. 12, *Montague- street, Portman-sq.*
Wilson, Tliomas, Esq.
Wilson, Mr. W**ro.** 5, ***IMtie** Smith -street, Wes tmintter*
† Winchester, Henry, Esq. 6t, *Strand*
Wiuckworlh, Mr. J. 35, *Upper N>rton-street*
† A indus, Thomas, Esq. 72, *Bishopsgate-street-without*
P Winne, Capt. J. Lascclles
Winter, Miatlhew, Esq. Tax-^cr, *Somcrtet-plt.ce*
P WtHterb-ttom, John, M.D. *Newbury*
Wisker. Mr. John, *Pottery, Vauxhall*
Wood, Mr. Benjamin, 56, *Hatton-garden*
P Wood, Edward, E*q. !"• H.S. *Northumbcrhu d-street, Strand, and Hangtr-palc, near Ealing*
Wood, Mr. Jatiies, *ll, C kandus-street, Cot garden*
Wcvtui, Jolin. Esq. *C*/rrfj^"
W>od, John, E*r. *Bartholomew Hospital*
Wood, J. Esq. *Alnwrth Farm, near Emsbrook, Herts*
Wood, Matthew. Esq. *Al dley-street*
Wood, Thomas, Esq. *Little St. T postle*
P **Ifood,** William, Esq. *Northumbtrlimd -street, a nd Hangti-vale, rtar Ealing*
W>odburne, Mr. William, 112, *St. Martin's-lane*
† Woodfall, George, Esq. *Dean's-yard, Westminster*
Woods, Samuel, Esq. 8, *George-ya -street*
P Wooton, William Samuel, Esq. *lardy **Lombard***
Wornum, Mr. Robert, 42, *Wigmore-street*
P Esq. 20, *Old Jewry*
Wright, **Chtie*.** *Market-Drayton, Shropshire*
Wright, John, Esq. *Liverpool*
Wright, Mr. Lemuel
Wright, Mr. Rotic!t, 52, *Theobald's-road*
P W[illegible]

Wyme, Rev. J<an, 13, *Bid/ord-rote*
Wyoo, Tliom:s, Esq. 30, *Vauxhall-walk*

Y

Yarrell, Mr. WiiUatn, 9, r;rw/ *Rvdrr-streel, St. Jamt4t*
Yates, Johu Aitbou, Esq. *Liverpool*
Yatt-v Mr. William
Yockoey, Mr. Samuel F. 11, *^td/ord-ttrat, Corent-gardtn*
Yooge, Mr. Georp, 156, *Strand*
Youug, Florence, Esq. 143, *Borough*

Z

Zackary, M. M. Esq. F. H. S. 2( ), *Adam-ttrttt, Adeiphi, and Strand on the* Grant, A>u>

CORRESPONDING MEMBERS,

Marie Claude Antoine Marrier Baron De Mienvi lie. *Ancient Captain of the French Navy, Knight of St. Louis, &c.* <5T *Pa.ris.*

Charles Telfair, Esq. *Paris.*

Bibye Le Sage, Esq. *Paris.*

Le Comte Charles Lasteyrie, *Vice-President of the Society at Paris for the Encouragement of Na lumallm ustry.*

1)>. Hamel, *Petersburgh.*

Honoui able Sir Stamford Raffles, F.R.S. and F.S.A *Lieut. Gov. of Fort Marlbro, Island of Sumatra.*

N. Wallich, M. D. *Superintendant of the Botanic Garden, Culcutta.*

The < Chevalier Molard, *Member of the Royal Academy of Sciences, Paris.*

M. Bèlot de Saril, *Malmaison, near Paris.*

M Ccaax "Moreau, *Elcve Vice Consul de France, London.*

M. Marie Pierre Frederie Matthieu, *Member of the Academy of Dijon.*

M. M^on Four, *Pharmacia d* S. A. S. M. le Prin « de Condé. er of the Academy of Dijon.*

M. de Gouvenain, *Member of the Academy of Dijon.*

Thomas Fo&U anque, Esq. *his Majesty's Consul, Calais, &c.*

Bdwan l Nelson Alexander, Esq. *of Halifax, York.*

The 51ar uU de Paroy, *of Paris.*

Eli Ives, M. D. *Professor of the Materia Medica and Botany* a/) *Yale College, Connecticut, United States*

Lieut.-General Prince Volkonsky, *St. Petersburgh.*

Benjamin Silliman, Esq. *Professor of Chemis try, Yale College, Connecticut, United States*

Pavel Lui d, Esq. *Drammen, Norway*

J. Aldini, *Hon. Prof. of the University of Wilna, Member of the Imperial Institute of Milan, &c. &c.*

Mr. H enjamin Schlick, *Architect, Copenhagen.*

M. Paulin Malosse, *Avignon.*

INDEX.

INDEX.

INDEX.

B.

C.

D.

E.

F.

G.

H.

INDEX.

INDEX.

I N DE\.

Printed by T. C. Hansard, Peterborough-court, Fleet-street, London.