worked, nothing is easier than to demonstrate the expediency of adopting the same plan here, which has succeeded so well in the famous mines of Guancavelica in Peru.* For, first, whenever the supply of quicksilver fails, as has happened times without number, either in consequence of war, of losses at sea, or of the delay attendant upon procuring it from such a distance, the reduction of the ore in the amalgamation works is brought to a stand, the revenue is thrown into arrear, the whole kingdom suffers, the working of the mines is interfered with, and trade receives a check. By setting the quicksilver mines at work, all, or most of these evils, would be remedied, facilities would be afforded for reducing the silver in an expeditious manner, and the amount of the tenths, the one per cent. and the coinage duty would be augmented."

In confirmation of the above, it may be added, that other veins of quicksilver, appearing, by the analysis of Professor Del Río, to afford ores worth working, have recently been discovered in Mexico. Analyses of two specimens of the ore may be seen in the *Philosophical Magazine* for August, 1828.

MR. OGDEN'S *Marine Steam Engine*.

SIR,—In an account given in a late Liverpool paper of a public dinner of engineers and others, friends to the promotion of steam power, on the 15th of September last, I observe that the health of Mr. Ogden, the consul of the United States, at Liverpool, was proposed by Mr. Vignoles, C. E. and drank with great applause, as the person who was "the first to apply the power of steam to navigation on the ocean." Not being at all aware of Mr. Ogden's claims in this respect, and perceiving that the Editor of the "*Mechanics' Magazine*" was one of the party who joined in this public acknowledgment of them, I take the liberty of applying to him for some information on the subject. I doubt not that there are many others equally ignorant with myself of the service which Mr. Ogden appears to have rendered to navigation, and to whom a detail of the particulars attending it will be as acceptable as to,

Sir, your obedient servant,

W. H.

Warrington, October 15, 1830.

The grounds on which Mr. Ogden is considered entitled to the honour of being the first to apply steam to navigation *on the ocean*, admit of a very satisfactory explanation. In 1810, Mr. Ogden was engaged in making some experiments with a small steam boat, and then, as we have been informed, first gave his serious attention to the subject of steam navigation. On the following year, he made a plan, and gave a drawing of an engine, to a friend, which he proposed he should adopt for a boat he was about building. Mr. Og-

* Solorz. Polit. lib. 6, cap. 2.

den's attention being diverted from this object by other business, he thought no more of it until 1813, when having again leisure, he matured the plan before alluded to, and obtained a patent for it from the government of the United States. The specification was in the following terms:—"This improvement is predicated on the fact demonstrated by Mr. Watt, that the elasticity of steam being proportionate to its density, its expansion, on being stopped off at one-fourth, one-third, or one-half, the capacity of the cylinder, will produce a power in a much greater ratio than one-fourth, one-third, or one-half of the whole, (vide *Encyclopædia*, American edition, art. *Steam*, Plate 478, Fig. 10.) I propose working steam, of whatever density, in two cylinders or other vessels, to be stopped off at any point from one-eighth to one-half. If at one-half, the instant one cylinder is half filled, its steam valve is closed, and that of the other is opened; on its piston arriving at the end of the stroke, that of the other will have performed half a one; its steam valve will then be closed; and that of the first again opened, as well as its opposite condensing valve; thus the motion will be regularly continued, each cylinder alternately half filled with steam," &c. &c. Mr. O. further claims as his invention, the application of the powers of the two pistons, in such a manner that they shall act simultaneously on the same axis at right angles with each other. It is plain that when one is at its minimum, the other being at its maximum, will carry it past the point, and that they will mutually tend to equalise the motion, thereby doing away the necessity of balance wheels."

In 1814, B. H. Latrobe, Esq. an engineer and architect of some celebrity in the United States, constructed the first engine on this principle; not, however, until he had combatted that principle most stoutly; insisting that, from the inequality of their motions, two cranks could never be brought to act together. Mr. Latrobe was induced, however, to try the experiment, and the result was most satisfactory.

In 1815-16, Mr. Ogden built a boat in the neighbourhood of New York, and set up on board of her an engine of two 27 inch cylinders, with a four foot stroke, shutting off the steam at one-half. With this boat he proceeded, in May, 1816, from New York to Virginia, where she was established to run between Norfolk and Richmond. During the passage they encountered a severe gale, when her performance astonished every person, and proved, most satisfactorily to Mr. Ogden's mind, the advantages of steam in any situation. In the autumn of that year, Mr. O. came to this country, and had an engine constructed by Fenton, Murray, and Wood, of Leeds. The same builders afterwards furnished another, from the same patterns, of two 53 inch cylinders, which Mr. O. put on board of a steam tug for the river Mississippi, and which we have heard him say he has frequently seen ascending that stream against a current of three miles and a half with a ship of three or four hundred tons on each side, and two smaller vessels, brigs or schooners, astern.

[*Editor Mechanics' Magazine.*

Description of the various kinds of Paper.

WE have been requested to insert the following description of the various kinds of paper, which appeared in the *London Mechanics' Magazine*, for February, 1829. The article, which is understood to be very accurately drawn up, is rarely to be met with at the present time.

The water marks used by the English manufacturers are figured in the original paper, but are here omitted, as having little interest for the American manufacturer, or dealer. Ed.

It was well remarked by the great philosopher, Boyle, that "if every artist would but communicate what new observations occurred to him in the exercise of his trade, the advantages gained to philosophy would be incalculable."

Under a conviction of the extensive application of the above truth, I submit the following information (first collected, with some pains, for my own use,) for insertion in your widely circulated miscellany; and although the title of *new* will not apply to it, yet, as I am not aware of any thing of the kind having before appeared in print, I hope it will be considered sufficiently scientific, and of such general interest, as to procure for it that honour.

Paper may be divided into three distinct classes; viz. writing and drawing papers, printing papers, and wrapping or packing papers.

First, *Writing or drawing papers*—Writing Fig. 1.

papers are called either *laid* or *wove*, from the moulds on which they are made. Laid papers retain the marks of the wires in long parallel lines crossed at intervals by other lines, as shown by fig. 1, which is a mould for making laid papers. Wove papers, on the contrary, bear no impression of the wires, the mould used for making them being formed of very fine wire, woven in a manner similar to linen,—whence the derivation of the term *wove*.

The appearance of a mould of this description is shown by fig. 2. Laid paper is generally of a bluish cast, which is obtained by adding smalt (the powder blue of commerce) to the pulp while in the vat. Wove paper is of two kinds,—blue wove, and yellow wove; the former of which is made by working the pulp to which smalt has been added, on a wove mould; yellow wove, on the contrary, is the pure colour of the rag, considerably heightened, however, by the process of bleaching.

Fig. 2.

Drawing papers are always of the latter, and writing papers (emphatically so called, from imperial to demy) of the first named description. In describing the numerous varieties of post, copy, foolscap, and post papers, the distinguishing terms, *laid*, *yellow wove*, or *blue wove*, are always employed. But in all

papers, from demy upwards, *wove* and *drawing*, or *laid* and *writing*, are synonymous terms; and where no distinguishing term is used, *laid* is always understood. The following is a list of the papers in this class, with their dimensions, and weight per ream:—

Name.	Dimensions.		Weight.
	In.	In.	lbs.
Antiquarian, - - -	52 $\frac{1}{2}$	by 30 $\frac{1}{2}$	236
Double Elephant, - - -	39 $\frac{1}{2}$	26 $\frac{1}{2}$	140
Atlas, - - -	33	26	100
Colombier, - - -	34 $\frac{1}{2}$	23	100
Elephant, - - -	29 $\frac{1}{2}$	21 $\frac{1}{2}$	72
Imperial, - - -	28	23	72
Super Royal, - - -	27 $\frac{1}{4}$	19 $\frac{1}{4}$	52
Royal, - - -	23 $\frac{1}{2}$	19	44
Medium, - - -	22 $\frac{1}{4}$	17 $\frac{1}{4}$	34
Demy, - - -	19 $\frac{1}{2}$	15 $\frac{1}{4}$	24
Extra large thick Post,	22 $\frac{1}{4}$	17 $\frac{1}{4}$	25
Ditto ditto thin ditto, -			18
Ditto ditto Bank ditto,	21	16 $\frac{1}{2}$	13
Ditto large thick ditto,			22
Ditto ditto middle ditto,			19
Ditto ditto thin ditto,			16
Ditto ditto Bank ditto,	19	15 $\frac{1}{4}$	11
Extra thick ditto, -			25
Ditto thick Post, -			20
Ditto middle ditto, -			17
Ditto thin ditto, -	16 $\frac{1}{2}$	13 $\frac{1}{4}$	14
Ditto Bank ditto, -			7
Copy, - - -	20	16	17
Square Foolscap, - - -	22 $\frac{1}{2}$	13 $\frac{1}{4}$	20
Extra thick ditto, - - -	15 $\frac{1}{2}$	12 $\frac{1}{2}$	18
Foolscap, - - -			15
Post, - - -			10

Drawing papers are not made smaller than demy, and are put up into reams in the flat state. Writing papers, on the contrary, are seldom made larger than imperial, never larger than atlas, and are generally folded in half.

Considerable trouble has at different times been taken in attempting to discover the origin of the names which the several kinds of paper now bear, but without success. Another object of unsatisfac-

* A ream of paper consists of twenty quires; viz. eighteen quires of twenty-four unbroken sheets, and two quires of twenty sheets each, defective paper,—one of which is placed at the top, the other at the bottom of the ream, to preserve the inside paper from string marks, and injuries of any other kind. If the two outside quires are replaced by two perfect quires, the ream is stated to be *all insides*. A *printer's ream* consists of twenty-one and a half unbroken quires of twenty-four sheets each, and is called a *perfect ream*.

tory research, is the origin of the peculiar water marks with which each of the laid papers is distinguished.

The derivation of these marks, as well as the time at which they were first used, is mere matter of conjecture; but I am inclined to think, that on their first adoption, a closer relation existed between them and the names of the papers distinguished by them than at present. By a knowledge of these marks, the original size of any paper may be at once discovered, however much it may have been cut, or reduced in size. These remarks apply to the *laid* papers only; in *wove* papers the water marks being always omitted. The post papers are seldom retailed in the folio, *i. e.* the original size, as quoted in the foregoing list, being cut in half, and folded, and ploughed round the edges, forming quarto post, the common letter paper of the shops; this cut and again folded, &c. forms octavo post, or note paper, &c.

Having said thus much of writing paper, I next proceed to the second division of my subject,—*printing papers*. At the head of this extensive and highly useful class stand the plate papers. These papers are of the same size, weight, and quality, as the drawing papers already described,—differing from them, however, in being of a particularly soft nature,—the process of sizing, which gives the firmness so necessary in papers intended to be written on, being wholly omitted in the manufacture of plate papers. Plate paper is not made smaller than medium,—the size of the plates for a demy book. These papers are, as their name implies, used for copper-plate printing; when the plates are to be coloured, drawing paper is used, then technically called *hard plate*, in contradistinction to the former, or *soft plate*.

The following is a list of the other papers in this class, the weights and sizes of which vary greatly, according to the choice of the maker:—

Name.	Dimensions.		Weight.	
	In.	In.	lbs.	lbs.
Large News, - - -	32	by 22	From 32 to	37
Small ditto, - - -	28	21	23	25
Royal, - - -	25	20	26	28
Medium, - - -	23 $\frac{1}{2}$	18 $\frac{3}{4}$	24	26
Demy, - - -	22 $\frac{1}{2}$	18	15	21
Short, (or Music,) Demy,	20 $\frac{1}{2}$	14	25	28
Copy, - - -	20 $\frac{1}{4}$	16 $\frac{1}{4}$	13	16
Crown, - - -	20	15	7	12
Foolscap, - - -	16 $\frac{1}{2}$	13 $\frac{1}{4}$	9	14
Post, - - -	15 $\frac{1}{2}$	12 $\frac{1}{4}$	9	10 $\frac{1}{2}$

The three last of these are generally made in the double size. Printing papers are generally of a yellow wove texture, and are not so well sized as the writing papers; but the sizing is not wholly omitted, as, without some portion of it, they would not possess sufficient strength for ordinary purposes.

I have now arrived at the third division of my subject, viz. *wrapping, or packing papers*. This class includes an almost endless variety of sorts and sizes; which, for the sake of perspicuity, I shall notice under the following heads; viz. *cartridge papers*—blue papers—hand papers—and brown papers.

I. Cartridge Papers.

Name.	Dimensions.		Weight.	
	In.	In.	lbs.	lbs.
Square Cartridge, -	33 $\frac{1}{2}$	by 21 $\frac{1}{2}$	From 47	to 50
Double Crown ditto, -	30	20	30	38
Elephant ditto, -	28	23	48	52
Common size ditto, -	26	21	40	50
Royal ditto, -	24	19 $\frac{1}{2}$	29	32
Demy ditto, -	22 $\frac{1}{2}$	17 $\frac{1}{2}$	26	28
Foolscap ditto, -	16 $\frac{1}{2}$	13 $\frac{1}{4}$	13	15

II. Blue Papers.

Name.	Dimensions.		Weight.	
	In.	In.	lbs.	lbs.
Blue Elephant, -	28	by 23	30	
Ditto Double Crown, -	30	20	From 20	to 22
Ditto ditto Foolscap, -	26 $\frac{1}{2}$	16	20	
Ditto ditto Royal, -	25	20	20	to 22
Ditto ditto Demy, -	22 $\frac{1}{2}$	18	15	18

III. Hand (or white brown) papers.

Name.	Dimensions.		Weight.	
	In.	In.	lbs.	lbs.
Elephant -	28	by 23	From 30	to 36
Thick Royal Hand -	24 $\frac{1}{2}$	20 $\frac{1}{2}$	36	40
Thin ditto ditto -	24	20	16	20
Curling -	23 $\frac{1}{2}$	19 $\frac{1}{2}$	10	12
Lumber hand -	22 $\frac{1}{2}$	18 $\frac{1}{2}$	13	15
Middle ditto -	22	17	12	14
Small ditto -	20	15	6	10

IV. Brown papers.

Name.	Dimensions.		Weight.	
	In.	In.	lbs.	lbs.
Imperial Cap -	29	by 22	From 60	to 84
Bag ditto -	25 $\frac{1}{2}$	19 $\frac{1}{2}$	36	48
Kentish ditto -	21	17 $\frac{1}{2}$	26	28
Small ditto -	20	15	11	12
Double four Pound -	32	20	56	66
Small ditto ditto -	28 $\frac{1}{2}$	17 $\frac{1}{2}$	42	52

In addition to the above, there are a variety of papers for particular purposes, which do not come under any of the divisions hitherto noticed. I therefore proceed briefly to notice the principal of them, commencing with *blotting paper*, which is well known to every person. It is made of three different sizes; viz. medium, post, and foolscap, of various colours, weights, and quantities. Blotting paper, especially the colourless description, is much used in chemical experiments, for the purpose of filtration; there is, however, a distinct kind of paper made for this purpose, and known by the name of *filtering paper*; it is generally made double crown size, of a thick woolly texture. *Tissue paper* is also too well known to need description, beyond stating that it is made the size of crown, double and single, and demy. A particular species of tissue paper is manufactured and sold under the name of *copying post*; it is wholly destitute of size, and is of a thin absorbent texture; its use is for copying newly written letters. For this purpose it is slightly moistened, and laid on the letter written with *copying ink*, and is subjected to the action of a press, kept in counting-houses for that purpose; on removing the letter from the machine, an accurate facsimile is found transferred to the copying paper, which, pasted into a book, answers all the purpose of the more tedious and laborious methods of transcribing hitherto practised. *Littress* is a kind of smooth cartridge paper, made of two sizes, royal and foolscap, and used wholly for the manufacture of cards. Among the various kinds of paper used by grocers, in addition to many of those already described, there is a thick purple paper, which forms a distinct class, under the title of

Sugar blues, viz.—

Name.	Dimensions.		Weight.
	In.	In.	lbs.
Large Lump - - -	22 $\frac{1}{2}$	by 32	108
Small ditto - - -	28 $\frac{3}{4}$	21 $\frac{3}{4}$	102
Single Loaf - - -	26 $\frac{3}{4}$	19	90
Powder ditto - - -	26	18	58
Double ditto - - -	22	15 $\frac{1}{2}$	44

There are a species of thick brown papers, made for particular purposes; among which may be placed a large coarse paper for strong packing purposes, known by the name of *Manchester papers*; *sheathing paper* for ship-builders, and *tip paper* for hatters, are also of a similar description.

It is necessary here to observe, that although I have made a very marked distinction, in the mode of classification which I have adopted, between the two classes of printing and wrapping papers, yet such, in reality, does not exist; as, in some cases, the finest printing papers are applied to wrapping purposes, and many of that class (as regards size, &c.) are made of an inferior quality, for the purpose of wrapping papers,—such, for instance, as the double

crowns and demys used by grocers, hatters, &c. &c. In hand papers, again, some irregularity occurs;—elephant, which stands at the head of that class, is almost exclusively used for the manufacture of paper hangings, and is made of various qualities, according to the description of work for which it is intended. The elegant crimson and satin hangings require a paper of the best printing quality; which will not, therefore, with propriety, come under the denomination of *hand paper*. But had these and similar particulars been allowed to interfere with the arrangement I have adopted, much confusion and unnecessary repetition would inevitably have resulted. I have, therefore, given the most usual weights and sizes, which remain much the same, in whatever class the quality of the paper may chance to place it.

Coloured papers is the title of an exceedingly numerous class, which divide themselves into two kinds; viz. those which are made at the paper mill, either by colouring the pulp while in the vat, or by dyeing the paper afterwards; and those which are made from white papers, by persons following the business of fancy stationers and coloured paper manufacturers. Among the former class we may reckon the coloured drawing papers, for mounting, &c. crayon papers, for draftsmen; coloured printing demy, royals, &c. for the covers of books; and the beautiful tinted post and tissue papers, in such high repute with the fair sex. The second class comprises, in addition to several of the above, coloured double crowns, demys, &c. for posting-bills; coloured foolscaps,—marble, cypress, morocco, with gold and silver papers; as also papers in imitation of the various kinds of woods, tortoise-shell, &c. &c. to which I may add, a paper most beautifully executed in imitation of buhl work. Indeed, the beauty and variety of the papers in this class is such, that to be duly appreciated, they must be seen. Description, were I to attempt it, would be injustice to them.

Several papers are frequently made in the double size,—as was noticed when speaking of printing papers. The dimension of papers, in the double, may be obtained by doubling the smallest admeasurement. Thus, crown, for instance, is 20 inches by 15 inches, and double crown 30 inches by 20 inches, and so with all others.

Hoping at some future time to resume the subject, with an account of the manufacture of paper, and some of the manipulations it afterwards undergoes,

I remain, sir, yours, &c.

WM. BADDELEY, JUN.

Improvement in Watches, being an Account of a new Metallic Alloy for the Pivot Holes of Watches. By MR. J. BENNET.

IN a machine so minute and complicated, and requiring such exactness of movement, as a watch, it is evident that whatever tends to increase or overcome the friction of the different parts, deserves careful and serious attention. At no part of a watch or clock is the