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(Assisted by several Scientific Gentlemen.)

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No. CXXXIV.

Recent Patents.

To Thomas Robinson Williams, *of Cheapside, in the City of London, Gent., for certain improvements in the manufacture of woollen and other fabrics, or fabrics of which wool or fur forms a principal component part; and in the machinery employed for effecting that object.*—[Sealed 14th February, 1840.]

This invention of improvements in the manufacture of woollen or other fabrics, relates, Firstly.—To the making of cloth, by felting alone, without spinning and weaving, by obtaining a long even and uniform bat of wool, or other well known felting substances, such as furs and the hairs of animals, used either separately or mixed, and sometimes with a small addition of non-felting fibrous materials, such as cotton, silk, or flax; such bat of wool or other material, being of suitable length, width, and thickness, for forming commercial ends or pieces of cloth.

The fabric or manufacture, thus produced, depends wholly for its union and strength upon the principle or tendency of these animal products, when properly treated, to combine and unite, or, as it is commonly called, to felt together, without the usual auxiliaries of spinning and weaving, or the use of any adhesive mixtures.

Secondly.—This invention consists in an improved machine for raising the pile of woollen cloths, manufactured by the above process, or produced by the ordinary operations of spinning and weaving.

The material having been willied, picked, and scribbled, in the usual way, is weighed out into quantities for producing any required thickness and width of goods, and taken to the apparatus, shewn in Plate I., at fig. 1.

This machine consists of a common wool carding-engine, which, to produce broad cloths, should be made from 72 to 84 inches wide. *a, a, a,* and *b, b, b,* are two long revolving aprons of linen cloth, (or other suitable material,) passing over the rollers or drums *c, d, e, f,* which receive a rotary motion from the doffers of the card. These aprons are supported by a slight flooring *g, g,* and, together with the drums, revolve in opposite directions,as represented by the arrows, so that the two inner surfaces of each apron move in the same direction with uniform speed, and with nearly the same velocity as the doffer of the card, as regards their surfaces.

The material is taken off from the doffers, by the usual comb crank motion, in an attenuated sliver, and passes forward between the two revolving aprons *a, b,* until it arrives at the further end thereof from the card. A direction is then given to the sliver, so that it shall pass up and over the upper apron *a, a,* and wind itself upon this apron, one sliver over the other, until the bat has become of sufficient thickness. As, in many manufacturing premises, these two long extended aprons could not be so conveniently used for want of room, the patentee sometimes extends them backwards and forwards, as shewn in the longitudinal section, fig. 2, or they may be arranged perpendicularly, if desired.

Another mode of producing a bat, for the finer and lighter descriptions of goods, is shewn at fig. 3.

It is still produced from successive folds of the sliver, but in this modification there are several slivers taken off from the doffers of different carding-engines, and simultaneously received upon the same aprons, and enter into the composition of one and the same bat.

For this purpose, any of the several arrangements of aprons found most convenient for adaptation to certain premises may be equally applied, it only being necessary to extend the lower aprons along and under two, three, or more carding engines, one standing behind or after the other, as shewn at fig. 3: the lower apron *b, b,* extends under the cylinders and doffers of three carding-engines. Under each of these carding-engines is a flooring *h, h, h,* for preventing the dirt and dust from falling upon the bat, but between each carding-engine, there is a transverse opening for allowing the slivers to fall upon the apron, which, as in the other cases (with the one sliver), are carried forward to the lower end of the apron frame, as before described.

It is necessary that these aprons should be kept uniformly extended throughout their whole lengths, whether arranged as in fig. 1, or wound in other directions. In order to effect this, the patentee employs the following means, shewn upon an enlarged scale, in the detached sectional view, fig. 4. Upon the two edges of the apron *a, a, a,* are sewn cords or strips of leather *i, i,* against which, longitudinal guides or slips of wood *k, k,* are brought in contact, by means of the forked arms *l, l,* and set screws *m, m,* thereby preventing the apron from contracting. Another plan of effecting this object, is shewn at fig. 5; the apron *a,* is here kept distended by means of friction rollers *k, k,* working against the cords or strips of leather *i.*

The bat, by either of the foregoing operations, having acquired its requisite thickness, is then cut across its width, as represented at A, figs. 1, and 2, and the end being passed over the roller *n,* it is wound firmly upon it by contact of the roller with the apron *a.* When the last end of the severed bat reaches the roller *n,* it brings with it the sliver, which is continuing to proceed from the carding engine, and this sliver is, as before, passed up over the apron *a, a,* and another bat is then commenced.

The continuous bat, having been obtained, as before described, and received upon the roller *n*, is then taken to another machine, represented at fig. 6, called the hardening machine, and placed in the situation marked *o*. *p*, *p*, is the frame-work, in which are mounted the two series of rollers *q*, *q*, *q*, and *r*, *r*, *r*. These rollers are wrapped round with an elastic cloth, and the lower set is furnished with a travelling apron, as represented at *s*, *s*. There are several pipes connected with a steam boiler, brought up and inserted between some of the lower rollers, and under the aprons, represented at *t*, *t*, which pipes extend from side to side of the apron, and are finely perforated upon their upper sides, to allow the escape of steam upwards, for the purpose of moistening and warming the bat of wool as the first stage of the felting process, called hardening, commences.

The upper tier of hardening rollers receives an alternating motion endwise, by means of a cranked shaft running along the side of the machine, upon which there are as many cranks or excentrics, having a short throw of about half an inch, and connected with each upper roller by shackle bars or slide rods. The hardening rollers receive also a slow progressive motion from the main shaft, on the other side of the machine, by means of suitable gearing, consequently moving the apron between the rollers in the direction of the arrows. There are, likewise, inserted between the rollers and under the apron, several heaters *u*, *u*, *u*, formed of hollow metal, and connected by stop-cocks with the boiler which supplies the perforated pipes with steam; these heaters are for the purpose of increasing and regulating the heat applied to the bat, and assisting the incipient process of felting.

As before stated, the roller *n*, with its bat, being brought from figs. 2, or 1, is placed in the position *o*, fig. 6, and the end thereof being entered between the front rollers of the hardening machine, it is gradually passed through them, and by means of the alternating motion of the upper rollers acting against the resistance offered by the lower ones, (which do not alternate,) and aided by the moisture and heat, the bat arrives at the other end of the machine in a consolidated firm state, where it is again wound upon a roller *y*, by friction of contact with the apron *s, s;* and when the whole bat, intended to form a piece of cloth, is finished and wound upon it, it is removed to the next operation; the machine for effecting which, is shewn at figs. 7, and 8. The frame-work of the machine is shewn at *a, a, a,* upon which are mounted two tiers of rollers *b, b, b*; the upper tier having rotary motion communicated to it, by means of bevil gear, as shewn in the drawing, which, by means of spur wheels, communicates a similar motion to the lower tier.

Each set of upper rollers should be weighted upon the lower ones, for the purpose of accommodating a certain degree of pressure, to the different degrees of thickness of various goods submitted to their action. *c, c,* is a cistern, lined with lead, for holding a supply of hot water or soap-suds, and in which the lower rollers can be more or less immersed by regulating the quantity thereof. Upon the bottom of this cistern there are several coils of metal pipe, perforated in many places, and connected by a stop-cock with a steam-boiler, for heating its contents. *d, d, d,* are friction rollers or drums, over which an upper and a lower endless apron *e, e,* are passed, for conducting the bat or cloth, from end to end, and through the machine; such bat, together with its roller *n*, having been placed in the situation marked B, fig. 7. The aprons *e, e,* move by the friction of the rollers *a, b,* in the direction of the arrows, passing in together between the front rollers, receiving the bat between them, and liberating it as it arrives at the lower end, one apron turning upwards, and the other downwards.

In order to give the two tiers of rollers a reciprocating or backward and forward motion, and at the same time to allow the bat, or, as it may now be called, the cloth, (alternately pressed and liberated between their inner surfaces,) gradually to move in a forward direction, through the machine, the following contrivance is applied:—*f*, is a pulley, receiving its motion from any convenient part of the running gear; to this pulley is affixed a crank-pin *g*, working a connecting-rod, attached to the lever *h, h,* which lever turns loosely upon the main shaft *i*. A toothed wheel *j*, *j*, is mounted fast upon the shaft *i*, taking into a small pinion *k*, which turns in a socket, formed in the lever *h*, *h*. Upon the axle of the pinion *k*, is also mounted a toothed wheel *i*, *i*, working into another or small toothed wheel *m*, *m*, which, together with a pulley *l*, is mounted loosely upon the main shaft *i*. It is evident, that if the pulley *l*, and wheel *m*, were to be fastened to any adjoining part of the machine, and the main shaft only to turn within them, a mere reciprocating motion would be given to the felting rollers of the machine, without their progressing or moving the cloth at all forward.

To effect, therefore, the required progressive motion, a small pulley *n*, is fastened to the pulley *f*, having a band *o*, *o*, passed over it around the pulley *l*, *l*, which, notwithstanding the constantly reciprocating motion, is adding thereto a progressive movement, in order to carry the cloth through the machine.

By the reciprocating motion of this machine, the felting action is produced in each direction, longitudinally; but in order that this effect may take place in other directions, the cloth is taken from the apparatus, just described, and placed in another similar felting machine; but, instead of being entered as before, the piece is first passed between two feeding-rollers *p*, *p*, one of which is shewn in fig. 8, placed at an angle of about forty-five degrees with the feeding-apron. These two rollers have a velocity from three to four times that of the feeding-apron, by which means the cloth is thrown in regular folds as it enters, laying at nearly the same angle as the position of the rollers. This arrangement causes the action to take place diagonally across the piece of cloth, and after having passed through in this direction, it is reversed, and when again passed, it will be seen that the action is nearly at right angles with the last.

In this way it may now be run through the machine several times, and some descriptions of cloth should be, for a time, milled in the common clothier's fulling stocks, and again passed through the felting machine, figs. 7 and 8.

The machinery or apparatus above described, is that which the patentee prefers, for manufacturing the finer descriptions of wool and hair. Fig. 9, represents, in vertical section, one arrangement of machinery, for manufacturing a coarser material. The feeding apparatus *a*, and cylinder *b*, are of the same construction as the ordinary devil, the feed-rollers and apron being actuated in the usual way; but the cylinder has a greater number of steel teeth. There is, however, no grating under this cylinder, but a large opening or box with an end or stop at *c*, is provided, for catching or retaining all the unopened locks of material or extraneous matter which fall, by gravity, into it. *d*, is a woven wire gauze, or perforated metal cylinder of large dimensions, say three feet in diameter.

It will be seen, by reference to fig. 9, that only the upper half of the cylinder *d*, is exposed to the draught of the toothed cylinder *b*; and upon this part of the cylinder, the fibres of wool or other materials are received; the lower half is open for the escape of the air through the floor into the room *e*, below, which is constructed of lattice-work.

The surface of the perforated cylinder *d*, is made to revolve in the direction of the arrow, at the rate of about five or six feet per minute; and the flow of the material having formed a bat of sufficient thickness thereon, (governed by the amount of feed,) it is received between the two fluted rollers *f*, *f*, the upper one being weighted upon the lower, and passed onwards between the two other endless aprons *g*, *g*. Of these aprons, the lower one revolves around the two end rollers *h*, and *i*, and consequently over the intermediate ones *j*, *j*, *j*, *j*, *j*, and the upper apron passes under the two rollers *k*, *k*, and up over the friction-rollers *l*, *l*. Three of the lower rollers, marked *j*, are enclosed by the pan *m*, for the purpose of admitting steam to the bat, during its passage between the two aprons, and for which purpose it is connected by a pipe, in communication with a steam-boiler.

A series of upright wooden beaters *n*, *n*, *n*, with smooth rounded ends at bottom, are supported in the frame-work *o*, *o*. These beaters are divided, in a transverse direction to that of fig. 9, into six or more parts, and receive a small quick perpendicular and falling motion by the tappet-shafts *p*, *p*, *p*, which are geared and revolve together, being connected with any convenient part of the machine, whereby to be set in motion. The quick alternating action of these beaters, aided by the steam and heat applied in this way to the bat, occasion it to be properly hardened and united, for producing a partly felted sheet, suitable for the succeeding operation of tight felting, in common with the bats produced by the previously-described machines for fine wools, by carding.

Fig. 10, represents, in section, another arrangement of machinery for manufacturing the coarser descriptions of goods. The operation of the machine is precisely similar to the last described, until the bat is formed, and has passed through the delivering rollers *f*, *f*; it is then received upon the endless apron *a*, and passes in between the cylinder *b*, and the hardening rollers *c*, *c*, *c*. The cylinder is covered with an elastic cloth, and formed hollow, for the purpose of enabling steam to be passed in at one end, and the condensed water to be taken off at the other, similar to a common paper-drying cylinder, and receives its motion from the lower delivering roller *f*. The hardening rollers *c*, *c*, *c*, receive their motion either by a band passed over them and connected with any convenient part of the machine, or have toothed wheels upon their ends, taking into a large wheel upon the axis of the cylinder *b*, so that the inner surfaces of these rollers shall turn in the same direction as the surface of the cylinder, and with a similar velocity; during which revolution, the cylinder *b*, has a short quick alternating motion, communicated thereto by means of an excentric, mounted upon a side shaft.

A perforated pipe *d*, is connected with a reservoir of water, for supplying moisture to the covering upon the cylinder *b*, before the bat comes in contact with it at *e*. As the bat is liberated from either of the two last-described machines, it is wound upon a roller *q*, by friction of contact, precisely in the manner before mentioned in the previous machines, and subjected to the operation of tight felting, in the apparatus above described, with reference to figs. 7 and 8.

The patentee further describes another mode of manufacturing goods upon this principle, according to which the operation of the tight felting-machine is unnecessary. Fig. 11, represents this arrangement. The bat, after having passed through the hardening machine, as before described, is in the act of winding around the roller *y*; another roller is placed above, upon which is wound a piece of smooth linen, cotton, or worsted cloth, previously wetted with a solution of soap. This linen, or other cloth, is wound up between the folds of the bat, as the roller revolves, and pressed firmly therewith, by means of a rod and weight, attached to the axle of the roller. When this is effected, the roller, upon which it has been wound, is withdrawn, and the bat is placed in a broad fulling stock, where it receives repeated blows or pressure, until it is sufficiently hardened or felted to be unwound and taken out of the cloth.

The goods manufactured by any of the above processes, may be subjected to all the different processes of raising, shearing or cropping, boiling, pressing, &c., used by manufacturers on the old system of spinning and weaving; but the patentee recommends the following machine, for raising the pile or nap of the finer qualities of felted goods.

Fig. 12, represents, in front elevation, the raising machine. *a*, *b*, are two cylinders, covered with wire cards, or teasles; *c*, *d*, are two other smaller cylinders, likewise covered with card teeth, to the arbor or shaft of one of which, the driving-pulley is attached at one end, and, by connecting wheels, this is made to actuate the other smaller cylinder. These cylinders, separately, are geared into the two larger raising cylinders, by toothed wheels, so arranged that the surfaces of the smaller ones revolve somewhat faster than those of the larger. Each pair of small and large cylinders are placed in slight contact with each other, and the teeth being set in different directions, the flock will be cleared as their surfaces revolve. *e*, *e*, *e*, are nearly the common arrangement of the regulating rollers, for conducting and taking away the cloth, as it is subjected to the action of the raising cylinders, and receive their motion from the carrying-shaft in any of the usual modes; and a perforated water-pipe may be used for supplying a spray of water to the cloth under action, as in the common gig.

It will be perceived, that the raising and clearing-cylinders are diagonally situated with regard to the cloth under operation, by which arrangement the one is acting from list to list, in one direction, and the other from list to list, in the contrary direction.

The patentee claims, firstly, the application of a double apron or aprons, or compound aprons and rollers or cylinders, for the production of bats, as herein described, from the long sliver, and the different means, herein described, for keeping these aprons, together with the bats, in a smooth and even condition. Secondly, the extended sliver itself, as herein described, applied to forming a bat, by successive folds or layers, for the production of long or commercial ends of cloth, without spinning or weaving.

Thirdly, the improvements of the hardening machines,—figs. 6, 9, and 10, by using the heaters, in addition to steam-pipes or pans, or in conjunction with a wetted apron, as hereinbefore mentioned, and using travelling aprons, as hereinbefore described.

Fourthly, the improved positions of the rollers in the felting-machine,—figs. 7 and 8,—for producing the double contact of each tier of rollers, and the combined reciprocating and progressive motion thereof, as well as the manner in which this motion is produced, as applied to the said felting-machine. Fifthly, the method of diagonal or cross felting, as effected by the feeding rollers, fig. 8, hereinbefore described. Sixthly, the method described at fig. 11, of producing long continuous fabrics of felt, in a fit state for the common fulling stocks.

Seventhly, with respect to the raising machine, fig. 12; the diagonal positions of the raising cylinders, as hereinbefore described, and particularly also the use of other or opposite revolving cylinders, whether covered with cards or any other material, for clearing raising cylinders whilst at work, as applied to cloth, manufactured by felting alone, or by the old method of spinning and weaving.

Lastly, the use of soap or saponaceous matters, dissolved in water, in conjunction with rollers, for assisting in the felting of fabrics, made without spinning and weaving, in contradistinction to acids or acidulated waters, which have heretofore been used for fabrics, depending for their union upon felting alone.—[*Inrolled in the Petty Bag Office, August*, 1840.]

To William Newton, *of the Office for Patents*, 66, *Chancery-lane, in the county of Middlesex, civil engineer, for certain improved machinery for manufacturing felts or felted cloths,—being a communication.*—[Sealed 20th September, 1841.]

This improved machinery for manufacturing felts or felted cloths, (communicated to the patentee by a foreigner residing abroad,) consists in a novel arrangement of machinery for laying broad sheets of woollen and other animal sliver, one upon another, in diagonal directions, by which the fibres are made to cross each other, and to constitute a bat of loose wool of uniform thickness.

The object effected by this improvement, is the manufacture of what is termed felt, cloth, or fabric, produced without the processes of spinning and weaving, by laying the fibres of loose, scribbled, or carded wool, or other material, capable of felting, in a thick sheet or bat, which is afterwards hardened, and milled or fulled, and thereby converted into a felt or felt cloth.

The wool, or other fibrous material, having been prepared in the ordinary way, is to be delivered from the doffer of a carding engine, in the form of a broad continuous sheet of sliver, or to an endless creeping cloth, from whence it is conducted to the improved machinery, there to be laid in an endless bat, as above stated.

In Plate II, fig. 1, represents an elevation of the improved machinery, and fig. 2, is a horizontal view, as it would appear when seen from above.

A, A, represents the standards or frame-work of an ordinary carding-engine; B, is the main shaft of that engine, driven by band and rigger, as usual. All the parts of the engine are not shewn, as the carding-engine itself forms no feature of this improved machinery. C, is the doffer cylinder, and D, is an endless creeping cloth, extended over tension-rollers, behind the doffer cylinder, to receive the broad sliver of wool, struck off from the doffer cylinder by the usual means.

a, a, is a rectangular frame, placed transversely at the end of the carding-engine, which frame slides upon railways *b, b*, fixed on the floor of the factory, or other building. This frame carries two rollers *c, c*, over which an endless cloth *d, d*, is tightly distended. In the same frame are also mounted, below the former, two other rollers *e, e*, carrying another endless cloth, which is intended to travel nearly contiguous to the under surface of the cloth *d, d*.

A pulley *f*, on the main shaft of the engine, carries a band, which, as it revolves, drives a pulley *g*, fixed upon a transverse shaft, mounted on the frame-work A, A, under the doffer cylinder. At the reverse end of this transverse shaft there is a pinion *h*, taking into a toothed wheel *i*, on the axle of the doffer cylinder; and hence, by the rotation of the main shaft B, the doffer cylinder C, is made to revolve through the intervention of the pulleys, bands, and gear *f, g, h*, and *i*. A large pulley *k*, also on the axle of the doffer cylinder, carries a band, which gives rotary motion to a small pulley *l*, on the axle of one of the tension rollers of the creeping cloth D; by means of which, as the doffer cylinder revolves, the creeping cloth is made to travel continually, and thereby conduct the sheet of sliver from the doffer cylinder, and deposit it upon the endless cloth *d*.

In order that the sheet of sliver, so delivered, may be laid evenly, and in diagonal layers, upon the receiving cloth *d*, that cloth must have a continuous progressive motion over its tension rollers *c, c*; and, simultaneously with that motion, the carriage, or frame, *a, a*, in which the endless cloth *d*, is mounted, must have a reciprocating sliding movement given to it, at right angles, to the progress of the endless cloth *d*. This is effected by the following means:—

At the front end of the axle of the doffer cylinder (see fig. 1), there is affixed a pinion *m*, taking into a toothed wheel *n*, on the end of a transverse shaft *o*, (see fig. 2.) One extremity of this shaft *o*, turns in a bracket attached to the frame A, the other in an independent standard E. The front end of the shaft *o*, has a bevel pinion *p*, fixed upon it, which takes into a corresponding bevel pinion, on the end of a longitudinal shaft *q*, turning in bearings attached to the standard E, and frame *a*. This longitudinal shaft *q*, is the axle on which one of the rollers *c*, is mounted;—the roller being hollow, and the shaft locked to it by a feather edge, or rib, allowing the roller to slide freely along the shaft, but compelling it to revolve with the shaft. It will thus be perceived that, by the rotation of the doffer cylinder, which actuates the gear, *m*, *n*, *o*, *p*, and *q*, the roller *c*, will be made to revolve, and the endless cloth *d*, *d*, *d*, be carried progressively onward, in the direction of the arrow, shewn in fig. 2. For the purpose of giving the reciprocating sliding lateral movements to the carriage *a*, and its endless cloth *d*, *d*, *d*, the following mechanism is employed:—Near the further end of the main axle B (see fig. 2), a pulley *r*, is affixed, carrying a band, which drives a pulley *s*. On the shaft of this pulley there is a pinion *t*, taking into a similar pinion, on a tumbling shaft *u*, extending across the lower part of the frame of the carding-engine, under the doffer cylinder. The pivot of one end of this tumbling shaft is supported by a bracket on the frame A; the other end of the shaft bears in a plate, sliding in a small standard F; and at that end of the tumbling shaft there is a pinion *v*, which is intended to take into one of the racks *w*, *w*, seen in fig. 1. The racks *w*, *w*, are formed in a horizontal sliding frame, attached to the carriage *a*, *a*; and as this frame is slidden to and fro, it draws or pushes the carriage along the railways *b*, *b*, giving the reciprocating horizontal lateral movements to the endless cloth *d*, *d*, *d*, as described above.

The standard F, is shewn detached at fig. 3, (in the same position as fig. 1), with a portion of the rack-frame *w*, *w*, the pinion *v*, being represented by dots, as seen through it. Fig. 4, shews the inner side of the standard F, with the sliding plate, in which the pivot or end of the tumbling shaft *u*, is inserted. The sliding plate is raised or depressed in the standard F, by a small lever *x*, mounted on a fulcrum pin, set in the standard; and this lever is worked by a weighted tumbling arm *y*, which, as it falls over, causes the sliding plate to shift the pinion *v*, of the tumbling shaft *u*, up or down, thereby bringing it into gear with one or other of the racks of the sliding frame *w*.

Let it be supposed that, by the position of the arm *y*, as in figs. 1, and 3, the pinion *v*, is placed in gear with the lower rack *w*; the rotation of the main shaft B, will, by means of the gear *r*, *s*, *t*, and *u*, as described, cause the pinion *v*, to draw the rack-frame *w*, and carriage *a*, inwards, that is, towards the carding-engine; and when the tappet *x*, attached to the rack-frame, comes into contact with the arm *y*, which it will do when the pinion *v*, reaches the end of the rack, the arm *y* will be made to tumble over and raise the lever *x*, and slider, which brings the pinion *v*, into gear with the upper rack *w*; and the continuous rotation of the tumbling shaft will move the rack-frame and the carriage outward, or away from the carding-engine, until the other tappet *x**, comes into contact, and in like manner tumbles over the arm *y*, and puts the pinion *v*, again into gear with the lower rack. By these means, it will be perceived, that the continuous broad sheet of sliver, from the doffer cylinder, will be carried by the creeping cloth D, and delivered into the upper surface of the endless cloth *d*, *d*, *d*; and, by the two motions of the carriage and endless cloth *d*, viz., its progressive and its reciprocating movements, the sheet of sliver will be laid in successive layers, one over another, in diagonal directions, upon the surface of the receiving cloth, as shewn by the diagrams, figs. 5, 6, 7, and 8, and thereby produce a compact bat of fibres, of uniform thickness. As the receiving cloth travels onward, the sheet of sliver will pass down with the cloth, between the rollers *c*, and *e*, and be thereby compressed and conducted, between the two endless cloths, until it arrives at the first roller *c*, by which it will be brought again to the upper surface, to receive additional folds or sheets of sliver, to be delivered on to its surface in the way and by the means above described; and when sufficient thickness of bat, in an endless sheet, has been thus attained, the bat is to be cut through in the direction of the axis of the rollers *c*; and, on being removed from the machine, may be hardened and milled, or fulled, by any suitable means, so as to produce a firm felt or felted cloth.

The patentee claims the construction or arrangement of a machine, by means of which slivers of wool, or any other fibrous material, capable of felting, may be conducted in a broad sheet from a carding-engine, and laid in folds, diagonally, one upon another, to produce a compact bat, ready to be fulled or milled into a firm felt or felted cloth.—[*Inrolled in the Petty Bag Office, March* 1842.]

Specification drawn by Messrs. Newton and Son.

To George Lowe, *of No.* 39, *Finsbury-circus, in the City of London, engineer to the Chartered Gas Company,—for improved methods of supplying gas, under certain circumstances, and for improving its purity and illuminating powers.*—[Sealed 16th March, 1841.]

These improvements consist, firstly, in giving a certain pressure to gas, for illumination, and thus obviating the inconvenience to the consumer of an inadequate supply, owing to the want of pressure in the street mains, which is more especially the case on dark days, and in the lower levels of a town or an establishment. Secondly, these improvements consist in increasing the illuminating power of gas, by purification.

In Plate II., fig 1, is a front view of a meter, with the improvements, for creating a given pressure to the gas, applied thereto. The axis or shaft of the meter extends through the back of the case of the meter, and is kept tight by a stuffing-box. Upon the end of this axis, a common-shaped water-wheel is mounted, which, by its rotation, gives a power over and above that which is produced by the gas itself. This wheel is enclosed in a case, the feet of which correspond with the feet of the meter, the water-wheel case being cut away to allow the space covered by the feet to form a receiver or case for the water, which is conveyed thence by a pipe. Fig. 2, shews the wheel, supported on the axis of the meter, and the form of bucket found to answer the purpose. Instead of a water-wheel, a weight may be used, attached to a cord, wound round the axis of the meter, to produce a similar effect; but in this instance, the weight would require winding up, similar to a clock, when run down.

Fig. 3, represents the gas-wheel, or that part of a meter which measures the gas, in section. Fig. 4, is a similar view, with an increase of metallic surface applied to the meter, for the purpose of augmenting the saturating power when charged with naphtha or other hydro-carbonaceous liquids, as proposed under a former patent, granted to the patentee in 1832*, and also to make the gas-meter act as a purifier, when charged with a solution of caustic potash or soda, instead, as heretofore, with water or other fluids.

As it was considered desirable, in some instances where large-sized meters are required, not to introduce naphtha into them, but to saturate the gas in a separate vessel, the patentee has described two modes of effecting this saturation; first, by the intervention of sponges, fragments of coke, pummice-stone, or any other suitable vesicular or capillary matter, moistened with naphtha; and secondly, by the application of a series of shallow trays, charged with naphtha, over which the gas is made to pass in its progress to the burners. Either or both of these forms are calculated, when charged with a solution of caustic potash or soda, to purify the gas of sulphuretted hydrogen and carbonic acid; and when charged with a diluted acid, it will have the effect of depriving the gas of ammonia and its compounds.

By reference to fig. 4, it will be seen, that the gas (pass-

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* For Specification of this Patent, see Vol. XII., p. 137, Conjoined Series.

ing in the direction of the arrows comes into contact with an additional quantity of the fluid which the increased surface of the metal has taken up. If it is found desirable to produce the same results, in a separate vessel, the apparatus shown, in vertical section, at fig. 5, may be used,—it consists of a double box, made of tin or other suitable metal, and contains three rows of shelves or wire gratings, on which is placed a stratum of sponge or other suitable material, through which the gas is made to pass in the direction of the arrows.

Fig. 6, is a plan view, with the cover removed, to shew the shelves, or wire sieves for supporting the sponge or other material, and the packing or luting-joint, to which the cover is screwed. A small stop-cock is attached to each partition, for the purpose of drawing off any surplus fluid.

When this vessel is used for extracting sulphuretted hydrogen, thereby giving increased purity to the gas, the sponges, in the first partition, must be saturated with a solution of caustic potash or soda, introduced through the funnel above, which solution, falling upon a perforated plate, will be equally distributed over the surface of the sponge. The like operation is gone through with naphtha, in the second partition, if an increased illuminating power is required. When ammonia is to be extracted from the gas, a solution of diluted sulphuric, muriatic, or other acid, may be substituted for that of alkali, but the partition, containing the acid, will require protection, such as a coating of bees' wax and tallow mixed.

Fig. 7, is a vertical section of a vessel, having three partitions, which will allow of the three operations going on at the same time; the first portion *a*, being charged with diluted acid; *b*, with a caustic alkaline solution; and *c*, with naphtha. *Fig.* 8, is a longitudinal, and fig. 9, a cross section, of a vessel, in which the gas is made to pass, in the direction of the arrows, over the surfaces of naphtha or other fluid, previously alluded to, contained in a series of shallow trays. The fluid is supplied through the funnel, at the top of the vessel, and as each tray is filled, the fluid flows over into the next lower tray, until it shews itself at the small stop-cock below, which indicates that the apparatus is charged, and ready for use. It is scarcely necessary to mention, that as the naphtha is absorbed, or the alkaline solution or diluted acid become saturated, they must be renewed.

Fig. 10, shews a method of applying this system of sponges, saturated with naphtha, to a table gas lamp. It will be observed, that the top of the vase unscrews, for the purpose of re-charging the sponges with naphtha.

The patentee claims, Firstly.—The application of mechanical means, for giving a power of moving gas-meters beyond what is produced by the flow of gas through them.

Secondly.—The mode of better adapting gas-meters, by increasing their surfaces, for the purposes hereinbefore mentioned.

Thirdly.—The application of alkaline solutions in gas-meters, for the purpose also hereinbefore described.

Fourthly.—The application and use of sponge or other suitable material, and also the use of shallow trays, containing caustic alkaline solutions, by which, owing to their extended surfaces, the gas is further purified from sulphuretted hydrogen and carbonic acid; and when charged with a diluted acid, will also take up the ammonia and its compounds.

Fifthly.—The application and use of sponge or other suitable material, and the use of shallow trays, charged with naphtha or other volatile hydro-carbonaceous liquids, for increasing the illuminating power of coal-gas, in the manner hereinbefore described.—[*Inrolled in the Inrolment Office, September*, 1842.]

To John Swain Worth, *of Manchester, merchant, for improvements in machinery for cutting vegetable substances,—being a communication.*—[Sealed 29th July, 1840.]

The improved machine for cutting vegetable substances, which constitutes this invention, is shewn in elevation at Fig. 1, Plate III. *a*, is the framing; *b*, the trough, for receiving the hay, straw, &c.; and *c*, a fly-wheel, mounted upon the end of an axis *d*, to which a revolving motion is given, by the application of manual power to the handle *e*, upon the other end of it. This motion is communicated by the pinion *f*, and spur-wheel *g*, to the shaft *h*, and thence, by means of the wheels *i*, *i*, to the shaft *j*. Upon the shaft *h*, a cutting-roller *k*, is fixed, and on the shaft *j*, a roller *l*, termed the surface-roller, is mounted, as will be seen by reference to the enlarged sectional view, fig. 2. The cutting-roller has a number of grooves in its periphery, to receive the knives or cutters *m*, which work in contact with the surface-roller *l*. This roller is formed of cast-iron, covered with zinc, block-tin, wood, or any other suitable substance; or it may be made entirely of wood.

The following is the action of this machine:—Manual power being applied to the handle *e*, the rollers *k*, and *l*, are caused to revolve, by means of the pinion *f*, and wheels *g*, *i*, *i*, and the vegetable matters, passing between the rollers, are cut by the knives *m*, into pieces of the required size.

The patentee claims the mode of combining the parts, herein described, for cutting vegetable substances.—[*Inrolled in the Inrolment Office, January,* 1841.]

To John Duncan, *of Great George-street, Westminster, Gent., for improvements in machinery for cutting, reaping, or severing grass, grain, corn, or other like growing plants or herbs,—being a communication.*—[Sealed 2nd November, 1840.]

This invention consists in a machine for cutting or reaping corn, grass, &c., to be drawn by a horse or horses; in the body of which machine, as it proceeds, the corn is collected and suffered to accumulate.

In Plate II., a plan view of the machine is represented: it consists of a body *a*, furnished with shafts *b*, and carried by a pair of wheels *c*. In front of the machine, at the right hand side of the shafts, is a frustrum of a cone *d*, mounted upon a vertical axis *e*, driven by gearing (not shewn in the drawing), from the pulley *f*. This pulley receives motion from the near running-wheel of the machine, by means of the pinion *g*, which is mounted upon the same spindle as the pulley, and takes into the spur-wheel *h*, on the axle of the wheels *c*. *i*, are fingers, projecting from the lower part of the machine, for the purpose of holding the corn firmly whilst it is being cut; *j*, are the cutters, which are similar in shape to the points of scythes, and are fastened upon a circular cutting-plate *k*, fixed to the bottom of the frustrum *d*; *l*, *m*, are guides for conducting the corn, after it is cut, into the body of the machine; *n*, is a screen, placed parallel to the guides *m*, to prevent the corn from escaping at the front of the machine; and *o*, is an extra floor, bolted upon the floor *a*, above the cutters, which receives the corn, &c. as it is delivered by the guides, and prevents it from becoming entangled with the cutters.

As the machine is drawn forward, the corn is gathered in between the fingers *i*, and cut by the cutters *j*; and it is then carried round with the frustrum *d*, by its projections *p*, (being pressed against the surface of the frustrum by a number of bent rods, or guides, affixed at their ends to two revolving discs) and delivered into the machine by the guides *l*, and *m*.

The patentee claims the combination of the fixed projecting fingers *i*, with the revolving cutters *j*; and also the combination of the frustrum *d*, with the revolving and stationary guides, by which the crop, when cut, is confined to and discharged from it.—[*Inrolled in the Inrolment Office, May,* 1841.]

To THOMAS WILLIAMS, *of Bangor, in the county of Caernarvon, smith, for an improved churn.*—[Sealed 17th May, 1842.]

THIS invention embraces four different kinds of churns, which are represented, by various figures, in Plate III. Fig. 1, is a vertical section, and fig. 2, a plan view of the first description of churn. *a*, is the body of the churn; *b*, a vertical shaft, turning in the centre of the same, having, upon its upper end, a bevil toothed wheel, which gears into and is driven by another bevil toothed wheel, keyed upon a horizontal shaft, above the churn.—This shaft is furnished with a fly-wheel at one end, and is turned by manual power, applied to a handle at the other end. Upon the lower end of the shaft *b*, four vanes or beaters *c*, are fastened, pierced with circular apertures *d*, and these vanes, when the shaft *b*, is in motion, beat the milk against the projections *e*, which are also formed with openings in them, and are fixed against the inside of the churn.

The second kind of churn is shewn in plan and section, at figs. 3, and 4. The exterior of the churn, and the mode of driving the shaft *b*, are the same as before; but instead of the four vanes *c*, two vanes *f*, are fixed upon the shaft *b*, at right angles to each other, and the framing *g*, is substituted for the projections *e*.

Fig. 5, is a side view, and figs. 6, and 7, are transverse sections of the third construction of churn, which consists of a rectangular trough or vessel *h*, for containing the milk. *i*, is a perforated beater, suspended from a horizontal shaft *j*; and at *k*, near each end of the churn, a breaker or slotted board *l*, is fixed. To the outer end of the shaft *j*, a weighted lever *m*, is fastened, and by pulling the cord or rope *n*, attached to this lever *m*, the requisite vibrating motion is communicated to the beater, and the milk is beaten or dashed against the breakers *l*.

Fig. 8, is a longitudinal section of a churn, constructed according to the fourth part of this invention. This churn consists, like the former, of a rectangular vessel *h*, and the milk is raised by an Archimedean screw *o*, working in a large pipe or tube *p*, and poured through the opening *q*, upon a breaker *r*, which detains the butter, but allows the milk to pass through.

The patentee claims, as his invention, the improved churn, of any of the peculiar forms herein shewn and described.—[*Inrolled in the Inrolment Office, November*, 1842.]

To William Hancock, *Jun., of Amwell-street, in the county of Middlesex, Gent., for certain improvements in combs and brushes.*—[Sealed 21st March, 1842.]

The first part of this invention consists in making currycombs, with flexible backs, in the following manner:—A piece of wire-card, of the kind used for carding cotton and other fibrous materials, is formed into the required shape; and on the back of it a piece of leather, felt, or thin veneer of wood is fastened, with a solution of caoutchouc, or any other strong flexible cement. A number of small pins are then inserted round the edges, for greater security, or they may be sewn together with wire or strong thread.

The second improvement relates to those brushes which are used for dry brushing, such as hair brushes, clothes brushes, horse brushes, machine brushes, &c.

It consists principally in making the backs flexible, in the same manner as the backs of the currycombs are made, instead of stiff and unyielding, as usual; and in making the brushes of a circular or curvilinear form, by fixing the bristles or hairs in a flexible back, and attaching it to a solid back, of the required form. When the brush is required to be very elastic, a thin piece of metal, whalebone, or horn, is inserted between the top and bottom pieces of the back, and the top piece gradually decreases in thickness from the handle to the outer extremity.

Expanding brushes are made by attaching to the under piece of the back of a flexible-backed brush, a sheet of caoutchouc, or a piece of cloth, varnished with a solution of caoutchouc, in such a manner that the enclosed space shall be air-tight; and, by means of a tube, with a screw-plug, in the handle of the brush, air is forced into the enclosed space, and the brush is thereby caused to expand.

Brushes are also made with flexible backs, in the manner shewn in Plate III., fig. 1. *a* represents the flexible back, fastened at its ends to the solid back *b*.

Those brushes which are sometimes used in water, such as bath brushes, are protected from its action by attaching to the under side of the flexible back, before drawing the hairs or bristles, a piece of India-rubber waterproof cloth, by means of a solution of caoutchouc.

The third part of this invention consists in improvements in making brushes for painting, varnishing, whitewashing, &c.

Fig. 2, is a section of a paint brush, constructed according to this improvement. The hairs or bristles are inserted in a metal stock or socket *c*, and are secured therein by passing the tapering metallic ferrule *d*, through a hole in the top of the socket, and soldering it; this ferrule receives the handle *e*, of the brush.

Fig. 3, represents an improved brush for whitewashing and similar purposes. The stock or foundation consists of two metal plates *f*, joined together at their ends, and strengthened by the stays *g*, *g*; between the plates *f*, the handle *h* is inserted, and through them a number of holes are made, to receive the cords *i*, *i*, by which the hairs or bristles are secured.

The handles of the brushes may be made either of wood or metal; and the patentee also includes, under this part of his invention, the application of metallic handles to the wooden stocks or foundations of brushes.

The patentee claims, Firstly.—As regards the class of combs called currycombs, the making of the same with flexible backs, such as hereinbefore specified.

Secondly.—As regards those brushes which are chiefly used for dry brushing, the making of them with flexible backs, such as described under the second head of this invention.

Thirdly.—As regards that class of brushes which are employed for painting, coloring, varnishing, plastering, and other like purposes,—the making of them with metal stocks or foundations, and handles, such as hereinbefore described; or with metal stocks or foundations only, combined with wooden handles; or with metal handles only, combined with wooden stocks or foundations; and whether such stocks consist of a socket and ferrule, connected together, such as hereinbefore specified, or of a metal ferrule only.—[*Inrolled in the Inrolment Office, September*, 1842.]

To George Evans, *of Dorset-place, Marylebone, surgeon, for an improvement or improvements upon trusses, for the relief of hernia.*—[Sealed 29th March, 1841.]

The first part of this invention consists in stuffing the trusses of pads with an elastic vegetable substance, called moc-main, obtained from the 'bombax heptaphyllum' or silk cotton tree.

The second improvement consists in a spring truss, for the relief of inquinal hernia. In Plate III., fig. 1, is a side view of the truss. *a*, is the pad, stuffed with moc-main, and covered with any material that will allow the elasticity of the moc-main free play, without becoming wrinkled when the pad is worn and compressed; *b*, is a spring lever, one end of which is fastened to the pad-plate *c*, by three screws *d*, placed in a triangular position, having on the other end of it a button *e*, to which the secondary bandage, that regulates the pressure of the pad on the hernial opening, is attached. The heads of the screws form buttons, on which the broad end of the bandage, that passes round the body, is secured, by means of three button-holes; and thus, by reason of the triangular position of the screws *d*, the pad can be adjusted to the required inclination. The strap or tongue, at the other end of the bandage, is hooked on the uppermost screw *d*, which is made longer than the other two, for the purpose of receiving the strap.

Fig. 2, represents a modification of the truss just described. *f*, is a lever, hinged to the pad-plate, as a substitute for the lever *b*, being provided with a spring *g*, which regulates the pressure of the pad on the hernial opening.

The third part of the invention consists in a truss for the relief of umbilical or femoral hernia. Figs. 3, 4, and 5, represent variations in the construction of the truss; fig. 3, is the side view of a truss, constructed according to this part of the invention. The improvement consists in the application of a double spring-lever *h*, fastened to the pad-plate *c*, by the screw *i*, and having on each end a button *j*, to which the bandages are attached. In the truss shewn at fig. 4, instead of the double spring-lever *h*, a pair of levers *k*, *k*, provided with springs *l*, *l*, are hinged together at the centre of the pad-plate. Fig. 5, shews a truss, provided with a pair of levers *m*, *m*, hinged to opposite sides of the pad-plate, one passing through the other; to each of which levers a spring *n*, is fastened, pressing upon the pad-plate.

The fourth part of the invention consists in a truss for the relief of 'prolapsus ani.' Fig. 6, is a side view of the truss. *a*, is the pad, covered with caoutchouc, having a spring-lever *o*, fastened on the pad-plate, with a button *p*, at each end of it, to button the straps on that support the truss.

The fifth improvement consists in a truss for the relief of 'prolapsus uteri.' This truss is covered with a coat of caoutchouc, to protect it from the effects of moisture, and is shewn in section at fig. 7. *q*, is the head of the truss, the top of which is formed into a cup, for the neck of the uterus to rest on, and has two holes *r*, *r*, in it, to drain off any moisture that may be deposited in the cup. Into the lower part of the head the end of the tube *s*, is screwed, in which tube a stem *t*, works, pressing against the spiral spring *u*, and being retained in the tube by a stud *v*, working in a groove in the stem. The bandages are attached to the ends of the lever-springs *w*, *w*, fastened on the cross-head *x*.

The patentee claims, Firstly.—The use of moc-main or silk cotton, as a stuffing for the pads of trusses generally.

Secondly.—The combination of a moc-main pad with a lever-spring, or with a hinged lever and spring, and with three studs or buttons, in a triangular position on the lever, in the formation of a truss, for the relief of inquinal hernia.

Thirdly.—The combination of a moc-main pad with two spring-levers, or two hinged levers and springs, in the formation of a truss, for the relief of umbilical or femoral hernia.

Fourthly.—The combination of a moc-main pad, covered with caoutchouc, with a hinged lever and spring, or with a spring lever, in the construction of a truss, for the relief of 'prolapsus ani.'

Fifthly.—The combination of a pair of lever-springs with a spiral spring, acting in a tube against a sliding stem, in the construction of a truss, for the relief of 'prolapsus uteri.' —[*Inrolled in the Inrolment Office, September,* 1841.]

To JOSEPH HULME, *of Manchester, in the county of Lancaster, engineer, for certain improvements in machinery or apparatus for grinding, sharpening, or setting the teeth of cards or other similar apparatus employed for carding or operating upon cotton, wool, or other fibrous substances.* —[Sealed 20th September, 1841.]

THESE improvements in machinery or apparatus for grinding, sharpening, or setting the teeth of cards or other similar apparatus, consist in a novel arrangement and construction of mechanism, designed for the purpose of operating upon the points of the teeth after the sheet or fillet of cards have been put upon their respective cylinders, rollers, or "flats," in order to set up or face the whole surface of the teeth into one regular plane or surface, and at the same time to give them the requisite degree of sharpness or edge which is essential to produce a perfect carding or sliver of the cotton or other filamentous material to be operated upon; and also for the purpose of re-setting or sharpening such carding or other teeth, cylinders, or surfaces, as have become worn or impaired from constant working or otherwise.

In Plate II., fig. 1, represents a front elevation of the apparatus, as applicable to cylindrical surfaces; and fig. 2, is a side or end view of the same.

It should be here remarked, that in sharpening or setting the teeth of cards upon the main cylinder or swift, and also the doffing cylinder of ordinary carding engines, the most convenient way will be to place the improved apparatus upon the framing of the engine, and set it up to or in contact with the cylinder, and so allow the cylinders to be ground up in their respective places; but in operating either upon "flats," or cylindrical top cards, or "strippers," or other smaller surfaces, it will be better to remove them from the carding-engine, and place them in a smaller frame, in connection with the grinding apparatus; but this may of course depend upon the option and convenience of the operator in all instances.

a, a, a, is a bed or framing of cast-iron, somewhat similar to a small lathe-bed; to each end of which are attached arms *b, b,* connected together by the cross-rail or frame *c, c.* A shaft *d, d,* is supported in bearings in the arms *b, b,* upon which a small bevilled pinion *e,* is keyed, taking into a bevil-wheel *f,* fast upon a stud *g,* supported by a carrier-piece, and adjustable in the mortice of the frame *c.* Upon this stud is fixed a toothed or chain-pulley *h*; a similar pulley *i,* being also placed upon a stud *k,* fixed in another part of the frame *c*; around and in gear with these pullies, is the endless chain *l, l.* To this chain a swivel connecting link *m,* is attached, which is also fastened to a stud at the back of the carriage or slide *n, n*; this carriage *n,* is capable of being traversed to and fro upon the stationary bed *a, a,* and is furnished with jointed swivel-pieces *o, p, q,* which carry or support the emery or grinding-block *r,* being formed as an universal joint, so as to enable the block *r,* to assume any suitable angle or position.

The operation of the machine is as follows:—The grinding machine being placed across the front of a carding-engine, in the direction of the main cylinder-shaft, and the block *r,* faced with emery or other cutting surface, being in contact with a carding-cylinder, as shewn in fig. 2, power is applied to the driving-pulley, placed upon either end of the shaft *d,* which, by its rotation, traverses the carriage *n,* with its grinding-block, regularly to and fro, from side to side of the cylinder, and as the cylinder is caused to revolve upon its own axis simultaneously, a perfectly even surface may be thus obtained, and any requisite degree of set or edge may be given to the teeth.

A modification of the improved apparatus for grinding cards, is represented at fig. 3, which is another arrangement of mechanism, adapted to the purpose of grinding or sharpening flats or top cards, or other flat surfaces. The essential features of this apparatus are still retained, but a revolving cylindrical grinding-roller is substituted in place of the grinding-block, before described. *a, a, a,* is a framework, supporting the bed *b, b,* which traverses to and fro, as in the former machine, and supports the swivel-jointed carriers *b, c, d,* in which the cylindrical emery-block *e,* is mounted. The flat or top card *f,* to be ground or set, is fixed with set-screws in the frame *g, g,* which turns up or down upon its centre *h.* Upon the frame *a, a,* is a table *i, i,* set perfectly level; and upon this table the flat card is first to be placed, preparatory to grinding, in order to set it square and flat before it is presented to the grinding-roller; the frame *g, g,* is then to be turned down upon it, and the flat secured therein by the adjustable set-screws in the frame, as shewn by dotted lines. The frame, with the top card, is now to be turned up, and being provided with a projection or nib *k,* upon the back, is held in this position by turning over the lock or catch *l,* which secures the position of the card, ready for the grinding operation.

Rotary motion is to be given to the grinding-roller, by means of the straps and pullies *m,* and *n,* and the grinding commences. Now, in order to traverse the flat or top card up and down, so that its entire surface may be evenly presented to the action of the grinding-roller, a frame or parallel motion *o, o,* is provided, and worked up and down by the crank-arm *p,* affixed to the shaft *q,* which may be driven in any convenient manner; and in order to slide the flat in and out in a horizontal direction, when shifting its position, and presenting it to the grinding-roller, another parallel motion is provided, by means of the excentrics *r, r,* and links *s, s.* This modification of the apparatus, it will be observed, is more particularly applicable to grinding-machines of the old construction.

The patentee does not confine himself to the peculiar mechanical arrangement of the parts shewn in the drawings, as it may be easily modified and varied; for instance, the traverse of the carriage may be done by rack and pinion, or mangle-wheel; but he claims this or any other modification of the working motions of the apparatus, as exhibited in the drawings, and herein set forth, for grinding, setting, or sharpening, the teeth of cards or any similar apparatus —[*Inrolled in the Petty Bag Office, March,* 1842.]

Specification drawn by Messrs. Newton and Son.

To William Henry Kempton, *of South-street, Pentonville, Gent., for improvements in the manufacture of candles.* —[Sealed 1st June, 1842.]

This invention relates to candles which are made with platted wicks, and consists in combining within, or affixing to the wick, a piece of bobbin, braid, cord, yarn, or other like preparation of fibres, for the purpose of regulating or controlling its tendency to bend outwards, and thereby prevent the candle from guttering; which circumstance frequently happens, when the ordinary platted wicks are used, especially if the candles are made of common tallow, on account of the heat being greater on that side to which the wick bends, in consuming, than on the other side.

The candle may be formed with either one or two wicks, and the piece of bobbin or cord, of the same length as the wick, is secured by introducing it into one of the strands, previous to platting. Another method of applying the cord to the wick, is by binding a piece of thread tightly round both, as shewn in the drawing, Plate III., or it may be affixed by running the cord into the side of the wick with a needle.

The cord is fastened to that side of the wick where the strands branch upwards from the centre towards the edges of the plat, as shewn in fig. 1, and thus, the wick is prevented from bending too much over the opposite side. Figs. 2, represent a wick with the cord attached to it by a binding thread. In these figures, *a*, is the wick, formed of three strands of loose cotton fibres; and *b*, the cord, also composed of three strands, which are each formed by twisting together three fibres of cotton; *c*, is the binding thread.

The patentee claims the application of platted wicks, combined with bobbin, braid, cord, yarn, or other like preparation of fibres; whereby the platted wick is regulated and controlled in its bending out of the flame, as described. —[*Inrolled in the Inrolment Office, December,* 1842.]

To William Thompson Clough, *of St. Helens, in the county of Lancaster, alkali manufacturer, for improvements in the manufacture of the carbonates of soda and potash,—being a communication.*—[Sealed 17th March, 1841.]

This invention consists in obtaining the carbonates of soda and potash of commerce, in combination with silicate of soda or potash, and thereby rendering those carbonates more useful for bleaching; and also in facilitating the production of the crystals of carbonate of soda, by the use of silica.

The silica is added to the soda or potash, in the process of manufacture, in such quantities as will be sufficient to saturate the caustic alkali it may contain, and convert it into silicate of potash or soda. It is applied to the alkaline liquor in the boiling down furnace; or, by preference, when for soda-ash or potash of commerce, it is mixed with the salts from the boiling-down furnace, with a shovel, or other instrument, and the combined materials are thrown into the finishing or carbonating furnace, and finished in the ordinary manner.

The patentee states, in his specification, that although he does not confine himself to the exact quantities, he prefers, when making carbonate of soda, to add from 10 to 15 per cent. of silica, and for carbonate of potash, only 7 per cent.

When the carbonate of soda, prepared as above, is crystallized, the larger part of it separates in nearly pure and colorless crystals, and the resulting mother salts, from the residual liquor, retain the whole of the silicate of soda.

Where crystals of soda are not required, and only the dry carbonates of potash or soda of commerce are wanted, for the purposes of the bleacher, a similar product to that obtained from the mother waters is produced, by combining a quantity of silicate of soda or potash, with carbonate of soda or potash, in such proportions that the mixture shall contain 20 per cent. of silicate of soda or potash.—[*Inrolled in the Inrolment Office, September*, 1841.]

To JOHN DUNCAN, *of Great George-street, Westminster, Gent., for an invention of improvements in machinery for driving piles,—being a communication.*—[Sealed 21st September, 1841.]

THE object of this invention is so to construct machinery for driving piles, that it may be made to travel progressively along the piles which have been driven by such machinery, and, by means of a suitable saw, cut off the upper ends of the piles to the height desired.

In order to carry out the invention, the pile-driving engine is mounted on a carriage with wheels, such wheels being guided, in their progress along the tops of the piles, by temporary rails, which are readily applied to and taken from the piles, as the carriage progresses, as will be hereafter explained; by this means, when a long range of piles for a railway or other work is to be driven, there will be no necessity for erecting a platform or works for supporting the machinery, except at starting, as the piles, which have been driven by the engine, will be rendered capable of sustaining the weight of the machinery in its onward progress.

In Plate III., fig. 1, represents a side view of the pile-driving engine, on six wheels, and supported on a temporary railway, formed on piles which have been driven by the engine; fig. 2, is a sectional plan of the same; and fig. 3, is a front view thereof. *c*, are the uprights which guide the monkeys and the weights; c^1, are the diagonal supports to the uprights; and c^2, the cross-framings from the uprights *c*, to the diagonal supports c^1: and it will be seen, that these parts are of the ordinary construction. c^3, is the horizontal framing of the machinery, which, with the flanged wheels *m*, constitute the carriage of the machinery. *a*, are the monkeys, and *b*, the weights, for driving the piles, which are similar to those in ordinary use; *d*, are the chains or ropes, by which the monkeys are worked,—they pass round barrels or windlasses *e*, to which motion is communicated in the following manner:—*h*, is an axis, turning in suitable bearings, and on this axis *h*, are affixed two wheels *g*, which, by means of their peripheries, drive the pullies *i*, formed or affixed on the barrels *e*, when the surfaces or peripheries of the pullies *i*, are held tightly in contact with the wheels *g*.

It should be understood that the axles or necks of the barrels *e*, can be moved a short distance in their bearings, so that the pulley *i*, may be brought into surface contact with the wheels *g*, and when in contact, they will, by their revolution, raise the weights, and when out of contact, the monkeys will be at liberty to descend again, and take hold of the weights. *f*, are sliding bars, each having a forked end, in which the axis or neck of one of the barrels is received, and the workman, attending to each barrel, may readily draw the pulley *i*, and hold it in contact with the wheel *g*, until the weight has been raised and let go; the workman will then force the surface of the pulley away from its wheel, when the monkey will follow its weight, as will be readily understood on examining the drawings. On the axis *h*, is affixed the drum or pulley *n*, by means of which, motion is communicated to the axis from a steam-engine, affixed on the carriage of the pile-driving machinery; the steam-engine is not however shewn, as it forms no part of the invention, for the axis *h*, may be turned by any other suitable power. On the axis *h*, is affixed a bevilled toothed-wheel *o*, which takes into and drives the bevilled toothed-wheel o_1, which is affixed on the axis *q*, having its upper bearing in the lever *r*, by which the axis can be moved, and, by such means, bring the wheels *o*, o^1, into and out of gear. At the lower end of the axis *q*, is affixed a drum or pulley *u*, which, by means of an endless band or strap *v*, gives motion to the pulley *p*, on the axis of the circular saw *s*, the axis of which saw is capable of being raised or lowered, more or less, by a screw *w*, and thus adjusted, according as the cut is to be, higher or lower, or similar to the preceding cut. The saw is carried by the bar v^1, which moves freely on the axis *q*, and thus allows the saw to be first placed and held in a position to cut off the top of a pile on one side of the machinery, and then on the other side; this is accomplished by the workman having a hooked staff, by which he draws the bar *v*, first towards one pile, and then to the other. e_1, e^1, are catches, which are to be placed in their respective ratchet wheels, (affixed on the axes of the barrels,) when it is desired to hold up the monkeys and weights for any length of time; but the catches are thrown back when the machinery is at work. *j*, *j*, are a series of piles which have been driven, and j^1, is a pile, in the act of being driven; *y*, is a cross-tie, the ends of which have spikes *z*, on their under sides, which are pressed into the piles, and the short rails *x*, are placed between projections *t*, on the upper surfaces of the ties *y*, there being one such tie to every two piles; and by this means it will be seen, that the rails can be quickly applied to the piles, and readily removed, as the carriage proceeds.

It will be readily understood, that in using the pile-driving machinery, constructed according to the invention, a suitable platform or surface must be arranged, at the commencement of the work, to support the carriage of the pile-driving engines till enough piles have been driven; after which, the piles themselves will be the means of supporting the carriage of the pile-driving machinery, and, by means of forming temporary rails or ways on such piles, the carriage will readily be moved by the work-people, as the work of pile-driving proceeds, and the upper ends cut off; or in place of having wheels applied to the pile-driving machinery, the same may be caused to progress as a sledge, on suitable surfaces or rollers, applied to the piles.

The patentee claims, firstly,—the mode herein described, of constructing pile-driving machinery, and in such a manner that the same may be caused to travel along a railway or other suitable surface, progressively formed or applied on the piles, as the work of pile-driving proceeds, and the ends of the piles are cut off by the machinery; and—

Secondly,—the application of a steam-engine to pile-driving machinery, in order, by such power, to raise the monkey or weight.—[*Inrolled in the Inrolment Office, March,* 1842.]

To JAMES SHANKS, *of St. Helens, Lancashire, chemist, for improvements in the manufacture of carbonate of soda.*—[Sealed 27th May, 1841.]

THESE improvements consist in two methods of operating on the black ash or carbonate of soda of commerce, for the purpose of converting the caustic soda and silicate of soda, therein contained, into carbonate of soda; and likewise, when crystals are to be made, increasing the quantity produced from the soda liquor.

The first method consists in breaking the masses of black ash into pieces, about an inch square, and placing them in layers, three or four inches deep, in a stone or iron vessel, called a carbonator, furnished with a pipe at each end, for the entrance and exit of the gases, hereafter mentioned. The layers are moistened with water, and then a stream of carbonic acid gas is passed through the carbonator, until the whole of the soda is carbonated; which may be known by the escape of sulphuretted hydrogen. The black ash is then removed to the vats, and treated in the ordinary way.

In the second method, the black ash is made into a lye, and then subjected to the action of carbonic acid gas. The carbonator, used in this process, is ten feet high, and of such an extent as to afford sixteen cubic feet of space for every ton of soda ash, and six cubic feet for every ton of crystals to be made per diem. Across the bottom of the carbonator an arch of open brick-work is thrown, and the space above it is filled with small pebbles, about the size of a cubic inch. The carbonic acid gas is introduced below the arch, and, ascending among the pebbles, meets the soda liquor, which is pumped in at the top of the carbonator from the vats that contain it. When this liquor is perfectly carbonated, it will lose its greenish yellow color, and assume a transparent appearance.

The patentee varies this process, by taking the last or weakest soda liquor from the vats, and surcharging it with carbonic acid gas, by passing it through the carbonator; it is then used for lixiviating the fresh charges of black ash in the vats.

The patentee claims, as his invention, the methods, above described, of operating upon black ash, as commonly prepared by manufacturers, or the solutions made therefrom, and converting the caustic soda and the silicate of soda, therein contained, into carbonate of soda.—[*Inrolled in the Inrolment Office, November,* 1841.]

To HENRY WATERTON, *of Fulmer-place, Gerard's Cross, Buckinghamshire, Esq., for improvements in the manufacture of sal-ammoniac.*—[Sealed 27th August, 1840.]

THESE improvements consist in decomposing common salt, by means of carbonate of ammonia, and thereby producing sal-ammoniac.

Two modes of effecting this are described; the first consists in making a saturated solution of common salt, in water, and mixing with it a quantity of finely pulverized carbonate of ammonia, about equal in weight to the salt contained in the solution. The mixture is agitated in a close vessel for six or eight hours, and as much carbonic acid gas is infused therein as it will absorb; (but the introduction of the gas is not absolutely necessary, although the patentee prefers it,) the liquid is then separated from the solid matter, by filtration and pressure. The solid matter is chiefly bi-carbonate of soda, and the liquid holds in solution muriate and carbonate of ammonia, and common salt, and sometimes a small portion of the bi-carbonate of soda.

The liquid is now placed in a distilling vessel, and the carbonate of ammonia being distilled over into a suitable receiver, a solution of muriate of ammonia and common salt remains in the still. This solution is evaporated, by heat, to such a consistency as will cause the separation of the common salt, by crystallization, and the salt, thus crystallized, is evaporated from the liquid by any convenient method. The liquid is then evaporated until it attains the proper specific gravity for crystallizing, and it is transferred into suitable utensils for that purpose. The crystals, produced by these means, are nearly pure muriate of ammonia, and, when pressed and dried, may be brought to market without further preparation, or they may be sublimed into sal-ammoniac.

The other mode of manufacturing sal-ammoniac, consists in taking a quantity of liquid, containing ammonia, either in the caustic state or combined with carbonic, hydrosulphuric, or hydrocyanic acid, (such as gas ammoniacal liquor, or bone ammoniacal liquor,) and rectifying it, by distillation, until the distilled portion contains from twenty to twenty-five per cent. of carbonate of ammonia. If the liquid contains any other acids than those above mentioned, a sufficient quantity of lime is used in the distillation to decompose the ammoniacal salt.

The distilled liquid being now mixed with as large a quantity of powdered common salt as it will dissolve, is agitated for several hours, and as much carbonic acid gas is infused into it as it will absorb. The remainder of the operation is the same as before described in the first method of manufacturing sal-ammoniac.

The patentee claims the use of carbonate of ammonia, in the manufacture of sal-ammoniac, by applying it to decompose common salt, as hereinbefore described.—[*Inrolled in the Inrolment Office, January,* 1841.]

To HENRY HOUGH WATSON, *of Bolton-le-Moors, in the county of Lancaster, consulting chemist, for his invention of certain improvements in bleaching, changing the color of, and otherwise preparing, purifying, and refining tallow, and certain other organic substances, mixtures, compounds, and manufactures.*—[Sealed 21st June, 1842.]

THIS invention consists in bleaching and otherwise preparing, purifying, and refining tallow, wax, and such other substances as are of a greasy or oleaginous nature.

The tallow, or other substance, to be operated upon, having been melted in a leaden or other vessel, incapable of being dissolved by diluted sulphuric acid, a solution, in water, of the article or compound known among chemists under the name of "mineral chameleon," (composed of manganesic or manganic acid and potash, or soda, or other alkaline or earthy base,) is mixed with it. Sulphuric acid, diluted with four or five times its bulk of water, (or any other diluted acid, which has a stronger affinity for the alkaline or earthy base of the chameleon than the manganesic acid, constituting, with the base, the chameleon,) is then gradually added, until the liquor, which separates from the mixture, after it has been well stirred and allowed to stand for a few minutes, is sour to the taste. If preferred, the diluted acid may be mixed with the tallow, or other substance to be operated upon, previous to adding the solution of mineral chameleon. The temperature of the mixture is then raised to about 150°, or from that to 212°, and agitated for an hour; after which the application of heat is discontinued, and the mixture allowed to stand at rest, until the tallow, grease, or other oleaginous substance, rises to and floats upon the surface of the acid liquor, off which, while in a melted state, it may be skimmed, and afterwards applied to the use for which it is required. By this process, the tallow, &c., is bleached or changed in color, according to the quantity of mineral chameleon used, and according to the less or greater tinge of color possessed by the substance before being operated upon.

The patentee states, that mineral chameleon, weighing one-twentieth of the tallow to be operated upon, is sufficient, in solution, to make English tallow, of ordinary quality, white.

The quantity of water to be used in dissolving the mineral chameleon, for bleaching the tallow, or other substance, is not material, but the proportions, which have been found to answer, are twenty or thirty parts, by weight, of water, to one part, by weight, of the chameleon. Instead of mixing the solution of mineral chameleon with the melted tallow, or other substance, and then adding diluted acid, the solution of mineral chameleon may first have as much of the diluted sulphuric or other acid mixed with it, as is required for the saturation of the alkali contained therein, or as is required to make the mixture sour to the taste. The resulting liquor will be of a red, crimson, or purple color, and this may then be mixed and agitated with the tallow or other substance, which must be kept at a temperature of from 150° to 212°, for an hour, or till the desired whiteness or change of color is produced. The color of the tallow or other substance, may be tested, at intervals, during the operation, by pouring a few drops of it upon a clean cold metallic substance.

If diluted hydrochloric or nitric acid is used, instead of sulphuric acid, the vessel in which the tallow or other substance is to be operated upon, must not be made of lead, as those acids are powerful solvents of that metal; but should be composed of wood, stone, or such other material as hydrochloric or nitric acid will not injuriously act upon.

Instead of using the solution of mineral chameleon, or the compound produced by mixing sulphuric or other acid with the solution of mineral chameleon, as hereinbefore described, the patentee bleaches the tallow or other substance, by the employment of a solution containing the red oxide, or the deutoxide of manganese, or a solution containing manganese, combined with more oxygen than it has combined with it when in the state of protoxide.

The solution to be used in bleaching tallow, &c., according to this part of the invention, is made by putting into a leaden vessel a quantity of sulphuric acid, and diluting it with water till its specific gravity (as found by testing a small quantity reduced to the temperature of 60° Fahr.) is only about 1.70 or 1.66. The operator then sprinkles into it, (while hot,) by little and little, the peroxide, red oxide, deutoxide, or other oxide, (not being the protoxide alone,) of manganese, at the same time stirring the liquor with a leaden rod or stirrer. The quantity of oxide of manganese, which is thus added, should be greater than the diluted acid (without the application of other heat than that generated by mixing the acid and water) is capable of dissolving by long digestion. The mixture is then allowed to stand for two or three days, being stirred frequently, to keep the oxide of manganese, as much as possible, in suspension; after which more water is added, and the mixture is stirred till the solution, (which will have acquired a pink or crimson color,) after the excess of oxide of manganese has been allowed to settle, is found to be of the specific gravity of 1.35. The mixture is, after this, repeatedly stirred during the space of three or four days or a week, the specific gravity of the clear liquor being tested, each day, with a hydrometer, and as often as it is found above 1.35, more water is added, until it is reduced to that.—When the liquor changes to a deep crimson or claret color, it is fit for use.

The proportions which the patentee has found to answer, in preparing this solution, are one hundred and sixty pounds of good commercial peroxide of manganese to each five hundred pounds of concentrated sulphuric acid, and the requisite quantity of water. Other acids may be used instead of, or along with, the sulphuric acid.

The tallow, or other substance, is now melted in a leaden or other vessel, (if not already in a fluid state,) by the introduction of steam or otherwise; and when its temperature is about 120° Fahr., or from that to 130°., the crimson or claret-colored liquor or solution is added by degrees. The tallow is kept stirred whilst the solution is being poured into it, and this stirring is continued for an hour, or till the tallow, or other substance, is sufficiently bleached, which can be ascertained, as before stated, by pouring a few drops upon a clean cold metallic substance.

When it is bleached to the satisfaction of the operator, the temperature is raised to 155° or 160°, and the stirring being then discontinued, the liquor will settle in the course of a few hours, and the melted tallow, or other substance, will float upon its surface, from which it may be skimmed or otherwise removed, and applied to such purposes as it may be required for. A ton of good English tallow may thus be made white, by an expenditure of one hundred and forty quarts of the crimson or claret-colored liquor, of the specific gravity 1.35. The quantity required for the bleaching of other substances besides tallow, is more, or less, according to the depth of color possessed by the substance before being operated upon.

When the liquor is mixed with the melted tallow, the mixture has at first a pinkish or muddy crimson hue, produced by the liquor being in a state of mechanical suspension or mixture in the tallow; but this vanishes as the tallow becomes bleached, and the liquor is afterwards found to have lost its crimson or claret color.

The residuary liquor, from which the bleached tallow has been removed, is used in preparing and purifying or "rendering" other tallow or greasy substance. The tallow, greasy substance, or fat, as brought from the butchers or other source, that is, before being separated from the cellular membrane, &c., which accompany it when obtained from the carcase it is derived from, is put into the vessel containing the residuary liquor, and heat is applied by the introduction of steam, or in any other convenient manner. By this means the membrane is dissolved, or the cells burst; and when the contents of the vessel have been kept at about the temperature of 160°, or from that to 212°, for an hour or two, the whole or greater part of the tallow or grease is liberated from the cells. Then, on the steam being shut off, and the mixture allowed to settle, the prepared or rendered tallow will float upon the surface of the liquor, and can then be removed into another vessel, for the purpose of being bleached, or may be disposed of in any other way.

The patentee states, with respect to the operation just described, that the liquor resulting from the bleaching of a ton of tallow, is sufficient to complete the preparing or rendering of a ton of fat, fresh from the butcher's. If thought desirable, fat may be prepared and bleached at one operation, by mixing it in the state in which it is received from the butchers, with the requisite quantity of the crimson or claret-colored liquor, and heating the mixture to the temperature of about 150° or 160°, at the same time stirring it well; after it has been kept at this heat for an hour or two, the temperature is raised to about 212° and maintained at that, for a short time, if it should be found requisite. After the fat or tallow, thus operated upon, has become clear, by standing for a time, it may be removed from the surface of the liquor. In this operation, it is requisite to use somewhat more of the crimson or claret-colored liquor than is required for bleaching tallow that has been previously prepared or rendered.

The utensils with which the mixtures of tallow, &c., and chemical ingredients, are to be stirred or otherwise brought into contact, and the vessels used, should be of lead, or of wood, covered with lead, provided that sulphuric acid is the acid used in the preparation of the solution; but when the solution is formed by the aid of any other acid, the utensils and vessels should be of wood, stone, or other substance, not capable of being acted upon by the acid in the solution.

With regard to the improved processes above described, the patentee claims the application of a solution of mineral chameleon or compound of manganesic or manganic acid and potash, or soda, or other alkaline or earthy base, to wax, tallow, or other greasy or oleaginous substance, in a melted, fluid, or softened state, by mixing the same therewith; and the previous or subsequent application of sulphuric acid, (or other acid having a stronger affinity than the manganesic acid for the alkaline or earthy base of the chameleon,) to the said mixture, for the purposes of bleaching and changing the color of the tallow, or other substance.

And he claims, for the same purposes, the application (by mixing) to melted, fluid, or softened wax, tallow, grease, or oleaginous substance of a solution or mixture, formed by adding sulphuric acid, or such other acid as just alluded to, to a solution of the mineral chameleon, previously to either of them being added to the substance to be operated upon. He also claims the application of a solution, (made by the aid of acid,) of the red oxide or the deutoxide of manganese, or a solution containing manganese, combined with more oxygen than it has combined with it when in the state of protoxide, to melted or softened tallow, or other fluid, or softened greasy or oleaginous substance, by mixing the solution with the substance to be operated upon, for the purpose of bleaching and changing the color of the same; and, when applied to "unrendered" tallow or fat, for the purpose of bleaching, changing the color of, and otherwise preparing, purifying, and refining the same. He likewise claims the application of the residuary liquor, (left after the bleaching or changing the color of prepared or rendered tallow, or other substance,) to unrendered tallow or fat, by heating and mixing the same therewith, for the purpose of preparing, purifying, and refining the tallow or fat.

When in bleaching or changing the color of tallow, or other oleaginous substance, a maximum degree of whiteness is not required, and when great expedition is not an object, the patentee, instead of using the compounds hereinbefore described, adds to the tallow, when in a melted or softened state, a quantity of oxide of manganese, (not the protoxide,) in a pulverized state. The mixture is stirred repeatedly, for a few hours, and kept at a temperature of about 150°; after which, the oxide of manganese is separated, by filtering, or is deposited, by the mixture being allowed to stand, and, at the same time, kept warm;—the tallow, or other substance, is then removed. Or, instead of this process, the patentee mixes the tallow, or other oleaginous substance, with the oxide of manganese and sulphuric acid, (previously made so dilute as to be incapable of charring organic matter,) and keeping the mixture at a temperature of about 212°, agitates it at intervals, until the desired change of color is produced. When the color of the tallow or other oleaginous substance, is found to be sufficiently changed, the agitation is discontinued, but the temperature is kept so high, that the substance will remain in a fluid state till the oxide of manganese and acid have settled, and until it is sufficiently transparent; after which, it may be removed for use. The oxide of manganese and acid may either be mixed together, previously to being added to the substance to be operated upon, or otherwise.

The patentee claims the several operations or processes, last hereinbefore described, for bleaching and changing the color of tallow, grease, and oleaginous substances.—[*Inrolled in the Petty Bag Office, December,* 1842.]

To John James Baggaly, *of Sheffield, in the county of York, seal engraver, for his invention of certain improvements in making metallic dies and plates, for stamping, pressing, or embossing.*—[Sealed 27th January, 1842.]

In carrying these improvements into effect, a model, in bas-relief, of the subject required to be sunk in a die, is first provided, and from this model a mould or matrix is produced, in sulphur, plaster or any other suitable material, of sufficient substance.

The back of this matrix must be made nearly parallel to the face; that is, the casting or matrix must be, as a shell, nearly of the same substance or thickness in every part, the general figure of the back of the matrix nearly corresponding to that of the face; and it may vary from one eighth to half an inch in thickness, according to the size and depth of the subject. From the back of this shell or matrix, including the thickness of the edges, a cast-iron die or block is obtained, in the usual way, (by means of a plaster model,) of suitable substance and dimensions for sustaining the blow or pressure in the operation of stamping. From the face of this matrix a model is obtained, for casting a hub or sinker, containing the raised part of the subject, in iron. This hub or sinker should have a staple or stud at its back, for attaching it to the press or stamp-hammer. The die-block and hub having been adapted and adjusted in the stamp or press, a plate of steel, or other suitable metal, of the required shape and thickness, is made red-hot, and laid upon the face or upper surface of the cast-metal die-block; the hub or sinker is then struck down upon the plate of steel, which, after several blows and repeated heatings, is brought into the form of the die-block, on the under side, and of the sinker, on the upper side.

The feather edges and other irregularities of the steel plate being removed, it may be hardened, if required. It must then be cleaned at the back and edges, and tinned over those parts. The face of the die-block must be also cleaned and tinned, and then the plate may be fixed in the die-block, by soft solder, and pressed, whilst hot, so as to bring it firmly to its proper seat or bed. After thus fixing the steel plate in the block, it is ready to be worked upon by the tool, which is technically called getting it up; and when this has been done the die is ready for use.

Instead of sinking the figure of the dies out of flat plates, as above described, the figures may be produced in the face of the matrix or die, by casting them from molten steel; after which, the steel should be heated gradually to a glowing red heat, in a close oven or furnace, and placed, in this state, in the die-block, to be operated upon by the sinker, in a stamper or press, for the purpose of closing the pores of the metal, and bringing up the finer parts of the impression. The die, so prepared, is then to be cleaned and tinned at the back, and affixed to the die-block by solder or other means.

In place of steel, castings of malleable iron, or brass and other alloys, may be substituted; and, after annealing, treated as above described, in reference to the cast steel.

The patentee claims, making dies and plates, for stamping, pressing, or embossing, as substitutes for the steel-faced dies, commonly produced by welding steel on to the body of a wrought-iron block, and afterwards cutting or stamping the subject thereon; which improvements consist, firstly, in producing, from flat plates of steel or other metal, the subject of the required die, by the means above described; secondly, by casting the said subjects from molten metal, and afterwards treating such castings in the way herein above explained; and thirdly, in attaching such stamped dies to cast-iron blocks, by means of solder.—[*Inrolled in the Petty Bag Office, July,* 1842.]

Specification drawn by Messrs. Newton and Son.

To John Wilson, *of Liverpool, in the county of Lancaster, lecturer on chemistry, for an improvement or improvements in the process or processes of manufacturing the carbonate of soda.*—[Sealed 25th February, 1840.]

The first part of these improvements consists in manufacturing carbonate of soda from a solution of sulphuret of sodium, by the employment of bi-carbonate of soda.

The bi-carbonate of soda is added to the solution of sulphuret of sodium, in the proportion of eighty-five parts of the bi-carbonate to forty-eight parts of the sulphuret; heat being then applied, sulphuretted hydrogen gas is evolved, and carbonate of soda remains.

If it is considered requisite that the gas should be collected, the carbonate of soda is manufactured in an iron pan, the cover of which is securely closed by a sand or water-joint, and is furnished with a pipe, to convey the gas into a gas-holder. After the gas has been evolved, the impure carbonate of soda is removed to a common white ash furnace, and heated to dryness; then, by dissolving it in water, and allowing the solution to settle, a clear liquor is obtained, which is afterwards concentrated by boiling, and allowed to crystallize; or the carbonate may be obtained in the state of a proto-hydrate, by evaporating the solution.

When the gas is not required to be collected, the operation is carried on in a reverberatory furnace, of the kind usually termed white ash furnaces. The mixture of bi-carbonate of soda and the solution of sulphuret of sodium is kept well stirred, until it becomes quite dry, and then the impure carbonate is treated in the way described in the first process.

The second improvement consists in adding to a solution of black ash as much bi-carbonate of soda as will saturate the caustic soda which it contains, and convert it into carbonate of soda.

The carbonate can be obtained in crystals, by allowing the solution of black ash to settle, when it has attained a specific gravity of 1.720, or about 54° of the common hydrometer, and afterwards decanting the clear liquor into coolers, to crystallize; or the carbonate may be produced in the state of a fine salt, by evaporating the solution.

The third improvement consists in preparing carbonate of soda from soda ash, by dissolving the latter, and saturating the caustic soda, contained in it, by the addition of bi-carbonate of soda; the remainder of the operation is the same as when the black ash liquor is employed.

Sesqui-carbonate of soda may be substituted for the carbonate of soda, in any of the above processes; but, in that case, two parts of the sesqui-carbonate must be used in place of one part of the carbonate.

The patentee claims the use of bi-carbonate of soda, and sesqui-carbonate of soda, in preparing carbonate of soda from a solution of sulphuret of sodium; also the use of bi-carbonate of soda, and sesqui-carbonate of soda, in preparing carbonate of soda from a solution of black ash, or from soda ash.—[*Inrolled in the Petty Bag Office, August*, 1840.]

To JOHN COLLARD DRAKE, *of Elm-tree-road, St. John's Wood, land-surveyor, for improvements in scales used in drawing and laying down plans.*—[Sealed 18th February, 1841.]

THESE improvements consist in making the scales, for laying down plans, of the same paper as that on which the plan or drawing is to be laid down. The scales are intended to accompany the plans to which they belong, and being of the same material, they consequently expand or contract, by changes of temperature, in exactly the same proportion as the plan.

The paper to be drawn upon is mounted on linen or cotton, by means of India-rubber cement, and on a strip of it the scale is made. The under surface of the straight edge or holder, by which the scale is held, whilst being used, is rabbetted, and covered with a piece of paper or linen, so as to form a space for the reception of the scale;

and the off-set scale, used with it, has a small metal frame at one end, which works against the edge of the holder.

The patentee claims the mode of constructing paper scales, with apparatus for applying the same in drawing and laying down plans; whereby the scales, and the plans laid down from the same, will be liable to he same effects of expansion and contraction, as above described.—[*Inrolled in the Inrolment Office, August*, 1841.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 465, Vol. XXI.)

May 3, 1842.

The President in the Chair.

"Description of the Tunnels, situated between Bristol and Bath, on the Great Western Railway, with the methods adopted for executing the works."—By Charles Nixon, Assoc. Inst. C. E.

The works described in this paper comprised a large quantity of heavy earth-work in tunnels, &c.; they were commenced in the spring of the year 1836, and terminated in the year 1840. The whole of the tunnels are 30 feet in height from the line of rails, and 30 feet in width; they are curved to a radius of about 120 chains; the gradient of that part of the line is 4 feet per mile. The strata through which they were given, consisted generally of hard grey sand-stone and shale, with the grey and dun shiver, &c.; in a few places only, the new red sand-stone and red marl were traversed. Every precaution was taken for securing the roofs, by lining them with masonry, where the nature of the strata demanded it, and in some places invert arches were turned beneath.

Driftways were driven before the tunnels were commenced, and shafts were sunk to enable the work to proceed at several points simultaneously. The modes of conducting the works, by these means, are fully described, with all the difficulties that were encountered. The construction of the centres is given, with the manner of lining the arches with masonry, which is stated to be what was termed "coursed rubble;" but was of a very superior description, and in every respect similar to ashlar-work.

The author offers some remarks with regard to the expense of working tunnels by means of centre driftways. He states this plan to be costly, and in many instances without corresponding advantages, on account of the difficulty of keeping the road clear for the waggons. He recommends that when driftways are used they should be on the lower side of the dip of the strata, as the excavation would be facilitated, and the road would be kept clearer. In long tunnels he has found the cheapest and most expeditious mode of working to be by excavating the centre part from shafts, and both the ends (together, if possible), from the extremities, after the open cuttings are made. The drawing accompanying the paper, gave a longitudinal section of all the tunnels, and showed, to an enlarged scale, several transverse sections of them, where the variations of the strata rendered either partial or entire lining necessary.

In answer to questions from Mr. Vignoles and other members, Mr. Nixon explained, that the extra number of shafts had been required in order to enable the works to be completed within a given time. There had not been any accidents during his superintendence; but subsequently one of the shafts had collapsed. The cost of driving the driftways, the dimensions of which were 7 feet wide by 8 feet high, was ten guineas per yard lineal. He then described more fully his proposed plan of cutting the driftways, on the lower side, instead of the centre of the tunnel, and stated the advantages chiefly to consist of a saving in labour and gunpowder, as a small charge sufficed to lift a considerable mass of rock when acting from the dip. The road was also less liable to be closed, by the materials falling into it, when the enlarged excavation proceeded from one side, instead of upon both sides.

Dr. Buckland, after returning thanks for his election as an honorary member of the Institution, expressed his gratification at the prospect of a more intimate union between engineering and geology, which could not fail to be mutually beneficial; and cited examples of this useful co-operation in the cases of railway sections and models, that had recently been furnished by engineers to the Museum of Economic Geology.

He then proceeded to remark upon the geological features of the South-Western coal-field, near Bristol and Bath, which had been described by Mr. Conybeare and himself, in the Transactions of the Geological Society of London (1824).

Some of the tunnels near Bristol are driven in the Pennant Grit of the coal formation, where it is thrown up at a considerable angle, and composed of strata, yielding slabs and blocks of hard sand-stone, used extensively for pavement.

In traversing such inclined and dislocated strata, the engineer's attention should, he conceived, be especially directed to the original joints that intersect the beds, nearly at right angles to their planes of stratification, and also to the fractures produced during the movements they have undergone. These natural divisions and partings render such inclined stratified rocks unworthy of confidence in the roof of any large tunnel, and liable to have masses suddenly detached.

Inclined strata, of a similar sand-stone, are perforated by many tunnels on the railway near Liege, in nearly all of which the roofs are supported by brick arches.

It has been found impossible to make the tunnels through Lias and Red Marl without continuous arches of masonry.

In any of the tunnels which have been carried through strata of the great Oolite, the parts left unsupported by masonry would, in his opinion, be peculiarly liable to danger, because even the most compact beds of Oolite are intersected, at irregular intervals, by loose joints, at right angles to the planes of the strata, and occasionally by open cracks; and it is to be feared that the vibration caused by the railway carriages, would tend eventually to loosen and detach these masses of stone.

He apprehended still greater danger would exist in tunnels cut through the loosely-jointed strata of chalk, unless they are lined throughout with strong masonry; and even that, in a recent case, had been burst through by the weight of the incumbent loose chalk coming suddenly upon the arch.

In open cuttings through chalk, where the numerous interstices, and the absence of alternating clay-beds, prevent any accumulation of water, there is little chance of such frequent landslips as occur where beds of stone, gravel, or sand, rest on beds of clay; but until the side walls of chalk are reduced to a slope, at which grass will grow, they will be subject to continual crumblings, and the falling down of small fragments, severed by the continual expansion and contraction of the chalk, under the destructive force of atmospheric agents, and chiefly of frost.

In open cuttings, where the inclination of the strata is towards the line of rails, the slope should be made at a greater angle than if the strata inclined from the rails. If this be done, fewer landslips will occur from accumulations of water, between the strata thus inclined towards the rails; and such slips may be further guarded against by minute and careful observation of the nature of the individual strata, and a scientific application of subterranean drains, at the contact of each permeable stratum, with a subjacent bed of clay.

Tunnels can be safely formed without masonry, in unstratified rocks of hard granite, porphyry, trap, &c., and in compact slate rocks; also in masses of tufa, such as cover Herculaneum, and are pierced by the grotto of Pausilippo, near Naples; but, in his opinion, wide tunnels, driven in stratified rock, could not be considered secure, unless they were supported by arches.

Mr. Sopwith confirmed the remarks on the importance to the Civil Engineer of a knowledge of the geological character of the strata through which tunnels, or open cuttings, were to be made. The cost was materially affected, as well as the stability of the works. The angle of inclination, and the lines of cleavage, should be carefully studied. On one side of a cutting the slope might be left steep, and all would be firm and dry; whilst, on the other, if the same slope was adopted, all would appear disintegrated and wet, and a series of accidents would be the necessary consequence. He could not sufficiently urge the importance of a more intimate connexion between the Geologist and the Engineer.

In answer to a remark by Mr. Farey, on the apparent advantages of Frazer's Centres for Tunnelling, Mr. Bull promised to procure for the Institution an account of the execution of some work with them.

"An Account of the Railroad constructing between Liege and Verviers, Belgium."

By Lieutenant Oldfield, Assoc. Inst. C. E.

The materials for this communication were drawn from the memoranda, made during a tour by the author, who is an engineering officer in the service of the East India Company.

It describes the general course of the railway, descending by the long inclined planes, from the height above Liege to the valley of the Meuse—its progress along the banks of the Vesdre, through tunnels, and over almost innumerable bridges and viaducts, to Chaudfontaine, and thence onward through the town of Verviers, in the direction of Aix-la-Chapelle, to the frontiers of Germany. The modes of excavating the tunnels, and the materials used in the other works on the line, are accurately described; the general acclivities and curves of the road, the rails, chairs, and methods of fastening them to the sleepers, and the prices of labour and materials, are all given in detail, and the whole was illustrated by enlarged diagrams from the author's sketches.

May 10, 1842.

The President in the Chair.

"Description of a Flax Mill, recently erected by Messrs. Marshall and Co., at Leeds."

By James Combe, Assoc. Inst. C. E.

The mill described in this communication consists of one room, 396 feet long by 216 feet wide, covering nearly two acres of ground. The roof is formed of brick groined arches, 21 feet high by 36 feet span, upon cast-iron pillars: an impermeable covering of coal-tar and lime is laid on a coating of rough plaster over the arches, and upon that is a layer of earth, 8 inches thick, sown with grass. This immense room is lighted and ventilated by a series of sky-lights, 13 feet 6 inches diameter, one at the centre of each arch. A vaulted cellar, with brick pillars, extends under the whole of the building, and contains the shafts for communicating the motion from a pair of engines, of 100 horses' power, to the machinery in the mill; the flues and steam-cases for warming and ventilating; the revolving fan for urging the air into the room, with the gas and water-pipes; and the remainder of the space is appropriated for warehouses.

The heating and ventilating are effected by a large fan, which forces the air through the pipes of two steam-chests, each 10 feet long, and containing together 364 pipes, of $3\frac{1}{4}$ inches bore: the temperature can be regulated by the quantity of steam, which is admitted into the chests, or by allowing a portion of cold air

These buildings would, he believed, be eventually used for agricultural purposes, and when engineering knowledge was more directed to the processes of agriculture, good results might be anticipated: his attention had been particularly directed to the subject, and he was convinced of the necessity of concentrated superintendence, which is not at present possible in the separate farm-steadings, as they are now constructed: this might be apparently foreign to the subject before the meeting, but the range of engineering was so wide that it was difficult to say where it should stop.

Mr. Lindsay Carnegie, as a landed proprietor, could bear testimony to the importance of the connection of engineering with agriculture, and to the advantages already derived from the improvements which had been introduced by Mr. Smith, who might be justly termed the father of the improved system of agriculture in Scotland.

Mr. Marshall explained, that he was indebted to Mr. Smith for the suggestion of this mode of construction, which he had not hesitated to adopt, although all the plans had been prepared for mills of several stories in height—he had been convinced of the superiority of the present plan, and his expectations had been fully realized. There were of course some difficulties to be overcome, and some experiments to try, all of which had not been successful, but in all the essential points, this kind of building was superior to any other. An equality of temperature, and a facility of imparting a certain degree of moisture to the air, which was indispensable for spinning yarn, had been perfectly attained.

Mr. Braithwaite inquired whether the arches were found to be perfectly water-tight? On some of the railways, which were laid upon arches, it had been found that asphalte had failed in rendering them impervious, and they were consequently useless, even for store-houses.

Ma. Marshall explained, that a few leaks had occurred, particularly near the skylight-frames, but they had been easily repaired, and were now water-tight.

Mr. Combe found that a mixture of finely-sifted engine-ashes, with the coal-tar pitch, was better than lime. The depth of soil above the arches should be sufficient to prevent the heat of the sun from penetrating through the cracks to the pitch and forcing it up. He had recently examined the roof carefully, and could only discover six indications of moisture penetrating; these had been easily repaired, and all was now perfectly sound.

Mr. Field agreed with Mr. Smith in his estimation of the advantages of carrying on all manufacturing processes as much as possible under one roof and on one floor,—great economy of time and labour would result, especially where heavy masses, such as parts of machinery required to be moved about; he would always adopt the system in constructing a manufactory.

Mr. Smith observed, that an arched roof would be found as cheap as one of wood and slates, and in the relative durability there could be no comparison.

Mr. Marshall desired it to be borne in mind, that the cut stone front of the mill had greatly enhanced the cost, and that being the first building of the kind, erected in the neighbourhood of Leeds, it had naturally been more expensive than others would be.

"Account of the Explosion of a Steam Boiler, at the Penydarran Iron Works, South Wales."

By Adrian Stephens.

The boiler, the explosion of which is described in the paper, was one of a pair for furnishing steam to a high-pressure engine, with a cylinder of 26 inches diameter, working expansively, the steam being cut off at half the stroke; each of these boilers was 41 feet long, and 7 feet diameter, with a centre tubes of 4 feet 2 inches diameter; the thickness of the plates throughout was $\frac{1}{2}$ inch; the ends were flat, with rings of angle-iron, and the pressure of the steam, to which the safety-valves were weighted, was 50 lbs. on the square inch.

From appearances, after the explosion, it was conjectured that the tube, which was collapsed in a remarkable manner in its entire length, had been softened by the heat, having probably been left dry along the upper side.

No opinion is given as to the cause of the explosion, but it is particularly mentioned that the supply of feed-water depended upon the regular attention of the engineer, and that the feed-pipe was placed so that the water fell directly upon the hottest part of the tube-flue; and it is remarkable that the tube is most extensively fractured at that spot.

All the appearances presented by the boiler, both before and after the explosion, and the injury done by the event, are accurately detailed, and the paper was illustrated by a drawing of the boiler and the setting.

Mr. Carnegie presented one of Hunter's Stone Boring Machines to the Institution, and explained its action to the meeting.

The machine is composed of two parallel bars of steel, supporting a traversing carriage, through the centre of which passes a spiral auger, attached to a screwed bar; this bar fits into a female screw clamp above the carriage, and on the upper end is a winch with four handles.

When the instrument is in use, it is fixed by two cramps upon the stone to be pierced, and the auger, being made to revolve, by means of the winch, scoops out, at each revolution, as great a depth of stone as is equal to the distance which the screw descends; the chips ascending through the spiral channel of the auger, are thrown off at the top. The peculiar shape of the point of the auger prevents its being abraded, as it operates by chipping the stone, and not by grinding it away. This, with the means of forcing it down by the screw, is the chief novelty of the machine. It has been extensively used at the works of the new Harbour of Arbroath, by Mr. Leslie, who speaks of it in the following terms:—

"Mr. Hunter's Boring Machine has been advantageously employed for above a year, in boring trenail holes in the stones used at the new Harbour of Arbroath. The holes are $1\frac{3}{4}$ inch diameter and from 9 inches to 2 feet in depth: the aggregate of the holes already bored, amounts to upwards of 30,000 linear feet. The machine may be adapted for boring holes of any dimensions. It does the work considerably cheaper than the 'jumper,' and much more correctly, as it makes the holes perfectly straight, cylindrical, and equal throughout, instead of the irregular form made by the common jumper. This machine is very well adapted for boring railway blocks, and has been much used in this quarter for that purpose. I consider it to be more especially valuable from the facility which it affords of boring and trenailing down the stones used in sea buildings, in any exposed situation, as I have found that trenailing is a great security to such building, while in progress, when the upper courses are much exposed and liable to be washed off, unless they be held down by other means than their own absolute weight.

"The expense of boring the old red sandstone rock, here, is about three halfpence per linear foot."

Mr. Vignoles bore testimony to the advantages of the machine;

he was now employing it for piercing holes in stones going from Arbroath to the West Indies, for the construction of a patent slip; there was great economy of cost and time by its use, in addition to the superior manner in which the holes were made.

Mr. Smith was convinced of the advantage of the machine in working almost all kinds of stone, but more especially for those resembling the Arbroath stones, which were from a bed beneath the old red sandstone: they were of fine grit mingled with schistose debris. The action of the tool was like that of the stone-planing machine, to burst chips off instead of grinding down the surface by small portions, and destroying the edge of the tool at the same time. With the planing machine, it was common to take off a thickness of 3 inches at one passage of the tool,—it acted like a " pick," and being fixed in a frame, weighing about 1½ ton, the power was great; at the same time there was little abrasion of the tool, and it never became heated or softened. It was probable that, with other qualities of stone, a screw with another pitch of thread might be required to force the auger forward, but with the thread now used in boring stones from the Arbroath quarries, the economy of time and cost appeared very great. In each of the blocks, for the Arbroath Railway, it was requisite to bore two trenail holes 1½ inch diameter, and 6 inches deep—and to level a space 9 inches diameter to receive the cast-iron chair: this had been contracted for, at two-pence halfpenny per block, which was a material diminution of the usual cost. He was convinced that the instrument only required to be known to be extensively used.

Mr. F. Braithwaite had for some years used Hunter's stone-planing machine, for dressing up slate and other stones, and was well qualified to give a favourable opinion of the principle of its action: he believed that the machine, under discussion, being upon the same principle, must be very useful.

May 24, 1842.

The President in the Chair.

" On the Machinery used for working the Diving Bell, at Kingstown Harbour, Dublin."

By Peter Henderson, Assoc. Inst. C. E.

After referring for the details of the machinery to the two drawings which accompany the paper, the author describes the foundations of the pier-head to have been laid in a depth of 20 feet at low water, on rock and firm sand. For 14 feet from the bottom, the wall is formed of Runcorn sand-stone, of fine quality, each stone containing about 50 cubic feet, and thoroughly squared. This has been preferred to granite, on account of its cheapness, and the facility with which it is worked under water.

After the foundation course is secured, from 300 to 350 cubic feet of this walling are frequently set, in a perfect manner, by the diving bell, during a fair working day of eight hours. The first stone was set on the 5th of August, and by the 1st of January 16,000 cubic feet had been laid.

From 6 feet below low water to the coping, it is proposed to make use of granite, in blocks of 50 cubic feet each, which is procured cheaply, and in abundance, in the immediate neighbourhood.

The piers are finished, in the interior, by walling of rubblestone, carefully laid.

For the purpose of forming this excellent harbour, an area of 251 acres has been enclosed, between two substantial stone piers of 8,340 feet in length, affording clear anchorage in a depth of water from 15 to 27 feet at low spring tides. The interior shews no natural tendency to collect deposits likely to reduce the depth of water, nor do any of the works exhibit symptoms of deterioration, while its continual occupation by vessels of every description, together with the comparative freedom from accident in Dublin Bay, afford convincing proof of its great utility.

"Description of a Steam Dredging Engine, used upon the Caledonian Canal."—By Walter Elliot.

The machine described in this communication is not remarkable as being of the most perfect description, but as it is stated to be among the earliest which were brought into use in this country, a certain degree of interest is attached to it. It was constructed in the year 1814, expressly for the formation of the Caledonian Canal; and it was also used for deepening the channels through the shoals in Loch Dochfour and Loch Ness. The length of the vessel is 80 feet by 23 feet in width; the bucket-frame is 42 feet long, with 25 buckets, worked by a condensing steam-engine of six horses power. The dimensions of all the principal parts of the machinery are given minutely, with accounts of several experiments for extending the use of the dredger.

On one occasion, as it was found that the buckets had much difficulty in penetrating the hard mounted clay, every alternate bucket was removed, and a pair of steel cutters substituted for each, in the expectation that the clay would be loosened and the succeeding bucket would take it up more easily. They did not, however, act satisfactorily, and a risk of fracture was incurred, which induced the abandonment of the plan.

On another occasion, in forming a portion of the canal between Loch Ness and the locks at Fort Augustus, where the height of the ground above the water averaged from 20 to 30 feet, and the excavation was required to be about 16 feet beneath it,—that part of the cutting above the water level was commenced by manual labour, while the dredging machine did the excavation under water; it was soon found however that the engine, having completed its share of the task, continued to undermine the upper portion, which, being of loose nature, fell into the water, and was raised by the buckets so rapidly, that the manual labour could not compete with the machine, and it was then used to complete the undertaking, which it did in eight months, having in that time excavated about 170,000 cubic yards of material.

When working in favourable situations, the quantity generally raised equals 90 tons per hour; 17 of the buckets are discharged per minute, with an expenditure of coal of about 15 cwt. per day.

The communication was illustrated by two detailed drawings of the boat and its machinery.

[*To be continued.*

MACHINERY FOR EXCAVATING OR CUTTING AND REMOVING EARTH.

Many have been the attempts to supersede, by means of machinery, the use of hand-labor, in the tedious and laborious operations of cutting and removing earth, for levelling inequalities of the surface, forming canals and docks, and clearing the beds of rivers. These mechanical contrivances have necessarily partaken of the same general features, viz., moving peckers and shovels or scoops, constructed and arranged in various ways, and actuated by wheels and levers, in a variety of forms and combinations, from the simple and well-known dredging apparatus, commonly worked in our harbours and rivers, to the elaborate and gigantic new American excavator, which, under the absurd cognomen of the "Yankee Geologist," has been proclaimed to the world as capable of removing mountains.

Without intending, in the slightest degree, to detract from the merits of this American invention, which we hear, from disinterested parties, who have witnessed its performance, to be one of paramount importance and vast capability, we think it necessary, in order to qualify the extravagant statements given in some of the periodicals of the day, both foreign and English, respecting its astonishing powers, to state what are the leading points on which its claims to novelty are founded.

In order to show this more clearly, it will be desirable to mention, in a brief way, the objects and features of the several machines for excavating and removing earth, which have been the subjects of patents within the last twenty years.—The first of these we find to be the invention of George Vaughan Palmer, of Worcester,—a machine to cut and excavate earth, granted 8th June, 1830.—This machine is mounted upon wheels, intended to advance upon a temporary railway, laid upon the surface where the excavation is to be made, beneath which a hole is dug to commence the operations in. There are a number of peckers in front of the machine, which, by vibratory action, dig into, and thereby break up, the earth. A consecutive series of buckets, connected by an endless chain, are brought down into the disturbed and broken ground, and scrape up the soil, stones, &c., which are carried away up an inclined plane, in the manner of the ordinary dredging apparatus. The machinery is worked by a winch and toothed gear, and advances upon its railway as the earth is broken and removed.—See Vol. VII., page 314, of our Second Series.

Sir Thomas Cochrane, Knt., obtained a patent, 20th October, 1830, for apparatus to facilitate excavations, sinking and mining, but this is a pneumatic contrivance, merely to prevent the percolation of water into a tunnel, whilst in progress of formation.—See Vol. VII., page 304, Conjoined Series.

Mr. G. V. Palmer, of Worcester, had a second patent granted 24th January, 1832, for improvements in machinery or apparatus for excavating, and which he called an excavating and self-loading cart. This contrivance much resembled an ordinary cart, upon two wheels, drawn by horses. Under the cart were placed the cutting or excavating instruments, formed something like the share and breast of a plough, which excavators were capable of being lowered, so as to take into the ground and break up the soil to any required depth, as it advanced; or they might be drawn up out of operation, in order to allow of the cart travelling on ordinary roads, when proceeding to or returning from its work. The running wheels of the cart were broad, and their felloes hollow, and in these hollows were transverse partitions, formed by plates, which constituted the bucket-wheels. On the cart advancing, the ploughs or cutters penetrated into and broke up the ground, and turned the soil sideways into the buckets of the running wheels, which, as they revolved, raised the soil, and in turning over let it fall on to inclined edges, by which it was conducted into the cart.—See Vol. I., page 278, Conjoined Series.

In December, 1833, a patent was granted to Mr. Thomas Affleck, of Dumfries, for his invention of improvements in the means and machinery for deepening and excavating the beds of rivers, removing sand-banks, bars, and other obstructions to navigation. This, however, consisted merely of apparatus, which, when agitated by the rolling waves, or rise and fall of rivers, disturbed and broke up the mud, sand, or gravel, for the purpose of enabling it to be washed away by strong currents or freshes. —See Vol. IV., page 273, Conjoined Series.

An apparatus to facilitate and improve the excavation of ground and the formation of embankments, invented by Mr. William Brunton, Engineer, of London, was made the subject of a patent, dated 2nd November, 1838. A part of this invention was a series of hook-shaped cutters, fixed in a frame, one in advance of another, and which, being connected to machinery, were forcibly projected into the ground, and made to plough it up in grooves; each cutter, as it advanced, cutting and preparing the way for the next cutter in succession. The other parts of the invention applied to the arrangement of stages, and the order in which a series of workmen were to dig and remove the soil. Also the manner of depositing soil for the formation of embankments; compressing it to give solidity; and conducting the earth-waggons, upon tram-ways, by endless ropes.—See Vol. XVII., page 284, Conjoined Series.

Mons. L. J. A. Ramel, a foreigner, obtained a patent in England dated 19th March, 1838, for his invention of improvements in machinery for excavating and embanking earth, for the construction of railways and other works. The specification of this patent does not set out, in very clear terms, what are the features of novelty proposed, but speaks of the "system of a lever." As far as we can understand the subject, it seems to be merely the adaptation of a long lever as a crane, which works vertically, to raise loads of earth in a box, in place of employing hand-barrows, passed up inclined planes, or of pitching the earth from stage to stage by hand-labour. This lever is mounted upon a platform, with running wheels, for the convenience of passing it from place to place, upon a railway; and the lever, to one end of which the loaded box is attached, is worked by a cord or chain, connected to the other end, and to a winding drum or barrel and windlass; and when the load of soil is conducted to the place of deposit, it is let fall into a cart, by opening the bottom of the box.

An invention of certain improved machinery, for cutting and removing earth, was communicated to Mr. William Newton, of Chancery Lane, by a foreigner, for the purpose of obtaining a patent, which was granted on the 27th March, 1839. This invention is a peculiar arrangement and construction of apparatus, mounted in a carriage upon a temporary railway, in which a series of rotary cutters or peckers, working in inclined positions, are made to break the ground below, at an angle of about forty-five degrees, as the carriage proceeds; and also to throw the earth, thus broken, into a consecutive series of buckets, attached to an endless chain, which, by travelling vertically, takes up the broken earth to the top of the excavation, and delivers it into a series of troughs above, which troughs, by moving in a transverse direction, carry away the earth and deposit it in carts or otherwise, as convenience may require.—See Vol. XVI., page 57, Conjoined Series.

Mr. W. Scamp, of Woolwich, obtained a patent, dated 16th February, 1841, for an application of machinery to steam vessels, for the removal of sand, mud, soil, and other matters, from the sea, rivers, docks, harbours, and other bodies of water. This invention consists merely of a barrel, studded all over with spikes, which, being mounted upon an axle, was suspended by lever arms from the vessel, and on being lowered down to the bed or bottom of the river, the barrel was made to revolve, as the vessel advanced, by a travelling endless chain, extending from a pulley or spur wheel, on the axle of the propelling wheels; or, by other rotatory means, to a pulley on the axle of the barrel, so as to cause the mud, sand, and other materials, on the bottom, to be disturbed or broken up by the spikes, and on mixing with the water, to be carried away by the current.

These are all the schemes which have been proposed and brought before the public, under the protection of Letters Patent in England, within the last twenty years, until the introduction of the American invention above alluded to.

This machine, which we are not permitted at present to lay before our readers in all its details, consists of a horizontal platform, mounted upon wheels, carrying a strong jib-crane, and also a steam-engine. From the end of this jib-crane the excavating tool or cutter is suspended by chains and pullies, which allow of its swinging in a forward direction; and the back part of the tool or cutter is attached to a rod or beam, sliding on rollers, which, being acted upon by chains and toothed wheels, in communication with the steam-engine, causes the cutter to be projected, with great force, against the earth required to be broken up.

The mechanism and the suspending chains, connected with the steam-engine, and with the projecting rod or beam, affords the means of regulating and determining the course in which the cutting tool shall move forward; and by means of a small hand-lever, a workman, standing upon the platform, is enabled to direct the advancing cutter through the ground, in a horizontal line, or through any inclined or curved course, up to a perpendicular; the movements of the pendulous chains determining the course of the cutter, whilst the sliding beam projects it forward.

The excavating tool is formed as a scoop, with strong tangs or teeth in front, to break the earth as it enters, and a sharp cutting edge to take up the broken fragments.

The machine having been moved upon its railway to the place where it is required to excavate, the platform is then made fast pro tem. in that situation, and the steam-power of the engine brought to act upon the mechanism, by sliding clutches or other contrivances. The pendant tool or excavator is then forced forward by chains, connected to the projecting beam, and passed round a rotary drum, driven by gear from the engine; and at the same time the pendant chain is drawn up or let out, as may be necessary, to allow the excavator to advance in the required course. When the projecting beam has carried the excavating tool forward to its extent of action, in a horizontal cut, the suspending chain, from the crane-jib, will raise the loaded scoop, (or the projecting and raising of the scoop may be simultaneous, as the workman shall direct,) which loaded scoop, when brought to its highest position, may be conducted to one side of the excavation by the swinging jib, and the contents let fall into a cart, by opening the back of the scoop; all which operations are effected through the agency and power of the steam-engine, under the direction and regulating hand of the workman.

It is only necessary further to say, that by turning the jib of the crane to the right or left, the cutting of the earth may be performed at any angle to the direction of the machine, and consequently to a very considerable extent; viz., a circuit of 40 or 50 feet, without shifting its situation; but when a change of place becomes necessary, the fastenings by which the platform was secured, must be withdrawn, and the power of the steam applied to move the whole upon its turning wheels to the next place, where it may be required to be made stationary.

Having given this brief description of the construction and mode of working the new American excavating machine, we conclude our present report, by stating the points of novelty which it may fairly claim over others that have preceded it. Firstly, it is locomotive; its movements and all its operative parts deriving their powers from the steam-engine which it carries. Secondly, that the earth is broken up and carried away from the place excavated by one instrument, (the scoop,) acting with immense effect, through the power and agency of steam. Thirdly, that the cutting may be made with equal facility, at any inclination to the horizon, and to a great extent around the spot on which it is stationed, by the direction of the workman, without requiring to be moved from its place. Fourthly, that by this machine, a channel may be cut through a hill, with the proper slopes for its sides, and a level base correctly formed, the excavated earth being simultaneously removed. Fifthly, the capability of cutting many feet below the base, on which the machine runs, by lengthening its chains and guide-beam; which last feature, renders it also applicable to working under water, when placed in a vessel, for removing sand-banks, bars, and beds of mud.

The figures and details of this machine, as set out in the specification, we shall give in an early forthcoming number.

List of Disclaimers
OF PARTS OF INVENTIONS AND
Amendments
MADE UNDER LORD BROUGHAM'S ACT.

John Jeremiah Rubery,—disclaimer to patent dated 14th November, 1837, for " certain improvements in the manufacture of part of the furniture of an umbrella. Filed 5th February, 1841.

Henry Phillips,—ditto to patent dated 17th August, 1835, for " certain improvements in purifying gas, for the purpose of illumination." Filed 5th February, 1841.

Abel Morrall,—ditto to patent dated 3rd January, 1839, for " certain improvements in the making or manufacturing needles, and in the machinery or apparatus employed therein." Filed 26th March, 1841.

Stephen Hutchison,—ditto to patent dated 12th October 1833, for " certain improvements in machinery or apparatus for manufacturing gas for illumination, and in the mode or means of supplying gas to the consumer; and also in the construction of gas burners, parts of which improvements are applicable to other useful purposes." Filed 20th April, 1841.

William Hannis Taylor,—ditto to patent dated 20th May, 1840, for " certain improvements in the mode of forming or manufacturing staves, shingles, and laths, and the machinery used for that purpose." Filed 3rd June, 1841.

William Crane Wilkins and Matthew Samuel Kendrick,—ditto to patent dated 28th April, 1840, for " certain improvements in lighting and in lamps." Filed 14th June, 1841.

Luke Hebert,—ditto to patent dated 7th March, 1840, for " improvements in the manufacture of cofered spades and shovels, soughing and grafting tools, and other implements of a like nature." Filed 24th July, 1841.

William Ward Andrews,—ditto to patent dated 2nd February, 1841, for " certain improved methods of raising and lowering windows and window blinds, and opening and shutting doors, which are also applicable to the raising and lowering of maps, curtains, and other articles." Filed 3rd August, 1841.

William Petrie,—ditto to patent dated 19th June, 1841, for " improvements in obtaining mechanical power, which are also applicable for obtaining rapid motion." Filed 18th December, 1841.

Baron Heurteloup,—ditto to patent dated 22nd May, 1834, for " improvements in certain parts of certain descriptions of fire-arms." Filed 7th January, 1842.

Baron Heurteloup,—ditto to patent dated 23rd February, 1839, for " certain improvements in fire-arms, and in the balls to be used therewith." Filed 7th January, 1842.

Thomas John Davis,—ditto to patent dated 8th August, 1840, for " certain improvements in the form and combination of blocks of such materials as are now used or hereafter may be used in building, or for paving public and private roads and court yards, or public and private causeways and subways, or any other purposes to which the said form and combination of blocks may be applied." Filed 22nd February, 1842.

George Allarton,—ditto to patent dated 11th November, 1841, for " improvements in the method of balling and blooming iron." Filed 11th May 1842.

William Knight,—ditto to patent dated 28th June, 1841, for " an indicator for registering the number of passengers using an omnibus or other passenger vehicle." Filed 18th May, 1842.

Thomas Parkin,—ditto to patent dated 9th April, 1839, for " improvements in railroad and other carriages, in wheels for such carriages, and in roads and ways on which they are to travel." Filed 25th May, 1842.

James Simister,—ditto to patent dated 18th December, 1828, for " improvements in weaving, preparing, or manufacturing a cloth or fabric, and the application thereof to the making of stays, and other articles of dress."—Filed 7th June 1842.

John Hall,—ditto to patent dated 9th December, 1841, for " improvements in the construction of boilers for generating steam, and in the application of steam to mechanical power." Filed 10th June, 1842.

Gottlieb Boccius,—ditto to patent dated 27th January, 1842, for "certain improvements in gas, and on the methods in use, or burners for the combustion of gas." Filed 29th July, 1842.

Isham Baggs,—ditto to patent dated 9th February, 1841, for "improvements in obtaining motive power, by means of carbonic acid, and also by a peculiar application of heated air." Filed 9th August, 1842.

Daniel Gooch,—ditto to patent dated 28th May, 1840, for "certain improvements in wheels and locomotive engines, to be used on railways." Filed 9th September, 1842.

Thomas Young,—ditto to patent dated 13th April, 1840, for "improvements in lamps." Filed 5th November, 1842.

Nathaniel Card,—ditto to patent dated 8th September, 1841, for "certain improvements in the manufacture of wicks for candles, lamps, and other similar purposes, and in the apparatus connected therewith." Filed 17th November, 1842.

John George Bodmer,—ditto to patent dated 27th May, 1835, for "certain improvements in machinery for preparing, roving, and spinning cotton and wool." Filed 22nd December, 1842.

Alexander Johnston,—ditto to patent dated 23rd July, 1842, for "certain improvements on carriages, which may also be applied to ships, boats, and other purposes, where locomotion is required." Filed 24th January, 1843.

List of Patents

Granted by the French Government from the 1st of October to the 31st of December, 1840.

PATENTS FOR FIVE YEARS.

Andrieu, represented in Paris by M. Perpigna, advocate of the French and Foreign Office for Patents, No. 2, ter: Rue Choiseul, for a system of perpetual motion.

Chagot, represented in Paris by M. Perpigna, advocate, for a new feather brush for dusting furniture.

Deconclois, represented in Paris by M. Perpigna, advocate, for a machine for manufacturing leaden pipes without soldering.

Delignac and Signoret, represented in Paris by M. Perpigna, advocate, for a machine for cleansing wheat.

Dufresne, represented in Paris by M. Perpigna, advocate, for a new plough.

Follet, represented in Paris by M. Perpigna, advocate, for an improved windmill.

Gateclou, represented in Paris by M. Perpigna, advocate, for a metallic trace for harness.

Hardy and Hurel, represented in Paris by M. Perpigna, advocate, for an apparatus for stopping looms, when an accident occurs.

Kirk, represented in Paris by M. Perpigna, advocate, for improvements in bobbin-net frames.

Laligant, represented in Paris by M. Perpigna, advocate, for a new press.

Masson, represented in Paris by M. Perpigna, advocate, for improvements in looms.

Nillus, represented in Paris by M. Perpigna, advocate, for an apparatus called "propeller," to be used instead of paddle-wheels.

Petit-Ozone, and Chaloupin, represented in Paris by M. Perpigna, advocate, for improvements in fire-arms.

Rosse, represented in Paris by M. Perpigna, advocate, for a new gun.

Tofflin-Martho and Couplet, represented in Paris by M. Perpigna, advocate, for a frame for making a new kind of bobbin net.

Alcan, of Paris, for a machine for raising the pile of cloth.

Alexandre, of Epinal, for a machine for extracting stones, minerals, coal, &c.

Andreoletty, of Paris, for a new chimney.

Aubin, of Rouen, for a new fire-engine.

Avieny Flory, Bayol, and Florens, of Paris, for an impermeable tissue.

Baes, of Paris, for a new dressing table.

Barrié and Legros, of St. Etienne, for improvements in locomotives and waggons.

Béral, of Paris, for a preparation of nitrate of iron.

Bernhardt, Madame, of Compiegne, for a new process for manufacturing soap.

Bertrand, of St. Pierre les Calais, for an improved bobbin-net frame.

Besnier, of Paris, for a mode of manufacturing buttons with powder of tortoiseshell.

Brunard, of Paris, for economical fuel.

Burnier, of Paris, for an instrument for drawing from nature.

Collon, of Paris, for an improved hydraulic turbine.

Canning, of Paris, for improvements in the manufacturing of carbonate of soda.

Billion, Junr., of Paris, for a mode of manufacturing felt for dampers of pianos.

Buchard, of Nantes, for apparatus for refining sugar.

Bouin, of Bordeaux, for a crane with a circular motion.

Bourgais, of Havre, for a mode of purifying fish oil.

Bravard and Verny, of Paris, for an improved method of applying bitumen.

Brochard and Pignon de Charbonnel, of Nantes, for improvements in the manufacturing of animal charcoal.

Brocot, of Paris, for improvements in clock-works.

Broquet and Guillemin, of Paris, for disinfection of the Barège water, used for baths.

Brosson, of Paris, for an improved siccator for drying tissues.

Brun, of Paris, for an apparatus for separating the liquid from the solid matter, in privy vaults.

Canning, of Paris, for improved castors for furniture.

De Canson, of Annonay, for improvements in taps and kennels.

Carrière, of Belleville, for a new system of heating.

Cellier, of Paris, for the introduction of ferruginous substances, in the manufacturing of biscuits.

Chouippe, of Paris, for an improved instrument for administering internal fumigations.

Claudot, of Verdun, for improvements in retorts and crucibles.

Col, of Paris, for a horizontal mill.

Cornillard, of Paris, for a new mode of manufacturing sheet-iron, sheet-lead, &c.

Coutenot, of Paris, for an improved mill for grinding plaster.

Coyen, Leblanc, and Muller, of Trouville, for a mathematical instrument, called *aréametre.*

Cramer and Roze, of Paris, for an improved lamp.

Cuveiller, represented in Paris by M. Perpigna, advocate, for improvements in soap-making.

Gullat and Roustan, of Paris, for a new system of navigation.

Damien Limousin, of St. Etienne, for a machine for manufacturing velvets, &c.

Daumas, of Paris, for grease for lubricating machinery.

Defert, of Paris, for an instrument called "edellomètre," to be used instead of leeches.

Delemer, of Wazemmes, for an improved metallic sieve.

Delprat, of Paris, for a mechanical extinguisher.

Denis and Chicard, of Paris, for a new syringe.

Deslandes, of Paris, for a new method of fixing metallic lace-holes.

Devieckx and Bannelly, of Brussels, for a measure for coats.

Douce, of Paris, for a new game called "battle."

Douglas, of London, for improvements in the manufacture of soap.

Driollet, of Paris, for a new system of harnessing horses.

Duclos, of Paris, for a new description of wheels, propelled by steam.

Dufour, of Rouen, for a frame for preparing wool for weaving.

Durand, of Paris, for an hydraulic water-closet.

Escande Sibas and Renaut, of St. Mandé, for a method of fixing metallic powder on paper or tissues.

Espanant, of Oleron, for a machine for manufacturing chocolate.

Etienne, of Marseilles, for a purgative elixir.

Fauqueux, of Paris, for a new system for chimnies and stoves.

Feylaud, of Nontron, for a new method of packing.

Fourneaux, of Paris, for a new kind of organ.

Fournet and Julien, of Lyons, for a new calefyer.

Givre and Magat, of Tarare, for improvements in the weaver's shuttle.

Gottlob, of Dijon, for an improved press.

Grilly, of Paris, for an improved lock.

Hérold, of Paris, for improvements in pianos.

Héruville, of Paris, for a machine for compressing tissues.

Hunter Murdoch, of London, for a machine for pulverising wood for dyeing.

Huguin, of Paris, for antimephytic vaults.

Jacquet and Danezy, of Privas, for an improved letter-copying apparatus.

Jaroski, of Paris, for an instrument for cutting pantaloons.

Journet, of Paris, for a machine for excavating earth.

Keene, of London, for a process for manufacturing gloves.

Kæchlin (André) and Co., of Mulhouse, for a spinning machine.

Koll, of Strasbourg, for a typographic press.

Labussière, of Paris, for a frame for weaving pantaloons without seams.

Larat and Aguettant, of Lyons, for improvements in carriage springs and iron wheels,

Lasseron and Rollet, of Niort, for a mill for grinding corn.

Lasseron and Rollet, of Niort, for a stove for drying flour.

De Laurens, of Mont de Marsan, for a machine for threshing corn.

Laurent and Co., of Paris, for a new system of flooring.

Lechevalier, of Paris, for the preservation of gun-powder.

Lecoq, of Bolbec, for improvements in the process used for printing tissues.

Leclercq, of Paris, for improvements in carriage wheels.

List of Patents

That have passed the Great Seal of IRELAND, from the 17th December, 1842, to the 21st of January, 1843, inclusive.

To John Thomas Betts, of Smithfield Bars, in the city of London, Gent., for improvements in covering and stopping the necks of bottles, jars, vases, and pots,—being a communication from a foreigner residing abroad.—Sealed 24th December.

John Bishop, of Poland-street, in the county of Middlesex, jeweller, for improvements in apparatus used for retarding carriages on railways, parts of which are applicable for portioning power, and improvements in steam-cocks or plugs.—Sealed 24th December.

John Ridsdale, of Leeds, in the county of York, for improvements in preparing fibrous materials for weaving, and in sizing warps. —Sealed 24th December.

Isham Baggs, of Wharton-street, in the county of Middlesex, chemist, for improvements in the production of light.—Sealed 29th December.

Samuel Carson, of York-street, Covent Garden, in the county of Middlesex, Gent., for improvements in purifying and preserving animal substances.—Sealed 29th December.

William Coley Jones, of Vauxhall-walk, in the parish of Lambeth, in the county of Surrey, practical chemist, for improvements in treating and operating upon a certain unctious substance, in order to obtain products therefrom for the manufacture of candles and other purposes.—Sealed 29th December.

James Morris, of Cateaton-street, in the city of London, merchant, for an invention of improvements in locomotive and other steam-engines,—being a communication from a certain foreigner residing abroad.—Sealed 30th December.

George Edmond Donisthorpe, of Bradford, in the county of York, top manufacturer, for improvements in combing and drawing wool and certain descriptions of hair.—Sealed 30th December.

Charles Maurice Elizee Sautter, of Austin Friars, in the city of London, Gent., for improvements in the manufacture of sulphuric acid,—being a communication from a foreigner residing abroad.—Sealed 30th December.

William Coley Jones, of Vauxhall-terrace, in the county of Surrey, practical chemist, and George Furguson Wilson, of Vauxhall, in the same county, Gent., for improvements in operating upon certain organic bodies or substances, in order to obtain products or materials therefrom, for the manufacture of candles and other purposes.—Sealed 30th December.

Gabriel Hippolyte Moreau, of Leicester-square, in the county of Middlesex, Gent., for certain improvements in propelling vessels.—Sealed 11th January, 1843.

Gabriel Hippolyte Moreau, of Leicester-square, in the county of Middlesex, Gent., for certain improvements in steam-generators.—Sealed 11th January.

Thomas Wrigley, of Bridge Hall Mills, in the county of Lancaster, paper-manufacturer, for certain improvements in machinery or apparatus for manufacturing paper.—Sealed 20th January.

Thomas Ridgway Bridson, of Great Bolton, in the county of Lancaster, bleacher, for certain improvements in machinery or apparatus for stretching, drying, mangling, and finishing woven fabrics.—Sealed 21st January.

List of Patents

Granted for SCOTLAND, subsequent to December 22nd, 1842.

To Gabriel Hippolyte Moreau, of Leicester-square, London, for certain improvements in propelling vessels.—Sealed 27th December.

Robert Wilson, manager at the works of Messrs. Nasmyths, Gaskell, and Company, Patricroft, near Manchester, engineer, for certain improvements in the construction of locomotive and other steam-engines.—Sealed 27th December.

James Morris, of Cateaton-street, London, merchant, for improvements in locomotive and other steam-engines,—being a foreign communication.—Sealed 27th December.

Henry Samuel Rush, of Sloane-street, London, for improvements in apparatus for containing matches for obtaining instantaneous light.—Sealed 29th December.

John Rand, of Howland-street, Fitzroy-square, London, artist, for improvements in making and closing metallic collapsible vessels.—Sealed 29th December.

Henry Beaumont Leeson, of Greenwich, M.D., for improvements in the art of depositing and manufacturing metals and metal articles, by electro galvanic agency, and in the apparatus connected therewith.—Sealed 30th December.

Robert Logan, of Blackheath, near London, for improvements in obtaining and preparing the fibres and other products of the cocoa-nut and its husks.—Sealed 9th January, 1843.

James Gardener, of Banbury, Oxfordshire, ironmonger, for improvements in cutting hay, straw, and other vegetable matters, for the food of animals.—Sealed 11th January.

Charles Hancock, of Grosvenor-place, London, artist, for certain improvements in printing cotton, silk, woollen, and other fabrics.—Sealed 11th January.

Wilton George Turner, of Gateshead, Doctor in Philosphy, for improvements in the manufacture of alum. — Sealed 12th January.

John Stephen Bourlier, of Sherborn-street, Blandford-square, London, engineer, for certain improvements in machinery used in printing calicoes, silks, paper-hangings, and other fabrics,—being a foreign communication.—Sealed 12th January.

William Wood, of Holborn, London, carpet manufacturer, for a new mode of weaving carpeting and other figured fabrics.—Sealed 13th January.

Matthew Gregson, of Toxteth Park, Liverpool, for an invention or improvement applicable to the sawing or cutting of veneers,—being a foreign communication.—Sealed 16th January.

Samuel Hall, of Basford, civil engineer, for improvements in the combustion of fuel and smoke.—Sealed 18th January.

Joseph Beaman, of Smethwick, Harborne, Staffordshire, ironmaster, for an improvement in the manufacture of malleable iron.—Sealed 18th January.

Alexander Johnston, of Hillhouse, county of Edinburgh, for improvements on carriages, which may also be applied to ships, boats, and other purposes where locomotion is required.—Sealed 20th January.

New Patents
SEALED IN ENGLAND.
1842-3.

To Alonzo Grandison Hull, of Clifford-street, Doctor of Medicine, for improvements in electrical apparatus, for medical purposes, and in the application thereof to the same purposes.—Sealed 28th December—6 months for inrolment.

Thomas Thompson, of Coventry, weaver, for certain improvements in weaving figured fabrics.—Sealed 28th December—6 months for inrolment.

Henry Crosley, of the city of London, civil engineer, and George Stevens, of Limehouse, Gent., for certain improvements in the manufacture of sugar, and the products of sugar.—Sealed 28th December—6 months for inrolment.

Edward Thomas Lord Thurlow, of Ashfield Lodge, Ixworth, Suffolk, for an improvement or improvements in bits for horses and other animals.—Sealed 29th December—6 months for inrolment.

Benjamin Bailey, of the Borough of Leicester, frame-smith, for improvements in machinery employed in the manufacture of stockings, gloves, and other frame-work knitted fabrics.—Sealed 29th December—6 months for inrolment.

John Stephen Bourlier, of Sherbon-street, Blandford-square, engineer, for certain improvements in machinery used in printing calicoes, silks, paper-hangings, and other fabrics,—being a communication.—Sealed 29th December—6 months for inrolment.

Joseph Rock, Junr., of Birmingham, factor, for improvements in the construction of locks.—Sealed 29th December—6 months for inrolment.

Henry Samuel Rush, of Sloane-street, mechanic, for improvements in apparatus for containing matches for obtaining instantaneous light.—Sealed 29th December—6 months for inrolment.

Baron Victor de Wydroff, of Old Bracknell, Berkshire, for improvements in the construction of railways, and in wheels to run on railways, and in apparatus for clearing the rails.—Sealed 29th December—6 months for inrolment

John Bishop, of Poland-street, Westminster, jeweller, for improvements in apparatus for portioning steam-power; and also improvements in plugs, cocks, or taps, for steam, gases, and liquids.—Sealed 29th December—6 months for inrolment.

William John Loat, of Clapham, in the county of Surrey, builder, for an improved mode of constructing floors and roofs.—Sealed 11th January, 1843—6 months for inrolment.

Crawshay Bailey, of Nant-y-Glo Iron Works, Monmouthshire, Esq., for certain improved constructions of rails for tram-ways and railways.—Sealed 11th January—6 months for inrolment.

James Harvey, Junr., of Regent-street, goldsmith, for certain improvements in steam-engines,—being a communication.—Sealed 11th January—6 months for inrolment.

William Ritter, of 106, Fenchurch-street, Gent., for improvements in crystallizing and purifying sugar,—being a communication.—Sealed 11 January—6 months for inrolment.

Julian Edward Disbrowe Rodgers, of Upper Ebury-street, Middlesex, chemist, for certain improvements in the separation of sulphur from various mineral substances.—Sealed 12th January—6 months for inrolment.

Pierre Armand Le Comte de Fontainemoreau, of Skinner's-place, Size-lane, for a certain process or processes of combining clay with some other substances, for the producing of a certain "ceramic paste," capable of being moulded into a variety of forms, and the application thereof to several purposes,—being a communication.—Sealed 14th January—6 months for inrolment.

James Harvey, of Bazing-place, Waterloo-road, timber-merchant, for improvements in paving streets, roads, and other places,—some of which improvements are his own invention, and others have been communicated to him by a foreigner, residing abroad.—Sealed 14th January—6 months for inrolment.

William Snell, of Northampton-square, Gent., for improvements in machinery for the manufacture of farina.—Sealed 14th January—6 months for inrolment.

Nathaniel Card, of Manchester, candlewick manufacturer, for certain improvements in the manufacture of candlewick, and in the machinery or apparatus for producing such manufacture. —Sealed 14th January——6 months for inrolment.

Henry Hussey Vivian, of Singleton, Glamorganshire, Esq., and William Gossage, of Birmingham, manufacturing chemist, for their invention of certain improvements in treating or reducing ores of zinc; also certain improvements in furnaces to be used for reducing ores of zinc, part of which improvements are applicable to other furnaces.—Sealed 14th January—6 months for inrolment.

James Hamer, of Wardour-street, engineer, for improvements in propelling vessels.—Sealed 19th January—6 months for inrolment.

Thomas Earl of Dundonald, of Regent's Park, for improvements in rotatory or revolving engines, and in apparatus connected steam-engines, and in propelling vessels.—Sealed 19th January —6 months for inrolment

Joseph Kirkman, Junr., of Soho-square, piano-forte manufacturer, for improvements in the action of piano-fortes.—Sealed 19th January—6 months for inrolment.

Thomas William Bennett, of Gray's-inn-road, timber-merchant, for improvements in paving or covering roads, streets, and other ways or surfaces.—Sealed 19th January—6 months for inrolment.

Luke Hebert, of Dover, civil engineer, for certain improvements in machines for grinding and for dressing or sifting grain, and other substances.—Sealed 19th January—6 months for inrolment.

William Bates, of the Borough of Leicester, fuller and dresser, for improvements in the dressing and getting-up of hosiery goods, comprising shirts, drawers, stockings, socks, gloves, and other looped fabrics, made from merino, lambs'-wool, worsted, cotton, and other yarns, and in machinery for raising the nap or pile on the same.—Sealed 19th January—6 months for inrolment.

Thomas Sunderland, of Albany-street, Regent's Park, Esq., for improvements in moving floating bodies through water and air, and in accelerating the flow of water, air, and other fluids, through shafts, pipes, and other channels.—Sealed 19th January—6 months for inrolment.

Uriah Clarke, of Leicester, dyer, for certain improvements in frame-work knitting machinery, and a new kind of frame-work knitted fabric.—Sealed 21st January—6 months for inrolment.

Frederick Albert Winsor, of Lincoln's-inn Fields, Barrister at Law, for a new apparatus for the production of light,—being a communication.—Sealed 26th January—6 months for inrolment.

Charles Frederick Bielefeld, of Wellington-street North, Strand, papier-maché manufacturer, for improvements in suspending or hanging swing looking-glasses, and other articles requiring like movements.—Sealed 26th January—6 months for inrolment.

William Palmer, of Sutton-street, Clerkenwell, manufacturer, for improvements in the manufacture of candles.—Sealed 26th January—6 months for inrolment.

Henry Chapman, of Arundel-street, Strand, for a fabric for maps, charts, prints, drawings, and other purposes.—Sealed 26th January—6 months for inrolment.

Francis Mc Getrick, of Ernest-street, St. Pancras, artisan, and Matthew Bailey Tennant, of Henry-street, Regent's Park, Gent. for improvements in apparatus for preventing the engines and carriages from going off railways, and for removing obstructions on railways.—Sealed 26th January—6 months for inrolment.

Edward Smallwood, of North Lodge, Hampstead, Gent., for improvements in covering roads, ways, and other surfaces.—Sealed 26th January—6 months for inrolment.

Robert Goodacre, of Ullesthorpe, Leceistershire, Gent., for certain improvements in weighing apparatus, applicable to cranes or other elevating machines, whereby the weight of goods may be ascertained while in a state of suspension.—Sealed 26th January—6 months for inrolment.

James Boydell, Junr., of Oak Farm Works, Staffordshire, ironmaster, for improvements in the manufacture of metals for edge tools—Sealed 26th January—6 months for inrolment.

George Parker Bidder, of Great George-street, Westminster, civil engineer, for an improved mode of cutting that kind of slates, commonly called roofing slates, though sometimes used for other purposes.—Sealed 26th January—6 months for inrolment.

William James Greenstreet, of Blackfriars-road, Gent., for certain improvements in machinery or apparatus for producing or obtaining motive power.—Sealed 26th January—6 months for inrolment.

Joseph Kirby, of Banbury, Oxfordshire, Gent., for improved apparatus for manufacturing bricks, tiles, and other articles, from clay or earthy materials.—Sealed 26th January—6 months for inrolment.

George Philips Bailey, of 146, Fenchurch-street, brush-maker, for certain improvements in brushes.—Sealed 26th January—6 months for inrolment.

Henry Phillips, of Exeter, chemist, for improvements in removing impurities from coal gas, for the purposes of light.—Sealed 26th January—6 months for inrolment.

Martyn John Roberts, of Bryn-y-carran, Carmarthen, Esq., for improvements in dyeing wool and woollen fabrics.—Sealed 26th January—6 months for inrolment.

CELESTIAL PHENOMENA FOR FEBRUARY, 1843.

D.	H.	M.	
1			Clock before the sun, 13m. 53s.
—			☽ rises 8h. 5m. M.
—			☽ passes mer. 1h. 37m. A.
—			☽ sets 7h. 22m. A.
2	5	41	♀ in Perihelion
3	0	22	♅ in conj. with the ☽ diff. of dec. 6. 19. S.
	11		☽ in Apogee
4	22	2	♀ greatest Hel. Lat. N.
5			Clock before the sun, 14m. 19s.
—			☽ rises 9h. 5m. M.
—			☽ passes mer. 4h. 21m. A.
—			☽ sets 11h. 52m. A.
	4	48	Juno in conj. with ♄ diff. of dec. 9. 17. N.
7	4	32	☽ in □ or first quarter.
9	13	23	Vesta in oppo. to the ☉ intens. of light 0·866
10			Clock before the sun, 14m. 33s.
—			☽ rises 11h. 55m. M.
—			☽ passes mer. 8h. 33m. A.
—			☽ sets 4h. 16m. M.
11			Occul *q* Geminorum, im. 17h. 6m. em. 17h. 37m.
12			Occul ζ Cancri, im. 13h. 6m. em. 14h. 9m.
12	13	49	☿ greatest Hel. Lat. N.
14			Mercury R. A. 21h. 47m. dec. 9. 24. S.
—			Venus R. A. 18h. 39m. dec. 19. 0. S.
—			Mars R. A. 15h. 37m. dec. 18. 15. S.
—			Vesta R. A. 9h. 38m. dec. 22. 5. N.
—			Juno R. A. 19h. 40m. dec. 11. 55. S.
—			Pallas R. A. 5h. 30m. dec. 20. 43. S.
—			Ceres R. A. 8h. 11m. dec. 32. 33. N.
—			Jupiter R. A. 20h. 48m. dec. 18. 22. S.
—			Saturn R. A. 19h. 31m. dec. 21. 37. S.
—			Georg. R. A. 23h. 48m. dec. 2. 4. S.
—			Mercury passes mer. 0h. 12m.

D.	H.	M.	
14			Venus passes mer. 21h. 3m.
—			Mars passes mer. 18h. 1m.
—			Jupiter passes mer. 23h. 10m.
—			Saturn passes mer. 21h. 52m.
—			Georg. passes mer. 2h. 12m.
—			Occul 16 Sextantes, im. 14h. 59m. em. 15h. 52m.
	7	53	☿ in inf. conj. with the ☉
	8	10	Ecliptic oppo. or ○ full moon
15			Clock before the sun, 14m. 28s.
—			☽ rises 6h. 42m. A.
—			☽ passes mer. 0h. 19m. M.
—			☽ sets 7h. 5m. M.
	13		☽ in Perigee
	—		Occul g^1 Leonis, im. 14h. 19m. em. 15h. 19m.
16	7	56	♂ □ with the ☉
	—		Occul *b* Virginus, im. 10h. 10m. em. 10h. 34m.
20			Clock before the sun, 14m. 4s.
—			☽ rises 0h. 28m. M.
—			☽ passes mer. 4h. 47m. M.
—			☽ sets 8h. 58m. M.
			Occul *f*1 Scorpii, im. 16h. 37m. em. 17h. 43m.
	20	9	♂ in conj. with the ☽ diff. of dec. 4. 27. N.
21	10	46	☽ in □ or last quarter
24	13	8	♀ in conj. with ☽ diff. of dec. 2. 27. N.
24			Saturn, im. 18h. 33m. em. 19h. 53m.
	19	49	♄ in conj. with the ☽ diff of dec. 0. 55. S.
25			Clock before the sun, 13m. 33s.
—			☽ rises 4h. 37m. M.
—			☽ passes mer. 8h. 30m. M.
—			☽ sets 0h. 28m. A.
26	11	31	☿ stationary
	12	56	♃ in conj. with the ☽ diff. of dec. 3. 28. S.
	—		Mercury, im. 18h. 28m. em. 19h. 22m.
	20		☿ in conj. with ☽ diff. of dec. 1. 8. S.
28			♀ greatest elong. 46. 41. W.
	7	46	♀ in conj. with ♄ diff. of dec. 2. 43. N.

The Eclipses of Jupiter's Satellites are not visible at Greenwich this Month.

J. LEWTHWAITE, Rotherhithe.

THE

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CONJOINED SERIES.

No. CXXXV.

Recent Patents.

To JOHN ANTHONY TIELENS, *of Fenchurch-street, in the city of London, merchant, for an invention of improvements in machinery or apparatus for knitting,—being a communication.*—[Sealed 7th April, 1842.]

THIS invention of improvements in machinery or apparatus for knitting, consists in the construction and employment of certain apparatus, and the arrangements thereof, in conjunction with suitable mechanism, as hereafter described, for producing loops or meshes, which, being continued, form the knitted work or fabric.

In Plate IV., fig. 1, is a vertical section, taken through the middle of the machine; and fig. 2, is a horizontal section, or sectional plan, taken through the line A, B, of fig. 1.

The machine, which is of a circular form, is suspended from a strong beam, by means of the vertical shaft or axle *a, a,* and is composed principally of the four following parts, to which the minor portions of the machine are connected. These four principal parts consist of four plates *b, c, d,* and *e,* see fig. 1. The first plate *b, b,* is firmly secured to the vertical shaft *a, a,* in any convenient manner, and is intended to support various stationary parts of the apparatus that act upon the needles and jacks, or sinkers, as will be hereafter described, and is therefore denominated the support plate. The second plate *c, c,* is called the needle-plate, because the needles are placed radially around its circumference, as seen in the sectional plan view fig. 2, and also in the detached figures. This plate is mounted loosely on the vertical shaft *a, a,* and revolves freely around it, and by means of the bolts and nuts *f, f,* it is connected with the third plate *d, d.* This plate *d, d,* which is made in the form of a broad ring, is furnished, at or near its periphery, with long slits or openings, (see detached view, fig. 3,) which receive the jacks or sinkers, and maintain them in a perpendicular position. From the circumstance of this plate being thus perforated with long slits or openings, it is called the "comb plate." The fourth plate is shewn at *e, e,* and is firmly fixed to the vertical shaft *a,* by screws, or otherwise, but it is capable of being raised up and down, in order to regulate its height, (when required,) which is accomplished by means of the screw-box *g,* below, and the helical spring, (see fig. 1); the position of the railway-plate requiring adjustment, according to the fineness and coarseness of the thread, and the elasticity which the knitted fabric is to possess. The plate *e, e,* is called the "railway-plate," because an undulating rib or rail, which is formed on its upper surface, supports the lower ends of the jacks or sinkers *h, h,* and by means of the undulations formed thereon, which, in the machine, as represented, are four in number, the action of the sinkers, (as seen in fig. 4,) is regulated.

From the foregoing, it will be understood, that the top and bottom plate *b,* and *e,* or, as they may be called, the "support-plate," and "railway-plate," are stationary, being fixed to the vertical shaft *a, a,* as before stated; and that the "needle-plate" *c,* and "comb-plate" *d,* which are connected together by the bolts *f, f,* revolve freely around the shaft *a, a.* Rotary motion is communicated to them by means of the bevil pinion *i, i,* on the crank-shaft, which pinion gears into a circular bevil rack *j, j,* formed on, or attached to, the upper face of the needle-plate *c, c*. As these plates revolve and carry round with them the needles *k, k*, and sinkers *h, h*, these latter are made to fall and rise in the perforations of the comb-plate, and between the needles of the needle-plate, according to the undulations formed on the upper surface of the railway-plate; but as these sinkers might not always descend by their own weight at the proper time, they are made to do so by coming in contact with, and passing under, the inclined end of the metal-piece *l, l*, see figs. 1 and 4. When the sinkers have passed down (as shewn in fig. 4,) the inclined plane of the railway-plate, they are kept in that position by the angle-piece e^1, fig. 5, which catches on a ledge on the front part of the sinker.

The requisite outward motion of the sinkers, between the needles, to form the loop, is effected by the cam-pieces *m, m*, and *n, n*, which are supported from the plate *b, b*, above, as seen in the figures. When the sinkers have passed in front of these cams, they are forced back into their original positions by the helical spring *o*, as seen in figs. 1 and 4, which surrounds them, and also by the pressing-pieces *p*, and *p**, as seen in figs. 2 and 3.

The cam-pieces *n, n*, are mounted on centres at *q*, and the distance that the sinkers are forced out by them, is regulated by means of the screw *r*, which passes through a block on the same, and abuts against a stationary piece *s*. The motions of the sinkers, it therefore appears, are regulated as follows:—The upward and downward, or vertical motion, in the comb-plate, by the undulations on the railway-plate, and the outward motions, between the needles of the needle-plate, by the cams *m*, and *n*; the backward motion by the spring *o*, and pressing-pieces *p*, and *p**.

The threads, (of which there are four in this machine,) to form the work, enter by the trumpets *t, t*, and are conducted by them under the front notches *h**, *h**, *h**, of the sinkers *h, h, h*, fig. 2, and laid along the needles. The front notch of the sinker having taken hold of the thread during the descent of the sinker, between the needles, down the inclined plane in the railway-plate, a loop, hanging between the needles, is formed, and at the same time the sinker is pressed forward, between the needles, by coming into contact with the cam *m*, and thereby the loop is carried under the beak or beard of the needles, as shewn at fig. 5.

It will be observed, in fig. 4, that after the sinkers have descended the inclined plane of the railway, as already described, and before they begin to ascend the opposite incline, as hereafter described, they pass along a horizontal portion, which is represented in the drawing as capable of being adjusted by a screw. This, however, is not essential to the machine; the adjustment of the sinkers as to height, if the machine is accurately constructed, being made by the screw-box *g*, as above described.

When the lower end of the sinker comes in contact with the opposite incline, it is raised, and is also pressed back by the pressing-piece *p**, which forces back the work and the sinker into the recess between the two cams *m*, and *n*, as shewn by dots in fig. 3. The effect of this will be, that as the sinker *h*, passes up the inclined plane, on the railway-plate, the notch of the sinker will be raised out of the loop, and as the sinker is pressed back by the piece *p**, the point 1, fig. 5, catches hold of the work and draws it back from under and beyond the beak or beard of the needle, which is then closed by coming under the revolving presser-plate or roller *u*, as seen in fig. 6. The sinker, in continuing its progress, is next brought against the cam *n*, *n*, which gradually forces it outward, and by the projecting shape of its breast, pushes the work over the beard of the needle, which has been closed for this purpose by the presser-plate *u*,—and ultimately throws the loop of the work, already made, over the end of the needle, and thereby over the loop which has just been made, as seen in fig. 7, and at c, fig. 3; and which loop remains at the end of the needle, until another loop is made by the next two needles. When the work is thrown over, it is pressed back by the notched wheel *w*, and the sinkers are brought into their original position by the spring *o*, already mentioned.

The construction of the needles, and the manner of fixing and securing them in the needle-plate, so that they can be changed or removed at pleasure, is distinctly shewn in figs. 6 and 7.

The inner end of the needle is bent down, and enters a circular groove, made by screwing a brass ring *y*, into the needle-plate near its periphery. The shafts of the needles lie radially round the needle-plate, in grooves or notches, made on the upper side of the brass ring *y*, and the needles are firmly secured in their proper places by means of the sector-pieces *z*, which are screwed tightly down to the needle-plate. A ring of leather, felt, pasteboard, or other suitable substance, is placed between the sector-pieces *z*, and the needles, to hold the needles more firmly.

The patentee claims, firstly,—the peculiar arrangement of mechanism or combination of parts, hereinbefore described, for performing the operation of knitting or producing looped work; secondly,—the arrangement and combination of the needles, placed radially around a circular plate or disc, and the application of such apparatus for the production of knitted or looped fabrics; thirdly,—the peculiar construction and combination of the comb-plate, railway-plate, and sinkers, and the application thereof for the production of knitted or looped fabrics; fourthly,—the peculiar combination and arrangement of the circular disc and wheel, as hereinbefore described, for closing the beak of the needles, and pressing back the work in the process of knitting; and lastly,—the peculiar construction, combination, and arrangements, hereinbefore described, for fixing and removing the needles, employed in knitting by machinery.—[*Inrolled in the Petty Bag Office, October*, 1842.]

Specification drawn by Messrs. Newton and Son.

To Joseph Hughes, *of Whitehall Mills, Chapel-en-le-Frith, in the county of Derby, paper-maker, for certain improvements in the method or process of manufacturing paper.*—[Sealed 29th January, 1842.]

These improvements in the method or process of manufacturing paper, apply particularly to white paper, and, firstly, in that part of the method or process of manufacture in which the rags or "half stuff" is gased and bleached, preparatory to being converted into pulp; secondly, in a new method or process of destroying the gas in the rags, or half stuff, preparatory to the process of "bowking" or immersion in the bleaching liquor, instead of submitting it a second time to the operation of the rag-engine, as commonly practised, which new process will be found greatly to economise time and labor in this part of the manufacture; and thirdly, in a novel mode of finishing the paper as it proceeds from the common Fourdrinier web-machine, by means of certain apparatus applied to such machinery, in order to improve the finish or appearance of the paper produced.

The first part of the improvements consists in a novel method of making the "bleaching powder," or chloride of lime, usually employed in treating or operating upon the rags or half stuff. This bleaching powder is produced by employing the waste chlorine gas, which is ordinarily used in gasing the rags and impregnating lime therewith, instead of opening the gas chests and allowing the superfluous gas to escape into the air, (to the injury of animal and vegetable life,) as is usually practised after the rags have been gased, and without employing more drugs than are commonly necessary for the gasing process.

In Plate IV., fig. 1, two common stone gas-chests or chambers, are represented in section, at *a, a, a*, with the rags or half stuff contained therein, and supposed to be under the operation of gasing; the chlorine gas passes into these chambers through the pipes *b, b, b*, proceeding from the still in which it is generated, and acts, as usual, upon the rags; after they are fully gased, instead of opening the chests, as usual, the rods *c, c*, are lifted, and the valves *d, d*, opened, when the superfluous gas will pass into the lower cistern or chamber *e, e*. This chamber is provided with layers of lime *f, f*, which will become impregnated with the gas, and the bleaching powder will thus be made from the operation of the waste gas from the gasing-chambers, the layers of lime being stirred once or twice during the working off of the gas. A portion of this gas may also be advantageously employed in making the bleaching liquor used in an after process, which is also a novel feature in such manufacture.

A pair of leaden pumps *g, g,* with leaden clacks, wooden plungers, and packed either with hemp or India-rubber, are to be employed for exhausting a portion of the gas from the cistern or chamber *e, e,* and impregnating lime-water, contained in the reservoir or vessel *h, h,* therewith, which will also be found to make sufficient bleaching liquor from the waste or superfluous gas, after the rags have been fully gased as usual.

The second part of the improvements is effected by immersing the half stuff, as it is taken from the gas-chest, in a stone cistern, with false bottom, containing a weak solution of lime and water. The rags should be well stirred up whilst being placed in the solution, when they must stand from one to two hours; clean water must now be turned in at top, and a valve opened below, in order to drain or wash the rags entirely free from any lime or gas, which washing through should continue an hour and a half. The gas will thus be completely destroyed, and the rags or half stuff be ready for bowking or immersion in the bleaching liquor; and it will be found, that the rags, prepared in this manner, only require half the time in bowking that is usually taken. If it is preferred, this process of destroying the gas may be performed in the rag-engine instead of an independent cistern, but this extra employment of machinery is not requisite.

The third part of the invention will be clearly explained by reference to figs. 2 and 3. Fig. 2, represents a side elevation of the improved finishing apparatus, attached to a paper-machine, the end of the framing and last drying cylinder of which is shewn at *a, a, a.* The improvements consist in the application of one, two, or more, pairs of friction-bowls, or rollers *b, b, b,* worked with a felt or cloth, or without, geared with the machine, and having a change-wheel attached, so that any requisite amount of friction can be given to the surface of the paper, passing between them, by driving the upper bowls from three to six or more revolutions per minute faster than the lower bowls; this must be regulated according to the finish required upon the surface of the paper, which is represented at *c*, *c*, passing from the drying cylinder *a*, to the paper-roll *d*. Fig. 3, represents another arrangement or modification of a similar finishing apparatus, but with three pairs of bowls instead of two.

The patentee claims, firstly, the production or manufacture of the "bleaching powder" and "bleaching liquor," commonly used in the first or early process of paper manufacture, by the application, employment, or use of the waste or superfluous gas, after the common gasing process has been fully performed; secondly,—destroying the gas in the rags or "half stuff," by the immersion of them in a weak solution of lime and water, preparatory to the "bowking" or bleaching process, whether such immersion is performed in the common rag-engine, or in a separate and independent cistern; and lastly,—the application of friction-rollers or bowls to the end of a Fourdrinier's machine, as shewn in the drawings, for the purpose of finishing the paper by friction, such rollers, or bowls, being made of steel, chilled iron, or other metal or material.—[*Inrolled in the Petty Bag Office, July,* 1842.]

Specification drawn by Messrs. Newton and Son.

To SAMUEL HARDMAN, *of Farnworth, near Bolton, in the county of Lancaster, spindle and fly-maker, for his invention of certain improvements in machinery or apparatus for roving or slubbing cotton and other fibrous substances.* —[Sealed 27th August, 1841.]

THESE improvements in machinery or apparatus, for roving and slubbing cotton and other fibrous substances, apply solely to the flyer, usually employed in that description of roving and slubbing machine, now denominated presser-frames. It is well known to persons conversant with cotton preparing machinery, that these machines are so called, in consequence of one arm of the flyer being provided with a small presser lever, for the purpose of laying the roving in a firm and compact state; and have been almost universally adopted, in consequence of their advantages over the former roving and slubbing machinery.

In slubbing and roving presser-machines, it is a most desirable object to run the spindle, with a regular steadiness, throughout the entire formation of the bobbin of rovings, but with the ordinary presser-flyer this is impossible; for, as the roving accumulates on the bobbin, and its diameter increases, the equilibrium of the spindle and flyer becomes destroyed, as the flyer is only provided with the presser-lever on one side or arm; and the greater the expansion of the presser-lever, the more unsteady the spindle becomes.

The present improvement is intended entirely to obviate this imperfection; it consists in furnishing each arm, or side, of the flyer, with a presser lever, so that the flyer is at all times balanced, and the action upon the accumulating diameter of the bobbin perfectly equalized; consequently, as the bobbin increases in diameter, both the pressers, on the sides or arms of the flyer, expand simultaneously, and in similar proportions, so that the spindle is thus kept perfectly steady throughout.

In Plate IV., fig. 1, represents a front view, and fig. 2, a side view of the improved flyer, with spindle and bobbin complete, as it may be supposed to have been removed from a roving-frame. *a, a,* is the spindle; *b, b,* the flyer, both arms of which are similarly formed, and furnished with a presser-lever *c, c.* These levers are made to act against the bobbin or roving *d, d,* by means of the springs *e, e,* attached to the arms of the flyer.

The patentee claims the application and use of two pressers or levers (one attached to each arm or side) to the flyers used, or employed, in machines for roving and slubbing cotton and other fibrous substances, which he denominates a "double presser-flyer."—[*Inrolled in the Petty Bag Office, February,* 1842.]

Specification drawn by Messrs. Newton and Son.

To THOMAS WATERHOUSE, *of Edgley, in the county of Chester, manufacturer, for a certain improvement or improvements in machinery for carding cotton, wool, flax, silk, and similar fibrous material.*—[Sealed 24th May, 1842.]

THIS invention consists in the application of certain rods, or straight-edges, to the ordinary carding-engine, by which the carding, or work performed, is said to be improved.

In that class of carding-engines, where top-rollers and clearers are employed, either in conjunction with, or without, top-cards or flats, the material, in the process of carding, is retained on the roller by the rod or straight-edge, as hereafter described, and subjected to a carding or combing action, which does not take place in the ordinary arrangement, when this part of the improvements is not applied.

In Plate IV., fig. 1, represents a side view of a carding-engine, with the ordinary flats or top-cards *a*, the main cylinder A, and two revolving top-cards B, provided with clearers or swifts *b*. Fig. 2, is an enlarged section of these parts, to which the improvements are applied. Supposing the carding-engine to be in action, the various cylinders will revolve in the direction of the arrows, and the cotton, or other fibrous material, will proceed round the revolving rollers B, in the direction of their rotation, until it is stript off by the clearer or swift *b*, and delivered again to the main cylinder A. The direction in which the cotton, &c., commonly passes from the roller B, to the clearer *b*, is shewn by the dotted line, at ^2b, fig. 2; in this case, the carding-cylinder B, is merely cleared by the clearer *b*, and the cotton is delivered to the main cylinder A, in a similar state to that in which it was received from the roller B. The bar or straight-edge *c*, which is seen, in section, at figs. 1 and 2, passes the whole length of the roller B, and clearer *b*, and is supported, at each extremity, by the framing of the machine. The sectional form of the rod is circular, but it may be flat, with a circular edge, or tapering like a wedge, with the thinner end rounded, or of any other suitable form. The diameter of the rod, or thickness of its edge, should be adapted to suit the length of the fibre, or staple, of the material to be carded, which any person, practically acquainted with carding, will readily discover.

By the application of this bar, or straight-edge, and in the position described, the cotton, or other fibrous material, in the process of carding, is held in the card, on the roller B, until it has passed under the rod *c*, or straight-edge, when it is taken up by the swift or clearer *b*, which, in addition to clearing the fibrous materials from the carding-roller B, cards or combs it, inasmuch as it is seized by the clearer *b*, before the fibre is free of the card, on the roller B.

A modification, of this part of the invention, is seen at fig. 3, where the clearer *b*, is represented at the opposite side of the roller B, to that seen at fig. 2; by which arrangement, the same or similar results are, or may be, obtained.

The next improvement consists in the introduction of a bar, or straight-edge, between the ordinary licker-in and dirt-roller, or clearer; by means of which, the cotton, or other fibrous material, is more effectually cleared of motes, and other injurious matter, before it is delivered to the main cylinder, than heretofore. Fig. 3, represents a section of the main cylinder A, with the licker-in O, placed in the ordinary position. Below the licker-in is placed the dirt-roller P, which revolves slowly, and has a constant tendency to strip, or clear, the licker-in, while the straight-edge *c*, which, in this arrangement, comes in close contact with the cards on the dirt-roller, allows the licker-in to retake the cotton, or other fibrous material, freed from motes and dirt, and deliver it to the main cylinder A. In this figure, it will be observed, that the rod, or straight-edge *c*, is formed to cover the side of the dirt-roller P, nearest the main cylinder, so as to prevent any dirt escaping to the main cylinder.

The patentee claims the application of a bar, or straight-edge, between the clearer or swift *b*, and the carding-roller B, together with a similar application of a bar, or straight-edge, between the licker-in O, and dirt-roller P, as set forth and described at figs. 1, 2, and 3.—[*Inrolled in the Inrolment Office, November,* 1842.]

To Samuel Wilkes, *of Darleston, in the county of Stafford, iron-founder, for improvements in boxes and pins, or screws, for vices and presses.*—[Sealed 26th September, 1839.]

These improvements consist in making the boxes and male screws of vices and screw-presses of malleable cast-iron.

The mode of constructing the boxes of vices is as follows:—The patentee first prepares an accurate brass model of the box; he then divides it, longitudinally, into three or more parts, which are hinged together, and secured, when in use, by slipping a ring over each end of the box. A core of sand, or of sand and loam, is formed in this model, having a rod of wood, one-fourth of an inch square, and somewhat longer than the core, in its centre; the core, thus formed, is placed in the centre of a sand-mould, in which the box is to be cast, being supported by the rod just mentioned, and the melted iron is poured into the mould, in the usual way.

The moulds, for casting the male screws, that work in the vice-boxes, are made by filling a tube with sand, and ramming it tightly down; then, through the cover of the tube, which is cut with a female screw, a cylindrical rod, somewhat smaller than the intended screw, is introduced; and, when this is withdrawn, an accurate brass model of the male screw is turned gently down the hole in the sand, being steadied, in its revolutions, by the female screw in the cover of the tube. When the brass screw is removed, the tube is connected to a mould of the head of the screw, and in this conjoined mould the screw is cast.

The vice-boxes and screws, thus produced, are afterwards annealed.

The boxes and male screws of presses are made in the same manner as the vice-boxes and screws.

The patentee claims, firstly,—constructing the boxes of vices of malleable cast-iron. Secondly,—constructing the pins or male screws of vices of malleable cast-iron.

Thirdly,—constructing the boxes of presses of malleable cast-iron. Fourthly,—constructing the male screws of presses of malleable cast-iron. Fifthly,—the mode of forming the moulds, in which the cores, for casting the boxes vices and presses, are made, of three or more pieces. Sixthly,—the mode of forming the moulds, for casting the male screws of vices and presses in metal, as before described. —[*Inrolled in the Inrolment Office, March,* 1840.]

To SAMUEL WILKES, *of Darleston, in the county of Stafford, iron-founder, for improvements in the manufacture of vices.*—[Sealed 16th April, 1840.]

THE first improvement consists in casting the vices of malleable iron, and afterwards annealing them; and also in casting the pins or male screws of such vices hollow, by placing a sand-core in the mould in which they are cast. By this means, the annealing of the screws will be facilitated, and they may afterwards be used hollow, or filled with cylinders of wrought-iron.

The second improvement relates to a mode of "steeling" the chaps of vices, and consists in casting the chaps with a dove-tail groove, formed in them, to receive a corresponding dove-tail on the backs of the steel faces, as shewn at *a*, in Plate V., figs. 1 and 3.

The third part of the invention consists in improvements in the construction of parallel vices. Fig. 1, is a side view, and fig. 2, is a transverse section of a small parallel vice. *b*, is the fixed chap of the vice, formed upon the plate *c*, by which it is affixed to a bench or other surface. This plate has two dove-tail guides or projections *d*, between which the fixed nut *e*, of the moveable chap *f*, works, and the guides are also embraced by that chap. The object of employing these guides, is to ensure a correct movement of the chap *f*.

Fig. 3, is a longitudinal section of a bench-vice. The moveable chap *f*, of this vice, rests upon the plate *c*, and through it a tube *g*, extends, attached to the projections *h*, of the plate, and having a slot in its under side, from one end to the other. In the tube *g*, a screw *i*, works, carrying the nut *j*, which is affixed to the moveable chap by pins, passing through the slot in the tube; and thus, by turning the handle *k*, the moveable chap will be caused to advance towards or recede from the fixed chap.

The patentee claims, firstly, the mode of making the chaps and bodies or limbs of vices of malleable iron, and submitting them to a process of annealing, as above described; and also the casting of the pins, or male screws of vices hollow, as above described. Secondly,—the mode of applying steel faces or surfaces to the chaps of vices, as above described. Thirdly,—the mode of constructing the sliding chaps of vices, by applying dove-tail guides, as above described, in respect to figs. 1 and 2; and also the mode of constructing vices, by cylindrical tubes or surfaces, for sliding chaps of vices, as above described.—[*Inrolled in the Inrolment Office, October*, 1840.]

To Richard Edwards, *of Fairfield-place, Bow, in the county of Middlesex, dealer in emery-cloth, for improvements in preparing and combining materials used in lighting or kindling fires.*—[Sealed 29th February, 1840.]

These improvements consist in the preparation of what the patentee terms "ventilated faggots," to be used for lighting fires, in place of the ordinary bundles of fire-wood.

The faggots are composed of pieces of wood or reeds, or of wood and reeds combined; each piece is pointed at one end, and, if required to light very quickly, those pointed ends are dipped into melted brimstone, or other inflammable matter. The pieces of wood, or reeds, are then cemented to a strip of paper, rag, wood-shaving, tape, or other cheap combustible material, by means of resin, pitch, or other adhesive combustible matter; their pointed ends are all in the same direction, and they are arranged at certain distances apart, so that, when made into a bundle, there will be a space between every two pieces, for the passage of a current of air.

To light a fire with these improved faggots, one of them is placed in the stove or grate, with the pointed ends downwards, and the cinders, or coals, are packed around and above it; a light being then applied to the faggot, it becomes instantly inflamed. In some cases, the patentee places several pieces of coal, or cinders, in the faggot, which, becoming quickly ignited, ensure the lighting of the fire. —[*Inrolled in the Inrolment Office, August,* 1840.]

To JULES ALPHONSE SIMON DE GOURNAY, *of Bread-street, in the city of London, Gent., for improvements in the manufacture of horse-shoes.*—[Sealed 22nd January, 1840.]

THESE improvements consist in attaching the shoe to the horse's foot without the use of nails, which act injuriously on the hoofs of horses that require frequent shoeing.

The shape of the shoe, and the methods of securing it on the foot, are shewn in Plate V., fig. 1, representing the shoe in perspective, and fig. 2, a horse's hoof, with the shoe attached thereto.

At the front of the shoe one or more clips or projections *a*, are formed, and near its hind ends are two ears or hooks *b*; the space between the ears and clips, being occupied by from two to eight catches or stops *c*, which are secured to the shoe by rivetting. These stops are received in notches, cut in the wall of the hoof, and the shoe is fastened upon the foot by a bridle or band of leather, metal, or other suitable material *d*. The bridle is made with looped ends, in which the ears *b*, are inserted, and over the front part of it the extremities of the clip or clips are bent and rivetted.

For diseased or defective hoofs, the clip is made in two pieces, hinged together at *e*, as shewn in fig. 3, and is connected with the bridle by a screw *f*, passed through the loops *g*.

For winter use, studs *h*, (see fig. 4,) are screwed into the under part of the shoe, to prevent horses from slipping; but these may be removed at pleasure.—[*Inrolled in the Inrolment Office, July,* 1840.]

To THOMAS HARRIS, *of Shiffnall, in the county of Salop, veterinary surgeon, for an improved horse-shoe.*—[Sealed 11th January, 1841.]

THIS invention consists in an expanding horse-shoe, which differs from the ordinary expanding shoe, in this particular, —that the latter consists of two pieces, rivetted or connected together at the toe, whereas the former is composed of three pieces, rivetted together at the quarters.

In Plate V., fig. 1, is a plan of the under side of the shoe, in its contracted state, and fig. 2, is a plan of the upper side, in its expanded state; the dotted lines, in the latter figure, shewing the position of the shoe when contracted. The toe-piece *a*, is connected to the side-pieces *b*, *c*, by conical rivets *d*, *d*; and the "halvings" of the side-pieces are so cut, that when the shoe is at its greatest point of contraction, as in fig. 1, they will impinge upon the shoulders of the toe-piece, at *e*, *f*; and when it is at its greatest point of expansion, as in fig. 2, they will impinge upon the shoulders *g*, *h*.

The object of constructing the shoe in this manner, is to allow the natural elasticity of the heels free play, without throwing all the motion to the toe, as in the ordinary jointed shoe.

The patentee claims the improved horse-shoe, hereinbefore described.—[*Inrolled in the Inrolment Office, June,* 1841.]

To Thomas Vaux, *of Frederick-street, Gray's-Inn-road, in the county of Middlesex, worsted manufacturer, for improvements in horse-shoes.*—[Sealed 19th January, 1841.]

This invention consists in forming horse-shoes with moveable toes and cauks, in order that they may be roughed and unroughed without removing them from the foot.

In Plate V., fig. 1, is a side view, and fig. 2, a plan of the under side of a horse-shoe, constructed according to this invention; fig. 3, shews the toes and cauks to be attached to the shoe. The toe *a*, is received by a dove-tail groove, in the front part of the shoe, and is secured therein by a screw *b*; the cauks *c*, are inserted into dove-tail grooves, at the hind ends of the shoe, and are retained therein by the pins *d*, driven through the back of the shoe, and clenched, as shewn in the drawing.

Fig. 4, is an edge view, in section, and fig. 5, is a plan of another shoe, the toe of which is retained in the dove-tail groove by the wedge *e*, driven into suitable grooves at the back of it; a pin *f*, is then passed through the wedge and toe, and clenched at the front of the shoe.

Fig. 6, is a plan of the under side of a shoe, with two toes or projections *a*, secured by screws *b*, as shewn in figs. 1 and 2.

The shoes may be made of wrought-iron, as usual; but the patentee prefers casting them in sand moulds, and afterwards annealing them from seven to ten days, according to the substance of the metal to be operated upon.

The patentee claims, firstly, the mode of constructing shoes of malleable cast-iron, with dove-tail grooves and moveable projections, as described.

Secondly,—the mode of making shoes of wrought-iron, with dove-tail grooves and moveable projections, as described.—[*Inrolled in the Inrolment Office, July,* 1841.]

To Osborne Reynolds, *of Belfast, in the Kingdom of Ireland, clerk, for certain improvements in covering streets, roads, and other ways, with wood; and also in the means of enabling horses and other animals to pass over such roads and other slippery surfaces, with greater safety than heretofore.*—[Sealed 25th February, 1842.]

This invention of improvements in covering streets, roads, and other ways, with wood, and in the means of enabling horses and other animals to pass over the same with greater safety than heretofore, consists, firstly, in various improvements upon a former invention of the patentee, for which a patent was granted on the 27th April, 1841, for improvements in paving streets, roads, and ways;* and secondly, in a novel method of making the shoes of horses and other animals take a firmer hold on the pavement.

In order to form a firm, compact, and cheap paving, the patentee first levels the ground, and rams it hard, covering it also with sand, if desirable; upon this surface, boards, planks, beams, laths, or slips of wood, are laid, either in close contact, or with any intervals between them; and upon these boards, so arranged, blocks of wood, of any form, are placed. The forms of blocks preferred, are parallelopipedons, or other figures, such as may be formed by one cut, either oblique, or perpendicular to the grain of the wood, from a plank of any breadth, and of any thickness not exceeding four inches; and blocks, formed similarly from round or unhewn timber, may also be used. If thought desirable, a second, or even a third layer of boards are placed on the first; these boards are imbedded, wholly or partially, in cement, and nailed, or otherwise fastened together. In some instances, a few grains of gravel, or other hard substance, not less in diameter than one-twentieth of an inch, are interspersed between those sides of blocks which are in contact, in order that these grains may be partially imbedded in each of two adjacent sides, and thereby add to their mutual support.

* See Vol. XXI., p. 16, of our present Series.

To make the pavement water-tight, the blocks are surrounded with cement; and to unite the whole compactly together, the blocks are secured to the foundation-planks, or to each other, or both, by nailing or pinning each block to the mass already formed.

To roughen the surface of the pavement, gravel, or broken stone, screened, so as to contain neither dust, sand, or grains of any size less than that described above, is scattered over it.

The second part of the invention consists in forming bars, ribs, or projections, on that part of the under side of horse-shoes which is between the toe and the cauk, for the purpose of preventing horses from slipping. In Plate V., fig. 1, represents the under side of a horse-shoe, constructed in this manner; and fig. 2, is a side view of the same. *a, a,* are the bars, ribs, or projections, formed on the under side of the shoe, and *b, b, b,* are three ribs, which form the toe of the shoe.

The patentee claims, firstly, the method, herein described, of using boards for a foundation of wood pavement; also the use of blocks, of the forms described, together with the modes, described, of strengthening the whole, by means of hard grains of gravel, and nails of iron, or pins of wood; and further, the method, described, of roughing the surface continually by gravel, or broken stone. Secondly,—the improved method, herein shewn, of constructing the shoes of horses and other animals, whereby they are prevented from slipping, as above described.—*Inrolled in the Rolls Chapel Office, August,* 1842.]

Specification drawn by Messrs. Newton and Son.

To JOSEPH BUNNETT, *of Deptford, in the county of Kent, engineer, for certain improvements in pavements for streets, roads, and other surfaces, and in machinery for producing and repairing the same.*—[Sealed 21st June, 1842.]

THE first improvement consists in the new form of block, for wood pavement, shewn in Plate V., at fig. 1.

This block is from eight to twelve inches square, and is made with two of its sides vertical, and the other two shaped in the manner represented in the drawing; it is formed out of a rectangular block, by making two cuts *a*, *a*, at an angle of from 65° to 75° with the surface of the block, two horizontal cuts *b*, *b*, and a vertical cut *c*. The blocks are combined together, (as shewn,) without the employment of keys, pegs, or tenons; the projection *d*, of each block, resting upon the shoulder *e*, of the preceding block. The fibres of the wood are inclined at an angle of from 65° to 75°.

The second improvement consists in connecting wooden blocks together by the use of keys, which are inserted into recesses in the sides of the blocks.

Fig. 2, is a side view, and fig 3, a section (taken on the line, *y*, *x*, fig. 2,) of four blocks, combined in this manner. The ends of these blocks are inclined at an angle of from 65° to 75°, and their sides are vertical, having a recess or mortice *f*, formed in them by a circular cutter. These mortices, when the blocks are being laid down to form a pavement, come opposite the mortices in the sides of the adjoining blocks, and receive the lozenge-shaped keys *g*.

Fig. 4, is a sectional plan of four square blocks, connected together by keys *g*, and having a mortice in each side; fig. 5, is a sectional plan of seven square blocks, combined into a mass by the application of keys; the mortices being formed at the corners of the blocks, in each alternate row, instead of at the centre of their sides. Fig. 6, is a vertical section of a key-block, the mortices *f*, of which, are cut away to its under surface, to permit of its being raised when the road requires repairing; and fig. 7, is a sectional plan of another key-block, which is removed from its place in the pavement by drawing it endwise; two of the mortices being cut away, in a horizontal direction, to the end of the block, for that purpose.

The third improvement consists in the adoption of a uniform system of grooving for the upper surfaces of the blocks, so that the grooves in each block will correspond with those in the adjoining ones, and form continuous lines of grooves; thus, admitting of machinery being used for deepening and clearing them from dirt. The grooves either cross each other at right angles, as represented in fig. 8, or half the grooves proceed in a direction parallel to the side of the road, and the others cross them in a diagonal direction, as shewn in fig. 9.

The fourth improvement consists in machinery for cutting and preparing wooden blocks for paving. Fig 10, is a front view of a machine for making the block described under the first part of this invention; it consists of a table *a*, supported by legs *b*, upon which the blocks of wood are placed, to be made into the form represented in fig. 1. *c*, are guides for the blocks; and *d*, is a ribbed wheel, that moves them through the machine; being driven by an endless band, from the steam-engine, or other prime mover, passing round the pulley *e*, on its shaft *f*. This shaft is carried by springs *g*, which are pressed upon by the screws *h*, for the purpose of causing the ribbed wheel to take a firm hold of the blocks; and the screws are made to press, more or less, upon the springs, by turning the handle *i*, of the wheel *j*; and thus giving motion to the wheels *k*, upon the heads of the screws. *l*, is an inclined shaft, carrying the discs or cutters *m*, by which the oblique cuts are made in the block; two horizontal circular cutters *n*, are affixed on the upper ends of the shafts *o*, for effecting the horizontal cuts in the sides of the blocks; *p*, is a vertical cutter, keyed upon a shaft *q*; and *r*, are four bevil-edged cutters, for forming the grooves in the upper surfaces of the blocks, mounted on a horizontal shaft *s*, which turns in bearings underneath the table *a*. The shafts *l*, *o*, *q*, and *s*, are driven by endless bands, passing round their pulleys *t*, *u*, *v*, and *w*.

The following is the operation of the machine:—The blocks of wood being placed upon the table *a*, between the guides *c*, motion is communicated to the different shafts, by means of their respective pulleys, and, by the revolution of the ribbed wheel *d*, the blocks are moved along the table or bed *a*, over the inclined cutters *m*, between the horizontal cutters *n*, beneath the vertical cutter *p*, and, lastly, over the bevil-edged cutters *r*. The blocks are thus brought to the form represented in fig. 1, and their upper surfaces suitably grooved for securing a firm foot-hold for horses and other animals.

Fig. 11, is a plan of an apparatus for forming mortices in the sides of the blocks, for the reception of keys, as described in the second improvement.

The right-hand side of the apparatus is used for those blocks which are to be morticed on two sides only, as shewn in figs. 2, and 3; it consists of a frame *a*, which can be adjusted to the size of the blocks, by means of the screws *b*, and slots *c*, and of a cutter *d*, composed of a toothed disc, enclosed between two sharp-edged side plates, as represented in the edge-view of one of the cutters at fig. 12. The block of wood is introduced between the sides of the frame *a*, and a mortice is made in its side by the revolution of the cutter; it is then turned, and a corresponding mortice is formed in the opposite side.

When the block is to have a mortice in each of its four sides, the left-hand side of the apparatus is used, which is furnished with two circular cutters, and a mortice is formed in two sides of the block at the same time.

The fifth improvement consists in apparatus for cleaning and repairing the grooves in the upper surface of wooden pavements.

The first instrument is a rake, for cleaning the dirt out of the grooves, the teeth of which can be set at any required distance apart, and are of the same shape as the grooves. The other instrument or apparatus is employed for cleaning, and likewise for repairing or renewing the grooves; a side view of it is shewn at fig. 13. *e*, is a frame, mounted on four bevil-edged wheels *f*, which travel in the grooves of the pavement; *g*, is a cranked shaft, working in bearings at the upper part of the frame, and upon this shaft a fly-wheel *h*, is mounted. *i*, is a horizontal shaft, furnished with six or more bevil-edged cutters *j*, according to the width of the apparatus, set at the same distance apart as the grooves in the surfaces of the blocks; it is supported by levers *k*, one at each side of the machine, which turn upon the axle of the fore-wheels, as a fulcrum, and the shaft *i*, is raised or lowered by turning a screw *l*, that acts upon the outer end of each lever. Motion is communicated from the fly-wheel to the cutter-shaft by the endless band *m*, which passes under the binding pulley *n*, and round the pulley *o*, and thence back to the fly-wheel. The machine is pushed along, or across the road, by a workman, whilst another man stands upon the platform *p*, and, turning the shaft *g*, causes the cutters to revolve, and throw the dirt from the grooves into the box *q*; but the way in which this is effected, is not clearly shewn in the drawing attached to the specification.

When the grooves are required to be deepened, the cutter-shaft is lowered by turning the screws *l*.

The patentee claims, firstly, the block represented in fig. 1, and the application thereof, as also shewn in that figure; secondly,—the manner of connecting wooden blocks for pavements, by means of keys, tongues, or tenons, inserted into indents, chases, or mortices, as herein described and shewn; thirdly,—the system of uniform grooving of the upper surfaces of wooden pavements, and its application, in the manner, and for the purposes herein described; fourthly,—the arrangement of machinery for cutting and preparing wooden blocks for pavements, described and shewn in figs. 10, 11, and 12; and fifthly,—the machinery for clearing and preparing the grooves in the upper surfaces of wooden pavements, as described and shewn in fig. 13.—[*Inrolled in the Inrolment Office, December,* 1842.]

To John Perring, *of Cecil House,* 85, *Strand, in the city of Westminster, hat manufacturer, for improvements in wood paving,—partly communicated by a foreigner residing abroad.*—[Sealed 7th July, 1842.]

The first part of these improvements consists in forming and combining together blocks of wood, in the manner represented at fig. 1, in Plate IV.

The blocks are cut from squared timber, having the core as near the centre as possible; and, supposing the timber to be six inches square, the cuts are made at distances of six inches apart, measured perpendicularly between the planes of the sections, so that the vertical depth of each block will be equal to the distance from *a*, to *b*. They are cut across the grain, at an angle of 45° with their upper surfaces, or any angle between 40° and 45°. By this method of forming the blocks, the pressure on the outer and weaker fibres will be supported, in a vertical line, by the central and stronger fibres of the wood.

The blocks are pinned together, at their sloped and vertical sides, by pegs or pins *c*, *d*, placed at the points of intersection of lines drawn diagonally across those sides; and they are laid down in masses, consisting of from sixteen to twenty-four blocks; the outer sides of those masses that are situated at the edge of the road being cut off in the line *e*, *f*, so that they may abut firmly against the gutter-blocks. The courses of blocks incline, alternately, in opposite directions, and thus break joint in the direction of the line of traffic.

The second improvement consists in paving roads with blocks, cut across the grain at an angle of from 75° to 80°, as shewn in fig. 2, and pegged together, at their vertical sides only, by two pegs instead of one, which are situated upon a central line, parallel to the upper and lower surfaces of the blocks. In carrying out this improvement, the wood, of which the blocks are made, is older and of a closer grain than that used in the first improvement, and the fibres are, consequently, of a more uniform strength.

The third improvement consists in connecting blocks together in the manner shewn in figs. 3, and 4.

In these modifications, the blocks all incline in the same direction, but are caused to break joint. At fig. 3, they are connected together, at their vertical sides only, by pegs *c*, disposed upon a central line, parallel to the upper and lower surfaces of the blocks. The blocks, shewn at fig. 4, are connected at the centre of their inclined sides, by the insertion of pegs.

The fourth improvement consists in separating the courses of blocks by slips of wood, for the purpose of affording a secure foot-hold for horses and other animals.

Fig. 5, is a side view, and fig. 6, an end view, shewing the method of attaching the slips to the blocks. *g*, are the slips, which are fastened to the sides of the blocks, by pegs *c*, and, as the slips are of considerable length, they serve to connect together a number of blocks in the same course, and thereby render unnecessary the pins *d*, used in fig. 1. The surface of the pavement presents an appearance similar to that produced by grooving the blocks.

A modification of this method is described, in which the slips are of the same length as the blocks, and the latter are connected together, at their inclined sides, by pegs *d*.

In figs. 5, and 6, the slips are fastened to two sides of each block, only, but they may be applied to all the sides, if preferred.

The patentee claims, firstly, the improvement in wood paving, whereby the blocks are cut and placed so that the central or stronger fibres shall always assist in supporting the external or weaker fibres; whereby, also, the blocks are arranged so as to break joint, and be bonded together continuously throughout at both surfaces; and whereby, also, the blocks are pegged together at the centres of both their vertical and sloped sides. Secondly,—the improvement in wood paving, whereby the blocks are pinned or pegged together, by pins or pegs, at the centres of both their sloped and vertical sides, in the manner described, at whatever angle the blocks may be cut. Thirdly,—the improvement in wood paving, whereby blocks, cut at angles varying from 75° to 80°, are united together, by pegs, at their vertical sides, as above described. Fourthly,—the improvement in wood paving, by the use of two pegs, on the central line, as above described, of the vertical sides, whatever the angle of the blocks. Fifthly,—with respect to the third part of this invention, the improvements in wood paving, consisting in the modifications of arrangement and connection therein described. Sixthly,—the improvement in wood paving, by the use of slips of wood, or other elastic substance, between blocks, of whatever shape, for the purpose of affording a secure foot-hold.—[*Inrolled in the Inrolment Office, January,* 1843.]

To Richard Hodgson, *of Montague-place, in the county of Middlesex, Gent., for improvements in obtaining images on metallic and other surfaces.*—[Sealed 7th July, 1842.]

The first part of this invention relates to that class of optical instruments in which images are obtained upon suitable receiving surfaces, by means of reflecting mirrors; the improvement consists in causing the images, so reflected, to pass through a lens or lenses, interposed between the mirror and the receiving surface; and also, in passing the images through a tube or trunk, placed between the mirror and the receiving surface.

These improvements are shewn in Plate VI., at figs. 1, and 2. Fig. 1, represents a camera box, twelve inches in length, containing a reflecting mirror *a*, the surfaces of which are ground to different degrees of concavity; the silvered face being of sixteen inches radius, and the other face of ten inches radius. The object to be reflected upon the receiving surface is supposed to be the sun, or a star at an infinite distance, the rays from which are parallel, before reflection, and converge afterwards to the line *b*; but, by the interposition of an achromatic lens *c*, of eight inches focus, fastened in a tube *d*, the rays are made to converge to a focus at the point *e*. In passing through the achromatic lens, much of the spherical aberration is corrected, and the chromatic is greatly diminished.

In fig. 2, the mirror *a*, is the same as the one above described, and it is placed in a similar box; the object to be reflected is supposed to be at a distance of eight or ten feet. From the extreme points of the object, the rays *f*, proceed, and, after reflection, would form a curved image of it on the line *g*; but, by interposing the correcting lens *h*, (which is a meniscus, of fourteen inches focus, fixed in the tube *i*,) the convergence of the rays is increased, and the image is formed upon the line *j*.

The patentee does not confine himself to the use of mirrors, having surfaces of unequal radii, as mirrors with parallel surfaces, or metallic mirrors, may be employed with advantage; and when the above improvements are used for astronomical or telescopic purposes, another lens is added, after the image has reached its focus, for the purpose of magnifying or increasing it; the receiving surface is then placed farther back.

The second part of the invention consists in the introduction of a prism into refracting cameras, with curved or worked surfaces; (such prism being either single or compound, and with silvered or unsilvered surfaces,) and also in the introduction of a lens or lenses, behind the prism, to gather the rays to a shorter focus.

Fig. 3, shews a tube for a refracting camera, furnished with an achromatic object glass, formed by combining a double convex lens of crown glass *k*, with a prism of flint glass *l*. The focus of the object glass is eight inches, and it is attached to a tube *m*, which slides in another tube *n*, containing a correcting lens, of twelve inches focus; this lens consists of a meniscus of flint glass *o*, placed with its convex side towards the object, and of a double convex lens of crown glass *p*, of unequal radii; the lesser radius being towards the object. The correcting lens increasing the concentration of the rays, they will form the image about four inches behind it, augmenting at the same time its intensity.

The patentee claims, firstly, the mode of constructing optical instruments, (wherein images are obtained on surfaces by reflecting mirrors,) in such a manner that the images reflected are caused to pass through a lens or lenses, interposed between the mirror and the receiving surface; also the passing of the image or images from a mirror through a tube, interposed between the mirror and the receiving surface. Secondly,—the mode of combining a prism of curved surfaces with a lens or lenses, in refracting cameras, as described.—[*Inrolled in the Inrolment Office, January,* 1843.]

To George Haden, *of Trowbridge, in the county of Wilts, engineer, for his invention of certain improvements in apparatus for warming and ventilating buildings.*—[Sealed 15th February, 1842.]

This invention consists in the application of certain metallic plates or zig-zag pieces to the external sides of stoves, grates, or other warming apparatus, which, being cast on the sides, or otherwise affixed thereto, increase the extent and effect of the heating surfaces, by currents of air passing with considerable rapidity in close contact with these heated surfaces; the air thereby becoming warmed, may be conducted to any room or apartment, where the temperature is required to be raised.

In Plate V., fig. 1, is a front elevation of a close stove of a rectangular form, the front casing being removed; and figs. 2, 3, and 4, represent other views of the same, with the outer casing removed. The surfaces of the top and four sides of the stove are furnished with projecting plates of metal *a, a, a,* which may be straight and ranged in angles, or bent or curved in any way that may be thought most desirable. These plates vary in projecting depth, from one inch to twelve inches, according to the size of the stoves, and they may be arranged in any directions, and at any angles, with reference to the sides that may be found most convenient. The sides of the stove being furnished with any number of these plates, and arranged in any convenient manner, as said, the stove may be covered or surrounded with a casing of any suitable material, which, as it must touch the outer edges of the projecting plates *a, a, a,* will form a number of zig-zag channels. Through these channels atmospheric air is conducted from below, through apertures made for that purpose.

As metals of all descriptions are known to be good conductors of heat, the projecting plates, which are connected to the sides of the stove, soon become heated by the fire within, and the air, being obliged to pass in narrow streams between these plates, soon becomes warmed, and, on arriving at the top, may be conducted off, through a pipe or flue, to any apartment that requires warming, or may be allowed to pass at once into the room which contains the apparatus. Straight or bent plates are equally applicable, and the apparatus may be also employed for diffusing heat, derived from hot water, as shewn in the horizontal section, fig. 5, or from steam or gas. The patentee prefers the projecting plates to be cast on to the sides of the stove, so as to form a component part thereof; but he does not confine himself thereto, as they may be affixed to the side of the stove by hard solder.

Pure atmospheric air may be supplied to the apparatus, by means of pipes or flues, leading from the outside of the building; and by thus causing a constant draft, the apartment will be well ventilated.

The patentee claims the application of projecting plates or pieces placed in zig-zag ranges, and at any angles on the sides or surfaces of grates or stoves, or other apparatus for diffusing heat, by radiation and rapid circulation of atmospheric air.—[*Inrolled in the Rolls Chapel Office, August,* 1842.]

Specification drawn by Messrs. Newton and Son.

To Thomas Clive, *of Birmingham, iron-founder, for certain improvements in the construction of candlesticks.*—[Sealed 7th April, 1842.]

This invention consists, firstly, in a new "push-up," for raising the candle, and secondly, in combining that push-up with Barlow's elastic holder, for which letters-patent were granted April 25th, 1839.*

In Plate VI., fig. 1, is a vertical section of an ordinary table candlestick, shewing the mode of applying the improved push-up thereto. The push-up consists of a rack *a*, on the upper end of which is fastened the cup *b*, that receives the lower end of the candle; motion is communicated to the rack, for the purpose of raising or lowering the

* For description of this invention, see Vol. XVII., p. 141, of our present Series.

candle, by means of the pinion *c*, shewn detached at fig. 2. The ends of this pinion are carried by the shaft *d*, of the candlestick, and it is turned by applying the thumb and fore-finger to the button *e*.—*f*, is a spring, which prevents the rack from sliding downwards, except when acted upon by the pinion *c*; and the rack and pinion are pressed together by the spring *g*, in order to keep them in gear.

The combination of the improved push-up with an elastic holder is represented at fig. 3. *h*, is the holder, and *i*, the cup, on which the candle rests; the remainder of the parts are marked with the same letters as in fig. 1.

When a candle is to be introduced into this candlestick, the push-up is raised, by turning the button *e*, and the cup *i*, coming in contact with the tongues of the elastic holder, causes them to expand; the candle is then placed on the cup, which being lowered, by the means above mentioned, the tongues contract, and clip the candle firmly.

Fig. 4, shews a mode of raising and lowering the push-up by turning the nozzle of the candlestick. To the under part of the nozzle, a cylinder *j*, is soldered, fitting nicely round the shaft of the candlestick, and in its lower edge a number of teeth are cut, which take into the teeth of a wheel *k*, on the end of the pinion *c*; hence, by turning the nozzle, the pinion *c*, will be caused to revolve, and elevate or depress the push-up.

The patentee claims, as his invention, any push-up in which a rack and pinion is used, of whatever form, and however placed; and also the methods, hereinbefore described, of giving motion to the rack and pinion.—[*Inrolled in the Inrolment Office, October*, 1842.

To JOHN AMERICUS FANSHAWE, *of Hatfield-street, in the parish of Christ Church, in the county of Surrey, Gent., for an improved manufacture of water-proof fabric, applicable to the purposes of covering and packing bodies, buildings, and goods exposed to water and damp.*—[Sealed 16th December, 1841.]

THIS improved manufacture of water-proof fabric, applicable to the purposes of covering and packing bodies, buildings, and goods, exposed to water and damp, is composed of fibrous materials, either animal or vegetable, or both; and of caoutchouc and other adhesive resinous or mineral substances, which are to be manufactured, in a peculiar way, into sheets, applicable to the above-mentioned purposes.

The materials to be employed, are hair, wool, cotton, flax, hemp, cocoa-nut fibre, or other fibrous substances, any or all of which, according to the quality of goods required, are to be incorporated into a mass of caoutchouc, (India-rubber,) by the peculiar means hereinafter described; and to this mass may be added pitch, resin, shellac, bitumen, or asphalte; and also, if required, sulphur, white lead, chalk, red lead, ochre, or other opaque coloring matter.

These sheets, when so made, are to be applied to various purposes of covering the sides and bottoms of ships and other vessels, the roofs of buildings, sheds, tents, walls, floors, paths, or other surfaces; and likewise for the envelopes of packages, and other things, requiring protection from the weather, or from moisture; and for the making, or coating, of vessels to contain water, as buckets, tanks, fire-hose, and other tubes; and also as a substitute for oil-cloths and leather, under various adaptations.

In Plate VI., several views are shewn of an apparatus, found convenient to be used for this manufacture. Fig. 1, is a front elevation of the machine; fig. 2, is a vertical section, taken through the middle of fig. 1; and fig. 3, is a horizontal section, taken above the level of the rotary axle. *a, a,* is a hollow vessel, or box, of a rectangular form, intended to contain steam, or hot air; *b, b,* is a cylindrical vessel, placed within the former, so that about two-thirds of its circumference shall be immersed in the steam, or hot-air chamber *a, a.* In the centre of this cylindrical vessel, a strong iron roller *c,* is mounted, its axle turning in plummer-boxes, bearing upon brackets *d, d,* affixed to the outer sides of the steam-box *a, a.* This roller is furnished with a great number of pins or teeth, standing about three-eighths of an inch from the periphery of the roller; but they may project further, and the roller may be made to revolve, by means of a pulley and band, or winch, affixed to the outer part of its axle.

The upper portion of the cylindrical vessel *b, b,* is made to open upon a hinge-joint at *e,* for the purpose of allowing the caoutchouc to be readily introduced into the cylindrical vessel; and when that has been done, the cover, or moveable portion of the cylindrical vessel, is shut down, and confined by a lever-clamp *f,* which is made fast by hand-screws. The caoutchouc, which should be cut into small pieces, being in a sufficient quantity in the cylindrical vessel, steam, or hot air, is admitted by a pipe *g,* into the box *a,* and any condensation may be drawn off by another pipe, furnished with a cock *z.* Rotary motion is now to be given to the roller *c,* by the action of which, aided by the heat, the caoutchouc will soon become soft and plastic; the hair or other fibrous substances are then introduced through an opening *h,* in the cover, in small quantities at a time; and also the pitch, shellac, or other bituminous and earthy matters; when, by the action of the revolving roller and the heat, these materials soon become perfectly incorporated with the caoutchouc, and assume the form of one adhesive mass.

The proportions of these materials, so incorporated, must depend upon the quality of the fabric required to be produced. For the sheathing of ships' bottoms, fifteen pounds of good caoutchouc are introduced into the cylindrical vessel; to this is added one pound of pitch or other bituminous matter, and one pound of black resin, with half a pound of shellac, or other resinous matter, and half a pound of brimstone, which are to be finely powdered and mixed, and then introduced in small quantities at a time. During the time that this operation is going on, a quantity of cow's hair, or hair of any other description, is introduced into the cylindrical vessel; this supply is continued as long as the plastic materials within will take up the hair into the mass. About three pounds of hair are found to be sufficient; and the operation of mastication being carried on for about one hour, will bring these materials into a fit state for the next process, viz., that of roll-

rolling it out into sheets. For this purpose, a pair of heavy hollow rollers are provided; these rollers are to be heated, (say to about 100° Fahrenheit,) by the introduction of steam, hot water, or other means; the incorporated mass of caoutchouc, &c., is then taken from the cylinder, and passed several times between these spreading rollers; their distance apart being adjusted, occasionally, as the process goes on, by screws or otherwise, for the purpose of bringing them closer together, and gradually spreading the material out into a sheet, so as to reduce it to about the thickness of an inch in substance; after which, it is covered on each side with a layer or sliver of carded hair, and again passed between the rollers. This coating of carded hair, and the rolling, is repeated, until a further quantity of about forty-eight pounds of hair has been incorporated in the whole mass, and the sheet, so formed, is, by rolling and spreading, reduced to about one-twentieth of an inch in thickness.

These quantities of materials, so operated upon, will be spread out to a superficial area of very considerable extent, and may now be cut into sheets, of such dimensions and forms as may be required.

In adapting this manufacture to the production of sheets of fabric, suited to the covering of roofs of buildings, and some of the other purposes above contemplated, the same mode of operation, as above set out, is employed; but, for these purposes, the patentee uses wool, and any other fibrous materials finer than hair; to these fibrous and adhesive gummy materials, mixed in about the proportions stated, a composition of two pounds of glue, with three pounds of alum, dissolved in water, are added; and with these are mixed six pounds of whiting, and sometimes a small quantity of coloring matter, or, in place of the whiting, ocre or other earthy materials, may be used. When these last-mentioned materials have been properly mixed together, and evaporated to dryness, they are to be reduced, by grinding or otherwise, to a fine powder, which powder may be incorporated with the other materials, in the cylindrical vessel above described; or, if preferred, when the material is passed between the spreading rollers.

In adapting this manufacture to the covering of tents, and other temporary erections, as a substitute for tarpauling, for floor-cloths, coating of walls, covers of packages, and some other uses, a woven fabric of cotton, flax, or hemp, is attached to the sheet of caoutchouc, hair, &c.; which is done by laying the woven cloth smoothly upon the face of the composition fabric, previously to passing it for the last time between the spreading rollers, when the warmth and pressure of the rollers, as the combined fabrics pass between them, will cause the two to adhere firmly together. The compound fabric may then be painted on its surface, if required, with any ornamental device, or pattern, as floor-cloths are commonly painted or printed. In some instances, a cloth, having been previously dyed or printed with stripes, or other devices, by the ordinary process of calico printing, may be employed; which, when combined with the before-described caoutchouc, and fibrous fabric, by pressure, will produce a water-proof covering, of light and handsome appearance, suited for tents and other hangings, exposed to rain and the damp of the atmosphere.

The patentee claims the mode of manufacturing sheets of fibrous materials with caoutchouc, by means of mastication, in the manner above described, and not by solution; which fibrous matters may be mixed with any or all of the other materials, named above, for the purpose of making the substance, quality, and appearance of the fabric, according to the purposes to which it is intended to be applied.—[*Inrolled in the Petty Bag Office, June,* 1842.]

Specification drawn by Messrs. Newton and Son.

To William Carron, *of Birmingham, in the county of Warwick, lathe-maker, for improvements in the construction of clogs and pattens.*—[Sealed 21st December, 1841.]

The first improvement in clogs consists in combining a flexible metallic sole with a divided tread, for the fore part of the foot, as represented in Plate VI., fig. 1. *a,* is the sole, made out of a thin plate of metal, to the hind end of which the heel of the clog is fastened, and to the front part the pieces of wood or leather *b, c, d,* are rivetted; the flexibility of the sole allowing the fore part of the tread to bend between the pieces *b, c, d.*

The second improvement is shewn at fig. 2; it consists in attaching the sole to the tread *b,* at the fore part only; so that the sole will bend in walking, as seen in the drawing.

The third improvement consists in constructing an expanding clog, with a flexible metallic sole. Fig. 3, is a plan of the clog. In the back part of the sole three slots *e,* are formed, to receive three buttons or studs, affixed to the heel of the clog; and to the under side of the sole a spring *f,* is fastened, working in a recess in the heel. This spring has, at all times, a tendency to keep the clog in its shortest position; but the clog can be lengthened, by drawing the toe and heel from each other, in opposition to the action of the spring.

The fourth improvement consists in a mode of forming the leather caps for the toes of clogs and pattens. The leather is cut into pieces, of a suitable size, and, after being softened, by immersion in warm water, is rubbed over with a mixture of "dubbing," oil, and grease; it is then pressed into a concave mould, suitably shaped, by means of a convex tool or "force," and, when cold, is ready to be made into a toe-cap. The leather may be japanned, if required, previous to applying it to the clog or patten.

The fifth and last improvement consists in applying to pattens, the iron heads, marked *g,* in the side view, and plan, figs. 5 and 6. These treads are highest at the ends g_1, and approach the toe with a gentle curve; the object of employing them is to enable persons to use pattens with facility.

The patentee claims, firstly, the mode of constructing clogs, by combining a flexible metal sole with divided treads at the fore parts of the clogs, as above described; secondly,—the mode of constructing clogs, by combining a flexible metal sole with the fore part of the tread, in a peculiar manner, as above described; thirdly,—the mode of combining a flexible metal sole with the heel of a clog, in order to allow of the clog expanding; fourthly,—the mode of constructing the leather caps for the toes of clogs and pattens, as above described; and fifthly,—forming the iron treads of pattens with a curved surface in front, as above explained.—[*Inrolled in the Inrolment Office, June,* 1842.]

To SAMUEL MASON, *of Northampton, merchant, for improvements in clogs; part of which improvements is also applicable to boots and shoes.*—[Sealed 27th January, 1842.]

THIS invention comprises seven improvements; the first relates to India-rubber galoches; the second, third, fourth, fifth, and sixth,to clogs; and the last, to boots, shoes, and clogs.

The first improvement is shewn in Plate VI., at fig. 1, which represents an India-rubber galoche; the toe and heel parts are lined, as usual, but the part marked *a*, is left unlined, in order that it may expand, when the boot is introduced into the galoche, but afterwards contract, and draw the toe and heel-piece together; thus holding the galoche tight upon the boot.

Fig. 2, represents a section of a clog, constructed according to the second improvement. The toe and heel-pieces are formed separately, and connected together by a curved spring-sole *b*, which, when the clog is off the foot, causes the heel and toe to approach each other, in the manner shewn. This spring-sole being straightened, when the clog is in use, will, by its tendency to return to its original position, keep the clog on the foot.

The third improvement consists in connecting the toe-piece of the clog, by a spring-sole *b*, with a frame or band *c*, fig. 3, that encloses the heel of the boot, instead of a heel-piece; the clog being kept on the foot by the elasticity of the spring-sole.

The clog, described under the fourth improvement, is similar in appearance to the one just mentioned; but the sole is formed of a non-elastic plate of metal, and the clog is kept on the foot by means of a screw, passed through the band *c*, at *d*, and inserted into the heel of the boot.

The fifth improvement consists in fastening the clog on the foot by a screw *e*, fig. 4, which is inserted through the heel-piece of the clog, and through a small metal upright or standard *f*, into the heel of the boot.

Fig 5, is an elevation, partly in section, shewing the mode of fastening which constitutes the sixth part of this invention. *g*, is a bell-crank lever, having a spring *h*, pressing upon one end; its other end is formed into a catch, from the back of which, through the heel-piece of the clog, a stud *i*, projects. In the heel of the boot is a small bolt *j*, the head of which is partially rounded; this bolt, when the clog is put on the foot, presses back the upper end of the lever *g*, in order to pass the catch; and by the return of the lever to the position shewn, the clog is secured. To unfasten the clog, the upper end of the lever *g*, is drawn back, by means of the stud *i*; the boot may then be withdrawn.

The seventh part of this invention consists in securing the outer soles of boots, shoes, and clogs, to the welts, (when they are used,) or inner soles, by the use of India-rubber cement. The parts to be connected, are coated with the cement, and submitted to pressure until they become dry.

The patentee states, that he is aware that India-rubber cement has been used for securing the soles of clogs, and galoches, made of India-rubber; he therefore confines himself, in the application of this improvement, to those boots, shoes, and clogs, which are made of leather, or any other suitable materials, with the exception of India-rubber.

The patentee claims, firstly, the mode of constructing India-rubber clogs, herein described; whereby the India-rubber, by the bend of the sole, and the elasticity of the sides, will retain the clogs on the feet. Secondly,—the mode of constructing clogs, by applying a bent spring-sole, in such a manner as to cause the toe and heel to approach each other, when taken off the foot, as described.

Thirdly,—the mode of applying a bent spring-sole, without a tread for the heel, as described; the spring-sole keeping on the clog. Fourthly,—the mode of fastening clogs, made without a tread for the heel, by means of frames for the heels, with screws, or other catches, as described. Fifthly, —the mode of fastening clogs by applying a screw *e*, as described. Sixthly,—the mode of fastening clogs by means of a spring-catch, as described. Seventhly,—the mode of making boots, shoes, and clogs, by applying soles by means of India-rubber cement.—[*Inrolled in the Inrolment Office, July,* 1842.]

To William Baker, *of Grosvenor-street, Grosvenor-square, in the county of Middlesex, surgeon, for certain improvements in the manufacture of boots and shoes.*—[Sealed 27th January, 1842.]

This invention consists in introducing a layer of horse-hair, or any other strong curled hair, felted or matted together, between the inner and outer-soles of boots and shoes, for the purpose of rendering the sole more elastic than usual, and preventing the damp and cold from penetrating to the foot of the wearer.

Fig. 1, is a side view of a boot, partly in section. *a,* is the layer of felted or matted hair, inserted between the inner and outer-soles *b, c,* occupying the place of the "shank-pieces," and of the small strips of leather, or other material, called "bottom-fillings." Fig. 2, is a plan of the layer of matted hair, the dotted lines representing the outer edge of the sole, which is larger than the layer of hair, in order that its edge may be finished in the usual manner. In some cases, a layer of caoutchouc is introduced beneath the layer of hair, to prevent the entrance of water into the boot; or, if preferred, a solution of caoutchouc may be applied to the under surface of the matted hair. When the sole of the boot or shoe is composed of more than two thicknesses of leather, the layer of felted or matted hair is placed between the two upper pieces.

The patentee claims, firstly, applying a piece or sole of matted or felted horse-hair, or other strong curled hair, between the inner and outer-sole, in the manufacture of a boot or shoe; and secondly, the application of India-rubber, together with matted or felted hair, to the sole of a boot or shoe, as before described.—[*Inrolled in the Rolls Chapel Office, July,* 1842.]

Specification drawn by Messrs. Newton and Son.

To MARC CARLOTTI, *of Little Argyle-street, Regent-street, Gent., for certain improvements in the construction and manufacture of boots, half-boots, shoes, clogs, and galoches, —being a communication.*—[Sealed 8th April, 1842.]

THE first part of these improvements consists in a mode of introducing and concealing a wooden sole between the in-soles and outer-soles of boots, half-boots, shoes, clogs, and galoches, for the purpose of protecting the feet from damp, and rendering unnecessary the ordinary process of sewing the sole to the vamp, and the various pieces of the sole together.

In Plate VI., fig. 1, is a side view of a finished clog, constructed according to this improvement, and fig. 2, is a side view of a clog, in an unfinished state.

The wooden shoe is formed in one piece, of the same size as the in-sole; or it may be made of two pieces *a, b,* which are attached to the in-sole *c,* by nails; the lower edges of the toe and heel-pieces *d, e,* of the clog (or the lower edges of the vamp, when boots or shoes are being made,) are then adjusted round the edge of the wooden sole, and are secured by nailing over them a piece of leather *f,* about one inch and a half in thickness. The lower edge of this piece of leather is arranged even with the bottom of the wooden sole, and over it a strip of metal *g,* is nailed; the upper edge of the leather is then turned down, and, after being tightly drawn over the lower edge of the sole, is nailed to the bottom of the same, as shewn at fig. 3. The clog or boot is completed by nailing the leather sole *h*, over the wooden one.

The second improvement consists in securing clogs and galoches upon the feet, by means of springs, without the aid of ankle-straps, &c. The mode of applying the springs is shewn at fig. 4, which is a plan of the clog represented at fig. 1. *i*, is a spring, composed of three or more metal plates; it is let into the upper surface of the sole, and its ends are confined in the sockets *j*. A degree of curvature is given to the spring, sufficient to raise the heel, as shewn at fig. 1, when the clog is not in use; and hence, when the clog is on the foot, the spring will keep the hind part of it in close contact with the heel of the boot, and prevent it from slipping off. *k*, is a semi-circular spring, the ends of which are attached to the heel of the clog by pins; and *l*, is a small curved spring, fastened to the centre of the spring *k*. The clog is retained on the foot by the spring *k*, clasping the heel of the boot, against which it is forced by the spring *l*; and it is removed from the foot by pressing upon a stud that projects from the curved spring, through a slot in the back of the clog. The springs *i*, and *k*, may be applied to the same clog, or used separately. In some cases a stud is substituted for the spring *l*; or, if only the spring *i*, is employed, the stud is attached to the heel of the clog.

Fig. 5, is a plan view of a jointed clog, furnished with the springs above described; the spring *i*, being shorter than the one shewn at fig. 4, and extending across the hind joint of the clog. A spring clasp, for securing the clog on the foot, is also described in the specification.

The patentee states, in conclusion;—"I do not claim, as any part of the said invention, so much as, in the above description, relates to the employmeut or use of wooden soles, or of vamps for boots, half-boots, shoes, galoches, or toe and heel-pieces for clogs; or as relates to the construction, arrangement, employment, or use of the springs *i*, in the drawing hereunto annexed; or the studs or knobs, fixed to the heels of clogs or galoches themselves, when furnished only with the springs *i*; the same being hereinbefore, and in the said drawing, hereunto annexed, only referred to and described, the better to lead to, and explain, and describe, and shew the application of the said invention; but I do claim all else that is hereinbefore, and in the said drawing described; and that, whether the same is used or employed together, or separately, or with any other combination or arrangement, having the same object, as being part and parcel of the said invention, and as having never been practised or used by any other person or persons," &c.—[*Inrolled in the Inrolment Office, October,* 1842.]

To William Noel, *of Jermyn-street, Saint James's, in the city of Westminster, boot and shoe-maker, for his invention of certain improvements in the manufacture of boots and shoes.*—[Sealed 21st April, 1842.]

These improvements, in the manufacture of boots and shoes, consist in the application of metallic springs, as hereinafter described; whereby a greater degree of elasticity, than usual, is given to the boot or shoe, and the insertion of shank-pieces, for the purpose of giving rigidity and stiffness to the waist, is rendered wholly unnecessary.

In Plate VI., fig. 1, represents a section of a boot or half-boot, made according to this invention; fig. 2, is a side or edge view, and fig. 3, a plan view of one of the metallic springs employed by the patentee; it is made of thin well-tempered steel, slightly curved, as represented, and covered with paint, or other suitable material, to protect it from rust. The spring is introduced in the waist of the boot or shoe, between the in-sole and outer-sole, as seen in fig. 1.

In manufacturing a boot or shoe, according to this invention, the sole is "taken down," quite thin, from the joints backward to the heel; but the whole substance of the leather, to be placed under the heel, is left. The spring is then fastened, at one end, to the back part of the sole, under the heel, by means of pins or rivets, as seen in figs. 1 and 3; and the other end of the spring is allowed just to reach the joints, or half way between the toe and the heel.

From the above description, it will be understood, that the spring is to be fastened at one end only, the rest of the spring being allowed some play between the in and outer-soles; it being one essential feature of the invention, that the spring should be fixed only at one end, so that the play, between the soles, above described, may freely take place. Instead of fastening the spring at the heel part of the boot, as shewn in the drawing, and above described, it may be fastened at the opposite end, to the sole, and allowed to enter and work in the heel; or it may be fastened at the middle to the waist of the boot, each end of the spring being free; but the method shewn in the drawing, at fig. 1, is preferred.

The patentee claims the improvements in the manufacture of boots and shoes, by the use and application of metallic springs, as above described.—[*Inrolled in the Petty Bag Office, October,* 1843.]

Specification drawn by Messrs. Newton and Son.

To CLAUDE SCHROTH, *of Leicester-square, in the county of Middlesex, Gent., for certain improvements in the process, manner, or method of embossing or producing raised figures, designs, or patterns, on leather, or such like materials; and in the manner or means used for effecting the same; also in the making or forming of certain tools or apparatus used therein.*—[Sealed 26th June, 1839.]

THE object of this invention is to produce, in an economical and perfect manner, fac-simile copies of designs, figures, or patterns, done in basso-relievo or raised figures, whether stamped, carved, embossed, sculptured, modelled, cast, or otherwise produced; such copies or fac-similes being obtained in leather, or the skins of animals, and in connection with other materials, when required. These copies of devices are applicable to all the purposes for which basso-relievo ornamental work is employed; viz., for the decoration of the interiors or exteriors of buildings, (as medallions, cornices, panels, rosettes, picture or other frames, &c. &c.,) and for cabinet-work, and various other articles of furniture.

The invention consists in an improved process or method of producing such fac-simile copies, in basso-relievo or raised ornamental articles, and in making or forming the dies, or apparatus, used in the process of obtaining the same.

The metal blocks, plates, moulds, or dies, to be used in producing the copies or fac-similes of the different basso-relievos, are made by casting them from plaster or clay models, which are prepared for this purpose, either by taking impressions, or moulds, from old carvings, embossing, pieces of sculpture, or castings, or by modelling or forming new patterns, designs, or figures, in clay or plaster materials, in the same manner as sculptors model their designs, previous to operating upon marble. The dies are formed of any suitable metal, or mixtures of metal, but the patentee prefers the following alloys:—1st, lead and antimony, in about the same proportions as used for typography. 2nd, fusible alloy of bismuth, lead, and tin, (as that commonly known as Darcet's alloy.) The proportions are varied, according to the use intended to be made of the dies.

The alloy of lead and antimony is used for those dies in which the skins are to be embossed, without using the press, as hereafter explained; and the alloy of bismuth, tin, and lead, for the dies that are submitted to the action of the press.

The dies, into which the leather or skin is forced by hand, require to be only about the thickness of three-eighths of an inch; this thickness being regulated by the process of making them.

The plaster, clay, or other model or design, being prepared, a thin sheet of tin, pewter, tin-foil, or lead, is laid over it, and caused to take the form of the design (*i. e.*, made to enter into all the counter-sunk parts and interstices); then upon the sheet of tin-foil is placed a layer of earthy materials, of the same thickness as the die or block is intended to be cast. Over this earthy covering, plaster of Paris, mixed with water, is poured, in order to form a recipient for the metal alloy; the object of this recipient being to economise the alloy. When the plaster becomes set, the cap, or tin-foil, is raised, and the earthy matters are removed.

It will be understood, that on the model being placed in the hollow plaster recipient, the projecting parts of the model will correspond with the counter-sunk parts of the recipient, and between the model and recipient there will be a space, equal to the thickness of the earth used in the first operation. The recipient is now placed on the bed of a screw-press, and properly adjusted, and the requisite quantity of the alloy, in a fluid state, poured into it The alloy is stirred by the operator (to prevent the heavier metal separating from the lighter) until it arrives at a proper consistence; and then the plaster model being carefully placed upon it, the follower of the press is brought down quickly, forcing the model into the alloy, and thus producing the required matrix or mould. When great nicety is requisite in obtaining the matrix, the model should be accurately adjusted, and fixed to the follower of the press.

In order to prevent the model from breaking, by being too suddenly brought into contact with the hot metal, it should be placed in a stove or oven, to drive off any moisture it might contain, and then allowed to cool in a dry place. If the same model is required to be used several times, it should be made of lead, or any other suitable substance, instead of being formed of plaster.

The blocks, plates, moulds, or dies, which are intended to bear the action of frequent pressure, or many operations, should have their undersides plane and smooth, in order that every part may sustain an equal pressure. Such dies are obtained in the manner first described; but instead of casting them in plaster recipients, they are made in one piece, in boxes, formed of any suitable substance which is a bad conductor of heat, such as wood, pasteboard, &c. These boxes should exceed in length and width the dimensions of the model, and the height of their sides should exceed, in a small degree, the thickness of the metallic casting.

The method of manufacturing embossed leather ornaments, consists in forcing such leather into all the countersunk interstices of the block, plate, mould, or die, and is effected as follows:—The skin is first beaten in water, until it becomes completely softened and thickened, and then the operator takes it out of the water, and, without wringing or pressing, rolls and works it with his hands, so as to make it shrink, that is, to increase its thickness at the expense of its width and length, after the manner of fulling. He then places it in the middle of the metal mould, and having ascertained the centre part of the design, he proceeds, by gently unrolling the edges of the skin; and then, with the ends of his fingers, begins the operation of pressing the skin into the interstices of the die or plate, and stretching out the leather, proceeding gradually from the centre of the plate to the outsides; for it is at the expense of the width and length of the skin that the cavities of the mould are filled.

When the principal cavities are sufficiently covered or filled with leather or skin, the workman proceeds to fill up the smaller cavities, by means of a wooden, bone, or copper instrument; (similar to those used by sculptors, for modelling,) sometimes making use of a brush, with which he gently strikes the skin. He then presses on the surface of the leather a sponge, which has the double effect of compressing the leather into the more minute cavities of the design or mould, and at the same time absorbing the greater portion of the water which the skin had taken up. At this stage of the proceeding, either of the following methods may be employed to complete the embossing and drying of the leather; viz., it may be effected by means of heat, or by the agency of an absorbing substance.

In order to dry and finish the articles by heat, the mould or die, containing the skins, is to be placed on a chafing-dish, until the temperature reaches from about 108° to 144° Fahr. During the drying operation, papier-maché, or other suitable material, previously prepared, is forced into the deepest cavities of the skin or leather, in order to keep it in its place, and prevent it receding from the die,—the preparing tools, and sponge, being constantly pressed on all the parts, and in different directions, in order to cause the leather to adhere to the cavities of the mould, until it and the papier-maché are dry.

The papier-maché, with which the cavities are filled, may then be removed, and the operation is finished. The elasticity of the leather, and its contraction, in drying, allows of its being drawn out of those parts of the mould which otherwise would retain it, and consequently the mould need not be made of several pieces.

The second method of compressing and drying, consists, as before stated, in the employment of an absorbing substance. The substance used for this purpose must be reduced into fine powder, or very minutely divided; and the patentee prefers those materials whose particles are sufficiently void of cohesive properties, as to remain in a state of division, after being strongly and repeatedly pressed.

The mould, after it has received the leather or skin from the hands and tools of the workman, as above described, is placed on the table or bed of the press, and is enclosed in a frame of wood or metal, formed of side-pieces, without top or bottom; the top edges of the frame being about two or three inches higher than the mould, when the design is not much in relief, and from about six to twelve inches, or more, when the embossing is raised in a greater degree.

The frame is to be filled with fine saw-dust of wood, well dried, or dust of other suitable material; so that the die or mould may be covered with a layer of such dust. Above the frame is placed a plate, or follower, of such a size as will enter freely within it. The screw of the press being turned, compression takes place, and the saw-dust forces the leather into all the cavities of the mould. After a short time, the screw may be turned in a contrary direction, and the frame and saw-dust removed; the leather having acquired a sufficient consistency to be drawn out of the mould, and dried by heat, or in the open air, according to circumstances.

The ornaments, formed by the methods above described, may be allowed to retain a certain degree of the pliancy of the leather, or have a hardness given to them, equal to that of wood, or plaster, by causing them, when sufficiently dry and warm, to absorb a solution of gum-lac, dissolved in spirits of wine, or of resin, in spirits of turpentine, or merely a solution of glue. All the cavities, in the back of the design, must be filled up with paper, saw-dust, or pulverized cork, mixed with glue or hot resin.

When the embossed or basso-relievo ornaments, or devices, are used for the panelling of rooms, in imitation of carvings, the pieces of embossed leather should be united, so as not to shew the junctions.

It is obvious that these raised or embossed products may be painted, gilded, or silvered, (when rendered impervious by gum-lac or any suitable resinous substance,) or they may be painted to represent wood, marble, or other materials.

The patentee claims, firstly, the improved process, manner, or method, hereinbefore set forth and described, of obtaining copies or fac-similes of pieces of sculpture, carvings, models, castings, and other raised figures, in basso-relievo, on leather or skins of animals; and the means used therein; particularly the application and use of saw-dust, or other powdered or finely-divided substance, for the purpose of forcing the skins into the cavities of the dies or moulds; and secondly, the improved mode or method of making or forming the moulds, dies, or matrices, or apparatus, also herein described, as connected with the above process of producing basso-relievo devices on skins of animals.—[*Inrolled in the Rolls Chapel Office, December,* 1839.]

Specification drawn by Messrs. Newton and Son.

ON WOOD PAVING.

(To the Editor of the London Journal of Arts, Sciences, &c.)

Sir,

I feel some diffidence in laying before you a plan, which has lately occurred to me, for giving a firm foot-hold to horses upon wood pavements, knowing, as I do, that the letters which appear in your valuable publication, are generally from gentlemen distinguished, for their talents, in the scientific world; but should my suggestion meet with your approval, I shall receive more satisfaction from its appearing in a work, which was the first to bring before the public the applicability of wood to paving roads, and has since traced the various improvements made in this now all-engrossing subject, than if it were published in any other journal.

At present there seem to be three methods proposed, to obviate the inconvenience of horses slipping upon wood pavement. The first is by grooving the upper surface of the blocks, or shaping them so as to leave spaces between the blocks when laid down. This system has evidently two objections:—Firstly, mud and dirt are harboured in the grooves and spaces, which, working up in wet weather, render the wood extremely slippery; and secondly, the heavy pressure of waggons and other vehicles passing, is very likely to crush the end fibres of the wood, and cause the grooves thereby to be filled up, and require constant cutting or grooving, by which the substance of the block is gradually diminished. The second method, is substituting a shoe, with ribs and other projections, in place of the ordinary horse-shoe, which, if it be no inconvenience to the horse, is certainly an innovation not likely to be generally adopted. The third method, is strewing on the surface of the road-way gravel or sand, the expense of doing which, and the dirt it would occasion, if done, are obstacles almost sufficient to balance its usefulness.

The plan I would submit, as an improvement to the foregoing, is to lay down bars of cast-iron, in lines parallel to the curb-stone, with knobs or small projections, about an inch apart, on their upper surface. Grooves must be cut between the lines of blocks to receive the indented bars, the knobs of which, when laid down, should project about a quarter of an inch (more or less) above the paving. By these means, horses will be enabled, with their present shoes, to get a good hold of the ground, whilst, at the same time, the other parts of the pavement may be made perfectly smooth. The number of rows of bars must be regulated according to the width of the road-way; for instance,—if the way be wide enough to admit of two carriages going abreast, I would have nine bars laid down, at about four inches apart, in the middle of the road, and nine in the centre of the space, between the middle and the curb-stone; this would be width of surface sufficient for a pair of horses to trot over, while the carriage would travel on the smooth wood without the least jar. An advantage, besides saving of material, would be derived, by making the *safe footing* partial, as the driver must, of necessity, keep on his proper side of the road when running at any speed. The bars, which may be half an inch wide, should be cast with prongs projecting downwards, in order to fix them when inserted in the pavement.

With a wish to remedy the evils of wood paving, and at the same time preserve that boon which only the inhabitants of a crowded London thoroughfare can appreciate, I submit my suggestion to the attention of your readers, which, should it be found impracticable, may at least bring some more able person to consider the subject.

I am, Sir,

Your obedient humble Servant,

A SUBSCRIBER.

Scientific Notices.

NEW MEANS OF INCREASING THE SENSITIVENESS OF DAGUERREOTYPE PLATES.

By M. Barnard.

The author prepares the iodized plate according to the ordinary method employed by M. Daguerre; after which he exposes it, for a half a minute, to the action of chlorine, mixed with common air, in such proportion that it may be inhaled without any very painful sensation. The plate then becomes so sensitive, that on placing it in a dark room, with an aperture similar to that employed for portraits in miniature, an impression is produced in the short space of time necessary for removing and replacing the screen. The drawing is completed, by mercury, in the ordinary manner.

A plate, thus treated with chlorine, becomes, when exposed to the light, of a very deep violet color, nearly black. The mercury does not become tarnished immediately, and in this state, the picture is even more beautiful than when it has been washed with the hyposulphate of soda; but this washing is necessary for its preservation.

According to the author, the lights and shadows are more distinct by this process than by the ordinary method. The proportion of chlorine, necessary for producing the effect, is very small; an excess of chlorine must be carefully avoided. It is almost unnecessary to add, that no light must, on any account, be admitted during the operations.—*Bibl: Univ.*

COLORING PHOTOGRAPHIC PICTURES.

By M. Lechi.

M. Arago has presented to the Academy of Sciences, in the name of M. Lechi, some photographic pictures, colored after being formed. This coloring is effected in a very simple manner; it consists in depositing successive uniform layers of color on each part of the picture, which is removed, almost immediately afterwards, by passing the plate through hot water.

What remains of the color, after this ablution, does not seem, in the least, to injure the appearance, or alter the form of the image. The effect is different from that obtained by coloring an image upon paper, in which, if a uniform layer of color be put on those parts where the tone of color is the same, it will always be seen that the shadows have, at first, been black. In the specimens, presented by M. Lechi, the shadows, on the contrary, seem to result from the application of several layers of the same color. Thus it seems, that those parts of the picture which were at first black, retain, after being washed, a larger proportion of coloring matter than the lighter parts.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 59, Vol. XXII.)

"Description of the Maplin Sand Lighthouse, at the Mouth of the River Thames."

By John Baldry Redman, Grad. Inst. C. E.

The paper commences with an enumeration of the various channels and sand-banks at the mouth of the Thames, with the floating lights, beacons, and buoys, marking the entrances of the Channel; and gives the objections to floating lights, and the reasons for selecting the Maplin Sand, as the position for a fixed lighthouse.

In the year 1837, a survey was made by Mr. Walker, the engineer to the Trinity House, and, by boring, it was ascertained that the first 6 feet of the sand was close and compact, but below that, for 20 feet, the boring rod went more easily as it descended, and it was found that it became mingled with argillaceous earth as the depth increased.

It was then decided to use, for the foundations, Mr. Mitchell's screw moorings; and in 1838, the patentee, under Mr. Walker's directions, commenced fixing nine cast-iron screws of 4 feet diameter, so as to form an octagon, with one screw in the centre: attached to each of these screws was a cast-iron pile, 5 inches in diameter and 26 feet long, which was inserted into the sand 21 feet below low-water mark. On account of the constant shifting of the sand from around the piles, it was determined to place a raft or grating of timber around and between them: the surface of the raft was covered with faggots of brushwood, well fastened to the timbers, and upon them was deposited 120 tons of rough Kentish ragstone, by which the raft was secured in its situation, and, after a time, no further changes occurred in the level of the surface of the sand.

In the summer of 1840, the superstructure was commenced: it consists of nine hollow iron columns or pipes, curved at the top to a radius of 21 feet towards the centre; they were secured upon the piles, and two series of continuous circular horizontal ties bound them together, while they were connected with the centre column by diagonal braces—all of wrought-iron. Upon these columns is built a wooden dwelling for the light-keepers, in the upper part of which is placed a French dioptric light, of the second order, its centre being 45 feet above the mean level of the sea, and at that elevation can be seen from a ship's deck at a distance of nine or ten miles; a bell is fixed on the gallery, which is sounded by machinery, at intervals, during dark and foggy nights.

The communication gives all the details of the dimensions, and the mode of fixing the cast-iron screws and piles, made by Messrs. Rennie; the iron-work by Messrs. Gordon, of Deptford; the wood-work by Messrs. Gates and Horne, of Poplar; and the lanthorn by Messrs. Wilkins: the whole is illustrated by a series of drawings, which fully describe this useful construction, which has hitherto withstood the most violent attacks of the sea to which it is exposed.

In answer to questions from the President, Mr. Wilkins stated, that he had been in the Eddystone and the Malpin Sand lighthouses, during severe gales of wind; that, as might be conceived, from the nature of the construction, the latter building was more affected than the former by the striking of heavy seas: the motion appeared to be more like torsion than simple vibration, which he attributed to the waves striking the ladder and its projecting stage, and thus tending to twist the upper part. Still the motion was not such as would cause injury to the building.

The President pointed out two diagonal braces, extending downward from the end of the ladder-stage, to the piles on either side, which had been introduced in order to counteract the twisting described by Mr. Wilkins. In constructions of this nature, it was of importance to oppose as little resistance as possible to the seas, especially in the upper part of the building; a system of bracing had therefore been adopted, which consisted principally of two series of continuous circular horizontal ties between the piles, at the several heights of 6 feet and 15 feet above low-water mark of spring tides. From the external ring of piles, two sets of diagonal stays, extended to the centre pillar, forming strong triangular trusses, in the direction of each pile, and two sets of horizontal stays, stretched between the piles and the centre pillar, at the levels of the circular bands. The amount of direct vibration was very small, and he did not conceive that the twisting motions, which had been described, was sufficient to warrant the introduction of diagonal braces, which would materially augment the surface upon which the waves would act.

Mr. Vignoles directed the attention of the meeting to the system of diagonal bracing between the piles, which had been adopted at the Port Fleetwood lighthouse; he apprehended that as the principal force of the waves would be exerted against that part of the structure which was above the high-water level, the diagonal braces, extending between the upper part of the piles and the level of low-water, were preferable to the horizontal continuous bands of the Maplin Sand lighthouse, although assisted by the system of radiating central truss-braces which it possessed: he conceived, that both buildings were strong enough for the purposes for which they were constructed, but he preferred the mode of bracing adopted in the Port Fleetwood house, the vibration of which he knew to be very small, although situated in an exposed position, where the rise of tide is 30 feet.

Mr. Donkin observed, that there could not exist a doubt of the introduction of diagonal braces rendering the building stronger; how far they were necessary, or might be prejudicial, in offering additional resistance to the passage of the waves, should be well examined before adopting them. He considered the position of the suspended ladder decidedly objectionable, as any torsion, caused by the waves striking it, must tend to dislocate the fibre of the material of the piles, and to fracture them.

Mr. Farey believed the construction of the Maplin Sand house to be better adapted than the Fleetwood house for resisting the direct action of waves, but the diagonal bracing of the latter enabled it to withstand torsion better than the hoop-bracing of the former. He inquired, why the lower part of the light-keeper's house was made conical? as he apprehended that it would receive a heavier blow from a wave than if it had been flat.

The President replied, that the main body of the waves seldom or never rose so high as the bottom of the house, and that the conical form allowed the air and spray to rise up and be guided off, without affecting the building, as it would do if the bottom was flat.

With regard to the torsion, that had only been felt at first when the ladder extended too low down and received a constant succession of blows from every wave, which naturally communicated a vibration to the whole structure; the ladder was now shortened and nothing of the kind was felt; the waves scarcely, even in the roughest weather, struck the suspension stage or the boat. He preferred the continuous horizontal bracing, which bound all the piles firmly together, like the staves of a barrel; and, from observations he had made, he believed the amount of vibration to be greater in the Port Fleetwood lighthouse than in that at the Maplin Sand.

In answer to a question from Mr. G. H. Palmer, the President said, that at present there was not any indication of a change in the condition of the cast-iron from its contact with the salt water.

Professor Brande was unable to give any additional evidence on the observed facts connected with the change suffered by cast-iron exposed to the action of salt water, or in mines and in various other positions ; from experiments which he had made, he was led to believe, that many of the appearances observed in the changes of cast-iron, arose rather from a peculiar mechanical combination of the molecules, than from a difference in the chemical constitution of the metal : no difference could be detected by analysis in the metal which had undergone change and that which had not.

It should be remarked, that the contact of two metals was not essential to cause galvanic action ; a film of oxide upon the surface of the body of metal, formed a very active galvanic pile ; hence arose the necessity for preventing oxidation, by proper paints or varnish, before using pieces of cast-iron in exposed situations.

Mr. Farey observed, that in the early engines, constructed by Woolf, in Cornwall, in which the packing segments were of gun-metal, and the body of the piston was of cast-iron, wherever the two metals were in contact, the iron was turned to plumbago : this had been particularly observed where high-pressure steam was used : it might be a question, whether the temperature of the steam, and the quantity of mineral water carried over with the steam, by the large amount of priming of the engines in that day, had not materially contributed to produce the effect.

Mr. P. Taylor believed, that the temperature of the steam had not any connection with the subject. In the metallic packing of steam-pistons of low-pressure marine engines, which he had constantly under repair at Marseilles, wherever the wedge-pieces were of gun-metal, the backs of the cast-iron segments were converted into plumbago, whilst those surfaces of cast-iron, which were ground together and worked against each other, remained unchanged ; the same might be said of the rubbing surfaces of cast-iron against gun-metal ; it appeared, therefore, that the formation of an oxide was necessary to commence the change. He repudiated the use of cast-iron in situations where these changes were to be apprehended ; he would employ wrought-iron, as although that did become oxydized, it retained its relative strength to the last, whereas cast-iron, when changed into plumbago, retained its bulk, but lost nearly all power of cohesion.

Mr. John Taylor said, that in Cornwall the cast-iron pump-trees, exposed to the action of mine water, were very speedily destroyed ; and even although 1½ inch thick, they could be cut to pieces with a knife when first taken out of the pit. The air-pump buckets of steam-engines, in which the body was of cast-iron and the valves of gun-metal, formed the most perfect kind of galvanic apparatus; they should be made entirely of gun-metal.

In manufactories of vinegar and pyroligneous acid, the decay of cast-iron was very rapid.

Mr. Glynn attributed, in a great degree, the rapid decay of cast-iron, in coal mines, to the presence of sulphuric acid evolved from the pyrites.

Mr. Philip Taylor agreed with Mr. Glynn; even copper pipes were rapidly destroyed in the bilge-water of vessels, which always contained much sulphuretted hydrogen,—he recommended the use of stout lead pipes in such situations; they would be found much more durable.

Mr. Davidson had found it necessary to substitute gun-metal gratings for the cast-iron ones at Messrs. Hanbury's brewery, as although they were ¾-inch thick, they had been entirely destroyed in four years.

The President gave a short account of the construction of a lighthouse now making by Messrs. Gordon and Co. at Deptford, under his directions, for the Point of Air. The lanthorn for it would be cast from a gun which had been raised from the wreck of the Royal George.

Mr. C. W. Williams exhibited and explained the sight-tubes which he now used for the marine boilers of the City of Dublin Steam Packet Company's vessels.

The instrument consists of a wrought-iron welded tube, 2 inches diameter, with a screw-thread cut upon the exterior; it is inserted across the water spaces of the boilers, and secured by means of nuts in such positions behind and opposite the furnace, as enables the engineer to see all that goes on interiorly, particularly the degree of perfection or imperfection in which the gaseous matter enters into combustion, and the effect of admitting or excluding the air.

The instrument had been found very useful, not only in experiments but in practice, on the large scale, and he deposited it in the Gallery of the Institution in order that it might serve as a model for those who were inclined to adopt it in marine boilers.

May 31, 1842.

The PRESIDENT in the Chair.

"On the construction of Model Maps, as a better mode than Sectioplanography, for delineating the Drainage and Agricultural Improvements of a Country, or projected lines of Railways, Canals, &c."—By John Bailey Denton, Assoc. Inst. C. E.

This communication was accompanied by a map in relief of an estate, as a specimen of the method which the author recommends.

The subject of mapping in relief is not new, and the author had previously published a treatise on the subject, but having made extensive experiments, he was enabled to bring the subject before the Institution in a more defined form, showing that the construction of the models had been reduced to a simple and cheap method. These models are peculiarly recommended for pointing out the capabilities of district for drainage, either for agricultural purposes or for collecting waters together for manufacturing power. They are superior to maps, as they show at a glance the relative heights of the various points, display the geological phenomena, and may be made to delineate the state of cultivation of the districts. The lines of railways, of roads, or of canals, can be more clearly defined upon them, and they are stated to be peculiarly adapted for parish surveys.

The expense of making a model of an estate, of compact form, is stated to be from two shillings and sixpence to three shillings and sixpence per acre.

"Observations on the Periodical Drainage and Replenishment of the Subterraneous Reservoir in the Chalk Basin of London." —By the Reverend James Clutterbuck, &c. &c.

This paper, which formed the substance of a letter to the Reverend Dr. Buckland, and was by him communicated to the Institution, consists of a series of observations on the periodical drainage and replenishment of the subterranean reservoir of the chalk basin of London, especially that part of it which lies in a N. W. direction between London and the Chiltern Hills.

The author divides the district into two portions, that to the north and that to the south of the river Colne.

The northen portion is mostly covered only with a bed of gravel, through which the rain water percolates to the chalk, in which, being upheld by the retentive strata below, it accumulates until it finds vent by several deep valleys, which incline southward, and carry off a large quantity of water by the streams Ver, Gade, Bulbourne, and Chess, into the river Colne, which runs in a S.W. direction under the escarpment formed by the outcrop of the London and plastic clays.

The surface of this reservoir or the water level, regulated by these vents, dipping towards the south at an average inclination of nearly 300 feet in fourteen miles, may be represented by a line drawn from the upper district at that angle, and terminating at the river Colne.

The southern portion is almost entirely covered by the London and plastic clays, from the surface of which the rain water flows in open drains and water-courses. A considerable portion of that which flows towards the Colne, sinks into the subjacent chalk, when it arrives at the outcrop of the sand of the plastic clay formation, and assists in the replenishment of that portion of the reservoir that underlies the London and plastic clays. Here the water level, or the height to which it would rise through perforations in these clays, where its continuity is interrupted by them, would be represented by a line drawn from the Colne to mean tide level in the Thames below London, the only apparent vent for their waters. In the upper district, during the replenishment of the reservoir, which usually occurs between December and March inclusive, the water accumulates in a proportion increasing with the distance from the river or vent, and falls off in a corresponding ratio during its periodical exhaustion, which usually takes place between April and November. This alternation of level, which in the upper districts exceeds 50 feet in perpendicular height, would be represented by a line fixed at the river or vent, and rising at an angle proportionate with the increase furthest from it, the extent of its rise or fall being determined by the quantity of rain percolating the chalk. The ratio between these extreme points, is so exactly maintained, that if the distance of rise or fall in two wells, one near, and another at a distance from the vent, be ascertained, the alternation in the intermediate wells will be determined with considerable accuracy.

The progressive rise of the water level is apparent at the sources of the streams which break out at higher levels in the valleys in which they run, or when brooks or burns burst forth and run during a certain period, when the surface of the reservoir attains a certain level, previously to which, the water rises in every depression till it reaches the height at which it can flow away; the converse of the effects, which preceded their bursting, may be seen as they cease to flow.

When no water percolates the surface of the upper district, the flooding of the Colne by heavy rains, together with the sinking of the water into the chalk, at the outcrop of the sand of the plastic clay formation, raises the level in that locality, and, by checking the drainage, retards the exhaustion of the reservoir. When this occurs during the replenishment, and from continued rain, the level near the river maintains an increased elevation, the water checked in its course towards its vent accumulates in a ratio increasing with its distance from it, a process of adjustment to be traced throughout the district during the replenishment, and conversely during the exhaustion of the reservoir.

The geological condition of the lower portion of the district, together with the paucity of wells, make it difficult to ascertain the extent of the natural alternations of that part of the water level which underlies the London and plastic clays; the difficulty is increased by an unnatural depression caused by the exhaustion of water under London, which is said to increase yearly, and indicates that the rapidity of the demand exceeds that of the supply; the alternation at that point may be from 2 to 4 feet, and is coincident with the rising and falling of the levels in the upper district.

If water be discharged from a shaft in the chalk by a power not capable of exhausting it entirely, the rapidity of the reduction of the level will gradually decrease, until it is exactly balanced by that of the supply; when the exhaustion ceases, the level will rise in the inverted ratio of its reduction; if the level be measured in a line from the point of exhaustion, a similar reduction will be found, falling off at an angle decreasing with the distance from it.

The aggregate discharge of water from under London, produces a similar effect: daily measurements in one well, confirmed by some coincident measurements in another more than a mile distant, show that, beginning on Monday, the level is gradually reduced during the week; the cessation of pumping on Sunday is marked by the rising of the level by Monday morning; if any great quantity of rain falls, a sudden rise or check in the periodical fall takes place; the resumption of any extensive or continued discharge of water may be traced; a general coincidence of rise and fall in different wells is apparent; holiday times, such as Christmas, Easter, and Whitsuntide, may be distinguished. Thus, the measurement of a chalk well in London would show the days of the week and the great festivals, by the daily variations; the seasons would be indicated by the average difference in the height of the level at different periods of the year; and the changes of the weather by the falling of rain, would also be shown.

The chalk under London is of a much closer nature than that in the upper districts; it yields the water sparingly but steadily from orifices beneath those beds or bands of flint, which are the most unbroken and the strongest, and from faults and cracks which are frequently met with. The constant and increasing demand, not only depresses the level under London, but must accelerate the exhaustion of the reservoir above. When the water level, near the Colne, is suddenly raised by heavy rains, a simultaneous effect is produced on the chalk wells in London. This suggests the possibility of connecting a periodical defalcation of water, observed in that stream, and the river Lea, on Monday, at those seasons when the water is short, with the exhaustion of water under London. The courses of both these streams is somewhat similar, with reference to that place, though they flow in opposite directions. There is some evidence in favour of this supposition, which may be established when more information is obtained, which will be best effected by keeping registers of the daily variations of wells in different localities, and determining the height at which the water stands, with reference to Trinity high-water mark. Such information, if brought together, would well repay the labour bestowed on its collection.

The author's views were illustrated by a number of sketches and enlarged diagrams of the geological formation of the district, &c.

Dr. Buckland was desirous to bring the subject of Mr. Clutterbuck's paper before the Institution, because he was impressed with the value of a systematic series of observations upon a matter so intimately connected with engineering as the theory of the causes of the supply of water to springs and rivers, and the rise of water in Artesian wells.

In his Bridgewater Treatise, pl. 68 and pl.69, he had illustrated, by diagrams, the causes of the accumulation of a subterranean reservoir, consisting of sheets of water diffused through strata of gravel, sand, and chalk, within the basin of London, and of the rise of water in wells and small perforations through the London clay, under the influence of hydrostatic pressure.

Mr. Clutterbuck's observations and experiments confirmed the general opinion as to the existence of these subterranean sheets of water in the chalk basin, and indicated a connection between their distant parts, by the sympathy he had observed between the sudden floods at Watford and certain wells in London, the level of which had been carefully observed, and found to rise a few hours after the occurrence of the floods at Watford. In London also, he had confirmed observations already made upon deep wells, at considerable distances from one another, and found that any large quantity of water, taken from one well, reduced the level of those adjacent.

It had been questioned whether the communication between wells of this kind took place solely through the medium of large cracks and fissures, or whether the entire masses of the permeable strata, beneath the level of the lowest springs which flowed from them, had all their pores and minutest interstices so entirely filled with water, that any abstraction of this fluid from one well was more or less rapidly replaced by a general flow towards it from every part of the water-logged stratum of sand, or gravel, or stone, in which it was excavated; on the latter hypothesis, during such a flow, the surrounding wells would be affected in the direct ratio of their proximity to that from which large quantities of water were taken.

It had been found at Brentford, that, as the number of Artesian wells increased, the force and quantity of each became diminished; a similar effect followed in the case of adjacent wells in London; the inference he would draw, therefore, was, that a very extensive supply for the metropolis could not be obtained from deep wells of this kind, although a few wells might be supplied abundantly.

The district called the London Basin, is made up of a continuous seam of chalk, from 300 feet to 500 feet in thickness, which, on the S.E. of the Colne, is covered with beds of sand and gravel, alternating with plastic clay, and over all these a thick covering of London clay, whilst the country, N. and N.W.

of the Colne, is for the most part composed of naked chalk. Beneath the whole chalk basin lies a sub-stratum of clay or gault, which is impermeable by water, and upholds the reservoir in question. The valleys in this chalk are traversed by the rivers Ver, Gade, and Chess, whose chief perennial supply of water is from springs that issue out of the chalk; in one of these valleys Mr. Dickinson had proved, by experiments made with Dalton's rain-gauge, (which, being buried 3 feet beneath the surface, received only such water as descended more than that depth,) that during about two-thirds of the year the rain which fell rarely sank 3 feet into the earth, but in November, December, January, and February, it passed down into the subjacent chalk, in proportions which accorded so constantly with the greater or less amount of rain falling in these four wet months, that he had been accustomed to regulate the amount of orders undertaken to be executed in his paper-mills, during the following spring and summer, by the indications on this rain-gauge, of the quantity of water that descended more than 3 feet in the preceding winter.

The Colne is often flooded by the effect of sudden rain which is retained upon the surface of the London clay; but that portion of its water, which is derived from perennial springs, is supplied from the overflowings of the natural reservoirs, or subterranean sheets of water which fill the interstices of the chalk, and also of the sand and gravel beds of the plastic clay formation. The surface of this reservoir is marked by the outbreak of a succession of springs, at levels gradually rising as they are nearer to the upper regions of the chalk; and as the entire supply of this subterranean stock of water is derived from rain that falls on the surface of permeable strata within the London basin, the abstraction of water from any part of this reservoir would, Dr. Buckland conceived, diminish the quantity remaining to be discharged, by springs, into rivers in the vicinity of such abstraction, by the total amount of water so transferred to any other than its natural channels.

It was asserted that the surface of the water in this subterranean reservoir did not maintain a horizontal level, but that it rose nearly 300 feet in fourteen miles, between the town of Watford and the highest spring that issued from the neighbouring chalk hills. The molecular attraction of the particles of chalk through which this sheet of water is diffused, and the obstruction presented by friction to its descent through the numerous pores and minute crevices by which it has to pass in adjusting the line of its upper surface, might account for this deviation from the level line which fluids assume, if left to act freely in open spaces, or in large and continuous conduits; Mr. Clutterbuck's repeated observations upon wells, along the line in question, must be considered to have proved the existence of this inclined level. His observations were also very important, as to the floods at Watford raising, in a few hours, the level of the water in deep wells in London, and as to the effect of a steam-engine erected to pump water from a large experimental well near Watford, in lowering the water in smaller wells in that town and the country adjacent to it.

Mr. Dickinson had made very accurate observations upon the absorption of water by the chalk, and was convinced of its being always in a wet state, almost amounting to saturation; but few crevices and fissures exist in the chalk of the district under notice; the rain therefore occupies a considerable time in overcoming the molecular attraction of the particles through which it passes.—Wherever fissures exist at a certain depth below the chalk, they become channels, which collect and facilitate the flow of water to maintain the springs; the accumulations of the winter rain sink slowly down in summer, and by a series of vents or springs, furnish a supply for the rivers which run in the deepest valleys of the chalk district; a long cessation of rain lowers the level of the water in the rivers, at an interval of some months after the drought, and any extraordinary demand, by pumping from the wells in the chalk, would lower the water in the wells around, even at a considerable distance.

From experiments with the rain-gauge, buried 3 feet below the surface, he found that but little rain penetrated to that depth until the months of November, December, January, and February—the total quantity per annum was shown to vary between 17 inches and 6 inches, which latter amount sufficed to fill the principal springs. He was induced to believe, that, if a large supply of water was drawn from the chalk, it would eventually have a prejudicial effect in diminishing the water in the rivers of the district.

Mr. Clutterbuck said, that the sphere of his observations extended over a line of wells 20 miles in length, and in the whole of them there was the most perfect accordance between the alterations of level of the water and the indications of the rain-gauge, allowing the time necessary for the rain to sink into the chalk,—as also there was between the fall and replenishment of the wells at Watford and those in London, whence large quantities of water were obtained by pumping;—he could always tell by measuring the height of water in one well of the series, what would be that of any other well along the line: he therefore was satisfied of the accuracy of the observations in his paper.

Mr. Dickinson observed, that he could not satisfactorily account for the greater amount of variation in the wells at the higher part of the district, when compared with those of the lower part—the alternations of the former amounting frequently to 30 feet, while those of the latter were only 10 feet in the same time.

Dr. Buckland believed this fact to arise from the hydrostatic pressure being less interfered with, by friction and capillary attraction in the lower part of the district, than in the upper part.

Mr. Clutterbuck accounted for the alternations of level in the sand springs, being greater than in the chalk springs, by the relative degrees of opposition the water met with, from the friction in passing through the two kinds of strata.

Mr. F. Braithwaite had made many borings and sunk several deep wells into the chalk,—he would instance particularly the wells at Messrs. Meux's and Messrs. Reid's breweries, and that at Greenwich Hospital; in these wells he had used cylinders of iron to shut out the sand springs. He did not find the chalk so spongy or saturated with water as had been stated; he imagined that the supply of water was derived from the crevices in the chalk, and in many instances water had not been arrived at, because one of these crevices had been missed, whilst in a well of less depth, nearly adjoining, in which they had fortunately hit upon the crevice, a plentiful supply of water was obtained. In the first and second beds of flints under London there was very little water; from the third to the fifth bed the quantity increased, and at 30 feet lower down, a continuous fault or crevice was generally found which conveyed a good supply of water; the rise and fall of water in wells in the chalk did not accord with those of wells in the sand beds above the chalk; the alternations in the former amounting to only a few inches in a given time, while those of the latter were as many feet. He placed great confidence in the observations made by Mr. Clutterbuck. That gentleman had told him accurately, from the variations of the well, in the Hampstead Road, all the differences of the quantity of water drawn from Messrs. Reid's well, arising either from an extra demand or from cessation in the pumping.

The brewers of London could be supplied by the water companies at a cheaper rate than by pumping, but as a large quantity was used for refrigerating the wort, it was important to have the water at a low temperature, they therefore were obliged to pump it up at a great expense. The quantity raised at Messrs. Reid's well, was about 7700 barrels, of 36 gallons each per day, which was calculated to be a sufficient supply for 5000 families,—there was already a decided diminution manifested in the supply from the sand springs, and an extension of these effects might be anticipated from the sinking of any large number of wells into the chalk.

Dr. Buckland ascribed the difference of the supply of water in sand springs, and in those originating in chalk, to the relative extent of surface of the sandy and cretaceous strata in Hertfordshire, by which alone they receive their respective supplies of rain-water, the amount of sandy surface being to that of naked chalk, about as one to twelve.

The rain filters more rapidly through the sand, than through the chalk. In beds of hard and compact chalk, at great depths, the water sometimes finds no passage except through occasional fissures, but where the chalk is soft, loose, and fragmentary, it percolates rapidly.

In the deep well now sinking near Southampton, through London and plastic clay into hard and solid chalk, it would probably be necessary to continue the boring or excavation down into some loose and more permeable stratum below the chalk, before any very large supply of water would be obtained.

Mr. Palmer directed the attention of the meeting to the account of the wells in the London Basin, given in Conybeare and Phillips' Geology, (book 1, chap. iv., sect. 11.) It is there stated, that at Tottenham, which is about 70 feet above high-water mark, after boring through 123 feet of clay, and 2 feet of calcareous sand-stone rock, the water rose to within a short distance of the surface in a few hours. At Epping, where the summit of the well is 340 feet above high-water mark, the extreme depth of the bore was 420 feet, but it was abandoned because no water was found; at the end of five months, the water rose to within 26 feet of the surface, and it has so continued, at 314 feet above high-water mark.

These recorded facts induced him to receive, with much caution, the statements in Mr. Clutterbuck's paper, especially since he doubted the ready flow of water through the chalk, by which the sympathy between the various wells was demonstrated. He had found, that chalk might be used as a good puddle for holding water, and therefore, as it was certainly more compact when in situ than when it had been worked, unless the water flowed along the faults and the beds of flint, he could not understand how it passed so rapidly as had been stated. The chalk, no doubt, contained some water, but if it was saturated, why did not the water in all the wells assume one uniform level, instead of heights varying between 20 feet and 314 feet above high-water mark?

Mr. Clutterbuck contended that the main points of his statement were borne out by Mr. Braithwaite's experience at Messrs. Reid's well. A clear distinction must be drawn between the water derived from strata, above the clay, and that from the chalk; in some elevated spots near London, situated like Hampstead, the clay is capped with gravel, which, on being tapped, yielded a supply of water: at Stanmore, the water from the gravel at the top of the hill is used; and in a well, sunk through the clay, at the bottom of the hill, the water stood at 140 feet below the surface. He could not understand why, at Epping, there should exist any variation from the usual observed facts; the case deserved very careful examination, as it might arise from some local cause. In the course of his observations, upon the levels of the wells in London, he found on one occasion that no depression occurred on the Thursday, which had hitherto always been the case, he therefore sought for the cause and found that the Elstree reservoir had been opened on Wednesday, June 1st, which satisfactorily accounted for what had occurred, as from the dry state of the water-course not more than half the quantity of water which passed from the reservoir, reached the river Colne, the rest sank through swallow holes down into the chalk; this showed the attention to collateral circumstances, which was demanded in investigations of this kind.

Mr. Frederick Braithwaite presented and explained a model of a well, sunk by him in the year 1841, at Messrs. Reid's brewery, in order to obtain water from the chalk, which had become indispensable, in consequence of the decrease of the supply of water from the sand spring.

On examining the lower part of the well, which had collapsed in 1814, he found that the dimensions of the cast-iron cylinder to be introduced, must be limited to 5 feet 3 inches by 3 feet 2 inches; it was commenced at the depth of 87 feet from the surface, and carried down 135 feet, to within 1 foot 6 inches of the face of the first bed of flints in the chalk.

Being desirous of retaining all the water from the sand spring, he inserted an internal cylinder, which was sunk into the chalk at a depth of 138 feet from the surface, thus effectually shutting out the sand spring from that of the chalk, but permitting the former to flow to its accustomed level in the space between the two cylinders; and to make this supply available in case of need, cocks were inserted in the internal cylinders at convenient depths.

He then proceeded with the excavation in the chalk, increasing the dimensions at every foot in depth, until at 178 feet from the surface, the diameter was 16 feet 6 inches; the excavation was continued at that diameter to a depth of 202 feet from the surface.

In the progress of the work, water was found under the second, sixth, eighth, and tenth beds of flints, and the total supply at this period was two thousand barrels or seventy-two thousand gallons per day of twenty-four hours.

At 196 feet from the surface, the first tunnel was driven 91 feet N. W. in the direction of another well, which only increased the supply four hundred barrels, or fourteen thousand four hundred gallons in twenty-four hours.

The eighth bed of flints, at 154 feet from the surface, yielding the largest quantity of water, (three hundred barrels or ten thousand eight hundred gallons per day,) he drove a second tunnel, 6 feet high by 5 feet wide, for 16 feet E. to W., and then N. and S. for 108 feet, by which he obtained an increase of fifteen hundred barrels or fifty-four thousand gallons per day.

Having ascertained, by boring, that a further supply of water could be obtained at 20 feet below, he continued the excavation 22 feet deeper by 7 feet diameter, when he found water flowing from two horizontal fissures in the chalk without flints; at that depth he drove two tunnels, one N. W., connected with the first tunnel 91 feet long, by which he obtained an increase of three thousand one hundred barrels or one hundred and twenty-one thousand six hundred gallons per day; the second tunnel, in a S. E. direction, was driven for 24 feet, when he obtained a further increase of eight hundred barrels or twenty-eight thousand eight hundred gallons per day.

The total quantity of water thus obtained from the chalk, was seven thousand seven hundred barrels or two hundred and seventy-seven thousand two hundred gallons per day of twenty-four hours, or one hundred and ninety-two gallons per minute, forming, at the same time, a reservoir in the chalk, which could contain one hundred thousand eight hundred gallons.

He stated the total expense to be under £7000, including the hire and repair of temporay pumps, and the cost of two new sets of permanent pumps.

June 7, 1842.

The President in the Chair.

"An Account of the Alterations of Tullow Bridge."
By Charles Forth.

The old bridge at Tullow, over the river Slaney, was very dangerous from its steepness, its narrow roadway, (only 18 feet wide) and the awkward approaches to it; alterations were therefore determined upon, for which the author submitted a plan and also superintended the execution of it. The floods forbade any diminution of the waterway, and it would have been inconvenient to have raised the approaches on the low banks on either side; flat arches, of the following proportions, were therefore decided upon.

	Span.	Versed Sine.	Proportion of Versed Sine to Span.	Diameter of Circle of which the Arch is a Segment.
	Feet.	Ft. In.		Feet.
Land Arch	17	0 7	$\frac{1}{29}$	120
Second Arch	22	1 6	$\frac{1}{14}$	110
Centre Arch	28	2 3	$\frac{1}{18}$	110

The inclination of the roadway was thus reduced from one in seven to one in forty, while at the same time, by adding to the abutments on the up-stream side, the width of the roadway was increased from 17 feet to 28 feet, and by completing a portion at a time, the thoroughfare over the bridge was not at any time stopped. For the sake of economy, the work was done in undressed rubble granite, with an ashlar face, taking care that the stones abutted well against each other; and on removing the centres, no settlement of any importance took place, and the traffic of loaded cars, weighing 35 cwt. each, was carried on without any danger, within a week from the time the arches were keyed. The expense of the alteration was only £485, and it has stood well, although it has been subject to some heavy floods.

A detailed drawing of the bridge, before and after the alterations, accompanied the Paper, and Mr. Vignoles sent with it an enlarged plan, section, and elevation, for the purpose of more fully illustrating what he considered a successful work.

"On the Introduction of Letter-press Printing for Numbering and Dating the Notes of the Bank of England."—By Thomas Oldham, Assoc. Inst. C. E.

The author commences by noticing the numbering press invented by Mr. Bramah and adopted in the Bank of England in the year 1809, by which the expense and uncertainty of finishing annually a large number of bank notes, with the pen, was materially diminished, and forgery was rendered more difficult, although the machine was so far incomplete, that it produced only units, the tens and hundreds requiring to be brought forward by hand.

In that year (1809) the late Mr. John Oldham (the father of the author) offered unsuccessfully to the Bank of Newry, a machine similar in principle to that of Mr. Bramah, but with the additional power of effecting numerical progression, from one to one hundred thousand, by its own operation. In 1813, these machines were adopted at the Bank of Ireland, and one of them was subsequently attached to each press for printing the body of the notes, in order to register and check the number of notes passing through the press.

In the year 1819, Mr. Bryan Donkin invented a counting machine, which is described in vol. 37 of the Transactions of the Society of Arts; it is called "a machine applicable wherever it may be desirable to keep an account of the number of revolutions or strokes, which may be made by the wheels or levers of any other machine, in a given time or space; as for instance, the number of revolutions made by a mill wheel, or of the strokes of a steam-engine beam, in a given time, or the number of revolutions made by the wheel of a carriage or perambulator on passing over a certain space." This machine, like all the others used for a similar purpose, depended upon the relative motion of a series of ratchet wheels with projecting rims, having notches cut in them, so that when the first wheel counted units, the second wheel indicated tens, and so on progressively.

The principle of these machines was carried out in a complex manner, which required very neat adjustment to prevent their being deranged while working; the author, after he had succeeded his father as engineer to the Bank of England, turned his attention to this point, and the result has been the production of the machine described in the paper.

Four wheels, each divided by ten notches, leaving a facet between each, engraved with consecutive numbers from 1 to 0, are placed upon a shaft, a portion of their breadth being turned down about one-half of their depth, having a boss or collar between each; upon these bosses, and filling up the spaces, rest latches, and over each wheel is a pall, the width of the first being equal to that of the unit wheel, and the breadth of the others equalling that of the wheel and latch;—the palls are driven by a crank, by each revolution of which, the first wheel is moved through a space equal to one-tenth of its entire circumference, bringing regularly forward the numbers from 1 to 0, at which point the latch of the second wheel is depressed, and the wheel moves forward one division, marking the tens; the same process is repeated with regard to the other wheels, and thus any amount of numbers can be registered, by simply increasing the number of the wheels in proportion.

Machines on this plan are now generally adopted in the Bank of England, with perfect success, and in some cases they are added to the Bramah numbering machines; and as the author believed that they might be adapted to other purposes than Bank-note printing, he presented the drawings and description of them to the Institution.

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTIONS.

No. 1.

The rapid strides made by inventive genius in the fine and useful arts, which have contributed, in so great a degree, to raise

Britain to the proud position it now assumes in the scale of nations, would naturally bring all parties, connected with the prosperity of our manufactures, to the consideration of the best means to protect the inventor. We should therefore feel wanting in our duty, did we any longer delay bringing before our readers the subject of a revision of the Patent Laws. In doing this, it is not our wish hastily to propose alterations, and dogmatically retain the same opinions, but we would rather call the attention of our readers to the various laws by which the rights and properties of inventors are protected in foreign countries, and see, if out of all these some good practical hints may not be drawn for our own guidance. As a commencement then to a series of articles on this subject, we subjoin a translation of a "*projet de loi,*" which is now occupying the attention of the French Legislature. For the early information we possess on this subject, we are indebted to our esteemed and talented correspondent M. Antoine Perpigna, of Paris.

In a very able pamphlet, on the provisions of this Bill, entitled "*Observations sur le projet de loi, concernant les brevets d'invention; par A. Perpigna, ancien Avocat à la Cour royale de Paris,*" the author, who, from a personal knowledge, we can pronounce to be fully able to undertake such a task, has, with great care, considered the bill clause by clause, and made his observations thereon, which explain, in a concise and intelligible manner, the bearings of the various articles, and point out the effect they will be likely to have upon the interests of inventors, both French and foreign.

Some features of the proposed law may be considered improvements upon those already existing, as far as natives of France are concerned; but others are highly objectionable, from proposing to increase the government charges, or tax, on brevets for 5 and 10 years; and also instituting a series of, what appear to us, useless formalities, thereby mystifying the subject, and at the same time threatening to reject the inventor's application, if all these forms are not strictly complied with.

Foreign inventors (as British) are to be burthened with peculiarly rigorous restrictions, some of which are manifestly impracticable, and others useless and annoying. We indulge in a hope, however, that for the sake of both French and British inventors, the project will not become the law of that country, as it at present stands, but that the objectionable clauses will be so modified as neither to cripple the inventive genius of the people, nor the introduction of foreign inventions into France. We regret that our present limits will not allow us to present our readers with extracts from M. Perpigna's very judicious observations, conceiving, that from the very great intercourse existing between the two countries, the French law of patents must be a matter of considerable interest to British inventors.

FIRST HEAD.

General Arrangements.

Art. 1. Any new discovery or invention in any branch of the arts and manufactures, confers upon the author a right of full and exclusive enjoyment for the terms, and under the conditions hereafter mentioned. This right is conferred by a certain document, delivered by the Government, under the title of Brevets of Invention.

2. Subjects which may be protected by Brevet:—

The invention of any new article in the arts or manufactures.

The invention of new means, or the novel application of known means for producing or obtaining any article appertaining to the arts or manufactures.

3. Subjects which cannot be protected by Brevet:—

Principles, methods, systems, and generally, all discoveries or ideas purely scientific or theoretical.

Plans or arrangements of accounts or finance.

4. The duration of brevets shall be 5, 10, or 15 years:—

For each patent a fixed tax shall be paid in the following manner:—

* 500 fr. for a patent of 5 years.
1000 fr. for a patent of 10 years.
1500 fr. for a patent of 15 years.

SECOND HEAD.

Section I.

On the Application or Petition for Brevets.

Art. 5. On the formalities required upon granting Brevets:

Whoever wishes to obtain a brevet of invention, must deposit,

* 500 francs equal about £20. sterling; 1000 francs, about £40.; and 1500 francs, about £60.

under seal, with the Secretary of the Prefecture of his department, a packet containing, 1st, his petition; 2nd, a description of the discovery, invention, or application, constituting the object of the required brevet; 3rd, the drawings or specimens necessary for properly explaining the description; and 4th, an inventory of the papers or documents deposited.

6. Every application or petition must be confined to one distinct subject:—

The petition shall not contain any restriction, condition, or reservation.

The description must be written upon paper bearing a stamp of 1 fr. 50 centimes, entirely in French, without alterations or additions,—words that are drawn through, not counted, the pages and references underlined. It must not contain the names of any weights or measures, except those mentioned in the table annexed to the law of the 4th July, 1837.

The drawings shall be drawn in ink, and at the metrical scale.

A duplicate of the description and drawings must be attached to each application. All the documents must be signed by the applicant, or his representative, whose power of attorney must be annexed to the demand.

7. No deposit of documents shall be received without producing a receipt, proving the payment of the sum of 200 fr., in part payment of the whole tax for the patent.

A procès verbal, drawn up, without cost, by the Secretary General of the Prefecture, and signed by the applicant, shall prove the deposit of the papers on the day and hour such deposit shall be made. A copy of the procès verbal shall be sent to the depositor on payment of the cost of stamp and registration.

The date of the deposit shall constitute the period from which the rights, obligations, and duration of the brevet shall commence.

Section II.

Of the Delivery of Brevets.

Art. 9. Immediately after the registration of the demand, and within ten days of the date of the deposit, the prefects shall transmit the papers to the Minister of Agriculture and Commerce under the seal of the inventor, annexing thereto the procès-verbal of the deposit,—the receipt proving the payment of the tax, and the power mentioned in article 6.

10. On the arrival of the papers at the office of the Minister of Agriculture and Commerce, he shall proceed to open, register, and expedite, the demands in the order of their reception.

11. The brevets, of which the demand shall have been in proper form, shall be delivered, without previous examination, at the risk and peril of the applicants, and without guarantee as to the reality, novelty, or merit of the invention, or the sufficiency and exactness of the description. A document from the minister, proving the regularity of the application, shall be delivered to the applicant, and constitute the brevet of invention. To this document shall be annexed the certified duplicate of the description and drawings mentioned in article 6, after the copy has been examined with the original, and thereby recognized and established.

The first copy of the brevet shall be delivered free of expense, but all future copies shall pay a tax of 50 fr.

12. All petitions drawn up in an irregular manner shall be considered null and void; the money paid shall be forfeited to the treasury, but it shall be placed to the credit of the applicant, if he presents an amended petition within the space of three months.

13. After the delivery of the brevet, and within two years from the date of the procès-verbal of the deposit, mentioned in article 7, the petitioner shall declare to the Secretary of the Prefecture, who shall have received the deposit, the number of years for which he wishes to retain his brevet, within the limits fixed by article 4.

This declaration must be accompanied by a receipt proving the payment of the full tax for the brevet, and the declaration shall be verified by a procès-verbal, in the form prescribed in article 7.

The brevets, with regard to which these forms shall not have been complied with before the expiration of the above term, shall have no effect for the future, and the invention, which has been the subject of it, shall be open to public use.

14. A royal ordinance, inserted in the "*Bulletin des lois,*" shall publish every three months the names of all brevets, of which the term shall have been fixed by the preceding declaration. An extract of this ordinance shall be transmitted to every patentee whom it may concern.

15. The duration of brevets, for which a definite term has been granted, cannot be prolonged in any case.

Section III.

Of Certificates of Addition.

Art. 16. An inventor shall have the right, during the whole duration of his brevet, to make alterations, improvements, or additions to his invention, on observing the proper formalities on depositing the papers necessary for making his demand, as prescribed by articles 5, 6, and 7.

These alterations, improvements, or additions, shall be verified by certificates delivered in the same form, and having the same duration as the first brevet.

A duty of 20 fr. shall be paid on every demand for a certificate of addition.

17. No one, except the patentee, can, during the term of the provisional brevet, obtain a valid patent for any alteration, improvement, or addition, made in, or to, the object of the original brevet.

18. Any patentee, who wishes to obtain a new brevet for 5, 10, or 15 years, for any alteration, improvement, or addition, instead of a certificate of addition, which would expire with the original patent, must observe the formalities prescribed by articles 5, 6, and 7, and pay the tax mentioned in article 4, according to the term for which he may require the brevet.

19. Whoever shall have obtained a brevet for a discovery, invention, or application, infringing upon the object of another brevet, shall have no right to work the invention already protected, and on the other hand, the holder of the first brevet cannot work the invention which forms the subject of the new brevet.

Section IV.

Of the Working and Transfer of Brevets.

Art. 20. Every inventor, holding a brevet, shall be bound to work the invention forming the subject of his brevet in France, in an effective manner, and for some length of time, within two years from the date of the procès-verbal of the deposit.

21. A patentee can transfer the whole or part of his right.

The total or partial transfer of a brevet, whether such transfer be gratuitous, or for a consideration, can only be effected by a deed drawn up by lawyers.

No transfer shall be valid, with regard to a third party, until it has been registered with the Secretary of Prefecture of each of the departments, in which the respective parties reside.

This registration shall be made on the production and deposit of an authentic extract from the deed of transfer, and a tax of 20 fr. shall be paid on each such registration.

22. A copy of each procès-verbal of registration, accompanied by the extract of the deed of transfer, above mentioned, shall be transmitted by the Prefects to the Minister of Agriculture and Commerce, within ten days from the date of the procès-verbal.

A register shall be kept by the Minister of Agriculture and Commerce, in which shall be entered the transfers belonging to each brevet, and every three months an ordinance shall announce, in the form prescribed by article 14, the transfers registered during the last three months.

23. The assignees of the total right of a brevet, or their assignees, acting together, or a single assignee, acting for all, shall enjoy the benefits of articles 16 and 17.

24. The assignees of a brevet, and those who shall have obtained from the patentee a license for the working of his discovery or invention, shall profit by the certificates of addition, which shall subsequently be granted to him. They can, for that purpose, present a memorial to the Minister of Agriculture and Commerce, by payment of a tax of 20 fr.

. Unless there be agreements to the contrary, the purchasers of patented articles shall have an equal right of applying or causing to be applied to these objects, the alterations, improvements, or additions granted by the before mentioned certificate.

Section V.

Of the Communication and Publication of the Descriptions and Drawings.

Art. 25. The descriptions, drawings, specimens, and models, shall remain deposited with the Minister of Agriculture and Commerce, where they may be seen, without expense, by all applicants.

No copy, sketch, or notes, can be taken of these papers, specimens, or models.

26. The descriptions and drawings of brevets, of which the term is fixed, agreeably to article 13, and also the descriptions and drawings of inventions which have become public property,

according to the terms of the same article, will be published either verbatim, or by copious extracts.

At the commencement of every year, a catalogue of brevets, delivered during the preceding year, will also be published.

27. The collection of descriptions and drawings, and the catalogue, published according to the preceding article, shall be deposited at the ministry of Agriculture and Commerce, with the Secretary of each Prefecture, where they can be consulted without charge.

THIRD HEAD.

Of the Rights of Foreigners.

Art. 28. Foreigners residing in France, may obtain brevets of invention.

29. Any foreigner who has obtained, in his own country, a patent for a discovery or invention, capable of being patented according to the terms of articles 1, and 2, can obtain a brevet in France for the same invention or discovery, if the same privilege be granted to natives of France by the laws of the country to which he belongs.

The duration of the brevet, in the case above mentioned, shall not exceed that of the foreign patent, nor extend beyond the term of 15 years.

The tax, to be paid by the applicant, shall be fixed at the rate of 100 fr. for every year.

The applicant must annex to his petition, besides the documents named in article 5, an authentic copy of his foreign patent.

30. The forms and conditions, prescribed by the present law, shall be applicable to brevets, demanded or delivered, in conformity with the two preceding articles.

FOURTH HEAD.

Of Nullity and Forfeiture, and of the Actions relative thereto.

Section I.

Of Nullity and Forfeiture.

Art. 31. Brevets shall be void in the following cases :—

1st. If the discovery, invention, or application, is not new ;

2nd. If the discovery, invention, or application is not according to article 3, such as may be protected; 3rd. If the discovery, invention, or application, is contrary to the order or safety of the public, to good manners, or the laws of the kingdom, without reference to the penalties which may be incurred for the manufacture or sale of prohibited articles; 4th. If the description attached to the brevet is not sufficient for the execution of the invention, or if it does not indicate, in a complete and intelligible manner, the true meaning and intention of the inventor; and 5th. If the brevet has been obtained contrary to the provisions of article 7.

32. No discovery, invention, or application, shall be considered new, which in France or abroad, anterior to the date of the deposit of the demand, shall have received, either by means of printed publications, or in any other manner, a sufficient publicity to enable persons to execute it.

33. A patentee shall be deprived of all his rights,—1st. If he has not put his invention or discovery into operation in France, within the time fixed by article 20, or if he ceases to work it for more than one year; 2nd. If he introduces into France articles manufactured in a foreign country, similar to those protected by his brevet.

Section II.

Of Actions of Nullity and Forfeiture.

Art. 34. Actions of nullity and forfeiture may be instituted by any interested parties.

These actions, and also all disputes relative to patent rights, shall be carried before the "*tribunaux civils de premiere instance.*"

35. If the action be brought against one or more partial assignees, and against the nominal holder of the brevet, it shall be carried before the tribunal of the place of residence of the latter.

36. The affair shall be conducted and judged in the form prescribed, for summary matters, by the 405th, and following articles of the code of civil proceedings. It shall be communicated to the "*Procureur du Roi.*"

37. In all those cases where a judgment or decree, declaring the nullity or forfeiture of a patent right, shall have acquired the strength of a decision,—and in the case alluded to in No. 3, of article 31, the public ministry may pray that the brevet be declared null and void.

38. In every case, arising from the execution of the foregoing article, the public ministry shall include, in the cause, all assignees and licenses of the brevet, whose titles shall have been registered with the ministry of Agriculture and Commerce, conformably to article 22.

39. When the absolute nullity or forfeiture of a patent right has been pronounced by judgment or decree, having the force of an adjudged decision, notice thereof shall be given to the Minister of Agriculture and Commerce, and the nullity or forfeiture shall be published in the form determined by article 14, with reference to the publication of brevets.

FIFTH HEAD.

Of Infringement and the Penalties thereon.

Art. 40. Any attack against the rights of a patentee, whether by the manufacture of the article, or by the employment of the means forming the subject of his brevet, constitutes the crime of infringement.

Whoever shall be found guilty of this crime, shall be punished by a fine of from 100 fr. to 2000 fr.

41. Those who shall have knowingly sold, or exposed for sale, or introduced into the French territory, one or more counterfeit articles, shall be punished by a fine of from 25 fr. to 500 fr.

42. In case of a second offence, he shall be sentenced, besides the fine named in the two last articles, to imprisonment for from one to six months, for the case mentioned in article 40, and from eight days to two months, in the case alluded to in article 41.

It shall be considered a second offence, when the party has been found guilty of any of the offences mentioned in this law, within the five preceding years.

43. Article 463, of the penal code, may be made applicable to the above mentioned offences.

44. An action for the imposition of the above penalties, can only be instituted by the public authorities, on the complaint of the party aggrieved.

45. If the accused sets up, as his defence, the plea of nullity or forfeiture, or raises questions relative to the ownership of the patent right, the tribunal shall suspend the decree, and send the cause at once before the competent civil tribunal, within a time, which shall be determined by their judgment.

46. The proprietor of a patent right may, by virtue of an order of the president of the "*tribunal de premiere instance*," commence proceedings, by directing any officer to make an inventory or detailed description of the articles supposed to be counterfeits, with or without seizing the same.

The said order shall be granted merely on applying for the same, and producing the brevet.

When it is necessary to seize the articles, the said order may compel the plaintiff to give bail or security, before proceeding to do so.

There shall be left with the party possessing the articles described or seized, a copy of the order, and also of the certificate verifying the deposit of the bail, if such deposit be made; in default of which, the proceedings shall be of no effect, and damages shall lie against the officer.

47. In default of the plaintiff proceeding, either in the civil or correctional court, within the space of eight days, besides allowing one day for every three "*myriametres*" of distance between the place where the articles described or seized are found, and the dwelling of the party infringing, the seizure or description shall be of no effect, without prejudice to the damages.

48. The confiscation of articles acknowledged to be counterfeits, and, if necessary, of instruments or utensils destined specially for their manufacture, shall be declared against the counterfeiter, importer, or seller.

The confiscated article shall be delivered to the proprietor of the brevet, without prejudice to more ample damages, if such should be awarded.

SIXTH HEAD.

49. Royal ordinances containing regulations of public administration, shall fix the necessary arrangements for the execution of the present law, which shall not come into operation until six months after the promulgation thereof.

50. From the same period, the laws of 7th January, and 25th May, 1791; 20th September, 1792; 17th vendemiaire of the year 7; 5th vendemiaire of the year 9; the decrees of 25th November, 1806; and 25th January, 1807; and all previous regulations relating to brevets of invention, importation, and improvement, are repealed.

List of Disclaimers
OF PARTS OF INVENTIONS AND Amendments
MADE UNDER LORD BROUGHAM'S ACT.

(Continued from page 67, Vol. XXII.)

Miles Berry,—disclaimer and memorandum of alterations to patent dated 5th October, 1833, for "certain improvements in the construction of weighing machines,"—being a communication from a foreigner residing abroad. Filed 22nd February, 1843.

List of Patents

Granted by the French Government from the 1*st of October to the* 31*st of December*, 1840.

(Continued from page 71, Vol. XXII.)

PATENTS FOR FIVE YEARS.

Lefebre, Fiévet, and Co., of Turcoing, for an improved weighing machine.

Legendarme, of Paris, for an improved circular saw.

Lefage, of Paris, for the application of steam to the killing of bugs.

Levalleux, of Lille, for improvements in stretchers.

L'heureux, of Bolbec, for an improved drying apparatus.

Mariage, of St. Quintin, for a woollen fabric, imitating lace.

Mathieu, of Paris, for improvements in fire-arms.

Mathieu Varnier and Mathieu Chauffour, of Ay, for a machine for cutting into leaves ornamental wood, used for veneering.

Maublanc, of Paris, for a new locomotive.

Mauduit, of Falaise, for improvements in stocking frames.

Meeus, of Brussels, for a machine for threshing corn.

Migeot, of Paris, for iron-fastenings, for Persian blinds.

Millington and Sanderson, of Rouen, for a composition for greasing machines.

[illegible]llot, of Paris, for a machine for loading and unloading heavy goods.

Minie, of Paris, for a process for priming fire-arms.

Montviguier Monnet, of Paris, for an hydraulic interceptor, used in water-closets.

Moriçeau and Leroy, of Mouy, for an improved spinning card.

Mottet, of Paris, for a machine for cleaning hats.

Mucastiale, of La Guillotière, for a mechanical rail, for drawing ships out of water.

Muller and Merger, of Versailles, for a varnish without color, for pictures.

Murdoch, of London, for improvements in steam-engines used for navigation.

Ochin, of Lille, for wood paving.

Pareillet, of Chalons sur Saône, for a new horse collar.

Pascal, of St. Mandé, for elastic wheels for carriages.

Pernel, of Paris, for a new kind of gilding.

Perrillot, of Paris, for a gauze tissue, for ladies' bonnets.

Perrier, of Trèves, for a rotary pump.

Place, of Paris, for improvements in taps and kennels.

Planche and Dusse, of Paris, for improvements in castors.

Poisot, of Dijon, for an improved lamp burner.

Potonne, of Sevres, for a cylindrical gleaning apparatus.

Puys and Pieux, of Paris, for improvements in the making of buttons.

Radfort, of Sneinton, for improvements in rail-roads.

Ragault, of Paris, for an apparatus to prevent the falling of horses, when set to carriages of four wheels.

Ramel, of Paris, for improved boats, for conveying liquids without any barrels.

Ringé, of Paris, for a new lock.

Robin, of Paris, for improvements in buckles.

Rolland, of Sens, for the means of producing bees' wax.

Roman, of Lyons, for a pharmaceutic sugar-plum.

Rossin, of Paris, for a new steam-engine.

Ronaze, of Marseilles, for anapparatus for guarding against rocks at sea.

Rochu, of Paris, for an improved water-closet.

Sanders, of Paris, for an economical fountain.

Sanguieux, of Jouage, for a roller applicable to the manufacturing of velvet.

Sauterieux, of Paris, for an improved shade.

Schriber, of Paris, for an improved military dressing case.

Serres, of Grenade, for producing impressions on skins.

Simonet, of Paris, for a clasp for trouser straps.

Tiesset and Moussier Fiévre, of Paris, for a process for filtering liquids.

Tissot, of Paris, for the manufacturing of objects in filigrane glass.

Triquet, of Lyons, for a preparation of cards for the Jacquard loom.

Truchelut, of Lyons, for an alarm watch.

Valette, of Paris, for a new pipe.

Villard, of Lyons, for heating apparatus.

Wallet and Morgand, Brothers, of Paris, for a Diorama for a drawing room.

Willaey Faveret, of Besançon, for a new kind of stock for gentlemen.

Wirth, of Lyons, for a new kind of piano.

Patents granted from the 1st January to the 31st March, 1841.

PATENTS FOR FIFTEEN YEARS.

Boivin, of Lyons, represented in Paris, by M. Perpigna, advocate of the French and Foreign Office for Patents, 2 ter: Rue Choiseul; for an improved regulator.

Cuvillier, of Paris, represented by M. Perpigna, advocate, for an improved stove.

Dembinski, of Paris, represented by M. Perpigna, advocate, for a process for preventing the rupture of bottles containing champagne wines.

Guerin, of Nantes, represented by M. Perpigna, advocate, for a new motive power.

Holthorp, of Paris, represented by M. Perpigna, advocate, for an improved lamp.

Houldsworth, of Glasgow, represented in Paris by M. Perpigna, advocate, for improvements in spinning flax and hemp.

Huau, of Brest, represented in Paris by M. Perpigna, advocate, for an improved rigging for ships.

Jennings, of Neuilly, represented in Paris by M. Perpigna, advocate, for the manufacturing of animal black.

William Newton, engineer, of London, represented in Paris by M. Perpigna, advocate, for improvements in typographic presses.

William Newton, engineer, of London, represented in Paris by M. Perpigna, advocate, for improvements in waterproofing.

James Perry, of London, represented in Paris by M. Perpigna, advocate, for improvements in ink-stands.

Robertson, of London, represented in Paris by M. Perpigna, advocate, for the application of porcelaine earth to the manufacturing of various objects.

Spear, of Manchester, represented in Paris by M. Perpigna, advocate, for a machine for cleansing streets.

Stoddart and Gilbert, of the United States, represented in Paris by M. Perpigna, advocate, for a floating basin for repairing ships of all dimensions.

List of Patents

Granted for SCOTLAND, subsequent to January 22nd, 1843.

To George Benjamin Thorneycroft, of Wolverhampton, iron-master, for improvements in furnaces, used for the manufacture of iron, and in the mode of manufacturing iron.—Sealed 1st February.

James Boydell, Junr., of Oak Farm Works, near Dudley, iron-master, for improvements in the manufacture of metals, for edge tools.—Sealed 1st February.

James Clark, power loom cloth manufacturer, in Glasgow, for an improved mode of manufacturing certain descriptions of cloths. —Sealed 2nd February.

Taverner John Miller, of Millbank-street, Westminster, oil merchant, for improvements in apparatus for supporting a person in bed, or when reclining.—Sealed 13th February.

Samuel Kirk, of Stalybridge, in the county of Lancaster, cotton spinner, for certain improvements in machinery or apparatus for preparing cotton and other fibrous substances for spinning. —Sealed 13th February.

Charles Thatcher, of Midsomer Norton, Somersetshire, brewer, and Thomas Thatcher, of Kilmersdon, in the same county, builder, for certain improvements in drags or breaks, to be applied to the wheels of carriages generally.—Sealed 22nd February.

New Patents
SEALED IN ENGLAND.
1842-3.

To William Weild, of Manchester, engineer, for certain improvement applicable to window blinds, and certain parts of which improvements are also applicable to doors.—Sealed 28th January—6 months for inrolment.

John Barrow, of East-street, Manchester-square, engineer, for certain improvements in the manufacture and hanging of window sashes.—Sealed 28th Januaray—6 months for inrolment.

David Isaac Wertheimber, of West-street, Finsbury-circus, Gent., for improvements in calculating machines, part of which improvements is applicable to purposes where wheel work is required,—being a communication.—Sealed 28th January—6 months for inrolment.

George Benjamin Thorneycroft, of Wolverhampton, iron-master, for improvements in furnaces, used for the manufacture of iron; and also in the mode of manufacturing iron.—Sealed 31st January—6 months for inrolment.

William Maugham, of Newport-street, Lambeth, chemist, for an improvement in preparing aerated water.—Sealed 31st January —6 months for inrolment.

William Barnard Boddy, of St. Mary, Newington, surgeon, for improvements in apparatus and means for opening, shutting and fastening every description of sliding and lifting window-sashes, windows, and window-shutters.—Sealed 31st January—6 months for inrolment.

William Robinson Shaw, of Leeds, engineer, for certain improvements in feeding or supplying steam boilers with water.—Sealed 31st January—6 months for inrolment.

Samuel Kirk, of Stalybridge, Lancaster, cotton spinner, for certain improvements in machinery or apparatus for preparing cotton and other fibrous substances for spinning.—Sealed 31st January—6 months for inrolment.

Charles Hancock, of Grosvenor-place, artist, for an improved means of dyeing or staining cotton, woollen, silk, and other fabrics, and rendering them repellant of waters and moisture.—Sealed 31st January—6 months for inrolment.

Charles Clark, of Great Winchester-street, London, merchant, for an improved pyro-hydro pneumatic apparatus, or means of generating, purifying, and condensing steam and other vapours, and of extracting from vegetable substances, the soluble portions thereof; as also the application of parts of the said apparatus to other heating evaporating and distilling purposes.—Sealed 31st January—6 months for inrolment.

James Clark, of Glasgow, power loom cloth manufacturer, for an improved mode of manufacturing certain description of cloths.—Sealed 1st February—6 months for inrolment.

John Hill, of Manchester, machine-maker, for certain improvements in or applicable to looms for weaving carpets, and various other fabrics, in which raised loops, or a raised pile, constitute the face or the figure of the fabric.—Sealed 11th February—6 months for inrolment.

Robert Hicks, of Old Burlington-street, Middlesex, surgeon, for certain improvements in apparatus for impregnating liquids with gases.—Sealed 11th February—6 months for inrolment.

Joseph Morgan, of Manchester, manufacturer of patent candle-making machines, for improvements in the manufacture of candles.—Sealed 11th February—6 months for inrolment.

Jonathan Badger, of Sheffield, carpenter and builder, for improvements in the construction of bedsteads for invalids.—Sealed 11th February—6 months for inrolment.

Christopher Nickels, of York-road, Lambeth, Gent., for improvements in the manufacture of fabrics, made by lace machinery. —Sealed 11th February—6 months for inrolment.

Thomas Ensor, of Milborne Port, glove manufacturer, forimprovements in the manufacture of leather gloves.—Sealed 11th February—6 months for inrolment.

Henry Du Bochet, of South Mall, Ireland, piano-forte tuner, for a new method of making piano-fortes.—Sealed 11th February —6 months for inrolment.

Thomas Wolferstan, of Salisbury, iron-founder, for certain improvements in axletrees and axletree boxes.—Sealed 11th February—6 months for inrolment.

Alfred Brewer, of Surrey-place, Old Kent-road, wire-weaver and felt manufacturer, for improvements in machinery for manufacturing paper,—being a communication.—Sealed 11th February—6 months for inrolment.

George Ebenezer Doudney and Edward Phillips Doudney, of Mile End, Portsea, candle manufacturers, for improvements in the manufacture of dip and mould candles.—Sealed 17th February —6 months for inrolment.

James Boydell, Junr., of Oak Farm Iron Works, near Dudley, iron-master, for improvements in apparatus for retaining the wheels of carriages, in the event of an axis breaking, or otherwise.—Sealed 17th February—6 months for inrolment.

Henry Ross, of Leicester, worsted manufacturer, for improvements in combing and drawing wool and other fibrous substances.—Sealed 17th February—6 months for inrolment.

Charles Brook, of Meltham Mills, York, cotton spinner, for certain improvements in the apparatus used for purifying gas.—Sealed 17th February—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for an improved system of working coal mines and quarries of stone, marble, and slate, which may also be applied to the making of tunnels, borings, or to other purposes of the like kind,—being a communication.—Sealed 20th February—6 months for inrolment.

John Kymer, of Pontardalais, South Wales, coal proprietor, and Thomas Hodgson Leighton, of Llannelly, Carmarthen, chemist, for improvements applicable to the burning anthracite or stone coal, and other fuel, for the purpose of obtaining heat.—Sealed 21st February—6 months for inrolment.

Joseph Crannis and Robert Kemp, both of Southwark, furriers, for certain improvements in wood paving.—Sealed 21st February—6 months for inrolment.

Benjamin Brunton Blackwell, of Newcastle-upon-Tyne, Gent., and William Norris, of the city of Exeter, civil engineer, for an improvement in coating iron nails, screws, nuts, bolts, and other articles made of iron, with certain other metals.—Sealed 21st February—6 months for inrolment.

Lawrence Holker Potts, of Greenwich, Doctor of Medicine, for a new or improved method or methods of conveying goods, passengers, or intelligence.—Sealed 21st February—6 months for inrolment.

Henry Clark, of Drogheda, Ireland, linen merchant, for improvements in machinery for lapping and folding all descriptions of woven textures and surface fabrics.—Sealed 23rd February —6 months for inrolment.

Francis Roubiliac Conder, of Highgate, engineer, for improvements in the cutting and shaping of wood, and in the machinery for that purpose,—being a communication.—Sealed 23rd February—6 months for inrolment.

John Haggerston Leathes, of Norwich, Gent., and William Kirrage, of the same place, asphalte manufacturer, for certain improvements in coffins.—Sealed 25th February—6 months for inrolment.

CELESTIAL PHENOMENA FOR MARCH, 1843.

D.	H.	M.	
1			Clock before the sun, 12m. 42s.
	—		☽ rises 6h. 27m. M.
	—		☽ passes mer. 0h. 16m. A.
	—		☽ sets 6h. 18m. A.
	6	3	Ecliptic conj. or ● new moon
2	9	51	♅ in conj. with the ☽ diff. of dec. 6. 12. S.
	23		☽ in Apogee
5			Clock before the sun, 11m. 51s.
	—		☽ rises 7h. 31m. M.
	—		☽ passes mer. 3h. 2m. A.
	—		☽ sets 10h. 48m. A.
6			Occul 47 Arietis, im. 7h. 26m. em. 8h. 36m.
8	1	48	☿ in the descending node
	13	36	♀ in conj. with Juno, diff. of dec. 7. 40. N.
9	9	49	☽ in □ or first quarter.
10			Clock before the sun, 10m. 38s.
	—		☽ rises 10h. 44m. M.
	—		☽ passes mer. 7h. 16m. A.
	—		☽ sets 2h. 56m. M.
11	4	48	Ceres stationary
12	17	12	☿ greatest elong. 27. 35. W.
14			Mercury R. A. 21h. 53m. dec. 13. 53. S.
	—		Venus R. A. 20h. 36m. dec. 16. 58. S.
	—		Mars R.A. 16h. 31m. dec. 21. 4. S.
	—		Vesta R. A. 9h. 14m. dec. 24. 21. N.
	—		Juno R. A. 20h. 20m. dec. 9. 42. S.
	—		Pallas R. A. 5h. 56m. dec. 10. 50. S.
	—		Ceres R. A. 8h. 1m. dec. 32. 33. N.
	—		Jupiter R. A. 21h. 13m. dec. 16. 39. S.
	—		Saturn R. A. 19h. 42m. dec. 21. 14. S.
	—		Georg. R. A. 23h. 53m. dec. 1. 27. S.
	—		Mercury passes mer. 22h. 28m.
	—		Venus passes mer. 21h. 11m.

D.	H.	M.	
	—		Mars passes mer. 17h. 4m.
	—		Jupiter passes mer. 21h. 45m.
	—		Saturn passes mer. 20h. 13m.
	—		Georg. passes mer. 0h. 27m.
15			Clock before the sun, 9m. 16s.
	—		☽ rises 5h. 34m. A.
	—		☽ passes mer. 11h. 48m. A.
	—		☽ sets 5h. 26m. M.
	—		Occul ε Leonis, im. 12h. 52m. em. 13h. 58m.
16	5	59	Ecliptic oppo. or ○ full moon
16			☽ in Perigee
18	5	19	☿ in Aphelion
19	0	26	♅ in conj. with the ☉
20			Clock before the sun, 7m. 47s.
	—		☽ rises Morn.
	—		☽ passes mer. 3h. 53m. M.
	—		☽ sets 7h. 33m. M.
			Occul ι Scorpii, im. 14h. 14m. em. 15h. 4m.
	18	6	☉ enters Aries,—Spring commences
21	0	7	♂ in conj. with the ☽ diff. of dec. 2. 51. N.
	17	39	♃'s third satt. will im.
22	10	34	☽ in □ or last quarter
23	8	32	Pallas in □ with the ☉
24	4	53	♀ in conj. with ♃ diff. of dec. 1. 21. N.
	5	57	♄ in conj. with the ☽ diff of dec. 1. 22. S.
	17	54	♃'s first satt. will im.
25			Clock before the sun, 6m. 15s.
	—		☽ rises 3h. 39m. M.
	—		☽ passes mer. 8h. 6m. M.
	—		☽ sets 0h. 42m. A.
26	7		♃ in conj. with the ☽ diff. of dec. 4. 11. S.
	11	30	♀ in conj. with the ☽ diff. of dec. 3. 11. S.
	17	14	♃'s second satt. will im.
28	15	29	☿ in conj. with ☽ diff. of dec. 7. 39. S.
30	2		☽ in Apogee
30	11	49	Ecliptic conj. or ● new moon

J. LEWTHWAITE, Rotherhithe.

THE

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CONJOINED SERIES.

No. CXXXVI.

Recent Patents.

To Samuel Hall, *of Basford, in the county of Nottingham, civil engineer, for improvements in the combustion of fuel and smoke.*—[Sealed 14th January, 1841.]

This invention consists, in improvements upon, and additions to, the methods and apparatus described in the specification of a patent, granted to the patentee on the 24th June, 1836, for more perfectly effecting the combustion of fuel and smoke.

The present improvements consist, firstly, in apparatus or machinery for supplying fuel at the front of the fire-place, when it is a long one, and for removing it therefrom progressively along and upon the bars towards the back or bridge thereof, and at the same time raking and clearing the bars. Secondly,—in certain means of retarding the consumption of fuel as it becomes carbonized and converted into coke, for the purpose of retaining an ample quantity, in that state, for more perfectly effecting the combustion of the smoke and inflammable gases as they pass over it in commixture with atmospheric air. Thirdly,—in sprinkling a portion of water upon the fuel in front of the fire-place. Fourthly,—in apparatus or means of supplying atmospheric air to certain fire-places or furnaces. Fifthly,—in preventing large pieces of fuel, of certain furnaces, from passing into the chimnies and escaping from the tops thereof. Sixthly,—in taking the heat, for heating atmospheric air, from other situations, and by other means than those specified in the before-mentioned patent. The following is a description of the apparatus constituting the first and second parts of the improvements above mentioned.

In Plate VII., fig. 1, is a plan view of the apparatus, with the bar B, (shewn in figs. 2, and 3,) removed; fig. 2, is a side view of the apparatus; and fig. 3, is a front view, with the fire-bars in section. A, A, are the fire-bars of a steam-engine fire-place or other furnace, containing slides s^1, s^1, at those ends of them nearest to the bridge of the fire-place; one of the bars is shewn at A^1, (see detached figures,) which is a plan or view of the top of it; A^2, is a section, taken in the line 1, 1; A^3, is another section, taken in the line 2, 2; and A^4, is a section, taken in the line 3, 3. There are partitions in the bars, shewn by dotted lines, of a shape to fit the tops of the slides s^1, s^1, which slide on ledges *t*, *t*, whereby the parts of the slits *u*, *u*, from *v*, to *v*, can be partially or wholly closed, to regulate the quantity of air passing through those parts of the slits, for the purpose of increasing or diminishing the consumption of the fuel, when in a state of greater or less carbonization, as it approaches the back ends of the bars; or instead of these bars, common bars may be used, thickened at the back ends of them, as shewn by B^1, B^1, whereby the spaces u^1, u^1, extend only three-fourths or any other portion of the length of the bars. *a*, *a*, *a*, are iron teeth, situate between the fire-bars, and capable of being raised or depressed at pleasure, in order to rake the fuel from the front to the back of the furnace, or otherwise, as required.

B, (figs. 2, and 3,) is a cast-iron bar or frame, in which the teeth *a*, *a*, *a*, are firmly fixed by nuts *b*, *b*, *b*, screwed on the ends of their shanks. C, C, is a frame or carriage, to which six axles are attached, having a wheel *e*, upon each of them to move the carriage backwards or forwards upon the rails D, D. This movement is effected by the following means:—E, E, are toothed racks, firmly attached to the rails D, D, by the pillars or supports *d*, *d*; and *c*, *c*, are pinions, which are keyed on the shaft *f*, to work in these racks. This shaft *f*, is attached, by bearings, to the carriage C, C, which is moved on the rails D, D, when the shaft is turned round by the working of the pinions in the racks E, E. In order to turn the shaft *f*, conveniently, there is a bevil wheel *g*, keyed on one end of it, and into this wheel another smaller bevil wheel *h*, is worked, by the turning of the square shaft *i*, on which, while it is turned round, the small wheel slides, moving along with it the carriage C, C, it being attached thereto by the projection *j*. The shaft, when worked by manual labor, is turned round by the handle *k*.

The mode of giving the upward and downward motions to the points of the teeth is as follows:—On the carriage C, C, are attached two pillars *l*, *l*, which pass through two corresponding holes in the bar B, and give it a perpendicular movement, when, by the means about to be described, it is raised or lowered. In the middle of the carriage C, C, there is a cross-shaft F, on which are fixed the two arms *m*, *m*. In the end of each of these arms, most remote from the shaft F, is screwed a pin *n*, the head of which slides in the dove-tailed grooves *o*, *o*, of the bar B. There are other similar bars *p*, *p*, attached by joints to the carriage C, C, in one end of each of which is also screwed a pin *q*, similar to the pins *n*, *n*. The heads of these pins slide also in a similar way in the grooves *o*, *o*. The upper end of the arms *m*, *m*, and those of the arms *p*, *p*, most remote from the carriage, are connected together by means of the pins *n*, and *q*, and of a flat bar *r*, *r*, whereby the arms are always kept parallel with each other.

It is obvious that, by turning the shaft F, all the arms *m*, *m*, and *p*, *p*, will be put in motion, and that the frame B, and the teeth *a*, *a*, *a*, fixed in it, may be raised and lowered at pleasure, by the traversing of the pins *n*, *n*, and *q, q,* in the grooves *o, o.* In order to effect the turning of the shaft F, with ease, a toothed segment G, is keyed upon it; and in this segment a small pinion H, works, which is turned by the square shaft I, and slides upon it, (when the carriage moves on the rails D, D, in either direction,) by the turning of the handle J.—K, is a counter-balance weight, to allow of the bar B, and the teeth *a, a,* being raised with ease; and L, is a spring, attached to the carriage C, C, for the same purpose. M, is a bar in front, and N, is another at the back, to support the ends of the rails D, D, and carry the shafts I, and *i*, by means of the carriages O, O, and P, P.

The manner in which the foregoing apparatus operates is as follows:—When the fuel, on the fire-bars, requires to be moved from the front towards the back of the fire-place, the carriage C, C, is brought to the front of the ash-pit, the teeth *a, a, a,* being in a depressed situation, as shewn at fig. 3, by turning the shaft *i*, in the proper direction. The bar B, is then raised by means of the handle J, so as to project the teeth *a, a, a,* above the bars, and into the fuel at the entrance of the fire-place; they are then caused to traverse along the bars, and thereby bear along the fuel from the front towards the furnace-bridge, which operation not only clears the bars, but levels the fuel upon them, so as to cause it to cover them uniformly, and to proceed thereon as its carbonization is effected, as hereinbefore explained. When the carriage C, C, has arrived at the back of the ash-pit, the teeth are lowered out of the fire to prevent their being too much heated or injured, and to be ready for being brought forward again to the front of the ash-pit, while in that depressed situation, for repeating the process of bearing away the fuel towards the furnace-bridge, and raking the bars. The fuel, when this apparatus is used, may be supplied to the front of the fire through the ordinary fire-doors, and by hand in the usual manner.

Another part of the first improvement is shewn at fig. 4; it consists of apparatus for supplying and replacing the fuel at the front of the fire, on its being moved away by the above-mentioned process, without admitting cold atmospheric air into the furnace along with the fuel, as is the case when supplied by manual labor through the usual fire-doors. Q, is a section of the front end of a boiler; R, is a hopper, placed in an inclined position over the fire-doors S, for supplying fuel to the fire-place; T, is a space between the boiler and the hopper, for the admission of a stream of atmospheric air into the front of the fire-place, and over the fuel; U, is a plate, on which the fuel slides on its descent into the fire-place, which can be lowered, when required, to the horizontal position shewn by dotted lines, for the purpose of withdrawing the scoria from the fire, or the fire itself from the furnace, or even, if required, for feeding the fire occasionally, by manual labor, through the fire-doors, in the usual way; *t*, is a lever, fixed to one of the axles *s*, for the purpose of elevating or depressing the plate U;—*w*, is a pipe, extending the whole width of the fire-place, perforated with small holes, to convey and sprinkle water occasionally on the fuel, in the front of the fire-place.

By the operation of the apparatus above described, the fuel in the furnace is first ignited, and then more and more carbonized as it passes along the fire-bars, from the front to the back of the fire-place, so that the coke, which arrives at the end thereof, is nearly if not perfectly free from inflammable gases or smoke, while the whole of the other parts of the fuel, during the different stages of its progress on the bars, are in various intermediate states of carbonization. When the fuel is distributed upon the fire-bars, it is in a fit state for effecting the combustion of smoke or inflammable gases, as they are generated from fresh additions of fuel in the front of the fire-place, and passed over it in commixture with atmospheric air, whether the air be heated by the means described in the before-mentioned specification, or by those herein specified, or in any other way, or whether indeed (as may be desirable in some cases) it is not heated at all.

The fourth improvement consists in passing atmospheric air to steam-engine or other fire-places, through pipes, tubes, or passages within the boilers, instead of its going through flues on the outside of the boilers.—These means are peculiarly applicable to locomotive or other tubular boilers, as some of the tubes, for conveying the flame or heated gases from the furnace and through the water in the boiler to the chimney, may be converted into the tubes for introducing the air into the furnace, leaving the remaining tubes for the original purpose of conveying the flame or heated gases from the furnace through the boiler to heat the water and generate steam. The same improvement may however be practised with other boilers, by inserting within them air tubes, to convey air through the boiler in the same way to the furnaces or fire-places.

Figs. 5, and 6, represent the apparatus as applied to a tubular boiler of a locomotive steam-engine. Fig. 5, is a longitudinal section of the engine, taken through the centre. Fig. 6, is a transverse section, taken in the line *u, u,* looking towards the chimney. *a,* and a^1, are the usual pipes or tubes; *a*I, being such of them as are converted into air inlet tubes, which may be more or less numerous, and differently interspersed among the others, as experience may shew to be most efficacious. The pipes a^1, have other pipes a^2, inserted into one of them to convey atmospheric air through the smoke or exhausting-box A, (by which it is partially heated,) to such pipes a^1, on its way to the fire; this air may be taken by the pipes a^2, immediately from the atmosphere, as herein shewn, or after it has passed between the chimney and a casing around it. a^3, are small tubes around the fire, to convey atmospheric air, as above mentioned, among and above the fuel. The draught of the atmospheric air through the fire-bars, as well as through the air tubes a^2, and a^3, being very slight, when the engines are stopped, in consequence of no steam passing up the chimney, a pipe *w*, and a valve *x*, is applied to the boiler, by which means a portion of steam, while the engines are at rest, may be passed up the chimney for the purpose of producing a draught of air, in the same way as is effected by the steam, which escapes through the exhausting pipe or pipes of the engines when they are in action. As this part of the improvements would cause a waste of fuel, while the engines are at rest, an addition is made to the apparatus to compensate for such waste, or rather to render the steam generated by it available. This consists of a pipe x^1, applied also to the boiler, to pass the steam, generated by such fuel, (which would otherwise be wasted, as above stated,) into a system of pipes, placed within the water in the tender, thereby heating it previously to its entering into the boiler, and thus forming a component part of the apparatus. D, fig. 7, are the pipes; *b*, is a chamber, into which their upper ends are inserted; b^1, is a similar chamber, into which their lower ends are fixed, in the same manner; x^2, is a pipe, to be connected with x^1, to pass the steam into the upper chamber *b*; and x^3, is another pipe, to convey away into the atmosphere, from the lower chamber b^1, the water which results from the condensation of the steam. A valve *y*, fig. 5, furnished with a lever *z*, properly weighted, is attached to the boiler, so as to allow the waste steam to pass through the pipe x^1, into the tender, instead of escaping into the atmosphere through the safety-valve; and at the same time to prevent the pressure of the steam, in the boiler, from being too much lowered.

The fifth improvement consists of a bent metallic plate B, B, B, figs. 5, and 6, which leaves a space C, C, C, between it and the sides and top of the smoke-box A. This plate is perforated with a great number of small holes, their aggregate area being equal at least to the area of the chimney; but it is preferred to have them equal to double its area, or even more, so as to give a free passage of all gaseous matters through them into the space C, on their way from the box A, to the chimney, and at the same time to prevent the passage from the former to the latter of any large pieces of fuel.

The sixth improvement consists in placing the pipes used for heating air previously to its entrance into the front of certain fire-places, not only in the chimney, or in a chamber leading thereto, but in the placing of the said pipes; or in any part of the flues of the boiler, through which the flame or heated gases circulate on their passage from the furnace to such chimney or chamber; and this improvement extends to any other means whatever of heating air for the combustion of smoke and gases, by its being sent into the entrance of the fire-place, to pass from the front to the back thereof, over the fire.

The patentee claims, Firstly, the mode of applying an apparatus, as hereinbefore described, for conveying the fuel from the front to the back of furnaces or fire-places to which it is applicable, and for raking and clearing the fire-bars, and also for levelling the fuel; and the working of this apparatus by power as well as manual labor, by any of the well-known mechanical means of applying such power, and of throwing the machinery in and out of gear, as described.

Secondly,—the method of retarding and regulating the consumption of the fuel, when carbonizing, or when in the state of coke, by means of bars having slits in or projections on them, which slits or the spaces between the bars, formed by the projections upon them, extend only a part of the length of such bars; and by means of the slides, which may partially or wholly close a portion of those ends of the slits which are nearest the bridge of the fire-place, as hereinbefore described, or any other means of decreasing or regulating the supply of atmospheric air, and the consequent consumption of fuel when in the states of carbonization above mentioned.

Thirdly,—the mode of applying to a feeding hopper a moveable plate, capable of being lowered for allowing the scoria or fire to be taken out of the fire-place, or for supplying the fuel, in the usual way, through the fire-doors, or for any other purpose, as herein delineated.

Fourthly,—the means of sprinkling the fuel in the fire-place with water, by the apparatus herein described.

Fifthly,—placing the pipes, for heating the atmospheric air, (to effect the better combustion of fuel and smoke,) in any part of the flues leading from the fire-place to the chimney,—this being an addition to the patentees claim in the before-mentioned patent, for placing such pipes in the chimney or in a chamber leading thereto; and he further extends this claim to any other means whatever of heating air to effect the combustion of smoke or gases, by being sent into the entrance of the fire-place to pass from the front to the back thereof, over the fire.

Sixthly,—the method of applying the pipes or tubes for the admission of air to the fires of locomotive and other similar boilers, by placing them within the box usually called the smoke or exhausting-box, and within the boiler, as well as around the fire-box, as herein described. He also comprises in this claim, the method of applying air-pipes, tubes, or flues, within other boilers, to convey the air through them, in a similar way to the furnaces or fire-places, as hereinbefore described.

Seventhly,—the application of the apparatus, consisting of pipes and valves, for the two following purposes; viz., first,—for the passing of steam through the chimnies of locomotive steam-engines, when they are stopped, in order to produce, when that is the case, as well as when they are in activity, such a draught or current of air through the fire and through the pipes or tubes within the boiler, as is necessary to effect the requisite combustion of fuel and smoke. Second,—for the passing of steam into and through the insides of a number of pipes, passages, or channels, placed within the water contained in the tender, to heat such water previously to its entering the boiler.

Eighthly,—the surrounding of the smoke or exhausting-box with a space containing water, not shewn in the drawings, in the same way as the fire-box is surrounded; but this claim the patentee only makes when in combination with all or any of his methods of supplying air, hereinbefore described, for the combustion of fuel and smoke, and when, consequently, forming a part of this invention as a whole.

Ninthly,—the means of preventing large pieces of fuel from entering into the chimnies of locomotive or other engines, and escaping from the tops thereof, by means of perforated metallic plates, as hereinbefore described.—[*Inrolled in the Inrolment Office, July,* 1841.]

To Samuel Hall, *of Basford, in the county of Nottingham, civil engineer, for improvements in the combustion of fuel and smoke.*—[Sealed 9th May, 1842.]

This invention consists, in improvements upon, and additions to, the apparatus described in the specifications of patents granted to the present patentee on the 24th June, 1836; 30th July, 1838; and 14th January, 1841; for more perfectly effecting the combustion of fuel and smoke.

In Plate VII., figs. 8, and 9, represent the invention as applied to the furnace of an ordinary waggon-shaped boiler, for a stationary engine; fig. 8, being a longitudinal vertical section, taken through the middle of the furnace; and fig. 9, a horizontal section, taken through the flame or smoke-flues. *a*, is the fire-place; *b*, the bridge; *c*, the smoke-flue, through which the smoke and heated gases pass to the chimney *d*, in the course shewn by the arrows; *e*, *e*, are two metallic plates, inserted at the top and bottom of the passage, where the smoke-flue leads from the boiler into the chimney. In these two plates the ends of a number of pipes *f*, *f*, are fixed, the upper ends of which are open to the atmosphere, and the lower ends to the hot-air flue *g*, which passes under the boiler and under the main branch of the flame or smoke-flue, until it arrives at the bridge *b*, where it branches off right and left, so as to form two smaller flues *h*, *h*, one on each side of the fire-place, and beneath a portion of the smoke-flue. From the flues *h*, *h*, as well as from the lining of the door, small apertures *i*, *i*, open into the fire-place. The draught of the chimney produces a descending current of air through the pipes *f*, *f*, and along the air-flues *g*, and *h*, and through the openings *i*, *i*, into the fire-place, as shewn by arrows. The temperature of this air is greatly raised in its passage through the pipes *f*, *f*, and flues *g*, and *h*, and then mingles with the smoke and inflammable gases, as they are liberated from the burning fuel, and effectually consumes them.

Figs. 10, and 11, represent the invention as applied to a bleacher's pan, dyer's pan, brewing copper, or other similar vessel. Fig. 10, is a vertical section, and fig. 11, a horizontal section, taken through the flame or smoke-flue. *a,* is the fire-place; *b,* the flue, through which the flame or heated gases pass (as shewn by the arrows) to the chimney *c*;—*d, d,* are a series of pipes or passages, through the brick-work into the fire-place, and below the flame or smoke-flue, for the purpose of distributing a supply of air, in jets, among the smoke or inflammable gases, to effect their combustion. Air may be taken immediately from the atmosphere, or it may be heated by a system of pipes, placed in the flue leading from the pan or copper to the chimney, bringing it in at the sides of the flue by a method similar to that herein described, as applied to the waggon-shaped boiler.

Fig. 12, represents the invention as applied to the furnace of a baker's oven, or to any other description of furnace. *a,* represents the fire-place; *b,* the ash-pit; *c, c,* the air-passages, running parallel with the fire-place; and *d, d,* the apertures for introducing jets of air, either from the atmosphere, or previously heated, into the furnace; *e,* is the opening at the end of the furnace, to convey the flame from it to the baker's or any other description of oven.

The patentee, in the specification of his before-mentioned patent of 1838, described a plan for supplying air to the furnaces of marine steam-engine boilers, and other boilers of a similar construction, by inserting, within the water-spaces, bent pipes to convey jets of air from the ash-pit to the fire-place above the fuel; the upper ends of these pipes opening into the fire-place, and the lower ends into the ash-pit. The pipes are therein shewn as secured in their places, so as to make a water and steam-joint with the metal of the boiler, by means of double nuts.

One of the improvements relating to such apparatus in the present patent, consists in an improved mode of securing such pipes. In lieu of the double nuts, above mentioned, conical ferrules are driven tightly into the open ends of the tubes, in the same way as is done in securing the fire-tubes of locomotive boilers. This improvement is shewn at fig. 13, wherein *a,* represents the fire-place; *b,* the ash-pit;

c, c, the air-tubes, placed in the water-spaces with their upper ends opening into the fire-place, and their lower ends into the ash-pit; and *d, d,* are the ferrules, driven into the ends to press them into close contact with the boiler-plate, to make secure joints.

Figs. 14, and 15, represent the improvements as applied to a tubular boiler of a locomotive steam-engine. Fig. 14, is a longitudinal section of the engine, taken through the centre; and fig. 15, is a horizontal section of the furnace and of the apparatus within it, taken in the line *u, u,* fig. 14. *a,* and a^1, are the usual pipes or tubes; a^1, being such of them as are converted into air inlet tubes, which may be more or less numerous, and differently interspersed among the others, as experience may shew to be the most efficacious. The pipes a^1, have other pipes a^2, inserted into one end of them, to convey atmospheric air through the smoke or exhausting-box A, (by which it is partially heated,) to such pipes a^1, on its way to the fire. a^3, a^3, a^3, are small tubes around the fire, to convey atmospheric air above the fuel, to combine with or consume the smoke and inflammable gases generated from the fuel. a^4, a^4, are one or more tiers of tubes or apertures, to answer the same purpose as fire-bars; viz., for the admission of air into the lower part of the furnace, and among the fuel, to effect the combustion of the carbonaceous parts.

The other part of the apparatus, before mentioned, for effecting the above purposes, and which may be applied or not at pleasure, is shewn at E, figs. 14, and 15. *c, c, c,* are water-spaces connected with the boiler; a number of oval or oblong tubes *d, d,* are to answer the same purpose as the tubes or apertures a^4, a^4, and are to give an additional quantity of air among the fuel, which air is brought to them through the passage *e,* the same being open at the bottom to the atmosphere. As the draught of the atmospheric air, through the fire-bars as well as through the air-tubes a^2, a^3, a^4, is very slight when the engines are stopped and no steam passes from them up the chimney, a pipe *w,* and valve *x,* are applied to the boiler, to pass a portion of steam, while the engines are at rest, up the chimney, for the purpose of creating a draught.

To the pipe *w*, a cock *w*¹, is applied, to receive a quantity of steam from any other boiler or vessel, and pass it through the pipe *w*, into the chimney, for the purpose of creating a current of air through the fire, when it is first lighted, in order to get the steam up in the boiler more expeditiously than is done in the usual way. In some cases, instead of introducing a quantity of steam into the chimney, for the above purpose, by the cock *w*¹, and pipe *w*, it is conveyed from some other boiler or vessel and introduced by a separate pipe *w*², which can be let down into the chimney and withdrawn at pleasure.

In figs. 14, and 15, B, B, is a bent metallic plate, which leaves a space C, C, C, between it and the sides and top of the smoke-box A. This plate is perforated with a great number of small holes, their aggregate area being equal, at least, to the area of the chimney; but the patentee prefers them to be equal to double its area, or even more, so as to give a free passage of the gaseous matters through them into the space C, C, C, on their way from the box A, to the chimney, and at the same time to prevent the passage, from the former to the latter, of any large pieces of fuel. D, is a pipe, perforated with small holes, and communicating with the force-pump by a pipe, supplied with a stop-cock; the use of this pipe and cock is to throw a jet of water into the smoke-box at pleasure. F, F, is a steam-tight casing around the chimney, through which a portion of the water may be passed, on its way from the tender to the boiler, for the purpose of being partially heated; G, is a pipe, to convey the water from the water-pumps to the casing; and H, another pipe, to convey the water from the casing to the boiler; I, is a casing, applied to the doors of the smoke-box, to be filled with water, to keep them cool.

The following are the claims made by the patentee:— "As regards stationary and marine engines and furnaces, I claim, First, the particular mode, as herein described, of taking air, for effecting the combustion of smoke, from the atmosphere, and passing it underneath the main flame, flues, or passages, from the fire-places which pass under the bottoms of steam-engine or other long boilers, in combination with the introduction of such atmospheric air at the bridge of the fire-place. Second,—the above particular mode of taking atmospheric air under the above-mentioned main flues of boilers, in combination with its introduction, either in the front, or sides of the fire-place, or both, or all around it. Third,—the combination of the mode of taking atmospheric air to furnaces, as described in the above first and second claims, in combination with the previous heating of the air, by the means described and claimed in this patent and my aforesaid patents of 1836 and 1841. Fourth,—the introduction of air, of atmospheric temperature, by any other means than that above described, at the two sides of the above description of furnaces, with or without admitting any at the front or back thereof. Fifth,—the introduction of heated air to furnaces, in the manner described in the last or fourth claim. Sixth,—the introduction of air, of atmospheric temperature, all around the fires of bleachers', dyers', brewers', and other similar pans or boilers, or as nearly all around them as may be required, or as is convenient and efficient. Seventh,—the introduction of heated air, as described in the last or sixth claim. Eighth,—the combination of the feeders, for supplying fires with fuel, known by the name of 'Stanley's Feeders,' with each of the methods of supplying air to furnaces, described in this specification, and those of the patents of 1836, 1838, and 1841, respectively, to which furnaces such feeders are applicable. Ninth,—the introduction of jets or streams of air, of atmospheric temperature, to the furnaces of bakers' or other ovens; also to roasting, smelting, calcining, and all other furnaces, whether taken into such furnaces by the means shewn by fig. 5, or fig. 6, or in any other way. Tenth,—the introduction of heated air, in the manner and to the furnaces, described in my last or ninth claim. Eleventh,—the improved method, herein described, of fixing the pipes for supplying air to the furnaces of marine or other similar boilers."

"As regards locomotive engines, locomotive boilers, and other similar boilers, I claim, First, the use of one or more series of tubes, as shewn by a^4, figs. 14, and 15, placed around and near the bottom of the fire, to effect the combustion of the carbonaceous parts of the fuel, in the same way as tubes a^3, effect the combustion of the volatile inflammable parts of such fuel. Second,—the employment of the apparatus placed within the furnace, as shewn herein, to give a still further supply of air to the furnace, through the apertures *d*, *d*, *d*, to the central part of the furnace, whether such apertures open into the carbonaceous, or into the volatile parts of the fuel, or into both. Third,—the means of causing a draught of air through the fire when the engines are stopped, in combination with the supply of a sufficient quantity of air to the furnaces, whether inclusive or exclusive of that sent through the tubes (shewn herein by a^2, a^2,), placed in the smoke-box. Fourth,—the use of a jet of water, within the smoke-box, at pleasure, for the purpose of keeping it cool, and quenching any sparks or fire that may enter, or take place therein. Fifth,—the means, herein described, of creating a draught through the fire, by introducing a jet of steam into the chimney, from any other boiler, for the purpose of accelerating the getting up of the fire, and, of course, of the steam in the first instance. Sixth,—the means, herein described, of supplying a portion of water to the boilers of locomotive engines, by passing it through a casing around the chimney, whether such casing be connected, or not, with the casing of the smoke-box, or smoke-box doors, or both of them."—[*Inrolled in the Inrolment Office, November*, 1842.]

To James Nasmyth, *of Patricroft, near Manchester, in the county of Lancaster, engineer, for certain improvements in machinery or apparatus for forging, stamping, and cutting iron and other substances.*—[Sealed 9th January, 1842.]

This invention consists, in the direct application of the elastic force of steam, to raising the hammer or striking-block of the machinery or apparatus for forging, stamping, and cutting iron or other substances.

The mode hitherto generally employed, in the application of steam and other power to machinery for forging iron, or other substances, has been, to transmit the power to the hammer or striking-block, by means of rotary motion, under certain modifications, or by the intervention of machinery and apparatus, adapted for transmitting and applying such power and motion; this, in some cases, is by means of certain apparatus, consisting of revolving shafts and wheels, in which mechanical arrangements have been required, for converting the rectilinear motion of the piston, or the rotary motion of the crank-shaft of the steam-engine, or of the axle of the water-wheel, into the requisite rising and falling motion of the hammer or striking-block.

By referring to fig. 1, in Plate VIII., a general idea will be obtained, of the mode in which this has been most commonly effected in forging and working iron, namely, by having a cam-wheel W, on the revolving-shaft S, which, as it revolves under the tail T, enables the inclined backs of the cams O, P, Q, R, to elevate and let fall the hammer as each cam passes in succession under the tail T. It is therefore evident, that the force with which the hammer strikes the work on the anvil A, must be determined by the clear space X, between the upper surface of the work then on the anvil, and the face of the hammer at its greatest height; and it will also be evident, that when a large piece of work is placed on the anvil, there will be a very short fall, and consequently a slight blow, because of the small clear space between the face of the hammer and the upper surface of the work; and on the other hand, when a small piece of work is on the anvil there will be a heavy blow, which is in fact the very reverse of that which is required. And again, as the face of the hammer is only parallel with the face of the anvil, in one position or height from the anvil, the work cannot be hammered parallel, except when of one particular thickness, unless the tail of the hammer be raised to suit each particular piece of work, which is found to be most inconvenient. The impossibility of modifying the force of the blow at pleasure, which is so desirable in many cases, and the difficulty of obtaining access to both sides of the anvil, by reason of the cam-wheel W, and tail T, being in the way, occasion considerable inconvenience, and the expenditure of more time in executing any piece of such forge or other work than is desirable. To this may be added the great cost of all the complex machinery requisite for converting the rotary motion of the steam-engine or water-wheel into the rising and falling motion of the hammer or striking-block, and the liability of these parts to be broken and otherwise deranged, by reason of the nature of the work.

With the view of obviating the above-mentioned defects in the existing apparatus and machinery, and obtaining other additional advantages, the patentee has constructed a "direct action steam-hammer," whereby he is enabled to supply the means of striking blows, varying in intensity or force, at pleasure, and according to the requirements of the case, without the necessity of any rotary motion or wheel-work, as will be understood on inspecting the drawing. Fig 2, is a front elevation of the direct action steam-hammer, suitable for heavy work; fig. 3, is a vertical section, taken through about the middle of the apparatus; and fig. 4, is a general elevation of a steam-hammer, supposed to be in operation upon heavy work. *a, a,* is a cylinder, placed as nearly vertical as possible over the anvil *b,* being supported by the two side standards *c, c,* or placed on a beam, above the anvil, as in fig. 4. A piston *d,* works in the cylinder, and is attached and connected by its rod *e,* direct with the striking-block *f,* which, in this case, serves as the hammer or blow-giving part of the apparatus; the striking-block being guided, in its ascent and descent, by vertical guides *g, g,* attached to the side-frames or standards *c, c,* (figs. 2, and 3,) or the guide-rods *h, h,* fig. 4.

Steam, of such an elastic force, as by its action on the under side of the piston, will freely lift or elevate the hammer or striking-block *f,* is admitted by the valve *i,* to the cylinder *a,* which, pressing upon the under side of the piston *d,* raises the hammer or striking-block to such a height, within the limits of the height or length of the cylinder, as may be required. The striking-block *f,* being thus lifted to the required height, the valve is moved by the valve-rod and handle *j*, so as not only to shut off or prevent any further entrance of steam, but also to permit the steam, which supports the weight of the hammer or striking-block *f*, to escape by the pipe *k*. The instant this is done, the hammer descends with the full force due to the height of its fall, and so gives a proportionally powerful and intense blow to the work then on the anvil. The handle *j*, is again raised, either by means of the downward action of the block *f*, or by the hand of the attendant, as may be found most convenient, and the steam is again permitted to enter the cylinder and press on the under side of the piston. The hammer or striking-block is then raised, as before, and by thus admitting and letting out the steam, a rising and falling motion is given to the block *f*, by the direct action of the steam, and without the necessity for any rotary motion apparatus, such as shafts, wheels, &c., or the intervention of any other apparatus, of the kind above referred to; and, what is of great importance, the height of fall, and therefore the intensity of blow, may be regulated at pleasure, and the work may be struck by a surface of hammer, or cutting instrument, or die, (of any required form,) the face of which hammer, cutting instrument, or die, will at all times maintain its parallelism, or (if not parallel) the same relative position with reference to the surface of the anvil or sustaining-block, whatever be the distance between them.

The mode adopted by the patentee, in forming the connection between the piston-rod and the hammer or striking-block *f*, is as follows:—An elastic or compressible substance *l*, is interposed between the upper and under sides of the collar, on the lower end of the piston-rod, so that the piston-rod may convey its motion and lifting power to the block *f*, through the medium of such elastic or compressible substance, which may consist of wool, cork, wood, leather, caoutchouc, or other similar compressible and elastic substance; the object of this elastic medium being to remove any bad effect from the shock or jerk which might otherwise be transmitted to the piston, piston-rod, or cylinder either at the instant of the blow being given, or of the steam being suddenly let on, in the case where very high-pressure steam is used. And in order further to obviate the latter objection, arising from the sudden admission of high-pressure steam, the under edge of the valve *i*, is cut a little oblique to the opening into the cylinder, so that the entrance of the steam commences at one corner, and the piston begins to move without any jerk.

By reference to fig. 3, the situation of the compressible substance, above and under the knob or end of the piston-rod, is indicated at *l*, *l*, the substance in question being retained by the bottom of the cylindrical recess at l^1, and the top gland or collar at l^2, which collar also serves to enable the hammer or striking-block *f*, to be disconnected from the piston-rod at any time, if required. A strong helical spring *m*, is also placed around the piston-rod, and between the cylinder and the hammer or striking-block *f*, in order to prevent any sudden concussion between the hammer or block and the bottom of the cylinder; and also to assist the quick return of the hammer or block. In order to prevent the piston from being driven too high in the cylinder, the upper part of the cylinder is perforated with a series of openings *n*, *n*, to allow the steam to escape, should the piston reach that level.

The peculiar construction of piston, employed in the steam-cylinder of the apparatus above described, is clearly exhibited at *d*, in the sectional figure 3; it is composed of brass or other metal, and formed of a dished or umbrella-shape, in order that, as the steam exerts its pressure upwards, the piston may be caused to expand as it ascends, and thus secure the tightness or packing, without any other elastic substance being interposed between it and the cylinder; while, on the contrary, the descent of the piston is facilitated by the partial collapse of the piston, from the diminution of the pressure of the steam on the other side.

Another description of piston, employed by the patentee, is represented in the detached sectional figure 5. *a*, *a*, is the steam-cylinder; *b*, *b*, the metallic piston; *c*, the piston-rod; and *d*, *d*, a packing of hemp or other suitable material.—*e, e,* is a metallic ring, placed loosely under the packing; *f, f,* are a series of holes, all round the bottom plate of the piston; and *g, g,* a series of openings in the top plate of the piston.

Now, it will be seen, that the steam in the cylinder *a, a,* on exerting its pressure to move the piston upwards, will rise through the apertures *f, f,* in the bottom of the piston, and press the ring *e, e,* against the packing *d, d,* and thus pack the piston and cylinder tightly, as the piston ascends, (the holes, in the upper part of the piston, permitting the steam-pressure on the under side of the ring to come into action,) and as the hammer falls, on the steam being withdrawn from the under side of the piston, the packing will be gradually relaxed.

Fig. 6, represents a front elevation of a modification of the invention. This arrangement is intended to be used where a quick succession of heavy or light blows is required, and where the apparatus, for admitting and shutting off the steam, to raise and lower or let fall the hammer, is rendered self-acting. Fig. 7, is a sectional view of the steam-cylinder, valve-box, &c., drawn upon an enlarged scale.

The principal arrangement of the machinery is similar to that just described; *a, a,* being the steam-cylinder; *b, b,* the hammer or block, containing a swage, die, stamp, or cutting tool *c,* as required; *d,* the anvil; *e, e,* the side-frames or standards, supporting the striking machinery; *f,* the piston; and *g,* the piston-rod, connected to the hammer or striking-block *b,* by means of the compressible or elastic medium, as previously described.

An important feature in this last-mentioned arrangement, consists in the means of rendering the machinery self-acting, and capable of giving a rapid succession of blows. Supposing steam to be admitted into the valve-chamber *h,* by opening the steam-cock at *i,* the piston, with the hammer, will ascend; this hammer or block is provided with a stud or projecting piece *k,* which, as it ascends, strikes a stop *l,* upon the vertical rod *m, m*; and as this rod is connected to the slide valve-rod, by means of the lever *n,* it instantly [illegible]uts off the steam from the cylinder *a,* turns it into the exit passage *o*, and allows it to enter the cylinder again above the piston, and blow off at the pipe *p*. The hammer now descends as before, and the stud or piece *k*, strikes a similar stop *q*, on the vertical stop-rod *m*, which has the contrary effect of shifting the slide-valve, and turning the steam again into the cylinder below the piston; the repetition of such motions will of course give a corresponding succession of blows of the hammer or striking-block, the intensity or rapidity of which will depend upon the setting of the stops and the pressure of the steam. In the construction of this apparatus, a beam of timber *r*, *r*, or other material, capable of some slight compressibility, provided with a few thicknesses of leather *s*, as a packing, is introduced, and the hammer is furnished with two projecting studs *t*, *t*, so that, at every upward stroke of the hammer, a slight concussion and recoil shall be produced by the contact of the studs with the beam above, and thus add to the smartness of the blow upon the descent of the hammer.

The patentee does not claim the exclusive use of any of the several parts and arrangements of apparatus and machinery, hereinbefore described, except when the said parts and arrangements are used in connection with and furtherance of the said invention, whereby the elastic force of steam is made directly applicable to raise the hammer or striking-block, for forging, stamping, or cutting iron and other substances, as above described.—[*Inrolled in the Petty Bag Office, December*, 1842.]

Specification drawn by Messrs. Newton and Son.

To John Juckes, *of Shropshire, Gent., for improvements in steam-engine boilers; and in apparatus for feeding furnaces and fire-places; and for the more effectual combustion of the smoke and gases arising therefrom.*—[Sealed 8th November, 1838.]

These improvements consist in so modifying and arranging steam-boilers and their furnaces, as well as other furnaces and fire-places, that the fuel, with which they are supplied, may become highly heated before it is deposited upon the fire-bars.

In Plate VIII., figs. 1, and 2, are longitudinal sections of two steam-boilers and their furnaces. *a*, is a hopper, for containing the coal or other fuel, communicating by suitable openings with the tube *b*, by which it is deposited upon the fire-bars *c*, of the furnace; the fuel is forced along the tube *b*, as required, by means of a rammer or piston *d*, and, coming in contact with the heated portion of the tube, it undergoes a distillatory process, previous to being deposited upon the fire-bars; the distilled products pass into the fire, and are consumed.

Fig. 3, is a vertical section of a stove, for heating apartments, and fig. 4, is a partial section of an open stove or fire-place. The tube *b*, in fig. 3, is placed in a vertical position, and the piston is worked by a rack and pinion. In fig. 4, an angular scoop *e*, is used for raising the fuel, mounted on an axis at *f*, and worked by means of the pinion *g*, gearing into a rack *h*, attached to the back of the scoop; the fuel is forced up through an opening at the centre of the fire-bars, (shewn by the detached view, fig. 5,) which is afterwards closed by two or more sliding-bars *i*, to prevent it from falling, when the scoop descends; the bars *i*, are moved backwards and forwards by the pinion *j*, and rack *k*.

Two other modes of feeding furnaces and fire-places are described and shewn, in which the tube or tubes *b*, above mentioned, enter the furnace or fire-place from below, through an opening at the centre of the fire-bars.

The patentee claims, Firstly,—the mode of arranging steam-boilers and furnaces, so that the fuel will be fed to the fire-places thereof through heated surfaces, and thus subjected to a distillatory process, previous to being deposited upon the fire-bars. Secondly,—the mode of applying suitable means for heating the fuel of furnaces and stoves, in such a manner that the fuel, in its progress to the fire-places thereof, shall be heated, or undergo a distillatory process. Thirdly,—the mode of using a sliding-bar or bars to fire-places, as shewn at fig. 5, when combined with feeding fuel from below, whether it be combined with a heated tube or way, or not; but he does not claim the feeding of fuel from below, when uncombined with the above improvements, or one of them.—[*Inrolled in the Inrolment Office, May*, 1839.]

To John Juckes, *of Shropshire, Gent., for improvements in furnaces or fire-places, for the better consuming of fuel.*—[Sealed 9th December, 1839.]

This invention consists of a peculiarly constructed apparatus, for feeding furnaces or fire-places, whereby a vacancy is produced beneath the burning fuel, and a quantity of fresh fuel is supplied from below, to fill up the vacancy.

The mode of applying this invention, is shewn in Plate VIII. Fig. 6, represents a steam-boiler and furnace, provided with the requisite feeding apparatus. The fire-bars *a*, are divided into two sets, and between them a plate or platform *b*, is situated; this platform moves on an axis *c*, between two side-plates *d*, and is furnished with a curved surface *e*, at its front end, to close the opening into the chamber *f*, which receives the fuel from the hopper *g*. Against the under side of the platform a roller *h*, works, carried by an arm *i*, projecting from the shaft *j*, which has also another arm *k*, connected by a rod *l*, with the crank-lever *m*, and is likewise provided with a weight, to counterbalance the weight of the platform. *n*, is a crank-lever, mounted on the same shaft as the lever *m*, and attached to the rod *o*, of the piston *p*.

When the fire requires a fresh supply of fuel, the attendant first lowers the platform *b*, into the position shewn in the drawing, (the burning fuel forming an arch over the opening between the two sets of fire-bars,) by means of the crank-lever *m*, and he then moves the piston *p*, forward, by depressing the handle of the lever *n*; the fuel is thus forced upon the platform, which is now raised, and the piston drawn back. By this method, the fresh fuel is introduced beneath that which is burning, and the gases, evolved by it, pass through the ignited fuel, and are consumed.

A modification of the above method of moving the platform and piston is described in the specification; the chief difference being in the employment of pinions and racks, in place of the crank-levers *m*, and *n*.

Fig. 7, is a front view, and fig. 8, a section of a fire-place for a dwelling-house, supplied with fuel in a similar manner to the furnace represented at fig. 6; and fig. 9, is a plan view of the bottom of the grate, with its coal-box. *a*, is the coal-box; *b*, the platform; and *c*, a rack, on its under side, into which a spring-catch *d*, takes, and supports the platform at any required height. The platform is elevated by passing a poker or other instrument through an opening *e*, in the front of the coal-box, and into the loop at the side of the rack *c*; it is permitted to descend by releasing the catch from the teeth of the rack, by means of the handle *f*, and is supplied with coals through the lid *g*.

The patentee claims the mode of supplying fuel to furnaces or fire-places, by means of a platform, or such like instrument, acting in the manner described.—[*Inrolled in the Inrolment Office, June,* 1840.]

To JOHN JUCKES, *of Lewisham, in the county of Kent, Gent., for improvements in furnaces or fire-places.*—[Sealed 4th September, 1841.]

THESE improvements consist in forming the fire-bars of furnaces or fire-places into an endless chain, which passes over a wheel, at each end of the furnace, and is moved a short distance, at intervals, so that the fuel is gradually carried towards the bridge, and progressively brought into a state of combustion; by this means the gases, evolved from the fresh fuel, are consumed in their passage, over the ignited fuel, to the bridge of the furnace, or entrance into the flue of the chimney.

In Plate VIII., fig. 10, is a longitudinal section, and fig. 11, a transverse section of a furnace, provided with a series of fire-bars, connected together in such a manner as to form an endless chain; figs. 12, are side and end views of the fire-bars used therein. *a*, is the bridge and entrance into the flue of the chimney; and *b*, is a carriage or frame, that supports the fire-bars, which can be moved into and out of the ash-pit, by means of its wheels *c*, running upon the rails *d*;—*e*, *f*, *g*, are the fire-bars, which slightly differ from each other, as will be seen by reference to figs. 12, *e*, being the outer bars; *f*, those that are situated next to them; and *g*, the inner bars. The fire-bars are made into an endless chain, by passing the rods *h*, through their openings *i*, and rivetting the ends of the rods; the outer bars *e*, rest upon the rollers *j*, so that the portion of the chain within the furnace is supported by those rollers. The chain of bars passes over a wheel *k*, at each end of the furnace, and the bars are so arranged that each row will break joint with the row on either side of it; in order that as they pass out of the furnace, over the back chain-wheel, one end of each alternate bar may rise from between the others, as seen at *l*, fig. 10, and clear away any clinkers or hard cinders formed upon or between them.

The gudgeons of the front chain-wheel are moveable in the frame *b*, and are adjusted by screws and nuts *m*; upon its shaft a cog-wheel is affixed, driven by a pinion on the shaft *n*, and this shaft is turned by a lever *o*, (represented by a side and edge view, at fig. 13,) when the fire-bars are required to be moved. The lever consists of a bar *o*, with two plates o^1, o^1, fixed to its broadest end; between these plates is a ratchet-wheel *p*, mounted upon a hollow spindle *q*, the interior of which is suitably formed for receiving the square end of the shaft *n*. The ratchet-wheel turns freely upon its spindle, in one direction, but is prevented from turning the other way by a spring-click *r*, so that when applied to the shaft *n*, and moved up and down, in the same manner as a pump-handle, it will cause that shaft to revolve, and, by means of the pinion and cog-wheel, to communicate the requisite movements to the fire-bars.—The patentee states, that he generally moves the bars about one foot every twenty minutes. *s*, is a hopper, by which the coals are deposited upon the fire-bars; *t*, an iron box, for receiving the small coals that may fall between the bars before they become caked and ignited; and *u*, a sliding door, which is raised or lowered, as required, for the purpose of regulating the quantity of coals carried into the furnace by the fire-bars.

The patentee claims the mode of constructing furnaces or fire-places, by combining fire-bars into a chain, by which the parts may be changed in their position, from time to time, and progressively go into and out of action, as above explained.—[*Inrolled in the Inrolment Office, March,* 1842.]

As the above described invention is at present exciting considerable interest, we think it as well to draw the attention of our readers to the specification of a patent, for improvements in furnaces, granted to Mr. Bodmer, May, 1834, (see Vol. VII., p. 57, Conjoined Series,) in which, after shewing two descriptions of travelling fire-bars, viz., rotary and horizontal, he states, "It is obvious, that a propelling or travelling grate may be constructed by a series of fire-bars, attached to an endless chain, passed over conducting rollers, and actuated in any convenient manner."—p. 68.

To Jesse Smith, *of Wolverhampton, in the county of Stafford, lock maker, for his invention of improvements in the construction of locks and latches, applicable for doors and other purposes.*—[Sealed 9th November, 1841.]

These improvements in the construction of locks and latches consist, in certain novel parts, adapted to work the spring-bolt of a lock.

In Plate VIII., fig. 1, represents the improvement applied to a mortice lock; and fig. 2, the novel parts detached.—The lock bolt, of the ordinary construction, is shewn at *a*; and *b*, is the private bolt, as commonly applied. The spring-bolt is shewn at *c*, on which the improved parts are intended to act, for the purpose of drawing back the spring-bolt, by means of an ordinary handle, knob, or other suitable contrivance. A double-armed lever *d, d*, forms part of the piece called the "follow," which works in sockets in the plates of the lock, in the ordinary way. One arm of this lever *d*, acts against the crank-lever *e*, hanging upon a pin set in the lock-plate at *f*; and the other arm of the lever against a pin or stud, set in the hinder part of the spring-bolt *c*. The lower end of the pendant crank-lever *e*, is connected by a joint pin to the spring-bolt at *g*; and the upper end of this pendant crank-lever is acted upon by a spring *h*. The action of the lock, when the door is required to be opened, is as follows:—On turning the handle of the door, the upper arm of the follow-lever *d*, will rise and force the pendant crank-lever *e*, into the position shewn in fig. 1, the lower arm of the lever *e*, having by that means drawn the spring-bolt back, so as to allow the door to open. When the knob or handle of the follow is released, the force of the spring *h*, acting on the upper arm of the crank-lever *e*, will bring it and the bolt *c*, again into the projected and quiescent situation.

The above is one mode of drawing the spring-bolt *c*, back, but if the follow is turned in the reverse direction, the lower arm of the follow-lever *d*, bearing against a pin *i*, set in the hinder part of the spring-bolt, will also draw the spring-bolt back.

The patentee states that, although in the drawing attached to the specification, he has shewn these improvements only in connection with a mortice lock, yet he does not intend to confine himself to that or any other particular construction of locks, to which the same contrivance may be applicable; but he claims, the use of the pendant crank-lever, connected in any convenient way to the spring-bolt, when acted upon by the lever attached to the follow, as above described; however they may be varied in their forms or positions.—[*Inrolled in the Petty Bag Office, May,* 1842.]

Specification drawn by Messrs. Newton and Son.

To Isaac Dodds, *of Sheffield, in the county of York, engineer, for certain improvements in the modes or methods of supplying gas, for the purposes of illuminating towns and other places.*—[Sealed 13th November, 1841.]

These improvements in supplying gas, for the purposes of illumination, consist, in the first place, in an improved means of conveying gas from the station or manufactory to any required distance, (say many miles,) to the place or locality where it may be required to be consumed. The gas is to be conducted through pipes, or tubes of small capacity, instead of large tubular mains, as heretofore, which is effected by exhausting the air in the tubes or pipes, at that end which is nearest to the place intended to be illuminated, or farthest from the manufacturing station, or it may be at intermediate stations between them. By these means, the friction of the gas, in passing through the pipes or tubes, will be greatly relieved, and its progress facilitated and carried on with any required degree of velocity, which may be regulated by the working of the machinery. The same object is also effected by pumping, or otherwise forcing the gas forward from one station to another, with the same construction of machinery, or by any other convenient means. And occasionally the passage of the gas is further promoted by combining the two operations of exhausting and forcing, suitable machinery being applied at the opposite ends of the line of pipes or tubes.

In Plate IX., fig. 1, represents an internal view of an apparatus for exhausting, or it may be employed for forcing the gas; and fig. 2, is a transverse section of the apparatus. The external cylindrical vessel *a, a,* contains a rotary fan *b, b,* which is actuated by a pulley and band, or other contrivance, applied to its axle *c, c.* The tubes *d, d,* when this apparatus is used for exhausting, communicate with that end of the conducting main of pipes or tubes which is farthest from the supply or manufacturing station; and being likewise connected with the cylindrical vessel, thereby charge it with gas. The rotation of the fan, by exhausting the tubes *d, d,* causes the gas to flow through the main, with great rapidity, into the cylindrical vessel *a,* and which is, by the rotation of the fan therein, forced onward through the tube *f,* into a gas-holder or pipes; from whence it may be conveyed into other receptacles, or to the burners for use. If this apparatus be applied to the station end of the pipe or main, that is, between the purifiers and the main, its rotary action will force the gas onward, though not with equal effect to the operation of exhausting.

Fig. 3, represents, in section, another form of apparatus, which may be employed either for exhausting or propelling the gas in the mains. *x*, *x*, is a cylindrical tank, containing water. Within this tank there is immersed a moveable cylinder H, I, H, I, open at top and bottom, and having an air-tight partition *c*, *c*, dividing it in the middle. A cross-arm *d*, *d*, is affixed to the cylinder H, I, on the upper side of the partition-plate *c*, *c*; and to this is attached, by a joint, the vertical rod G, which is connected at top to a rotary crank. An air-tight vessel K, K, is fixed in the lower part of the tank, through which, pipes A, and B, pass; the pipe A, being for the passage of the gas from the purifying or other vessel, and the pipe B, for conducting it to the main, gas-holder, or burners. On the cylinder H, I, being raised, through the agency of the rotary crank and rod G, the valve *a*, in the pipe A, will rise, and allow the gas to pass into the lower compartment of the cylinder H, I, the bottom of which is rendered air-tight by the water in the tank; and on the descent of the cylinder, the gas, contained in the lower compartment, will be forced through the descending valve *b*, *b*, into the pipe B, and thence be forced onward toward the gas-holder or burners.

Another construction of apparatus, for effecting the same object, is shewn at fig. 4, which represents the apparatus in section. This may be called an Archimedean pump. A, A, is a stationary cylindrical tank, one end of which stands elevated at a considerable angle from the horizontal line. The interior of this tank is rather more than half occupied with water, and within it a barrel B, B, containing the spiral or Archimedean screw C, C, is mounted in such a manner as to allow of its revolving; D, is the pipe, by which the gas is conducted from the retorts, or from the purifier into the upper part of the cylindrical vessel A; and F, is the pipe, by which the gas is conducted from the compartment E, at the end of the Archimedean screw-barrel, to the gas-holder or burners. Rotary motion being given to the axle G, of the Archimedean screw-barrel, by a band and pulley, or by any other convenient means, the gas or air in the cylinder A, A, enters the spiral passages of the screw C, C, at the elevated open end, and being pressed by the resistance of the water, the gas or air is carried through the spiral passages, and discharged therefrom into the compartment E, at the opposite end of the barrel; whence it is, by the rotation of the apparatus, forced onward through the pipe F. It will be understood, that this apparatus may be applied at either end of the main, or at intermediate stations, for the purpose of either drawing or forcing the gas.

Another feature of these improvements in supplying gas, for the purpose of illumination, consists in certain novel constructions of apparatus, for regulating the supply of gas to a burner or burners, by which the quantity of gas passed may be kept uniform, however much the pressure may vary. Fig. 5, represents, in vertical section, the improved construction of burner. *a*, is the pipe, by which the gas is supplied from the main to the burner; *b*, *b*, a chest, for receiving the gas; and *c*, the passage which conducts the gas to the Argand ring *d*, *d*, or other construction of burner. In the passage *c*, a cone *e*, is introduced, for the purpose of partially closing the way, and thereby preventing the passage of a full current of gas. The apex of this cone, which is inverted, has a guide-rod *f*, sliding in an adjustable socket *g*, with a spiral spring *h*, to force the cone upward, and a diaphragm *i*, *i*, formed of bladder, or any other suitable material, is extended across the lower part of the chest *b*, constituting its bottom. This diaphragm is secured, round its edges, by flanges or otherwise, to the sides of the chest, and in the middle to the rod *f*, near the apex of the cone. The spring *h*, is adjusted by the screw-socket *g*, so as to raise the cone with certain force, and thereby keep the way, for the gas up the passage *c*, open; but when the gas, in the pipe *a*, and chest *b*, *b*, experiences any extraordinary pressure, its elastic force against the diaphragm, causes the cone to descend, and hence to contract the passage in the pipe *c*, as circumstances may require.

Fig. 6, is a vertical section of a modification of the last-mentioned apparatus, suited to supply several burners. *a*, is the pipe, leading from the main, by which the gas is conducted into the chest *b*;—*c*, is a cone, suspended by a rod at its apex, which has a spiral spring *d*, above, for the purpose of supporting the cone. A plate *e, e*, crosses the middle of the chest, having an aperture in it for the passage of the gas from the upper part of the chest into the lower part. In this aperture the cone *c*, hangs, and according to the height of the cone, so will the aperture, for the passage of the gas, be more or less contracted. A diaphragm, as before described, is secured to a flange, round the edge of the chest, and also to the apex of the cone. The cone is hollow, and is capable of receiving a small quantity of shot or other weighty matter, if required, for the purpose of counter-balancing the upward pressure of the spring *d*, which affords the means of a very nice adjustment of the opening, and thereby regulates the quantity of gas passed from the upper part of the chest into the lower part, and thence to the burners.

Should any extraordinary pressure of gas occur in the pipe *a*, and upper part of the chest *b*, the diaphragm would rise, and consequently lift the cone *c*, so as to contract the aperture in the plate *e, e*, and thereby regulate the quantity supplied through the pipe *f*, to the burner.—[*Inrolled in the Petty Bag Office, May*, 1842.]

Specification drawn by Messrs. Newton and Son.

To Alfred Green, *of Sheffield, in the county of York, surgical instrument-maker, for his invention of certain improvements in trusses or surgical bandages.*—[Sealed 15th March, 1842.]

This invention of improvements in trusses or surgical bandages, consists, in an improved mode of constructing the same, whereby they are rendered more compact, and made to fit more closely to the part affected, so that the truss will not shift its position when once properly placed.

One great inconvenience, arising from trusses of the ordinary construction, is the protuberance of many of the parts, such as the springs, studs, and buttons, by which the various parts are connected together; and also the bulkiness of the pads or cushions. These inconveniences, the patentee states, are considerably lessened; firstly, by employing a spring, of such a form as will, when in use, lie close and flat against the pad or cushion-plate; and secondly, by connecting or attaching the various parts together, by means of eyelet-holes, in place of studs, screws, buttons, or other fastenings, which would project and be visible outside the clothes.

In plate IX., fig. 1, is a front view of the improved truss, complete. *a, a,* is the body-belt, made of soft flannel, covered on the inside with chamois, or other soft leather; *b, b,* is the pad or cushion, made of a concave metal or other plate, its convex side being padded with soft flannel, and covered with chamois leather, or other suitable material, and the front or concave side of the plate is covered with strong leather or cloth. A perpendicular ogee steel spring *c,* is connected, by means of the metal eyelet-hole *e,* to the body-belt. This spring is covered with leather, and is also connected to the cushion or pad *b,* by the metal eyelet-hole *d,* which passes through the spring and the leather or other covering of the cushion; *f,* is the thigh-strap, connected to the end of the perpendicular ogee spring *c,* either by means of an eyelet-hole, or by being sewn on to the leather covering of the spring. This thigh-strap passes between the legs, and is fastened to the body-belt by one of the studs or buttons *g, g,* and thereby keeps the pad or cushion in its proper place. The body-belt is fastened round the body by means of the strap *h,* and buckle *i.*

Fig. 2, is a front view of another bandage, in which the perpendicular ogee spring *c,* is fastened to the body-belt, by the eyelet-hole *e,* but passes freely through a metal or leather loop, or slide *j,* made by sewing or otherwise attaching the loop or slide, in a horizontal position, on to the leather covering of the concave pad or cushion-plate.

Fig. 3, is a section, through the middle of the pad, shewing the concavity of the pad or cushion-plate, and the peculiar shape of the spring, which, when the truss is in use, lies close in the concavity of the pad. The other parts of the truss are the same as in fig. 1; and, as they are marked with similar letters of reference, no further mention of them is required. The perpendicular ogee spring may also be connected to the pad or cushion, by making a slot in the spring, and affixing a flat-headed stud, through the slot, to the cushion-plate, so as to admit of its sliding.

Fig. 4, represents the manner of applying two pads or cushions to a body-belt, for a double truss. The body-belt is divided into two parts, which are connected together by the middle strap and buckle *k*, *l*, by which means the pads or cushions may be brought nearer together, or separated farther from each other, as circumstances may require. The pad or cushion and spring, shewn, is of the same construction as fig. 2,—the spring *c*, being fastened to the body-belt by the eyelet-hole *e*, and allowed to pass freely through the leather or metal loop, or slide *j*.

The patentee claims, firstly, the method, herein shewn and described, of constructing trusses or surgical bandages with a perpendicular spring and concave plate; secondly, fastening a perpendicular spring to the body-belt of trusses and other surgical bandages; thirdly, the improved method of fastening or connecting the various parts of trusses and other surgical bandages together, by means of eyelet-holes, instead of the projecting studs, buttons, screws, and other means, heretofore used; and fourthly, the method shewn, in figs. 2, 3, and 4, of connecting the perpendicular spring to the pad or cushion, by means of a loop or slide of leather, metal, or other suitable material; whereby the pad or cushion may be raised or lowered, as circumstances may require.—[*Inrolled in the Petty Bag Office, September,* 1842.]

Specification drawn by Messrs. Newton and Son.

To William Newton, *of the Office for Patents.* 66, *Chancery-lane, in the county of Middlesex, civil engineer, for an invention of certain improvements in cleansing wool, and facilitating the operation of dyeing; and also in washing and bleaching cotton, yarns, or fabrics,—being a communication.*—[Sealed 21st December, 1841.]

This invention, communicated by a foreigner residing abroad, on whose behalf the patent, in this country, is obtained, consists of an apparatus, by means of which the processes of scouring, washing, and dyeing wool, cotton, and other fibrous substances, may be carried on, as it is stated, in a better and more effectual manner, and with a more satisfactory result, than by the methods usually employed.

The apparatus consists of a close vessel, suited for containing the substances to be washed, bleached, or dyed; contiguous to which is to be placed a vessel, containing the alkaline liquor and water for washing, or the dyeing liquor.

In Plate VIII., fig. 1, represents a vertical section of the improved apparatus. *a, a,* is a cylindrical vessel, made of iron or wood, or other suitable material, constructed strong enough to bear a pressure of from one to two atmospheres, and coated on the inside with some material not liable to oxidation, and incapable of giving out color or damaging the goods whilst under operation; *b,* is a false bottom, placed in the lower part of the vessel, and perforated with holes for the passage of the liquor; *c,* is a cover, closing the aperture, or man-hole, in the top of the vessel, which is furnished with two loops. Into these loops, wedges *d, d,* are driven, which, at their extremities bear on the upper part of the vessel *a,* and thereby hold up and make fast the lid or cover *c,* in contact with the top of the vessel. A tube *e,* is placed vertically in the middle of the vessel, resting upon the false bottom; it is open at bottom and closed at top, and is pierced with holes all round, for a considerable distance down, in order to allow the liquid to escape, in radial directions, into the goods packed in the vessel round it. A pipe *f,* supplies the liquid to the vessel *a,* by a force-pump *g,* which raises it from the reservoir *h,* and forces it into the lower part of the vessel *a.* The liquor in the reservoir may be heated to any given temperature, in any convenient manner, if required; or the reservoir may be an open boiler. A cock *i,* is inserted into the upper part of the vessel, in order that the liquid may be discharged, after having passed through the goods under operation. A flexible pipe *j,* is to be attached to the cock, for the purpose of returning the liquid into the reservoir, after it has circulated through the apparatus. In the bottom of the vessel *a*, there is a pipe *l*, provided with a cock, for emptying the vessel, after the operation is done. The wool or other substance, on which the cleaning operation is to be performed, must be tightly packed in the vessel *a*, as at *m*, *m*, and the pump *g*, being set to work, the liquor will be forced through.

In some cases, it is more advantageous to employ a closed vessel, as at fig. 2, which represents a vertical section of the vessel *a*, having a perforated piston *p*, attached to a cross-head *q*, working within it by means of a screw *r*. It may be also found, in some cases, that the central pipe presents too easy a passage to the liquid, which then does not act properly on the substances under operation. This apparatus is therefore modified accordingly. By turning the screw *r*, the cross-head and the piston are forced down upon the substances to be operated upon, which compresses them. Fig. 3, is a top view of the cross-head.

The other parts of the apparatus are similar to those already described; viz., *f*, is the supply-pipe, for introducing the alkaline or other liquid into the vessel *a*;—*g*, is a double-action pump, similar to the one above described. The reservoir, containing the liquid to be employed, and which has not been represented in the drawing, is similar to that shewn at fig. 1. *i*, is the exit-pipe, for the escape of the liquid, after it has passed through the perforated piston *p*, to which a leather tube may be adapted, if necessary, in order to conduct the liquid into the reservoir, or direct it into any other vessel. The screw *r*, is of a sufficient length to give a suitable pressure to the goods placed in the vessels employed, and may be turned by any convenient means.

In order to scour wool, packed in the vessel *a*, as described, in reference to fig. 2, an alkaline solution, or any other solution, generally used for that purpose, is poured into the vat. The pump *g*, draws up this liquor, and forces it into the lower part of the vessel *a*, through the supply-pipe *f*. The liquor rises through the false bottom, ascends into the vessel *a*, and passes through the substances contained therein, and through the perforated piston, and ultimately escapes by the exit-pipe or cock *i*. The same liquid may be brought back by a pipe or tube into the vat, from whence it is again drawn, by means of the pump, and thus a continuous circulation of the liquor is produced, and constantly driven upwards through the fibres of the material to be operated upon. The same process and the same apparatus is employed for the bleaching of cotton yarns, fabrics, or other fibrous materials, the solution employed being varied according to the substances operated upon. An artificial current is, by these means, directed upwards, which constantly washes the fibres of the wool or other material, and carries away the greasy and coloring matter it has extracted, which, being constantly driven upwards, cannot enter the material again, as hitherto has been the case in the old mode of washing; the material, thus operated upon, is rapidly and most completely washed.

In the dyeing of wool, which has been previously scoured and washed, the same apparatus is used, only instead of an alkaline solution, a coloring bath, of the required strength, must be employed. This bath is to be heated in any convenient manner, either by steam or the naked fire. When the wool has been washed, as described, it is to be placed in the apparatus, fig. 2, and the screw *r*, turned, so as to press the piston tightly down upon the material; when, by means of the pump, the coloring solution is made to pass again and again through the wool under operation, until it has become completely saturated with the coloring matter. The discharging-pipe may then be opened, and the wool, completely dyed, may be removed from the apparatus. Those colors which require that the wool should be previously saturated with a chemical agent, may be operated upon by the agent being introduced into the apparatus in the same manner; and when this operation is finished, the coloring solution may be injected, as before stated, and continued passing through the material, as long as may be necessary, until the operation is completed.—[*Inrolled in the Petty Bag Office, June,* 1842.]

Specification drawn by Messrs. Newton and Son.

To Charles Hancock, *of Grosvenor-place, in the county of Middlesex, artist, for his invention of certain improvements in printing cotton, silk, woollen, and other stuffs.*—[Sealed 8th February, 1842.]

In order to obtain a suitable medium for the colors, linseed oil, nut oil, or other drying oil, is mixed with raw or burnt Turkey umber, in the proportion of about one gallon of the oil to about every pound of the umber; linseed oil is preferred, because of its drying quality, and of its retaining its fluidity at lower temperatures than most others. This mixture is boiled over a slow fire, in an open metal pan, of large area, and of sufficient depth to allow it to rise without boiling over; the boiling is continued until the mixture gives indication of having nearly parted with most of its evaporable constituents, care being taken to draw the fire before any deposition of carbon takes place, which would have a discoloring effect on the contents of the pan. When these conditions have been duly observed, the resulting product is a viscid substance, of an uniform consistency, resembling that of dissolved caoutchouc, flowing freely on the application of a slight heat, or spreading by slight mechanical pressure, and neither soiling or running, on being brought into contact with textile fabrics or paper.

Instead of mixing the oil with umber, it may be used alone for a medium, when boiled, in the manner as aforesaid, till it has acquired a like consistency, and like properties; but the former method is preferred. In either case, instead of completing the process at one boiling, it may be effected with less risk of failure, though more slowly, by several boilings, allowing the mixture or oil to cool each time the fire is drawn. A metal cover may be suspended over the pan, by weighted chains or ropes passing over pullies, so that, in the event of the inflammable gases disengaged, catching fire, the cover may be instantly lowered, and the flame extinguished. When it is desirable, for any particular purpose, to have the medium of a more drying or more adhesive quality than usual, a little white vitriol, litharge, sugar of lead, or other dryer, or a little of any suitable resin, is added to the mixture or oil, when in the pan. Before the product of the boiling or boilings has become quite cold, it may be thinned down, if desired, with highly rectified oil of turpentine, or any other sufficient solvent. The combination of the above described composition or medium, with any of the pigments or other matters suitable for the printing of cotton, silk, woollen, and other stuffs, is best effected in vessels heated by steam, according to the mode usually adopted in color manufactories and laboratories. When the colors are to be applied to the stuffs, it may be done, without any previous preparation of the stuffs, by mordants, sizes, oils, or otherwise, and by means, either of cylinder printing machines, or plates, or blocks. If the medium has been previously thinned sufficiently, by oil of turpentine or other solvent, the colors may be applied in a cold state; or if the medium has not been so previously thinned, then, in order to make the colors flow freely, the color-troughs, tearing-sieves, plates, and cylinders, must be kept warm by steam, or some other transmitter of a gentle heat, by any of the well known methods commonly employed for such purposes.

The colors do not rest on the surface, but penetrate the body of the stuff, and this without running. Any smell imparted by the oil or turpentine, may be dissipated by exposure to the air. The medium possesses of itself a considerable degree of color, and may be used for printing stuffs, without the intermixture of any other coloring matter; and the stuffs, so printed on, may be of any color or colors.

In the processes hitherto described, it has been supposed that the figures, designs, or patterns, are to be printed with the oil or oil-colors; but instead thereof, the figures, designs, or patterns, may be produced, in the manner of resists, by some fugitive water-color, gum, or paste,—an oil or oil-color, prepared as before directed, being made use of, to produce only the general ground; the stuff is afterwards washed, to discharge the resist, and then aired, as before directed, to get rid of any smell of the oil or turpentine.

The patentee claims, firstly, the printing of cotton, silk, woollen, and other stuffs, (without any previous preparation of the stuffs, by mordants, sizes, oils, or otherwise,) with oil or oil-colors, prepared or compounded and applied in the manner hereinbefore set forth; secondly, the printing of stuffs, as aforesaid, with oil or oil-colors, compounded or prepared in the same manner as before set forth, however differently the same may be applied; thirdly, the printing of stuffs, as aforesaid, with oil or oil-colors, applied in the same manner as before set forth, however differently such colors may be prepared or compounded; and fourthly, the printing of stuffs, as aforesaid, partly with oil or oil-colors, and partly with water-colors, or any dischargeable resist, in the manner before-described.—[*Inrolled in the Inrolment Office, August,* 1842.]

To DOMINIC FRICK ALBERT, *of Cadishead, near Manchester, in the county of Lancaster, Doctor of Laws, manufacturing chemist, for an improved or new combination of materials and processes in the manufacture of fuel.*—[Sealed 1st February, 1841.]

THE materials used in the preparation of the fuel, are bituminous schiste, which is a slate or dark-colored stone, partaking of the nature of both coal and charcoal; aluminous clay,—a refuse, or the bottoms of the acetate of alumine, in red liquor works; ground coal,—a refuse from coal-pits, which should be quite free from sulphur; vegetable gelatine or tar,—a refuse from pyroligneous acid works, or wood distilleries; mineral gelatine or tar,—a refuse from coal-tar distillation; and mineral oil,—a refuse from naphtha distillation.

In manufacturing fuel from these materials, the patentee proceeds as follows:—Five parts of the vegetable gelatine, and the like quantity of mineral gelatine, are heated in a pan, until they are brought to a proper consistence; and then ten parts of schiste, ground to a powder, ten parts of ground coal, and five parts of aluminous clay, well dried, and mixed with four per cent. of mineral oil, are added to the gelatine. The ingredients are worked into a paste, which is deposited in a hole in the ground, near the pan, and, when cold, forms a cake or flag, without the employment of a press or mould.

The aluminous clay may be omitted, if it cannot be conveniently procured; but then the mineral oil must be mixed with the finest part of the schiste, separated from the rest by a riddle; or, as a substitute for the aluminous clay, fat marl, or common clay, free from stones, may be employed.

When the artificial fuel is being manufactured in places where there are no wood distilleries, the vegetable gelatine may be left out; but, in that case, ten parts of mineral gelatine must be used instead of five.

The patentee claims the new combination of materials and processes, above described, for the manufacture of fuel. —[*Inrolled in the Inrolment Office, July,* 1841.]

To DOMINIC FRICK ALBERT, *of Cadishead, near Manchester, Doctor of Laws, manufacturing chemist, for a new combination of materials, for the purpose of manufacturing a manuring powder.*—[Sealed 10th August, 1842.]

THIS invention consists in a cheap method or methods of introducing into compost or manure such acids, alkalies, and salts, as are required for the nutrition of plants.

A composition or mixture is first produced, consisting of four classes of ingredients; viz., 1st class,—Seven parts of ammoniacal water, from the gas-works, or four of spent urical liquor, resulting from the scouring of woollen tissues, cloth, flannel, &c. 2nd class,—Six parts of human excrements, which should be passed through a riddle, to free them from all extraneous matters. 3rd class,—Six parts of blood and animal gelatine, fibres, or teguments; all fleshes and skins being previously boiled to a pulp, to save grinding and chopping. 4th class,—Two parts of horse or cowdung. These ingredients are worked into a paste, in a large vat, or cemented reservoir; and their volatile ammoniacal gases are rendered stationary in the mixture, by the addition of from two to three per cent. of hydrochloric acid.

The composition is now mixed with a powder, composed of five classes of substances, which are as follow:—1st class,—Four parts of ground charcoal. 2nd class,—Two parts of either chromated lime, sulphated lime, muriate of lime, or sulphated clay. 3rd class,—One part of ground schiste, or pulverized and well-dried aluminous clay. 4th class,—One part of vegetable ashes, or alkalic silicates, such as the refuse of glass-works. 5th class,—One part of common salt. This manure will dry into a powder, if placed under a well-aired shed; or the drying may be hastened by means of a stove; but it will have a much quicker effect on the vegetation when used in a damp state. It may be spread over the land with a spade, in the same manner as bone-dust, &c.

As some of the ingredients, above mentioned, may not be readily obtained in various places, the patentee has mentioned a number of matters which may be substituted for them. The following are the materials that may be substituted for those which were employed in the preparation of the composition. 1st class,—Urine, in general, from man and beast, in the proportion of two parts of the former to three of the latter; or two parts of bone-dust, macerated in half its weight of sulphuric acid, may be used instead of five parts of urine. 2nd, 3rd, and 4th classes,—All sorts of animal refuse, such as tallow-chandlers' grease bottoms, woollen rags, tanners' spent lime, containing much hair, scrapings and cuttings from hides and leather, offal from the dressing of sheep's feet, animal charcoal from prussiate of potash works, cotton spinners' waste, impregnated with oil, the refuse from glue manufactories, and from cleaning foreign wool, &c. Instead of hydrochloric acid, sulphuric may be used, to prevent the exhalation of any unpleasant smell from the composition.

With respect to the powder, those ingredients which may be substituted, are as follow:—1st class,—Equal quantities of soot and charcoal. 2nd class,—The refuse of those soaperies, where kelp is employed, can advantageously represent one-half of the earths before mentioned; pulverized oyster shells also belong to this class. 3rd class,—The schiste may be reduced to powder, by exposure to the rain, in place of grinding it. 4th class,—The soap-suds, or soapy water, produced in any of the different branches of manufactures, are received into a cistern, and the mineral powders, before alluded to, are added to them; the water evaporates, leaving the grease and caustic alkali combined with the other materials. 5th class,—The worst kind of rock salt, or all kinds of sea plants, dried and rubbed into a powder, or calcined, or the animalized spent salt, from the curing of pork, &c.

The patentee claims, the combination of the materials, hereinbefore specified, in the proportions aforesaid, and the production thereby, of a powder or manure, at a very cheap rate; which powder contains a more abundant quantity of such acids, alkalies, and salts, as are required for the nutrition of plants, than any other manure now produced, at an equally cheap rate.—[*Inrolled in the Inrolment Office, February,* 1843.]

To Alfred John Phipps, *of the Blackfriars-road, in the county of Surrey, Gent., for certain improvements in paving streets, roads, and ways.*—[Sealed 1st August, 1842.]

This invention of improvements in paving streets, roads, and ways, consists, Firstly, in the employment of blocks of wood, of peculiar shapes or forms; and, Secondly, in a peculiar method of connecting these or other blocks together, so as to preserve them in their relative positions.

In Plate IX., are several figures, shewing the methods adopted by the patentee, of carrying these objects into effect. Fig. 1, is a plan view, and fig. 2, a side view, of part of a road-way, formed by blocks of wood, made by cutting blocks, of any convenient size, from a length of wood, as seen in fig. 3. These blocks must be cut in an angular manner, (as shewn in the figure,) and one of them placed on the top of another, with their angles subtending in opposite directions, and fastened together by cramps or other fastenings, (as shewn in fig. 2,) or in any other convenient manner.

By this arrangement, one end of each of the compound blocks, thus formed, is made convex, and the other end concave,—so that the convex end of one block enters the concave end of the next, thereby preventing it from either rising or sinking. In laying down a pavement, to be composed of these blocks, each line of blocks must be dovetailed into the two adjoining ones, so as to form a "break-joint," as seen in the plan view, fig. 1; and, if thought desirable, a key-block may be placed in the centre of the road-way.—This key-block is made by forming both ends or sides thereof, either concave or convex, as may be preferred.

Figs. 4, 5, 6, 7. and 8, represent another form of block, which may be either constructed of one piece, or made in two parts, and connected together so as to form a compound block. Fig. 4, is a plan view of several of these blocks, combined together to form part of a pavement. Fig. 5, is a side view, and fig. 6, an end view of the same. This pavement is constructed of pairs of blocks, shewn in plan at fig. 7, and elevation at fig. 8.

The profile of this block represents two equilateral triangles, with the apex of one pointing upwards, and the apex of the other pointing downwards. Upon inspecting the plan view, fig. 7, it will be seen that the part *a*, of the block, does not wholly cover the side of the part *b*, but is shifted laterally in a slight degree, and consequently leaves a shoulder *c*, to support the next block. At the same time, by thus shifting the part *a*, of the block, this part is made to overhang the part *b*, as seen at *d*, and it is this overhanging part that lies upon, and is supported by, the shoulder *c*, of the next block, as will be easily understood by a careful inspection of fig. 7, which represents the pair of blocks, slightly removed from each other, to prevent confusion, but in the same relative positions.—Although the angle of 60°, or that formed by an equilateral triangle, is the angle shewn in the drawings, yet the patentee does not confine himself thereto, as any other angle might be employed; the object of this block being, not only merely to support its own particular line of blocks, but also all those blocks with which it is in connection, in order to combine the whole into one compact and self-supporting mass.

The next part of the invention consists, in combining or connecting blocks together, by means of tongues or fillets, placed in an upright position, or nearly so. Figs. 9, and 10, represent plan and side views of part of a pavement, laid down upon this principle. The peculiar shape of block shewn in these figures, is not claimed as new;—it is formed by cutting up a length of wood, at any convenient angle, and placing two single blocks, side by side, but with their angles subtending in opposite directions. Fig. 11, represents one of the blocks detached, with the tongue or fillet connected thereto. In order to connect the blocks together, upright grooves *f*, *f*, are made in both sides of all the blocks; so that, when they are placed side by side, a square hole is formed, by two grooves coming in conjunction; and into this hole a tongue or fillet *e*, is driven.

One advantage attending the use of this part of the invention, is the facility with which any number of blocks may be removed and replaced, without at all injuring the solidity of the pavement. To effect this, it will only be necessary to withdraw the dowels or tongues, on each side of the blocks, and the pavement may be removed with ease. The manner in which these blocks are connected together, may also be employed with the blocks, shewn in figs. 1, and 2, instead of the connecting cramps or irons therein shewn.

The patentee claims, Firstly,—the manner of forming or constructing and combining blocks, as shewn in figs. 1, 2, and 3. Secondly,—the peculiar form of block, shewn in figs. 4, 5, 6, 7, and 8. Thirdly,—connecting or combining together blocks, of any suitable form, by means of a pin or pins, or dowels, fillets, or tongues, placed in an upright position, or nearly so, as shewn in figs. 9, 10, and 11; which pins, dowels, fillets, or tongues, may be withdrawn, in order to remove any part of the pavement, as above described.—[*Inrolled in the Rolls Chapel Office, February,* 1843.]

Specification drawn by Messrs. Newton and Son.

To Moses Poole, *of Lincoln's-inn, in the county of Middlesex, Gent., for improvements in paving or covering roads and other ways,—being a communication.*—[Sealed 11th August, 1842.]

The first part of this invention consists, in the peculiar forms of blocks, represented in Plate IX., at figs. 1, 2, 3, and 4; they are described by the patentee, in the following words:—"The solid, or form of block, fig. 1, is a quadrangular prism, inclined two ways, the base of which is a right angle. a, b, c, d, or a^1, b^1, c^1, d^1, rising, parallel to itself, in the diagonal direction d, b, for a row of blocks, and in an opposite diagonal direction c^1, a^1, for the following row, and so on, alternately changing the row. The solid or block, shewn at fig. 2, is a quadrangular prism, inclined in two ways, the base of which is a rhomboid e, f, g, h, or e^1, f^1, g^1, h^1, rising, parallel to itself and obliquely, in a diagonal direction g, e, for a row, and in the opposite direction h^1, f^1, for the following row, and thus alternately changing the rows." The block, represented in side and end view, at figs. 3, and 4, "is a quadrangular prism, the base of which is a right angle, rising perpendicularly and parallel to itself."

The second part of the invention consists, in forming the blocks into pavements, by the aid of tongues or tenons, beams, rods, and pins. Fig. 5, is a side view, and fig. 6, a plan of part of a pavement, composed of blocks, similar to that represented in front and side views at figs. 3, and 4. The blocks (which are preferred to be of oak instead of pine) rest upon the beams i, and are connected together by the tongues or tenons j, inserted in the mortices k, in the sides of the blocks. Before laying down the blocks, the ground is properly prepared by levelling; and if a very solid foundation is required, a quantity of oak laths are laid down, (the spaces between them not exceeding the base of each block,) and covered with a layer of gravel or earth, which is well rammed or beaten; and upon it the blocks are placed. Fig. 7, is a side view, and fig. 8, an end view of two courses of blocks, which are supported and retained in their places by the beams *l*, *m*, *n*. Fig. 9, is a side view, and fig. 10, an end view of another mode of supporting blocks, and retaining them in their places, by the employment of the beams *o*, and pins *p*. Fig. 11, is a plan of four courses of blocks, which are connected together, and support each other, by means of the rods *q*, and *r*. Other figures are shewn in the drawings attached to the specification, in which the blocks are connected and supported by one series of rods *q*, or *r*, only.

The pavements, shewn in figs. 7, 8, 9, and 10, are furnished with key-blocks, in order that they may be readily removed. One of these keys is seen at *s*, fig. 9; and it appears, from the description given by the patentee, that the key-block is not retained in its position by the pin *p*, but by the projection *t*, of its key; on turning which, the block is released, and can be withdrawn from its place in the pavement. Instead of using key-blocks, long pieces of wood or stone may be placed at the sides of the street or road, in contact with the sides or ends of the outer blocks; and when these side-pieces are taken up, the blocks can be removed.

To prevent horses and other animals from slipping, the patentee uses blocks of different descriptions of wood, such as pine and oak, laying down a row of each, alternately; or else forming each row, partly of one sort, and partly of another; he also grooves the upper surfaces of the blocks, in the manner shewn in figs. 6, and 11.—[*Inrolled in the Inrolment Office, February*, 1843.]

To Raoul Armand Joseph Jean Comte de la Chatre, *Chevalier de la Légion d'Honneur, of Leicester-square, in the county of Middlesex;* Richard Tappin Claridge, *of Weymouth-street, in the county of Middlesex, Gent., and* Richard Hodgson, *of Salisbury-street, Strand, in the county of Middlesex, Gent., for improvements in preparing of fabrics, to be used in covering floors, roofs, and other surfaces,—being a communication.*—[Sealed 26th April, 1842.]

These improvements, in preparing fabrics for covering floors, roofs, and other surfaces, consist in coating the fabrics, on one or both sides, with a composition called "oropholithe," which is produced by mixing together eight parts, by weight, of linseed oil, four parts of litharge or white-lead, nine parts of whiting, and thirty-six parts of sand. The oil and white-lead, or litharge, are first mixed together, then the whiting is introduced, and lastly, the sand is added to the mixture. But it is not absolutely necessary that this mode of proceeding, and the above proportions, should be strictly adhered to. If the composition is required to be of a light color, boiled linseed oil, and pale litharge, or ground white-lead, are used; but when a light color is not requisite, red litharge is employed. The whiting and sand are rendered perfectly dry, and passed through a fine sieve, before being added to the mixture; the sand is preferred to be of the kind called white or silver sand; but yellow sand, or finely-powdered bricks or tiles, may be used.

The fabric which the patentees prefer, for covering roofs, &c., is canvass, of an open texture, and it is prepared in the following manner:—The canvass is stretched upon a table or slab, of Roman cement or slate, supported by legs, and enclosed in a wooden frame; and a coat of the composition, one-sixteenth of an inch thick, is applied to one or both sides of it. The fabric is covered with the composition on one side only, when it is intended to be used in dry situations; but if it be required for covering roofs, and other surfaces exposed to wet and damp, both sides are coated. The composition is polished with pumice-stone, fine sand, oil, or brown free-stone; and it may be brought to any required tint, by the addition of a small quantity of coloring matter; it may likewise be ornamented with colored patterns or designs.

The patentees conclude as follows:—" Now, whereas we do not claim the table, or any of the instruments, hereinbefore described or mentioned, to be used in applying the said composition, called oropholithe, but we do claim, as our invention, the following improvements; that is to say,—the making the said composition, hereinbefore called oropholithe, in whichever of the modes, hereinbefore mentioned, and with whichever of the substances, hereinbefore mentioned, as being capable of being used in the composition thereof, the same may be composed; and whether combined, or not combined, with coloring matter; and the covering of one or both of the surfaces of fabrics, to be used in covering roofs, and floors, and other surfaces with the said composition.—[*Inrolled in the Inrolment Office, October,* 1842.]

To BENJAMIN COOK, Jun., *of Birmingham, in the county of Warwick, brass founder, for improvements in the constructions of bedsteads, both in metal and wood.*—[Sealed 23rd May, 1842.]

THESE improvements in the construction of bedsteads, both in metal and wood, consist in coating or casing the shafts or pillars, and other parts of the framing of bedsteads, with paper, pasteboard, papier-maché, or other similar composition; or attaching to such framing, figures or devices of a similar material, and afterwards ornamenting the external surfaces of the same, by painting, japaning, gilding, silvering, varnishing, and otherwise decorating them. In carrying this invention into effect, the patentee takes the metallic or wooden shafts, rods, or frames, (which have previously been formed and fitted to constitute a bedstead,) and covers or decorates such parts, as may be required, with the materials above stated, by any of the usual modes of attachment. As the process of manufacturing papier-maché and other similar compositions are well known, and also the means of forming such compositions into figures and ornamental devices, a further description will be unnecessary.

The patentee claims, as his invention, the decorating of bedsteads, with suitable ornaments, by means of the materials above stated.—[*Inrolled in the Petty Bag Office, November*, 1842.]

Specification drawn by Messrs. Newton and Son.

To WILLIAM EDWARD NEWTON, *of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for an invention of certain improvements in the production of ammonia; being a communication.*—[Sealed 9th November, 1841.]

THESE improvements consist in the application of a particular apparatus (hitherto used in this country for distilling alcohol) to the production of ammonia,—either pure, or more or less impure, according to the purpose for which it is required,—from any liquid, from which, by the agency of steam, it may be eliminated, either alone or in conjunction with vapour, carbonic acid, or other volatile matters, the presence of which do not prevent the application of ammonia to one or more useful purposes.

The apparatus, intended to be employed, is an upright vessel, divided by horizontal diaphragms, or partitions, into a number of chambers. It is preferred to construct the vessel of wood, lined with lead, and the diaphragms of sheet iron. Each diaphragm is perforated with many small holes, so regulated, both with regard to number and size, as to afford, under some pressure, passage for the elastic matters which ascend, during the use of the apparatus, to make their exit by a pipe opening from the upper chamber.

Fitted to each diaphragm are several small valves, so weighted as to rise whenever elastic matters accumulate under them, in such quantity, as to exert more than a desirable amount of pressure on the diaphragms. A pipe also is attached to each diaphragm, passing from about an inch above its upper surface to near the bottom of a cup, or small reservoir, fixed to the upper surface of the diaphragms, next underneath. This pipe is sufficiently large to transmit freely downwards the whole of the liquid which enters for distillation at the upper part of the upright vessel, and the cup or reservoir, into which the pipe dips, forms, when full of liquid, a trap, by which the upward passage of elastic matters, by the pipe, is prevented. The vessel may rest on a close cistern, contrived to receive the descending liquid, as it leaves the lowest chamber, and from this cistern it may be run off, by a valve or cock, whenever expedient. The cistern, or, in its absence, the lowest chamber, contains the orifice of a pipe, which supplies steam for working the apparatus. The exact number of chambers, into which the upright vessel is divided, is not of essential importance; but the quantity of liquid, and the surfaces of each diaphragm, being given, the distillation, within certain limits, will be more complete; and the quantity of liquid and the number of chambers being given, the process, within certain limits, will be more perfect. The liquid, undergoing distillation in this apparatus, necessarily covers the upper surface of each diaphragm to the depth of about an inch, being prevented from passing downward, through the small perforations, by the upward pressure of the rising steam and other elastic matters; and on the other hand, the steam being prevented, by the traps, from passing upwards, by the pipes, is forced to ascend by the perforations in the diaphragms; so that the liquid, lying on them, becomes heated, and in consequence gives off its volatile matters. When the ammoniacal liquid accumulates on one of the diaphragms, to the depth of an inch, it flows over one of the short pipes into the trap below, from whence it overflows into the next diaphragm, and so on.

The management of the apparatus varies in some measure with the form in which it is desirable to obtain the ammonia. When the ammonia is required to leave the upper chamber, in the form of gas, either pure or impure, it is necessary that the steam which ascends, and the current of ammoniacal liquid which descends, be in such relative proportions, that the latter remain at or near the atmospheric temperature, during its passage through some of the upper chambers,—becoming progressively hotter as it descends, until it reaches the boiling temperature; in which state it passes through the lower chambers, either to make its escape, or to enter a cistern, provided to receive it, and in which it may for some time be maintained at a boiling heat. On the contrary, if the ammonia, either pure or impure, be required to leave the upper chamber, in combination with the vapour of water, the supply of steam, entering below, must bear such proportion to that of the ammoniacal liquid, supplied above, that the latter may arrive at a boiling temperature in the upper part of the apparatus.

Solutions of ammoniacal salts, which have had their respective acids abstracted, by any of the usual means, afford, by being thus treated, ammonia gas, either alone or in combination with vapour of considerable purity; but the apparatus is equally serviceable in obtaining similar results, more or less impure, from the water obtained by the distillation of coals, or of bones, or other animal matters, as well as from stale urine.

Acids, and certain other matters, contained in these impure liquids, may first be partly removed by lime and other well-known means; and some of them will be further removed during the passage of the ammonia through the apparatus; or the liquids may be submitted, in their naturally impure state, to the steam in the apparatus, care being taken to use them so dilute, that the vapour, which escapes with them, shall be sufficient in quantity to prevent the solidification of the ammonia, by the carbonic acid which rises with it, and the consequent obstruction of the passages.

In Plate IX., is a sectional view of an apparatus that has been found to answer the purposes required. The apparatus consists, as before mentioned, of the upright vessel *a, a,* made of wood, and lined with lead. This vessel is placed on the top of a close cistern *b, b,* and is divided into small chambers *c, c, c,* by the horizontal partitions or diaphragms *d, d, d*; these diapraghms are perforated with small holes, and are also furnished with the short pipes *e, e, e,* the lower ends of which are inserted into cups or traps *f, f, f,* for the purposes before mentioned. The diaphragms are also furnished with valves *g, g, g,* for the purpose of allowing the elastic vapours to pass upwards, when too great a pressure is exerted by them in the lower chambers. The ammoniacal liquor is admitted into the apparatus by the pipe *h,* and, descending from one chamber to the other, eventually falls into the close cistern *b, b,* from whence it is drawn off by the cock *i.* Steam is conveyed into the apparatus by the pipe *j,* and ascends from the close cistern *b,* towards the top of the apparatus, with the elastic vapours which it eliminates from the ammoniacal liquor, and ultimately escapes with them (if not previously condensed,) through the exit pipe *k.*

The apparatus may be varied in its parts, and yet remain more or less efficient. For example,—instead of being furnished with perforations, valves, and pipes, the diaphragms may have plain surfaces, and each be bent upwards at one of its sides, so as not entirely to separate the contiguous chambers. The diaphragms should be bent upwards at opposite sides alternately, thereby permitting the descending fluid to fall or cascade from the right hand side of one diaphragm on to the next below; and then from the right hand side of that one on to the next in succession, and so on, until the whole of the diaphragms are occupied with liquid. With such a modification of apparatus, the liquid will be heated by the contact of the ascending steam sweeping over its extensive surface; and also by the steam acting on the under sides of the diaphragms on which the liquid rests.

The patentee claims the application to the production of ammonia, (pure or in combination with vapour, or with vapour and other volatile matters, as already described,) of any apparatus, so constructed as to cause, by means of diaphragms, a liquid, containing ammonia, in a volatile state, and steam, to pass in mutual contact, and in opposite directions, whereby a given quantity of heat is made to liberate ammonia from successive portions of ammoniacal liquid. —[*Inrolled in the Petty Bag Office, May,* 1842.]

To THOMAS STIRLING, *of Limehouse, in the county of Middlesex, patentee of the "Rapid Filterer," for improvements in the manufacture of fuel.*—[Sealed 20th March, 1840.]

THESE improvements relate to the artificial fuel produced by combining small coal, and tar, or other bituminous matters, with clay, or such like earth, and consist in hardening or consolidating such fuel, by submitting it, in moulds, to a considerable degree of artificial heat.

The following is the method of manufacturing fuel preferred by the patentee; but he does not confine himself thereto, his invention being merely the application of heat to fuel, prepared from the above-mentioned materials, and contained in moulds. 100 lbs. of vegetable tar, and 300 lbs. of mineral or coal tar, are heated in an iron vessel, and 105 lbs. of a solution of clay, of the consistence of tar, are stirred into them; the compound is then boiled up, and run into another pan, placed over a furnace, and 2,240 lbs. of small coal (which have been passed through a sieve of six meshes to the inch,) are added to it. When these ingredients have been thoroughly mixed by stirring, the fuel is put into moulds, of any required shape, and allowed to remain for an hour, or an hour and a half, in an oven or kiln, kept heated to from 250° to 300° Fahr. The moulds are then withdrawn, and when the blocks of fuel have become cool, they are ready for consumption.

The patentee claims the mode of manufacturing fuel from small coal, tar, and clay, by submitting the same, in moulds, to a considerable degree of artificial heat, as above described.—[*Inrolled in the Inrolment Office, September,* 1840.]

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTION.

No. II.

THE PATENT LAWS OF THE UNITED STATES OF AMERICA.

The Laws relating to Patents for Inventions, now in force in the United States of America, are those approved and passed by the Legislature of that country, on July 4th, 1836, March 3rd, 1837, and March 3rd, 1839. There is also another act, passed August 29th, 1842, by which a new class of subjects is protected. This act is similar in operation to the Consolidated Designs Copyright Act, 5 and 6 Vict., c. 100, lately passed by our own Legislature, and is intended to protect new and original designs in metal and other materials; woollen, silk, cotton, and other prints; busts, statues, bas-reliefs; new and useful patterns, prints, pictures, original shapes or configurations of any article of manufacture, &c. &c. There are also some new regulations relative to patents, such as stamping the name of the patentee and date of the patent on all patented articles, but the act does not repeal or change the laws under which patents are granted, but is merely additional thereto.

We have not thought it necessary to give all these acts in detail, as there are many parts which merely refer to the internal regulations of the Patent Office, and the salaries to be paid by Government to the officers and servants employed therein; but every portion of the several acts which can at all interest the inventor or patentee, has been carefully extracted and given verbatim, together with such information and instructions, direct from the Commissioner of Patents, at Washington, as may tend to explain the acts and their bearing upon the interests of inventors. Those paragraphs which are marked by inverted commas, are verbatim copies from the acts themselves, and a reference to the act and section of the act is given at the end of each paragraph so marked.

" Patents are granted to any person or persons that may have invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter, not known or used by others before his or their discovery or invention thereof, and not, at the time of his application for a patent, in public use, or on sale, with his or their consent, or allowance, as the inventor or discoverer."—Act of 1836, sec. 6.

The term for which a patent is granted is fourteen years; but it may, under certain circumstances, be renewed for seven years, as hereinafter mentioned.

Patents are granted to citizens of the United States, to aliens who shall have been resident in the United States one year next preceding, and shall have made oath of their intention to become citizens thereof, and also to foreigners who are inventors or discoverers.

"No person shall be debarred from receiving a patent for any invention or discovery, as provided in the act, approved on the fourth day of July, one thousand eight hundred and thirty-six, to which this is additional, by reason of the same having been patented in a foreign country more than six months prior to his application; provided that the same shall not have been introduced into public and common use in the United States prior to the application for such patent."—Act of March 3rd, 1839, sec. 6.

"Every person or corporation who has, or shall have, purchased or constructed any newly-invented machine, manufacture, or composition of matter, prior to the application by the inventor or discoverer for a patent, shall be held to possess the right to use, and vend to others to be used, the specific machine, manufacture, or composition of matter, so made or purchased, without liability therefor to the inventor or any person interested in such invention; and no patent shall be held to be invalid by reason of such purchase, sale, or use, prior to the application for a patent as aforesaid, except on proof of abandonment of such invention to the public, or that such purchase, sale, or prior use, has been for more than two years prior to such application for a patent."—Act of March 3rd, 1839, sec. 7.

A patent, taken out by an inventor in a foreign country, will not affect his right to a patent in the United States, provided the invention has not been introduced into public and common use in the United States prior to the application for such patent. In every such case the American patent is limited to fourteen years, from the date of the foreign letters-patent. A patent will not be granted for any new invention imported from a foreign country, unless the person who introduced it be the inventor or discoverer. If an alien neglects to put and continue on sale the invention in the United States, to the public, on reasonable terms, for eighteen months, the patentee loses all benefit of the patent.

Joint inventors are entitled to a joint patent, but neither can claim one separately.

An inventor can assign his right before a patent is obtained, so as to enable the assignee to take out a patent in his own name; but the assignment must be first entered on record; and the application for a patent must be duly made, and the specification signed, and sworn to by the inventor. And in the case of an assignment by a foreigner, the same fee will be required as if the patent issued to the inventor.

The assignment of a patent may be for the whole or for an undivided part, "by an instrument in writing." All assignments, and also the grant or conveyance of the use of the patent in any town, county, State, or specified district, must be recorded in the Patent Office within three months from date of the same. But assignments, if recorded after the three months have expired, will be on record as notice to protect against subsequent purchases. No fee is now charged for recording assignments. Patents, grants, and assignments recorded prior to the 15th of December, 1836, must be recorded anew before they can be valid as evidence of any title. This is also done free of expense.

In case of the decease of an inventor, before he has obtained a patent for his invention, "the right of applying for and obtaining such patent shall devolve on the administrator or executor of such person, in trust for the heirs-at-law of the deceased, in case he shall have died intestate; but if otherwise, then in trust for his devisees, in as full and ample manner, and under the same conditions, limitations, and restrictions, as the same was held, or might have been claimed or enjoyed, by such person, in his or her life time; and when application for a patent shall be made by such legal representatives, the oath or affirmation shall be so varied as to be applicable to them."—Act of 1836, sec. 10.

The Patent Office will be open for examination during office hours, and applicants can personally, or by their agents, satisfy themselves, on inspecting the models and specifications, of the expediency of filing an application for a patent.

All fees received are paid into the Treasury, and the law has required the payment of the patent fee before the application is considered; two-thirds of which fee is refunded on withdrawing the application. But no money is refunded on the withdrawal of an application, after an appeal has been taken from the decision of the Commissioner of Patents. And no part of the fee paid for caveats, and on applications for the addition of improvements, re-issues, and appeals, can be withdrawn.

It is a frequent practice for inventors to send a description of their inventions to the office, and inquire whether there exists any thing like it, and whether a patent can be obtained. As the law does not provide for the examination of descriptions of new inventions, except upon application for a patent, no answers can be given to such inquiries.

On the Application for a Patent.

No application can be examined until the fee for the patent is paid, and the specification, model, and drawings filed.

The application for a patent must be made by petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the invention or discovery, and praying that a patent may be granted for the invention, which petition should be signed by the inventor.

Description or Specification.

"Before any inventor shall receive a patent for any such new invention or discovery, he shall deliver a written description of his invention or discovery, and of the manner and process of making, constructing, using, and compounding the same, in such full, clear, and exact terms, avoiding unnecessary prolixity, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of any machine, he shall fully explain the principle, and the several modes in which he has contemplated the application of that principle or character by which it may be distinguished from other inventions; and shall particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery."—Act of 1836, sec. 6.

A defective specification or drawing may be amended at any time before a patent has issued; in which case the applicant will be required to make oath anew.

Of New Improvements.

"Whenever the original patentee shall be desirous of adding to the description and specification of any new improvement of the original invention or discovery, which shall have been invented or discovered by him, subsequent to the date of his patent, he may (like proceedings being had in all respects as in the case of original applications, and on the payment of fifteen dollars, as hereinafter mentioned) have the same annexed to the original description and specification; and the Commissioner shall certify, on the margin of such annexed description and specification, the time of its being annexed and recorded; and the same shall thereafter have the same effect in law, to all intents and purposes, as though it had been embraced in the original description and specification."—Act of 1836, sec. 13.

In all such cases, the claim in the original patent is subjected to a re-examination; and if it shall appear that any part of the claim was not original at the time of granting the patent, a disclaimer of such part must be filed in the Patent Office, or the specification of claims restricted, by having the patent re-issued, before the improvement can be added. And if there is not any thing which can be claimed, the improvement cannot be added, but may be secured by a separate patent, on the payment of the fee of thirty dollars, if the inventor is a citizen. If the patent was granted before the 15th of December, 1836, a model and drawings of the invention, as first patented, verified by oath, must be furnished, unless dispensed with by the Commissioner.

No patent for an improvement can be granted to the original inventor, assignee, or possessor of a patent granted before the 15th of December, 1836, until a model and drawings of the invention, as originally patented, verified by oath, shall have been deposited, unless dispensed with by the Commissioner.

If the applicant be an alien, and have resided one year in the United States next preceding the application, and have given legal notice of his intention to become a citizen of the United States, he must make oath to these facts before he can apply for a patent for the same fee as that paid by a citizen.

Of Drawings, Specimens of Ingredients, and Models.

The law requires that the applicant for a patent "shall accompany the whole with a drawing or drawings, and written references, where the nature of the case admits of drawings; or with specimens of ingredients and of the composition of matter sufficient in quantity for the purpose of experiment, where the invention or discovery is of a composition of matter; which descriptions and drawings, signed by the inventor and attested by two witnesses, shall be filed in the Patent Office; and he shall moreover furnish a model of his invention, in all cases which admit of a representation by model of a convenient size, to exhibit advantageously its several parts. The applicant shall also make oath or affirmation that he does verily believe that he is the original and first inventor or discoverer of the art, machine, composition, or improvement, for which he solicits a patent, and that he does not know or believe that the same was ever before known or used; and also of what country he is a citizen."—Act of July, 1836, sec. 6.

The drawings should, in general, be in perspective, and neatly executed; and such parts as cannot be shewn in perspective, must, if described, be represented in section or detail. Duplicates of them are required, as one must accompany the patent when issued, as explanatory of it, and one must be kept on file in the office.

The drawings must be signed by the patentee, and attested by two witnesses, except when the specification describes the sections or figures, and refers to the parts by letters; in which case they are neither required to be signed nor accompanied by written references upon the drawings, the whole making one instrument. Drawings are absolutely necessary, when the case admits of them.

An examination, as to originality of invention, may be made on a single drawing; but duplicates will be required before the patent issues.

The model required by law should be neatly made, and as small as a distinct representation of the machine or improvement, and its characteristic properties, will admit; the name of the inventor should be printed or engraved upon or affixed to it in a durable manner. Models forwarded without a name, cannot be entered on record, and are therefore liable to be lost or mislaid.

When the invention is of "a composition of matter," the law requires that the application be accompanied with specimens of the ingredients, and of the composition of matter, sufficient in quantity for the purpose of experiment.

Proceedings on Applications for Patents, and Appeals from the Decision of the Commissioner. (Act of 1836, *sec.* 7.*)*

"That on the filing of any such application, (consisting of petition, specification, model, and drawings, or specimens,) and the payment of the duty hereinafter provided, the Commissioner shall make, or cause to be made, an examination of the alleged new invention or discovery; and if, on any such examination, it shall not appear to the Commissioner that the same had been invented or discovered by any other person in this country, prior to the alleged invention or discovery thereof by the applicant, or that it had been patented or described in any printed publication in this or any foreign country, or had been in public use or on sale, with the applicant's consent or allowance, prior to the application, if the Commissioner shall deem it to be sufficiently useful and important, it shall be his duty to issue a patent therefor. But whenever, on such examination, it shall appear to the Commissioner that the applicant was not the original and first inventor or discoverer thereof, or that any part of that which is claimed as new had before been invented or discovered, or patented, or described in any printed publication in this or any foreign country as aforesaid, or that the description is defective and insufficient, he shall notify the applicant thereof, giving him briefly such information and references as may be useful in judging of the propriety of renewing his application, or of altering his specification to embrace only that part of the invention or discovery which is new. In every such case, if the applicant shall elect to withdraw his application, relinquishing his claim to the model, he shall be entitled to receive back twenty dollars, part of the duty required by this act, on filing a notice in writing of such election in the Patent Office; a copy of which, certified by the Commissioner, shall be a sufficient warrant to the Treasurer for paying back to the said applicant the said sum of twenty dollars. But if the applicant, in such case, shall persist in his claim for a patent, with or without any alteration of his specification, he shall be required to make oath or affirmation anew, in manner as aforesaid; and if the specification and claim shall not have been so modified as, in the opinion of the Commissioner, shall entitle the applicant to a patent, he may appeal from the decision of the said Commissioner."—This appeal is to be made to the Chief Justice of the United States Court for the District of Columbia, who may affirm or reverse the decision of the Commissioner of Patents, in whole or in part, and may order a patent to issue: or he may have remedy against the decision of the Commissioner of Patents, or the decision of the Chief Justice of the United States Court for the District of Columbia, by filing a bill in equity in any of the United States Courts, having jurisdiction, as hereinafter explained.

Re-issue to Correct a Defective Description.

When an applicant wishes to cancel an old patent, and to correct a mistake or error, which has arisen from inadvertence, he should state this fact in his application, and expressly surrender the old patent, which must be transmitted to the Patent Office before a new patent will be issued. And no improvement or alteration, made subsequent to the filing of the application upon which the original patent was granted, can be introduced into a patent upon re-issue. Section thirteen of the act of July, 1836, enacts, "That whenever any patent, which has heretofore been granted, or which shall hereafter be granted, shall be inoperative or invalid, by reason of a defective or insufficient description or specification, or by reason of the patentee claiming in his specification, as his own invention, more than he had or shall have a right to claim as new, if the error has or shall have arisen by inadvertency, accident, or mistake, and without any fraudulent or deceptive intention, it shall be lawful for the Commissioner, upon the surrender to him of such patent, and the payment of the further duty of fifteen dollars, to cause a new patent to be issued to the said inventor for the same invention, for the residue of the period then unexpired, for which the original patent was granted, in accordance with the patentee's corrected description and specification."

When the original patent has been lost,—before a re-issue can be granted, the original patent should first be restored, and then surrendered.

In the re-issue, the claim is subject to an examination as in the case of original patents; and if it shall appear that any part of the claim was not original at the time of granting the patent, the re-issue will not be granted, unless such part be omitted in the claim, or a disclaimer filed in the Patent Office. And if there is not any thing which can be claimed, the re-issue cannot be granted, and the surrendered patent cannot be returned. Where the patent was granted before the 15th December, 1836, a model and drawings of the invention, as originally patented, verified by oath, must be deposited in the Patent Office before a re-issue can be granted, unless dispensed with by the Commissioner.

"And in case of the death of an inventor, or of any assignment by him of the original patent, a similar right shall vest in his executors, administrators, or assignees; and the patent so re-issued, together with the corrected description and specification, shall have the same effect and operation in law, on the trial of all actions hereafter commenced for causes subsequently accruing, as though the same had been originally filed in such corrected form before the issuing of the original patent."—Act of July 4th, 1836, sec. 13.

On the surrender of a patent, several patents may be issued for distinct and separate parts of the invention, upon the payment of thirty dollars for every additional patent so issued.

Disclaimers.

The 7th section of the law of 3rd March, 1837, provides as follows:—"And be it further enacted, That whenever any patentee shall have, through inadvertence, accident, or mistake, made his specification of claim too broad, claiming more than that of which he was the original or first inventor, some material and substantial part of the thing patented being truly and justly his own, any such patentee, his administrators, executors, and assigns, whether of the whole or of a sectional interest therein, may make disclaimer of such parts of the thing patented, as the disclaimant shall not claim to hold by virtue of the patent or assignment, stating therein the extent of his interest in such patent; which disclaimer shall be in writing, attested by one or more witnesses, and recorded in the Patent Office, on payment, by the person disclaiming, in manner as other patent duties are required by law to be paid, of the sum of ten dollars. And such disclaimer shall thereafter be taken and considered as part of the original specification, to the extent of the interest which shall be possessed in the patent or right secured thereby, by the disclaimant, and by those claiming by or under him, subsequent to the record thereof. But no such disclaimer shall affect any action pending at the time of its being filed, except so far as it may relate to the question of unreasonable neglect or delay in filing the same."

In cases of patents granted before the 15th of December, 1836, no disclaimer will be admitted for record until a model and drawings of the invention, as originally patented, verified by oath, shall have been deposited, unless dispensed with by the Commissioner.

Interfering Applications.

"Whenever an application shall be made for a patent, which in the opinion of the Commissioner, would interfere with any other patent for which an application may be pending, or with any unexpired patent which shall have been granted, it shall be the duty of the Commissioner to give notice thereof to such applicants, or patentees, as the case may be; and if either shall be dissatisfied with the decision of the Commissioner on the question of priority of right or invention, on a hearing thereof, he may appeal from such decision, on the like terms and conditions as are provided in the case of applications for inventions not new; and the like proceedings shall be had, to determine which, or whether either, of the applicants is entitled to receive a patent as prayed for. But nothing in this act contained shall be construed to deprive an original and true inventor of the right to a patent for his invention by reason of his having previously taken out letters-patent therefor in a foreign country, and the same having been published at any time within six months next preceding the filing of his specification and drawings; and whenever the applicant shall request it, the patent shall take date from the time of filing of the specification and drawings, not however exceeding six months prior to the actual issuing of the patent; and on like request and payment of the duty herein required, by any applicant, his specification and drawings shall be filed in the secret archives of the office until he shall furnish the model and the patent be issued, not exceeding the term of one year, the applicant being entitled to notice of interfering applications."—Act of 1836, sec. 8.

A full description of the invention is required to enable the Commissioner of Patents to judge of interferences; and all applications will be examined and patents issued in the order of time in which the proper documents are completed and filed.

Caveats.

The law enacts, "That any citizen of the United States, or alien who shall have been a resident of the United States one year next preceding, and shall have made oath of his intention to become a citizen thereof, who shall have invented any new art, machine, or improvement thereof, and shall desire further time to mature the same, may, on paying to the credit of the Treasury, in manner as provided in the ninth section of this act, the sum of twenty dollars, file in the Patent Office a caveat setting forth the design and purpose thereof, and its principal and distinguishing characteristics, and praying protection of his right, till he shall have matured his invention; which sum of twenty dollars, in case the person filing such caveat shall afterwards take out a patent for the invention therein mentioned, shall be considered a part of the sum herein required for the same. And such caveat shall be filed in the confidential archives of the office, and preserved in secrecy. And if application shall be made by any other person, within one year from the time of filing such caveat, for a patent of any invention with which it may in any respect interfere, it shall be the duty of the Commissioner to deposit the description, specifications, drawings, and model, in the confidential archives of the office, and to give notice (by mail) to the person filing the caveat of such application, who shall within three months after receiving the notice, if he would avail himself of the benefit of his caveat, file his description, specifications, drawings, and model; and if, in the opinion of the Commissioner, the specifications of claim interfere with each other, like proceedings may be had in all respects as are in this act provided in the case of interfering applications."—Act of 1836, sec. 12.

From this section it will be seen, that British subjects and all other foreigners are excluded from the benefit arising from entering caveats, unless they are resident in the States; but if the act did *not* confine this right to natives or resident aliens, the *distance* from Europe would render it perfectly useless and nugatory.

Extension of a Patent beyond the Fourteen Years.

Section eighteen of the same act provides, "That whenever any patentee of an invention or discovery shall desire an extension of his patent beyond the term of its limitation, he may make application therefor, in writing, to the Commissioner of the Patent Office, setting forth the grounds thereof, and the Commissioner shall, on the applicant's paying the sum of forty dollars to the credit of the Treasury, as in the case of an original application for a patent, cause to be published in one or more of the principal newspapers in the city of Washington, and in such other paper or papers as he may deem proper, published in the section of country most interested adversely to the extension of the patent, a notice of such application, and of the time and place when and where the same will be considered, that any person may appear and show cause why the extension should not be granted. And the Secretary of State, the Commissioner of the Patent Office, and the Solicitor of the Treasury, shall constitute a Board to hear and decide upon the evidence produced before them, both for and against the extension, and shall sit for that purpose at the time and place designated in the published notice thereof. The patentee shall furnish to said Board a statement, in writing, under oath, of the ascertained value of the invention, and of his receipts and expenditures, sufficiently in detail to exhibit a true and faithful account of loss and profit in any manner accruing to him from and by reason of said invention. And if, upon a hearing of the matter, it shall appear to the full and entire satisfaction of said Board, having due regard to the public interest therein, that it is just and proper that the term of the patent should be extended, by reason of the patentee, without neglect or fault on his part having failed to obtain, from the use and sale of his invention, a reasonable remuneration for the time, ingenuity, and expense bestowed upon the same, and the introduction thereof into use, it shall be the duty of the Commissioner to renew and extend the patent, by making a certificate thereon of such extension, for the term of seven years from and after the expiration of the first term; which certificate, with a certificate of said Board of their judgment and opinion as aforesaid, shall be entered on record in the Patent Office; and thereupon, the said patent shall have the same effect in law as though it had been originally granted for the term of twenty-one years; and the benefit of such renewal shall extend to assignees and grantees of the right to use the thing patented, to the extent of their respective interests therein: Provided, however, That no extension of a patent shall be granted, after the expiration of the term for which it was originally issued.

Fees Payable at the Patent Office.

All fees must be paid in advance; the amount is fixed by law, except in the case of drawings, the expense of which will be communicated on application for the same.

Every applicant must pay into the Treasury of the United States, or into the Patent Office, or into any of the deposit banks, a deposit to the credit of the Treasurer, on presenting his petition or application, as follows:

	Dollars.
If a citizen of the United States, as a patent fee..	30
If a foreigner, who has resided in the United States one year next preceding the application for a patent, and shall have made oath of his intention to become a citizen	30
If a subject of the Sovereign of Great Britain....	500
All other foreigners	300
On entering a caveat	20
On entering an application for an appeal from the decision of the Commissioner	25
On extending a patent beyond the fourteen years	40
For adding to a patent the specification of a subsequent improvement	15
In case of re-issues, for every additional patent..	30
On surrender of an old patent, to be re-issued, to correct a mistake of the patentee	15
For a disclaimer	10

N. B. The Patent Office does not make original drawings to accompany applications for patents, but furnishes copies of the same only after the patent is completed. Competent persons in the city of Washington and elsewhere, are always ready to make drawings and prepare all the necessary documents, at the expense of the patentees.

On Recovering back Money paid for a Patent not taken out.

When an applicant, who is a citizen or a resident alien, relinquishes or abandons the application for a patent, he must petition the Commissioner of Patents, stating the abandonment or withdrawal of his application; in which case twenty dollars will be repaid. If the applicant is a foreigner, two thirds of the fee paid is to be returned.

In case of withdrawing a petition, the model deposited is by law retained.

Whenever a patent is refused by the Commissioner on the ground that the alleged invention is not new, or interferes with an existing patent, or is not sufficiently useful and important, or in case of two or more interfering applications, the party or parties against whom the Commissioner has decided, can have remedy by an "appeal to the Chief Justice of the District Court of the United States for the District of Columbia, by giving notice thereof to the Commissioner, and filing in the Patent Office, within such time as the Commissioner shall appoint, his reasons of appeal specifically set forth in writing, and also paying into the Patent Office, to the credit of the patent fund, the sum of twenty-five dollars. And it shall be the duty of the said Chief Justice, on petition, to hear and determine all such appeals, and to revise such decisions in a summary way, on the evidence produced before the Commissioner, at such early and convenient time as he may appoint, first notifying the Commissioner of the time and place of hearing, whose duty it shall be to give notice thereof to all parties who appear to be interested therein, in such manner as said Judge shall prescribe. The Commissioner shall also lay before the said Judge all the original papers and evidence in the case, together with the grounds of his decision; fully set forth in writing, touching all the points involved by the reasons of appeal, to which the revision shall be confined. And at the request of any party interested, or at the desire of the Judge, the Commissioner, and the Examiners in the Patent Office, may be examined, under oath, in explanation of the principles of the machine or other thing, for which a patent, in such case, is prayed for. And it shall be the duty of said Judge, after a hearing of any such case, to return all the papers to the Commissioner, with a certificate of his proceedings and decision, which shall be entered of record in the Patent Office; and such decision, so certified, shall govern the further proceedings of the Commissioner in such case: Provided however, That no opinion or decision of the Judge, in any such case, shall preclude any person interested in favor or against the validity of any patent which has been or may hereafter be granted, from the right to contest the same in any judicial court, in any action in which its validity may come in question." Act of March 3rd, 1839, sec. 11.

Remedy in Equity for Patentees.

In cases where patents are refused for any reasons whatever, or when there shall be two interfering patents, remedy can be had from the decisions of the Commissioners of Patents, or from the Chief Justice of the United States Court for the District of Columbia, by bill in equity; and the Court having cognizance thereof, on notice to adverse parties (and when there shall be no adverse party, a copy of the bill shall be served upon the Commissioner of Patents, when the whole of the expenses of the proceedings shall be paid by the applicant, whether the final decision shall be in his favor or otherwise,) and other due proceedings had, may adjudge and declare either the patents void in the whole or in part, or inoperative and invalid in any particular portion of the United States, according to the interest which the parties to such suit may possess in the patent or the inventions patented, and may also adjudge that such applicant is entitled, according to the principles and provisions of this act, to have and receive a patent for his invention, as specified in his claim, or for any part thereof, as the fact of priority of right or invention shall, in any such case, be made to appear. And such adjudication, if it be in favor of the right of such applicant, shall authorize the Commissioner to issue such patent, on his filing a copy of the adjudication, and otherwise complying with the requisitions of this act: Provided, however, That no such judgment or adjudication shall affect the rights of any person, except the parties to the action and those deriving title from or under them, subsequent to the delivery of such judgment.

The personal attendance of an applicant at the Patent Office, to obtain a patent, is unnecessary. The business can be done by correspondence, or through the medium of an attorney or agent.

AN ACT

In addition to an Act to promote the progress of the Useful Arts, and to Repeal all Acts and parts of Acts heretofore made for that purpose.

Sec. 1. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Treasurer of the United States be, and he hereby is, authorized to pay back, out of the patent fund, any sum or sums of money, to any person who shall have paid the same into the Treasury, or to any receiver or depositary, to the credit of the

Treasurer, as for fees accruing at the Patent Office, through mistake, and which are not provided to be paid by existing laws, certificate thereof being made to said Treasurer by the Commissioner of Patents.

Sec. 2. And be it further enacted, That the third section of the act of March, eighteen hundred and thirty-seven, which authorizes the renewing of patents lost prior to the fifteenth of December, eighteen hundred and thirty-six, is extended to patents granted prior to said fifteenth day of December, though they may have been lost subsequently: Provided, however, The same shall not have been recorded anew under the provisions of said act.

Sec. 3. And be it further enacted, That any citizen or citizens, or alien or aliens, having resided one year in the United States, and taken the oath of his or their intention to become a citizen or citizens, who by his, her, or their own industry, genius, efforts, and expense, may have invented or produced any new and original design for a manufacture, whether of metal or other material or materials, or any new and original design for the printing of woollen, silk, cotton, or other fabrics, or any new and original design for a bust, statue, or bas-relief, or composition in alto or basso-relievo, or any new and original impression or ornament, or to be placed on any article of manufacture, the same being formed in marble or other material, or any new and useful pattern, or print, or picture, to be either worked into or worked on, or printed or painted or cast or otherwise fixed on, any article of manufacture, or any new and original shape or configuration of any article of manufacture not known or used by others before his, her, or their invention or production thereof, and prior to the time of his, her, or their application for a patent therefor, and who shall desire to obtain an exclusive property or right therein to make, use, and sell and vend the same, or copies of the same, to others, by them to be made, used, and sold, may make application in writing to the Commissioner of Patents expressing such desire, and the Commissioner, on due proceedings had, may grant a patent therefor, as in the case now of application for a patent: Provided, That the fee in such cases which, by the now existing laws, would be required of the particular applicant, shall be one-half the sum, and that the duration of said patent shall be seven years, and that all the regulations and provisions which now apply to the obtaining or protection of patents, not inconsistent with the provisions of this act, shall apply to applications under this section.

Sec. 4. And be it further enacted, That the oath required for applicants for patents may be taken, when the applicant is not, for the time being, residing in the United States, before any minister, plenipotentiary, chargé d'affaires, consul, or commercial agent, holding commission under the Government of the United

States, or before any notary public of the foreign country in which such applicant may be.

SEC. 5. And be it further enacted, That if any person or persons shall paint or print, or mould, cast, carve, or engrave, or stamp, upon any thing made, used, or sold, by him, for the sole making or selling which he hath not or shall not have obtained letters-patent, the name or any imitation of the name of any other person who hath or shall have obtained letters-patent for the sole making and vending of such thing, without consent of such patentee, or his assigns or legal representatives; or if any person, upon any such thing not having been purchased from the patentee, or some person who purchased it from or under such patentee, or not having the license or consent of such patentee, or his assigns or legal representatives, shall write, paint, print, mould, cast, carve, engrave, stamp, or otherwise make or affix the word "patent," or the words "letters patent," or the word "patentee," or any word or words of like kind, meaning, or import, with the view or intent of imitating or counterfeiting the stamp, mark, or other device of the patentee, or shall affix the same or any word, stamp, or device, of like import, on any unpatented article, for the purpose of deceiving the public, he, she, or they, so offending, shall be liable, for such offence, to a penalty of not less than one hundred dollars, with costs, to be recovered by action in any of the circuit courts of the United States, or in any of the district courts of the United States, having the powers and jurisdiction of a circuit court; one half of which penalty, as recovered, shall be paid to the patent fund, and the other half to any person or persons who shall sue for the same.

SEC. 6. And be it further enacted, That all patentees and and assignees of patents hereafter granted, are hereby required to stamp, engrave, or cause to be stamped or engraved, on each article vended or offered for sale, the date of the patent; and if any person or persons, patentees or assignees, shall neglect to do so, he, she, or they, shall be liable to the same penalty, to be recovered and disposed of in the manner specified in the foregoing fifth section of this act.

Approved, August, 29th, 1842.

Information to persons having business at the Patent Office, under the Act of August 29, 1842.

ART. 1. This act authorizes the Treasurer of the United States to re-pay any money which has been paid into the Treasury by actual mistake, as for patent fees, thus precluding the necessity of special application to Congress for relief.

ART. 2. The privilege of renewal of lost patents is now extended to those granted before the fire of December, 1836. Heretofore it has been limited to those actually lost before the fire, thus excluding many lost subsequently, and before they were recorded anew in this office, leaving the inventor without remedy.

Art. 3. Protection is by this act extended to a new class of objects, viz.—To new and original *Designs* :—

For a manufacture of metal and other materials.

For the printing of woollen, silk, cotton, or other fabrics.

For busts, statues, or bas-relief, or composition in alto or basso-relievo.

For any impression or ornament, or to be placed on any article of manufacture in marble or other material.

For any new and useful pattern, print, or picture, to be in any manner attached to or fixed on any article of manufacture.

For any new or original shape or configuration of any article of manufacture: all such designs not being previously known or used by others.

Art. 4. American ministers, consuls, &c., residing abroad, may administer the oath required by applicants not resident in the United States. Heretofore such functionaries were not authorized to perform this act, thus subjecting applicants, in foreign countries, to much inconvenience.

Art. 5. The stamping or affixing the name of any patentee on any article, without authority so to do, or the affixing the word "patent" or "letters-patent," or the stamp, mark, or device of any patentee on any unpatented article, for the purpose of deceiving the public, is forbidden under a penalty not less than one hundred dollars.

Art. 6. Patentees or their assignees are now required to affix the date of the patent on each article vended or offered for sale, under a like penalty—thus affording to the public, notice of the duration of the patent;—when the article is of such a nature that the date cannot be printed thereon, it should be affixed to the case or package containing it.

It will be observed, that this act does not repeal or change the law under which patents have heretofore been granted, but is merely additional thereto,—all patents, except for designs, being granted for fourteen years, and the fee, as hitherto, being thirty dollars.

Before the grant of any patent under this act, the application must be made by petition to the Commissioner of Patents, and signed by the inventor. He is also required to furnish a written description or specification of his invention or production, in which the same shall be fully and clearly described,—such specification to be signed, witnessed by two witnesses, and verified by his oath or affirmation.

In all cases which admit of representation by drawings, the application must be accompanied by duplicate drawings and a specimen—and in other cases by duplicate specimens.

The provisions of the 6th section do not apply to patents granted prior to the passage of this act.

Scientific Notices.

STEAM EXCAVATING MACHINE.

We are now enabled to lay before our readers a drawing of the American excavating machine, which has excited so much interest amongst engineers, contractors, and all persons connected with the formation of railways, docks, and harbours. In Plate X., the machine is represented in perspective, which, although it does not enter into detail, will, it is hoped, by the aid of the following description, give a tolerably clear general idea of the construction and arrangement of the principal parts, and the manner in which the operation of excavating and disposing of the soil is effected.

The engine and boiler, by which the various parts of the machine are put into operation, are shewn at A, B.—*a, a*, is the framework, provided with wheels, by means of which the whole apparatus is capable of being moved along a temporary railway, as the machine digs away and removes the earth before it. The crane-post is shewn at *b, b*, at the upper end of which is placed the crane-jib *c, c*, supported by the diagonal beam *d, d*, which is also used for carrying certain wheel-work and apparatus, for effecting the required movements of the shovel. At each end of the crane are mounted pullies, over which a chain *e, e*, passes from the shovel or excavator *f, f*, and from thence down the centre of the crane-post, and under the carrier-pulley *g*, to a windlass or capstan, on the axis of which is mounted a large toothed wheel *h*, taking into a pinion upon the main driving-shaft, on which is mounted the fly-wheel c. The shovel or excavator is connected, by swing-joints, to the forked end of diagonal arms *i*, *i*, which are furnished with chains, attached to each end thereof. These chains pass once round pullies, mounted upon the axle of the toothed-wheel *k*; and hence, on rotary motion being communicated to the said axle, the diagonal arms *i*, *i*, and consequently shovel *f*, will be caused to move upwards or downwards. The end of the shovel is connected, by hinges, to the other parts thereof, and retained in its proper position, during the operation of digging, by means of a bolt or pin, which may be withdrawn, by means of suitable apparatus, when the filled shovel is raised by the chain *e*, *e*, and swung round to the required position; the shovel will then tilt over, depositing the excavated earth in a waggon or other required receptacle.

Upon the axle of the guide-pulley, on the top of the crane-post, is a bevilled toothed-wheel *l*, taking into a similar wheel, mounted upon a diagonal shaft *m*, at the lower end of which is a bevilled pinion, taking into another, mounted upon the axle of a pinion *n*, which latter pinion is capable, by means of hand-levers, of being shifted in and out of gear with the wheel *k*; by which arrangement, the chain *e*, passing over the guide-pulley, and communicating rotatory motion thereto, will cause the pinion *l*, and shaft *m*, to revolve, and thereby, through the intervention of the pinion *n*, and wheel *k*, effect the required motion of the diagonal arms *i*, *i*, and shovel *f*, the attendant being able to arrest the motion thereof, at any time, by means of the hand-levers connected to the pinion *n*.

The horizontal motion or swinging round of the crane, is effected by means of the horse-shoe-shaped pulley *o*, *o*, affixed to the crane by cross-rods; to this pulley, each end of a chain *p*, *p*, is fastened, which chain, having passed round the periphery thereof, is conducted downwards, by means of guide-pullies *q*, *q*, passing once around an axle, driven by wheel-work, connected to the engine, which wheel-work is capable of being shifted in and out of gear with the main shaft, by the attendant, through the intervention of a hand-lever; by this arrangement, the chain *p*, *p*, is put into motion at discretion, thereby causing the horse-shoe pulley *o*, *o*, to revolve, and with it the crane and shovel or excavator. The machine is propelled along its temporary railway, as the work progresses, by means of a toothed-wheel *r*, affixed on the axle of one pair of running-wheels, and connected to the motion of the engine by suitable gearing.

When the operation of excavating commences, the shovel is caused (by the loosening of the chain *e, e,*) to assume a nearly perpendicular position, the teeth thereof being turned towards the earth; motion then being communicated to the several parts, by means of their respective trains of wheel-work, the chain *e, e,* is gradually drawn tight, and wound around the windlass or capstan; during which operation the arms *i, i,* are brought into action, forcing the shovel into the ground by the means before described; hence it will be perceived, that the shovel or excavator is operated upon by power exerted in two directions, the one through the medium of the arms *i, i,* causing it to be thrust into the earth, the other through the medium of the chain *e, e,* and its appendages, causing it to be lifted therefrom; by which combined action, and suitable speeds of driving gear, the shovel will describe a curve in ascending, the commencement thereof being just in front of the machine, and the end thereof vertically under the front of the crane-jib. The shovel being filled with earth, and raised to this point, is swung round, by means of the horse-shoe-shaped pulley *o*; and the bolt, which secures the end thereof, being withdrawn, the contents will fall into the waggon or other required receptacle; after which, the crane is again swung round, and the various parts put out of gear, when the shovel will descend, in order to operate upon the earth as before.

This peculiar arrangement of apparatus, it will be seen, is applicable only to operations performed on land; but a machine, on the same principle, suitably modified for the intended work, has been constructed for the purpose of dredging harbours, deepening rivers, or other such operations, a description of which, with a more minute account of the first machine, we shall lay before our readers at a future time.

THE COMPLETION OF THE THAMES TUNNEL.

The report of the Directors of the Thames Tunnel Company, submitted to the general assembly of the Proprietors, on the 7th of March, 1843, announces that this extraordinary undertaking, which has excited the interest of the whole civilized world, is at last completed, and was opened for foot-passengers on Saturday, the 25th March. We congratulate the Proprietors, and also Sir I. Brunel, the talented engineer, on the successful termination of this undertaking, which is another proof of perseverance, when combined with skill, bearing down and finally overcoming the greatest difficulties; the following is the report of the Directors:—

"GENTLEMEN,

"Your Directors have the great satisfaction to announce to the Proprietors that the Thames Tunnel will be opened as a public thoroughfare in the course of this mouth, or, in fact, as soon as the formal arrangements can be made.

"The engineer, Sir I. Brunel, has reported the work to be complete for this purpose, and his unqualified confidence in the solidity and durability of the structure.

"Thus, after many years of anxiety and difficulties, perhaps without parallel in the history of great public works, the practicability of forming a thoroughfare for carriages and foot passengers, under a deep navigable river, and without interruption to the navigation, is proved and executed.

"The obstacles, which have from time to time impeded, and all but stopped the progress of the Tunnel, have been numerous.

"From the first, however, amongst its supporters, it reckoned those who were pre-eminently qualified to judge of the probability of its final success and utility, and your engineer and Directors, deriving confidence from the sanction thus given to the work, never hesitated to persevere, even under the most discouraging circumstances.

"The Duke of Wellington was an original subscriber in the year 1824. The work was commenced in 1825. In 1828, the capital of the Company was exhausted, and an irruption of the river, in front of the excavation, occurring at the same time, apparently involved it in irremediable difficulties, if not ruin. His Grace attended a public meeting, which was attended also by His Royal Highness the Duke of Cambridge, and supported the Resolutions which were moved in favor of advancing fresh capital, by means of loans on debentures, in order to continue the work. In the course of his speech, His Grace said, addressing a large meeting,—

"'You must all see, as well as I can detail to you, what the chances are of the success of this undertaking: this I will say, that if money is found, it is quite certain that the Tunnel must be completed. The accidents which have occurred, and which appear to have occurred only to demonstrate the enterprise, the genius, and the ability of the engineer who has conducted it, have proved to a certainty, that it is absolutely impossible that the work should not be completed;' and he added, 'That the work was important both in a military and commercial point of view.'"

"Dr. Wollaston also was an original subscriber, and lent his name and high authority to the undertaking, whilst he lived.

"The work, as has been stated, commenced in 1825, but was stopped in 1828, by an irruption of the Thames.

"From that time to the spring of 1835, no progress was made. In this year, under the sanction of an Act of Parliament, the Treasury allowed the Exchequer Loan Commissioners to advance, out of the grant voted for public works, the money necessary to complete the Tunnel; and it was again commenced, and has been continued, with few but inevitable interruptions and delays, to the present time, when, as the Directors have stated, it is securely completed, and is about to be thrown open as a thoroughfare for foot passengers. The two roadways, for carriages under the river, are also perfectly completed.

"From its commencement to the present date there have been but eleven years within which the excavation could be carried on. And during this time, for nearly two years or ninety-nine weeks, the works were suspended, from circumstances beyond the control of either the Directors or the engineer.

"When the public money was advanced, the practicability of the work was considered so doubtful, that it was made a condition, by the Treasury, that the most hazardous portion of it should be completed first, and before any expenditure upon any other part of the work was to be permitted.

"The Tunnel was therefore necessarily constructed in a line from the place of its commencement, viz.—from Rotherhithe to Wapping, under the bed of the river, as the whole of that portion of the work was deemed the hazardous portion. Hence no preparation could be made on the Middlesex side, either by the purchase of property, or the building of the shaft, &c., for descent.

"But what rendered this condition, annexed to the grant, of more serious importance was, that the engineer having found, from experience, it would be economical to work occasionally at both ends, alternately or at once, was unable to do so.

"It was found that the ground, through which the excavation had to be carried on, varied greatly: sometimes it was dense, and comparatively free from water, when the excavation could be carried on safely and expeditiously; at others, it was merely a loose river deposit, which had to be subjected to great pressure, by throwing gravel and clay upon that part of the bed of the river under which the work was being constructed, and allowing a heavily-laden vessel, adapted to the purpose, to settle over the shield. During this time, the whole establishment was at a stand still, adding largely to the cost and the time necessary for the completion of the work. Nor was the delay and the consequent loss of the expense of the establishment the only loss sustained. The machinery became injured and deteriorated, and had to be frequently repaired and renewed.

"All these circumstances were represented by the engineer to the Directors, and by your Directors to the proper authorities; but so uncertain was the completion of the enterprise considered, even up to the line of low-water mark, that it was not deemed right to advance, at any one time, more money than was required for the immediate continuation of the structure under the river.

"It is far from the desire of the Directors to make any complaint of the rule thus laid down, and with which the Proprietors have been before acquainted, and which the difficulty and novelty of the undertaking undoubtedly suggested; but it serves to show how strong was the conviction of the impracticability of the work, and also to account (which justice to the Directors and engineer requires should be stated) both for a longer time elapsing and a larger outlay taking place, than would have been the case had ample capital been at their disposal, to be applied according to their judgment and that of their engineer.

"The extra cost to the Company, during these periods of suspension, has been very little less than £40,000. in the whole. This sum, added to what remains undrawn of the sum the Directors were empowered to borrow, under their Act of Parliament, (viz. £30,000.) would go far towards the completion of the descents for carriages, even upon the present plan, enlarged as it was after the original dimensions and estimates were formed.

"Under these circumstances, adverse as they may be considered, and with a rigid economy carried often to the very verge of prudence, the work has been in fact executed in about nine years of actual work, at a cost of about £446,000, including property and expences of every description, with the particulars of which the Proprietors have been accurately and annually acquainted. The actual Tunnel of 1200 feet was executed in eight years.

"In the time stated, the whole work might easily, indeed more easily and safely have been accomplished, if, as has been explained, the requisite command of capital and its application had been obtained.

"The carriage-way descents are now alone wanting to complete the work. They are susceptible of being contracted for in the ordinary way; and your Directors propose, so soon as the foot thoroughfare is opened, to turn their attention to this portion of the work. It may require a new Act of Parliament; and your Directors recommend the Proprietors to invest them with a similar discretionary power to that granted on a former occasion, previously to the resumption of the work in 1835, in order to mature such arrangements as may be necessary for the full completion of the work, and to determine upon its expediency with reference to the amount of capital required, and the probable return for it: which plans, previously to their adoption, your Directors will, as before, submit to the Proprietors at a Special General Meeting to be called for that purpose.

"Your Directors are of opinion, that without the carriage-way descents (the two roadways for carriages under the river being already completed) are added, a considerable amount of toll will be lost to the Proprietors and the Government.

"For foot-passengers your Directors have fixed the toll at one penny per passenger, and which they hope the Proprietors will approve.

"The Directors propose, immediately on opening the Tunnel, to devote their attention to finally settling the cost of the permanent establishment, upon the most economical footing possible.

"They cannot conclude their Report without renewing an expression of their admiration of the ability of their engineer, Sir I. Brunel, who, in addition to the block machinery at Portsmouth, and the works in Chatham Dock Yard, now leaves another lasting memorial of his genius to this country. They desire also to acknowledge the zeal with which he has been seconded by the acting engineer, Mr. Page, and especially by Mr. Charlier, their clerk, in another department of the undertaking.

"Statements of the receipts and expenditure of the Company, for the year which ended the 31st of December, 1842, have been prepared, and are now submitted for the information of the Proprietors."

BENJAMIN HAWES, CHAIRMAN.

Thames Tunnel Office,
Walbrook Buildings,
7th March, 1843.

AERIAL STEAM CARRIAGE.

It is much to be regretted that men of letters connected with the periodical press, to whom the public naturally look with confidence for information upon all subjects of notoriety, should generally betray such extreme ignorance of the elementary principles of science, and even of the established laws of nature, as to give countenance to any absurd scheme that may arise, and present to the world, with vaunting pretensions, projects the most visionary and fallacious.

Under this designation, we have long felt satisfied that the proposed aerial machine must be classed; and we have seen, with no small degree of astonishment, not only that many intelligent and highly respectable persons have been induced to listen coolly to this wild project, but also that Parliament has condescended to entertain a Bill for forming a joint stock company, to carry this wonderful chimera into active existence.

We have delayed the publication of the present number of our Journal, in order to inspect and give a report of the specification of this invention, which has been just enrolled; and to discover, if possible, some new feature which might give colorable plausibility to the project; but no such feature is there developed. Time and space will not allow us now to detail the full particulars of this proposed machine; we say *proposed*, because no such machine has yet been made, or is, as we think, likely to be constructed, when its elements are understood by persons of common sense.

The apparatus consists of a car, containing the goods, passengers, engine, fuel, &c.; to which a rectangular frame, made of wood or bamboo cane, and covered with canvass, or oiled-silk, is attached; this frame extends, on either side of the car, in a similar manner to the out-stretched wings of a bird, but with this difference,—that the frame is immoveable. Behind the wings are two vertical fan-wheels, furnished with oblique vanes, which are intended to propel the apparatus through the air. These wheels receive motion through bands and pulleys, from a steam or other engine, contained in the car. To an axis at the stern of the car, a triangular frame is attached, resembling the tail of a bird, which is also covered with canvass or oiled-silk; this may be expanded or contracted at pleasure, and is moved up or down, for the purpose of causing the machine to ascend or descend.—Beneath the tail is a rudder, for directing the course of the machine to the right or to the left; and, to facilitate the steering, a sail is stretched between two masts which rise from the car.

The amount of canvass or oiled-silk, necessary for buoying up the machine, is stated to be equal to one square foot for each half pound weight, the whole apparatus being about 3000 lbs., and the area of surface spread out to support it, 4500 square feet, in the two wings, and 1500 in the tail,—making altogether 6000 square feet. The engine is proposed to be of from 25 to 30 horse power. It is stated in the specification, that on launching the machine into the air, an elevated situation must be selected, and the machine allowed to run some distance down an inclined plane, for which purpose vertical wheels are attached to the bottom of the car or boat. When the machine has thus acquired a momentum, the rotary fan-wheels are put in action to raise it into the air and propel it; the rudder, appended to the car, is then used for regulating its course.

In concluding our hasty remarks on this invention, we would remind our readers, that many projects of a like character have been promulgated to the world by enthusiastic projectors, all of which have fallen to the ground, (we use a figure of speech, for they have never risen,) from the fact of having overlooked the laws of matter, and miscalculated the powers of mechanism, in imitating the functions of animal life.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 149, Vol. XXII.)

June 14, 1842.

The President in the Chair.

"On Iron Sheathing, broad-headed Nails, and Inner Sheathing for Ships."—By J. J. Wilkinson.

These three papers complete the subject which the author commenced in the year 1841, and continued during the present session.

The first treats of the use of beaten iron, and iron nails, even in very ancient vessels, their corrosion, and consequent abandonment; the attempted introduction of rolled iron for the purpose of sheathing. It touches lightly on the construction of iron vessels, and on various attempts to protect them, which experience has now shown to be unnecessary, as the first iron steamer, built by Mr. A. Manby, in 1821, at the Horseley iron-works, has been in constant use on the river Seine up to the present period, without showing any symptoms of oxydation, although the only precautions taken, have been to apply a coat of pitch, as often as to a wooden vessel. Extracts are then made from Mr. Grantham's treatise on "Iron as a material for Ship-building." A list is then given of the patents connected with iron sheathing, and the various modes of preserving it from corrosion, alluding particularly to the valuable labours of Mr. Mallet (of Dublin) on this subject in the archives of the Institution.

The next division treats of metallic sheathing, or a coating of metallic oxide, formed by driving broad-headed nails nearly in contact with each other, into the sheathing board; this process is called filling. The nails used for this purpose by the Romans, were of the form as those of the present day. There are authentic records of "filling" being generally in use in this country in 1666—but it is conjectured that it was practised much antecedent to that time, and it has continued in use, until recently, in Swedish and Danish ships. This mode of protecting the piles of harbours and piers from the ravages of the worm, is then treated of, and examples are given of its success in various situations.

The third division treats of the inner coating or sheathing, which it has been found necessary to use, independently of the external metallic sheathing. It is stated, that some of the stronger and more adhesive kinds of inner sheathing, have proved mainly instrumental in preserving vessels from sinking, when the outer sheathing has failed or been destroyed.

Hair is noticed as among the earliest materials used for inner sheathing; it was usually applied in a loose state, and fixed by pitch or other resinous substances; it was subsequently woven into and used as a cloth;—the coarse part of flax was in the time of the Romans bruised and driven between the seams of their galleys. A vessel was discovered in the Mediterranean Sea (between the years 1458 and 1464) in a depth of water of twelve fathoms, where it is supposed to have lain for nearly 1400 years; the deck and sides were covered with paper, linen, and leaded plates. In all the oldest vessels which have been discovered, the hair was perfectly fresh, although the timber was in a state of decay, and it is stated that the worm never penetrates through an inner sheathing of hair. In the year 1761, when copper sheathing was introduced, experiments were tried upon different kinds of paper for lining, and after trying white-lead and other substances, thick brown paper dipped in tar was found to be the best.

A list is then given of the patents for different kinds of "felt" now used for inner sheathing, noticing particularly that of Messrs. Borrodaile and Co., which appears to be that which is most generally approved. Cocoa-nut fibre and cork, and many other substances, which have been tried at different times, are noticed, and the paper concludes with a copious list of the experiments upon the subject, which the author has compiled from various sources.

"On the Sinking and Tubbing, or Coffering of Pits, as practised in the Coal Districts of the North of England."

By Robert Thomas Atkinson, M. Inst. C. E.

This communication describes the means usually adopted in the Northern coal districts, for effecting the "winning" of those valuable mines; and the author expresses the obligation he is under to his uncle, Mr. Buddle, to whose valuable documents he had free access during the progress of his labours.

It commences with noticing the early periods of mining, before the introduction of steam power for pumping, when the extraction of coal was almost wholly confined to such tracts as could be drained by free water-courses, "adits," or levels; the chain and bucket pumps, and other limited and expensive means, are then explained, with the principles of free drainage, shewing that it was generally only applicable to districts of small extent, and that the best mines were left untouched.

Steam-engines, upon Newcomen's principle, were first used in the Newcastle district in the beginning of the last century, and they underwent many modifications, before they were superseded by the Boulton and Watt engines, now generally used. The consequence of this introduction of steam power for raising coal, instead of accomplishing it by means of horse gins and other rude contrivances, is, that the capability of supply appears only limited by the demand.

Over and above the weight of coal raised, it is necessary to draw immense quantities of water for the purpose of draining the mines. In some collieries the weight of water pumped up, amounts to as much as four times that of the coal raised. At the Percy Main colliery (which is rather an extreme instance), 3922 tons of water are pumped up daily, while only 636 tons of coal are raised in the same time. At the Benwell colliery, which is an average case, the weight of water amounts to 2020 tons per day, and the coals raised to 768 tons or 38 per cent. of the weight of water.

The principal technical mining terms, in use in the northern districts, are then explained, and the author pcoceeds to describe the methods of sinking the shafts, noticing the difficulties which occur in traversing strata of various kinds, and the modes of overcoming them,—the temporary timbering with "cribs" and "deals" previous to walling—and the different kinds of "tubbing or coffering" of wood, stone, or cast-iron, used in passing wet portions of the strata or perishable rocks; this part of the subject is treated of very fully, with all the details of the construction of the different kinds, and the methods of using them. The cast-iron tubbing, which was first introduced by the late Mr. Buddle, is particularly noticed, as is also its use in segments at the Percy pit in the year 1779; some instances are given of the decomposition of cast-iron tubbing and pumps, when exposed to the smoke of underground furnaces and the action of mineral water, the combined action of which has been found to reduce the metal to the consistency of plumbago.

The construction of the pumps, buckets, clacks, rods, &c. composing the apparatus for raising the water from the mines, is then fully described, with the " off-take joints" and the " fish-head" for drawing a drowned clack." The " hanging sets" or columns of pumps, with their " ground spears" used in sinking the shafts, are also described, with the method of fixing the cisterns at intervals in the shafts, for the different sets of pumps, which are all of the " lifting" kind.

Accounts are then given of the sinking of Percy pit, Flatworth colliery, commenced in 1799—of Howden pit, Percy Main colliery, in 1804—and of a pit at the Barrow Field colliery, in 1822, in all of which, great difficulties were encountered.

An explanation is then given of the extensive and complete set of sections of pits, drawings of the machinery, and of the models which accompanied the paper, and the author promises to extend the subject on a future occasion, as this communication is less comprehensive than was intended, and has been sent in its present state for the purpose of complying, during the session, with the usual condition of election.

List of Disclaimers
OF PARTS OF INVENTIONS AND
Amendments

MADE UNDER LORD BROUGHAM'S ACT.

(Continued from page 160, Vol. XXII.)

James Warren,—disclaimer and memorandum of alteration to patent dated 4th August, 1841, " for an improved machine for making screws." Filed 24th March, 1843.

Dr. Henry Beaumont Leeson,—ditto to patent dated 1st June, 1842, for " improvements in the art of depositing and manufacturing metals and metal articles, by electro-galvanic agency, and in the apparatus connected therewith." Filed 25th March, 1843.

List of Patents

That have passed the Great Seal of IRELAND, from the 27th January, 1843, *to the* 15*th of March,* 1843, *inclusive.*

To John George Bodmer, of Manchester, engineer, for certain improvements in the manufacture of metallic hoops and tyres for wheels, and in the method of affixing the same for use; and also improvements in the machinery or apparatus to be employed therein.—Sealed 27th January.

James Clark, of Glasgow, power-loom manufacturer, for an improved mode of manufacturing certain descriptions of cloths. —Sealed 1st February.

Thomas Thompson, of Coventry, in the county of Warwick, weaver and machinist, for certain improvements in weaving figured fabrics.—Sealed 18th February.

Julian Edward Disbrowe Rodgers, of Upper Ebury-street, in the county of Middlesex, for certain improvements in the separation of sulphur from various mineral substances.—Sealed 18th February.

William Young, of Queen-street, Cheapside, in the city of London, lamp-maker, for improvements in the construction of lamps and candlesticks.—Sealed 28th February.

John Rand, of Howland-street, Fitzroy-square, in the county of Middlesex, artist, for improvements in making and closing metallic collapsable vessels.—Sealed 28th February.

John Varley, of Colne, in the county of Lancaster, engineer, and Edmondson Varley, of the same place, cotton manufacturer, for certain improvements in steam-engines.—Sealed 15th March.

List of Patents

Granted for SCOTLAND, subsequent to February 22nd, 1843.

To John Craig, of Stanhope-street, London, for certain improvements in machines or apparatus for weighing,—being a foreign communication.—Sealed 28th February.

Edward Bell, of the College of Civil Engineers, Putney, Surrey, professor of practical mechanics, for improvements in applying heat in the manufacture of artificial fuel, which improvements are applicable to the preparation of asphalte, and for other purposes.—Sealed 2nd March.

George Bell, of the city of Dublin, merchant, for certain improved machines, which facilitate the drying of malt, corn, and seeds; also the bolting, dressing, and separating of flour, meal, and all other substances requiring to be sifted.—Sealed 2nd Maıch.

James Bullough, of Blackburn, overlooker, for certain improvements in the construction of looms for weaving.—Sealed 4th March.

John Thomas Betts, of Smithfield Bars, London, for improvements in the manufacture of metal covers for bottles, and certain other vessels; and in the manufacture of sheet metal for such purposes,—being a foreign communication.—Sealed 7th March.

Jules Le Jûne, of North-place, Regent's Park, London, engineer, for improvements in accelerating combustion, which improvements may be applied in place of the blowing machines now in use.—Sealed 7th March.

Thomas Howard, of Hyde, Cheshire, manufacturer, for certain improvements in machinery for preparing and spinning cotton, wool, flax, silk, and similar fibrous substances.—Sealed 11th March.

Charles Payne, of South Lambeth, London, chemist, for improvements in preparing vegetable matters, where metallic and earthy solutions are employed.—Sealed 13th March.

William Longmaid, of Plymouth, accountant, for improvements in treating ores and other minerals, and in obtaining various products therefrom; certain parts of which improvements are applicable to the manufacture of alkali.—Sealed 13th March.

William Barker, of Manchester, millwright, for certain improvements in the construction of metallic pistons.—Sealed 16th March.

Joseph Whitworth, of Manchester, engineer, for certain improvements in machinery or apparatus for cleaning roads; and which machinery is also applicable to other similar purposes.—Sealed 22nd March.

In consequence of an error made in the Chancery Office, Edinburgh, the following Patents were omitted in a former List.

John Thomas Betts, of Smithfield Bars, London, for improvements in covering and stopping necks of bottles and other vessels,—being a foreign communication.—Sealed 23rd January.

Thomas Thompson, of Coventry, weaver and machinist, for certain improvements in weaving figured fabrics.—Sealed 23rd January.

Julian Edward Disbrowe Rodgers, of Upper Ebury-street, London, chemist, for certain improvements in the separation of sulphur from various mineral substances.—Sealed 25th January.

New Patents
SEALED IN ENGLAND.
1843.

To John Heathcoat and Ambrose Brewin, of Tiverton, lace manufacturers, for certain improvements in the manufacture of ornamented net or lace.—Sealed 28th February—6 months for inrolment.

Gottlieb Boccius, of the New Road, Shepherd's Bush, Gent., for certain improved arrangements and apparatus for the production and distribution of light.—Sealed 28th February—6 months for inrolment.

George Bell, of Dublin, merchant, for certain improvements in machines for drying wheat, malt, corn, and seeds, and for bolting, dressing, and separating flour, meal, and other like substances.—Sealed 1st March——6 months for inrolment.

John Frearson, of Birmingham, machinist, for improvements in fastenings for wearing apparel.—Sealed 2nd March—6 months for inrolment.

Thomas Simpson, of Birmingham, for a certain improvement in buckles.—Sealed 2nd March—6 months for inrolment.

Masta Joscelin Cooke, of Gray's-inn-square, solicitor, for certain improvements in the manufacture of artificial fuel.—Sealed 2nd March—6 months for inrolment.

John Keely, the younger, of Nottingham, dyer, and Alexander Alliott, of Lenton, bleacher, for certain improvements in machinery or apparatus for drying or freeing from liquid or moisture, woollen, cotton, silk, and different fibrous materials, and other substances; and also for stretching certain fibrous materials,—being a communication.—Sealed 2nd March—6 months for inrolment.

William Walker, of George-yard, Crown-street, Soho, coachsmith, for certain improvements in the manufacture of springs and axles for carriages.——Sealed 2nd March—6 months for inrolment.

Charles White, of Noel-street, Islington, engineer, for certain improvements in machinery for raising and forcing fluids.—Sealed 2nd March—6 months for inrolment.

Rober Stirling Newall, of Gateshead, Durham, wire rope manufacturer, for improvements in the manufacture of wire ropes, and in the apparatus and arrangements for the manufacture of the same.—Sealed 6th March—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improvements in machinery or apparatus for making pins,—being a communication.—Sealed 7th March—6 months for inrolment.

James Pilbrow, of Tottenham, engineer, for certain improvements in the application of steam, air, and other vapours, and gaseous agents, to the production of motive power, and in the machinery and apparatus by which the same are effected.—Sealed 7th March—6 months for inrolment.

William Betts, of Ashford, in the county of Kent, railway contractor, and William Taylor, of the same place, plumber, for improvements in the manufacture of bricks and tiles.—Sealed 8th March—6 months for inrolment.

William Kenworthy, of Blackburn, in the county of Lancaster, cotton spinner, for certain improvements in machinery or apparatus called "beaming or warping machines."—Sealed 11th March—6 months for inrolment.

Charles Chilton, of Gloucester-street, Curtain-road, and Frederick Braithwaite, of the New-road, engineer, for improvements in machinery for cutting or splitting wood for fuel and other purposes.—Sealed 16th March—6 months for inrolment.

Arthur Chilver Tupper, of New Burlington-street, Middlesex, for improvements in the means of applying carpets and other coverings to stairs and steps, and in the construction of stairs and steps.—Sealed 16th March—6 months for inrolment.

Alexander Angus Croll, superintendent of the gas-works, Brick-lane, and William Richards, of the same works, mechanical inspector, for improvements in the manufacture of gas, for the purposes of illumination, and in apparatus used when transmitting and measuring gas or other fluids.—Sealed 16th March—6 months for inrolment.

Angier March Perkins, of Great Coram-street, engineer, for improvements in the manufacture and melting of iron, which improvements are applicable for evaporating fluids and disinfecting oils.—Sealed 16th March—6 months for inrolment.

John Thomas Betts, of Smithfield Bars, Gent., for improvements in the manufacture of metal covers for bottles and certain other vessels, and in the manufacture of sheet metal for such purposes; being a communication.—Sealed 16th March—6 months for inrolment.

Frederick Cook Matchett, of Birmingham, manufacturer, for certain improvements in the manufacture of hinges.—Sealed 16th March—6 months for inrolment.

Martyn John Roberts, of Brynycaeran, Carmarthenshire, Gent., for improvements in the composition of ink, blacking, and black paint.—Sealed 16th March—6 months for inrolment.

James Malam, of Huntingdon, gas engineer, for improvements in the manufacture of gas retorts, and in the modes of setting gas retorts.—Sealed 16th March—6 months for inrolment.

William Laycock, of Liverpool, merchant, for improvements in constructing houses and such like buildings.—Sealed 16th March—6 months for inrolment.

Wakefield Pim, of the Borough of Kingston-upon-Hull, engineer, for certain improvements in the construction or formation of buoys and other water-marks.—Sealed 18th March—6 months for inrolment.

Alexander Simon Wolcott, of City-terrace, City-road, machinist, and John Johnson, of Manchester, machinist, for improvements in photography, and in the application of the same to the arts.—Sealed 18th March—6 months for inrolment.

William Barker, of Manchester, Millwright, for certain improvements in the construction of metallic pistons.—Sealed 20th March—6 months for inrolment.

Solomon Robinson, of Dudley, Worcestershire, roll turner, for certain improvements in the manufacture of shot.—Sealed 20th March—6 months for inrolment.

Joseph Needham Tayler, of Chelsea, captain in Her Majesty's Navy, and William Henry Smith, of Fitzroy-square, civil engineer, for certain improvements in breakwaters, beacons, and sound-alarms; also in landing or transmitting persons and goods over or through strata, or obstructions of any nature, all of which may be used either separately or in combination. —Sealed 21st March—6 months for inrolment.

Andrew Barclay, of Kilmarnoch, Scotland, brass-founder, for certain improvements in lustres, chandeliers, pendants, and apparatus connected therewith, to be used with gas, oil, and other substances; which invention is also applicable to other purposes.—Sealed 24th March—6 months for inrolment.

Gregory Seale Walters, of Coleman-street, merchant, for improvements in the manufacture of chlorine and chlorides, and in obtaining the oxides and peroxides of manganese, in the residuary liquids of such manufacture,—being a communication.—Sealed 24th March—6 months for inrolment.

Alfred Hooper Nevill, of Chichester-place, Gray's-inn-road, corn-dealer, for improvements in preparing lentils and other matters for food.—Sealed 24th March—6 months for inrolment.

Nicolas Henri Jean François Comte de Crouy, of the Edgware-road, for certain improvements in rotary pumps and rotary steam-engines.—Sealed 25th March—6 months for inrolment.

Robert Faraday, of Wardour-street, Soho, gas-fitter, for improvements in ventilating gas-burners and burners for consuming oil, tallow, or other matters,—being a communication.—Sealed 25th March—6 months for inrolment.

Sir Samuel Brown, Knt., commander in Her Majesty's Royal Navy, of Blackheath, for improvements in the construction of breakwaters, and in constructing and erecting light-houses and beacons, fixed and floating, and in apparatus connected therewith; and also in anchors for mooring the same, which are applicable to ships or vessels.—Sealed 27th March—6 months for inrolment.

John Sylvester, of Great Russell-street, Middlesex, engineer, for certain improvements in producing ornamental surfaces, on or with iron, applicable in the manufacture of stoves and other uses; and for improvements in modifying the transmission of heat.—Sealed 28th March—6 months for inrolment.

Arthur Dunn, of Rotherhithe, soap-boiler, for improvements in treating, purifying, and bleaching fatty matters.—Sealed 28th March—6 months for inrolment.

CELESTIAL PHENOMENA FOR APRIL, 1843.

D.	H.	M.	
1			Clock before the sun, 4m. 7s.
	—		☽ rises 5h. 38m. M.
	—		☽ passes mer. 1h. 0m. A.
	—		☽ sets 8h. 38m. A.
	23	48	♀ in the ascending node
4	17	22	♃'s fourth satt. will im.
5			Clock before the sun, 3m. 13s.
	—		☽ rises 7h. 41m. M.
	—		☽ passes mer. 4h. 15m. A.
	—		☽ sets Morn.
	—		Occul 121 Tauri, im. 12h. 49m.
6	5	53	☿ in conj. with ♅ diff. of dec. 1. 47. S.
7			Occul *q* Geminorum, im. 10h. 53m. em. 11h. 30m.
7	11	6	☽ in □ or first quarter.
7	15	53	☿ greatest Hel. Lat. S.
8			Occul ζ Cancri, im. 8h. 3m.
9	16	10	♃'s first satt. will im.
10			Occul 16 Sextantes, im. 12h. 24m em. 13h. 20m.
10			Clock before the sun, 1m. 29s.
	—		☽ rises 1h. 36m. A.
	—		☽ passes mer. 8h. 40m. A.
	—		☽ sets 3h. 5m. M.
11			Occul g^1 Leonis, im. 12h. 28m. em. 13h. 29m.
13	11		☽ in Perigee
14	2	29	Ecliptic oppo. or ○ full moon
15			Mercury R. A. 0h. 56m. dec. 4. 9. N.
	—		Venus R. A. 22h. 58m. dec. 7. 28. S.
	—		Mars R. A. 17h. 15m. dec. 23. 1. S.
	—		Vesta R. A. 9h. 15m. dec. 23. 50. N.
	—		Juno R. A. 21h. 0m. dec. 6. 32. S.
	—		Pallas R. A. 6h. 44m. dec. 1. 26. S.
	—		Ceres R. A. 8h. 15m. dec. 30. 56. N.
	—		Jupiter R. A. 21h. 38m. dec. 14. 51. S.

D.	H.	M.	
16			Saturn R. A. 19h. 49m. dec. 20. 57. S.
	—		Georg. R. A. 0h. 0m. dec. 0. 44. S.
	—		Mercury passes mer. 23h. 27m.
	—		Venus passes mer. 21h. 27m.
	—		Mars passes mer. 15h. 41m.
	—		Jupiter passes mer. 20h. 3m.
	—		Saturn passes mer. 18h. 14m.
	—		Georg. passes mer. 22h. 24m.
	—		Clock before the sun, 0m. 9s.
	—		☽ rises 8h. 55m. A.
	—		☽ passes mer. 0h. 16m. M.
	—		☽ sets 4h. 54m. M.
	15	52	♄ in □ with the ☉
16	6	2	♂ in the descending node
17	22	9	♂ in conj. with the ☽ diff. of dec. 1. 12. N.
20			Clock after the sun, 1m. 2s.
	—		☽ rises 1h. 9m. M.
	—		☽ passes mer. 5h. 10m. M.
	—		☽ sets 9h. 18m. M.
	15	9	♄ in conj. with the ☽ diff of dec. 1. 47. S.
21	0	25	☽ in □ or last quarter
	16	9	♃'s fourth satt. will em.
21	16	45	Ceres in □ with ☉
22	23	25	♃ in conj. with the ☽ diff. of dec. 4. 52. S.
24	13	43	☿ in sup. conj. with the ☉
25			Clock after the sun, 2m. 2s.
	—		☽ rises 2h. 56m. M.
	—		☽ passes mer. 8h. 55m. M.
	—		☽ sets 3h. 7m. A.
	18	55	♀ in conj. with the ☽ diff. of dec. 6. 59. S.
26	4	15	♅ in conj. with the ☽ diff. of dec. 6. 18. S.
	9		☽ in Apogee
26	15	29	☿ in the ascending node
29	4	19	Ecliptic conj. or ● new moon
29	19	38	♀ in conj. with ♅ diff. of dec. 0. 52. N.
	19	43	☿ in conj. with the ☽ diff. of dec. 3. 19. S.

J. LEWTHWAITE, Rotherhithe.

THE

London

JOURNAL AND REPERTORY

OF

Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. CXXXVII.

Recent Patents.

To JOSEPH WHITWOTH, *of Manchester, in the county of Lancaster, engineer, for his invention of certain improvements in machinery or apparatus for cleaning roads; and which machinery is also applicable to other similar purposes.*—[Sealed 2nd August, 1842.]

THESE improvements have reference to the machinery or apparatus, for which a patent was granted to the present patentee on the 15th day of April, 1840.

In Plate XI., the improved apparatus is shewn in detail. Fig. 1, is a side elevation; fig. 2, an end elevation; and fig. 3, a horizontal view of the machine;—the following figures represent detached portions of the same. A, is the outline of the cart; B, are the side-frames of the apparatus, formed of wrought-iron, and connected together by cross-stays C. The apparatus is attached to the cart by brackets D, carrying the hollow bosses E, screwed to the side-frames B. The bosses E, form bearings for the axis F, carrying the chain-pullies G, and wheel H. This wheel is loose on the axis F, to which it is connected by the sliding-clutch I. It gears with the cog-wheel K, attached, by staples, to the off side-wheel of the cart.

When the sliding-clutch I, is in gear, the rotary motion of the running-wheel, as the cart goes forward, is communicated, by the wheels K, H, and axis F, to the pullies G. A second pair of chain pullies L, are fixed on the axis M, carried by the adjustable steel centres N, in the side-frames B. The chains O, with the brooms P, attached, are stretched over the corresponding pullies, and move round with them, as the cart proceeds forward. Each broom is successively brought into contact with the ground, and the loose soil, on the surface, is swept up the carrier-plate Q; at the top of which it is thrown forward into the cart. R, is a flap or apron, connected, by a hinge, to the top of the plate, to prevent any portion of the soil, &c., from falling between the plate and the back of the cart.

The carrier-plate Q, is suspended from the side-frames B, by screws S, and has no direct communication with the cart. It may be made of sheet-iron, and should have, on the lower edge, a strip of steel, to defend it from the effect of occasional friction with the ground. As the brooms wear, the position of the carrier-plate requires adjustment, by the screws S, in order to keep it in contact with the shortened brooms, as they pass upwards.

For the beard of the brooms, the patentee prefers the use of "piassava," the product of South America. It may be directly inserted into the broom-stock, small portions being separately placed in conical holes, drilled through the stock, at short intervals, and each separate portion being secured by pitch, and by a small wedge, driven in from the back, as shewn at fig. 4. The chains, by which the brooms are connected, are formed of open and closed links, as shewn at fig. 5. The open link T, has two flat ends U, between which the stock W, of the broom, is secured by a screwed pin and nut.

To facilitate the management of the chain, one of the open links (out of the entire series of each chain) has a hinge-joint X, which, when the nut is removed, allows one of the flat ends to be drawn through the adjoining link, whereby the continuous connection of the endless chain is obtained. The tension of the chain, over the pullies G, and L, is regulated by substituting longer or shorter links, at the joint X, as occasion may require.

The bearings E, have rotary play in the brackets D, by which they are attached to the cart; and hence, by the entire apparatus swinging in the brackets D, the lower brooms bear on the ground with considerable pressure. This pressure is relieved by weights, which counterbalance a certain portion of the weight of the apparatus. Y, is a weight, placed in the front of the cart for this purpose. It hangs in the recess Z, from the chains *a*, wound on the pullies *b*. The axis *c*, of the pullies, has its bearings in steel centres, fixed in standards on the cart, and carries the pinion *d*, taking into the wheel *e*, on the axis *f*. This axis is parallel with the former, and is similarly supported. It carries the grooved pullies *g*, for the chains *h*, the ends of which are fastened in one direction, to the pullies *g*, and in the other to the segments *i*, screwed to the side-frames B. A series of holes is formed in the weight Y, for loose weights, whereby the pressure may be regulated to any nicety.

By the chains *h*, the apparatus may be raised from the surface into an horizontal position. For this purpose, the wheel *e*, is made to slide from the pinion *d*, into gear with the worm *k*, by the lever *l*. The driver, by means of the handle *m*, can then raise the apparatus, whenever occasion may require, and it will continue suspended, by the action of the worm on the wheel. The worm *k*, is placed close to the pinion *d*, that it may receive the teeth of the wheel *e*, partially into gear, before it is entirely slidden out of gear with the pinion *d*; and, by this means, the state of suspension of the apparatus is maintained. As the apparatus is raised, the clutch I, is thrown out of gear, by the lever *n*, which has its fulcrum at *o*, on an arm *p*, fixed on the bearing E. One end of the lever is moved sideways, as the apparatus rises, by the inclined piece *q*, fixed on the cart; and the revolution of the brooms ceases. When the apparatus is lowered, the clutch I, is carried into gear by a spring *r*, fixed on the arm *p*. The side-pieces *s*, carry the bars *t*, (commonly called doctors,) for cleaning the brooms as they revolve. These pieces are slotted, to afford the opportunity of adjusting the position of the doctors to the length of the brooms. *u*, is a covering of tarpauling, or light boards. The brackets D, by which the apparatus is attached to the cart, are made with a joint *v*, and secured by a split key. The entire apparatus may thus be detached from the cart.

The body of the cart is constructed of two distinct parts, as shewn in the drawings, in which the upper part is marked *w*, and the lower *x*, having their junction at the line *y*. Fig. 6, is a side elevation of the upper portion of the cart; fig. 7, the lower portion; and fig. 8, an elevation of the back of the same.

Both parts of the cart have a strong framing of angle iron, with cross-ribs, to which are fastened boards of timber, or plates of sheet-iron. The cart-axle *z*, passes round the upper part. It is forged of great strength, and supported by the cross-stay 1. The lower part *x*, of the cart, which contains the load of soil, &c., is suspended from the axle *z*, by the chains 2. The weight of the loaded part *x*, is thus confined to the axle, and has no tendency to derange the action of the apparatus. An opportunity is also afforded of conveniently attaching and detaching the part *x*. For this purpose, the shaft 3, bearing in projections 4, on the axle *z*, carries the grooved pullies 5, for the chains 2; the ends of which are fastened, in one direction, by hooks, to the eye-pieces 6, on the part *x*, and in the other, to the pullies 5. The wheel 7, on the axis 3, gears with the worm 8, on the shaft 9, which has its bearings at 10, and is worked by a handle at 11. The part *x*, may thus be lowered to the ground, and the chains unhooked; when the sweeping apparatus (raised into the horizontal position, as before described), may be drawn, with the part *w*, over the part *x*, the latter being thus completely disengaged. If loaded, at the time, it may be emptied at leisure, or hoisted, and made to discharge its contents instantaneously, provided suitable apparatus be at hand. To re-attach the part *x*, the part *w*, should be moved backwards over it, and the chains applied. As it is drawn up by the handle 11, the pieces 12, fixed to the part *w*, guide it into the proper position. In working the carts, it will be found convenient, and economical, to provide an extra number of the lower parts, to afford opportunity for substitution, as occasion may require.

It will be observed, that the cart is not symmetrical; the near side being made to expand outwards, as much as the running-wheel will allow. This form is given, to enable the brooms to act near the curb-stone, along the side of streets or roads.

The apparatus, above described, might be modified, by substituting for the brooms, scrapers formed of hoop-iron, or strips of wood, and attached to the endless chains, in precisely the same manner as the brooms. After scraping the surface of the ground, they would move up the carrier-plate, carrying the soil, &c., with them. This change may be found advantageous in certain states of the ground surface; for instance,—when there is a large quantity of snow, or other soft substance, to be removed. The scrapers, or brooms, move with sufficient velocity to throw the soil &c., from the top of the carrier-plate, with considerable force into the cart. But, in dry weather, the soil accumulates rather more at the hinder part; and it is necessary, in order completely to fill the cart, that the driver should distribute the load. This he can easily do, by entering the cart through an opening provided in the top.

13, is a pipe, for drawing off, from the interior of the cart, the water which, in wet weather, is swept into it from the surface of the street. The pipe has its orifice about fourteen inches from the bottom of the cart, and is fitted with a plug 14. The cart being drawn to the side of the street, and the plug withdrawn, the water, above the orifice of the pipe, will be discharged into the gutter.

Referring to the drawings annexed to the patentee's former specification, enrolled the 14th of October, 1840, he here suggests certain modifications of the apparatus therein described.

In the apparatus shewn in Plate XIV., Vol. XVIII., Conjoined Series, at fig. 6, vessels, formed of wood, or iron, or other suitable material, might be substituted for the series of brooms, connected to an endless band of cloth. If, in place of each broom, a piece of wood, of suitable size and shape, were connected to the endless band, it would form, with the band, a vessel, capable of receiving the soil, &c., thrown up by the circular broom, and would afterwards deposit it in the cart.

Again,—in the machine, shewn at fig. 4, instead of the single scraper R, an apparatus, such as before described, might be used, consisting of scrapers, or scoops, attached to endless chains, passing over pullies, suspended from the cart, in such a position, that the scrapers might be brought successively to act on the loose soil thrown by the circular broom into the recess, formed by the plate Y, with the incline T, and carry it into the cart. Such an apparatus might be conveniently driven from the cart wheel, either by chain and pullies, or by toothed wheels, in the manner shewn in the drawings which accompany the present specification.

By making the circular broom larger in diameter, and somewhat reducing the depth of the cart, the soil, &c., could be conveyed up the carrier-plate, directly into the cart, without the aid of any intermediate scraper or scrapers. Whenever the circular broom is used, a carrier-plate, of similar form to that shewn in fig. 4, is indispensably necessary. Instead, however, of attaching it directly to the cart, as shewn in that figure, it will be more advantageous to suspend it from the arms *d*, which carry the axis of the circular broom. As the diameter of the circular broom will be reduced by wear, it will be desirable to form the broom of separate stocks, similar to those composing the endless broom before described: these stocks should be attached to arms, radiating at the sides of the brooms from the centre; and thus the opportunity would be afforded to adjust the broom to the carrier-plate.

The patentee's claims are as follow:—"Firstly,—the counter-balancing a certain portion of the weight of the apparatus, (composed of brooms or scrapers, and an incline or carrier-plate,) so as to relieve and regulate the pressure of the said brooms or scrapers on the ground; and also the mode of raising the apparatus entirely off the ground, when occasion may require. Secondly,—the mode of constructing the cart, to which the apparatus of brooms or scrapers, and carrier-plate, is applied, so as to admit of the said apparatus working near to the side of the road or curb-stone. Thirdly,—the mode of forming the cart, to which the apparatus of brooms or scrapers, and incline or carrier-plate, is attached, of two parts, so that the lower may be conveniently separated from the upper. Fourthly,—the mode of forming the brooms or scrapers into endless chains, by means of open and closed links, as described. Fifthly,—the so combining rotating brooms with an incline or carrier-plate, that the incline or carrier-plate, and the framing which carries the brooms, may be adjusted as the brooms wear away. Sixthly,—the modifications, hereinbefore described, in respect to figs. 5, and 8,* of the machinery of my former patent, above alluded to."—[*Inrolled in the Petty Bag Office, February,* 1843.]

To William Bedford, *of Hinckley, Leicestershire, frame-work knitter, for his invention of certain improvements in machinery, employed in manufacturing hosiery goods, or what is commonly called frame-work knitting.*—[Sealed 17th September, 1840.]

These improvements in machinery, employed in manufacturing hosiery goods, consist in certain novel arrangements and simplifications in the construction of the working parts of a stocking-frame, by which the production of work is considerably expedited, and, at the same time, the amount of labor is diminished.

In Plate XII., fig. 1, is a front elevation of the improved machine, in complete working order; fig. 2, is a horizontal

* These figures correspond to figs. 4, and 6, before mentioned.

view, shewing the parts as seen from above; and fig. 3, is a vertical section, taken transversely through about the middle of the machine, in the dotted line *x*, *x*, of fig. 1; the other figures represent detached portions of the working parts of the machine, drawn upon an enlarged scale.

The wooden frame-work A, A, A, supports the iron standards B, B, B, which carry the working parts of the machinery. The front pair of standards are connected together by a bar C, C, which is called the main bar, extending, horizontally, through the machine. A series of barbed needles *a*, *a*, *a*, of the ordinary form, set in leads, are mounted upon a horizontal bar D, D; which bar is attached to two end trucks E, E, running to and fro upon bed-plates *b*, *b*, fixed upon the bases of the standards. This bar D, with its trucks, constitutes a carriage, by which the needles are enabled to advance and recede, as will be more evidently seen in the detached fig. 4, representing, in a horizontal view, a portion of the needle-bar, with its truck, and the bed-plate on which it runs. A presser-bar F, is made fast, by screws, in front of the main-bar C, the use of which stationary presser-bar will be hereafter described. A series of jacks *c*, *c*, *c*, are mounted upon a fulcrum-rod *d*, in a comb *e*, fixed in the stationary jack-bar G, which is supported by transverse bars *f*, *f*, connected to the back and front standards. From each of these jacks a sinker *g*, is pendant upon a riveted pin *h*; the use of which sinkers is well understood by stocking-makers.

A series of thin curved pieces of metal *i*, called dividers, are placed under the presser-bar, and fixed in a bar *k*, screwed to the main-bar, between it and the presser-bar. These dividers are intended for the same purpose as that for which ordinary lead sinkers are employed; viz., for dividing all the work into equal loops.

The thread, from which the stocking fabric is to be produced, being wound upon a bobbin, placed in any convenient situation above the machine, is led off therefrom by a carrier *l*, which travels to and fro along the front of the machine. The thread-carrier *l*, is a small tube, (of which there may be two or more, according to the number of pieces of fabric intended to be wrought,) attached by an arm *m*, to a slider *n*, mounted on a longitudinal bar H; which slider is moved to and fro by cords *o*, *o*, connected to the slur-wheel I, and treadles J, and J*, below.

In beginning to work this machinery, the parts will be situate, as represented in their state of rest at fig. 3; the jacks *c*, *c*, *c*, being all held up by a series of bent springs *p*, *p*, fixed in a longitudinal rail K, the action of the jacks being confined laterally by a comb of guides *q*. The work having been set on the needles, in the ordinary way, and the workman seated upon the bench, in front of the machine, he depresses the treadle J, by his foot, which gives a partial rotary movement to the slur-wheel I, and thereby causes the cord *o*, to draw the slider *n*, and carrier *l*, toward the left, by which means the thread is laid over the upper surfaces of the needles. There are also attached to the slur-wheel I, other cords *t*, *t*, which pass over pullies in the fixed bar L, and are connected to the carriage of the slur-cocks M. These cords *t*, *t*, are allowed to be rather slack, so that the slider, with the carrier-tube, shall have moved some little distance onward before the cords *t*, *t*, are brought into tension. By these means, the slur-cocks are made to follow the carriers, in order that the jacks and sinkers may be depressed, immediately after the thread has been laid over the needles; by means of which, loops are produced between every two needles, as shewn in the partial front elevation, fig. 5, and transverse section, fig. 6. Fig. 5, exhibits a portion of the presser-bar F, several of the sinkers *g*, and also of the needles *a*, *a*, *a*; and fig. 6, is a transverse section of the same, with the dividers and needle-carriage; the length of the loops being regulated by the position of the falling-bar *j*, in the ordinary manner

The slider consists of two parts, there being a slight bar *r*, *r*, to the ends of which the cords *o*, *o*, are attached. This bar *r*, is passed through slots, in bracket-arms, extending from the slider *n*, and is held in contact with the slider by a spring *s*. It will therefore be seen, that by drawing the cord *o*,—the bar *r*, and slider *n*, with the arms *m*, and tube *l*, will all move together, until the progress of the slider is arrested by adjustable stops *u*, *u*, placed to regulate the width of the work. The rod *r*, however, is, by the slight pressure of the spring *s*, allowed to slide on further, in order to bring the cord *o*, again into a state of tension.

The business of the slur-cock M, as in other stocking-frames, is to depress the jacks and sinkers; and, it being now supposed that it has travelled over the jacks, and effected that object, the next movement is produced by raising the handles N, N. These handles are attached to a longitudinal bar O, the ends of which are made fast to two upright levers S, S, hanging upon fulcrum-pins, fixed to the wooden frame, as shewn at *v*, *v*. The first effect of raising the handles N, and lever S, will be to withdraw the arms *w*, attached to the bar O, from the projections *x*, *x*, at the under parts of the levers P, P, in the back of the machine. These levers P, hang upon stationary fulcrums *y*, *y*, and at their other ends are connected to bent rods Q, Q, and levers R, R, the latter of which hang on fulcrum-pins *z*, *z*, in fixed brackets, extending from the front standards. By thus withdrawing the arms *w*, from the projections *x*, *x*, the compound levers P, Q, and R, are set at liberty. The weight of the carrier-tubes *l*, *l*, their arms *m*, *m*, the sliding apparatus *n*, *r*, and *s*, with the bar H, bearing upon the outer ends of the levers R, being no longer held up by the levers, they are now allowed to descend, guided by pins and slots in the ends of the bar H, and the brackets of the standards, which causes the tubes *l*, to pass down between the needles *a*, *a*, and thereby carry the threads below the needles, as if laid by the hand of the workman.

The raising of the levers S, by the handles N, as described, causes the levers to act upon the needle-carriage E, which is done by a notch or fork 1, in the upper end of each lever S, taking hold of a pin 2, in the carriage E, as seen best in figs. 4, and 7. Thus the raising of the levers S, drives back the needle-carriage, as in fig. 7, and brings the beards or barbs of the needles under the presser-bar F; the threads, previously looped and held by the sinkers between the needles, as described, being, by the receding of the carriage, drawn to the heads of the needles, whilst the work, previously laid on, hangs behind the beards.

It is now again necessary to remark, that the presser-bar is stationary, in order to shew that it is made to close the beards into the eyes of the needles by the carriage E, at the moment required; passing over a small elevation 3, on the bed-plate *b*, by which means, the heads of the needles are raised up against the under edge of the presser-bar, as represented at fig. 7.

When the operation of making the work has advanced thus far, it is necessary that the jacks should be raised, which is done by the following means:—Attached to the upper ends of each of the levers S, there is a small friction-roller 4, which, as the levers S, rise, come in contact with the inclined planes T, affixed to arms U, U, hanging upon the fulcrum pin of the jacks, at the ends of the machine. By these means, the arms U, U, are raised, and with them a longitudinal bar V, which, coming into contact with the under parts of the jacks, lift them up, until they are severally caught hold of by the bent springs *p*, *p*, as seen in fig. 8; a bar Z, Z, pendant from the back of the rail K, having spring bearings, depresses the jacks to a proper elevation. The needle-carriage still continuing to recede, the needles *a*, *a*, *a*, as they pass between the dividers *i*, *i*, draw the loops of thread under the curved edges of the dividers, as shewn in figs. 8, and 9; by which means, the loops are all equalized and divided, allowing a similar portion of thread to every needle. In this receding movement of the needles, whilst their beards were held down by the presser-bar F, the stitches of the previously made work are slidden over the depressed beards, and by the time that the carriage has reached its ultimate receding points, the stitches of the work have been drawn over the heads of the needles, and made to embrace the loops under the beards in the heads of the needles, and thereby to form, of the said loops, a new series of stitches or range of work, as seen in figs. 10, and 11. By the workman now depressing the handles N, N, the needle carriage is brought forward again; by which movement, the work, being held by a lever frame W, is slidden toward the back parts of the needles; the parts of the machine being then in the positions shewn in figs. 1, 2, and 3, ready to commence a new course of work. The lever frame w, is formed with an opening chap w*, which is confined by catches, and the whole turns upon pivots 5, fixed to brackets connected to the standards. The lower end of one of the levers w, has a cord 6, attached to it, which, passing over a pulley, is connected to a treadle x, at the lower part of the machine. By depressing this treadle, the workman is enabled to bring forward the work to the heads of the needles, when required, and the lever frame is made to resume its position by a weighted cord 7.

The narrowing of the work is effected by the introduction of any number of moveable stops *u*, *u*, into the groove of the carrier-bar H, which arrests the lateral progress of the slider *n*; and, in order to make a tight selvage to the work, two sliders Y, Y, in front of the machine, are to be so adjusted upon their fixed bar, that the elevations *g*, *g*, shall stand immediately under the outside jacks of each range of work. By these means, the sinkers, pendant from these outside jacks, having a little nib fixed on each, will, by the elevations 9, 9, be prevented from falling so far as the other sinkers, and thereby produce short loops.—[*Inrolled in the Petty Bag Office, March,* 1841.]

Specification drawn by Messrs. Newton and Son.

To Reuben Partridge, *of Cowper-street, Finsbury, in the county of Middlesex, engineer, for his invention of certain improvements in machinery or apparatus for splitting and shaping wood into splints, for the manufacture of matches and other similar forms.*—[Sealed 14th March, 1842.]

These improvements in shaping wood into splints, consist in the employment of a perforated metal plate, through which blocks of wood are to be passed, by means of pressure; the perforations, in such plate, being so shaped and situate, as to cause the block of wood, when pressed against its face, to be divided or split into a multitude of small rods or splints; which splints are protruded through the perforations of the plate, in regular formed rods, either of a cylindrical, square, polygonal, or other figure, according to the shapes and dimensions of the perforations in the plate.

In Plate XIII., fig. 1, represents the face of one of these plates, having a multitude of circular holes pierced through it; and fig. 2, is a section of the same, taken through the plate, in the direction of a right angle to the face. The forms of the perforations are cylindrical throughout, except at their openings on the face, where they are slightly counter-sunk, for the purpose of presenting sharp cutting edges to the wood, when pressed upon it, and in order to afford more easy entrance.

The size of the perforations, in the plate, must depend upon that of the required splints or matches to be produced; but it is to be observed, that they must be as close together as possible, allowing sufficient substance of metal to afford strength and resistance to the pressure, when the wood is forced through. The reason for having the apertures so closely contiguous, is, that there may be as small a space of surface or blank, between the holes, as possible, in order that resistance to the passage of the wood may be avoided; and that, indeed, the whole area of the block of wood may be compressed laterally into the counter-sunk openings, and forced through the cylindrical perforations.

Although it is intended, by the patentee, generally to split the wood, and form the splints into cylindrical rods, yet he does not confine himself to that form, as the perforations, in the plate, may be made of any other figure, and thereby enable splints, of other forms, to be produced, by forcing wood through them.

The plate, shewn in the drawing, has a steel face, strengthened by a bell-metal back; but the patentee does not limit himself to any particular kind of metal, or compounds, or combinations of metals; nor to any precise dimensions; but a plate, about three inches wide by six inches long, and nearly an inch in thickness, has been found to answer the purpose. This plate may be employed in connection with any suitable pressing apparatus. The mode found to answer, is, by fixing the back of the plate against a firm resisting block or bearing, having an aperture equal to the area of the perforations in the plate, and then placing the end of the piece or pieces of wood, in the direction of the grain, against the face of the plate, within the area of the perforated parts. A plunger, or a lever, or any other suitable mechanical agent, being then applied to the back or reverse end of the piece of wood, it may be forced through the perforations in the plate, being first split, as it advances, by the cutting edges of the holes; and afterwards compressed and driven through the perforations in the plate, coming out on the opposite side or back of the plate, in the forms of a multitude of distinct splints, according to the shapes and dimensions of the perforations.—[*Inrolled in the Rolls Chapel Office, September,* 1842.]

Specification drawn by Messrs. Newton and Son.

To James Chesterman, *of Sheffield, in the county of York, mechanist, and* John Bottom, *also of Sheffield aforesaid, mechanist, for their invention of certain improvements in tapes for measuring, and in the boxes for containing the same.*—[Sealed 11th January, 1842.]

This invention of improvements in tapes for measuring, and in the boxes for containing the same, is divided into four parts, and consists, Firstly,—in an improved method of making or manufacturing the tape, whereby it is made more durable and less liable to stretch. Secondly,—in improvements upon a former patent, granted to the said James Chesterman, on the 14th July, 1829, for "certain improvements on machines or apparatus for measuring land and other purposes,"* whereby the last-mentioned invention is much simplified, and less liable to derangement. Thirdly, —in the application of the improved measuring-tape, or any other, for a like purpose, to straight rules, of the ordi-

* For Report of the Specification of this Patent, see Vol. VII., Second Series, p. 339.

nary construction, whether jointed or not. Fourthly,—in the application, to the improved tape-box, or to tape-boxes of any other construction, of a moveable revolving side, consisting of an almanac or calculating tables; or, instead of these, a piece of asses'-skin, paper, or other substance, on which calculations may be made, is attached to to the box.

The first part of the invention, viz., the manufacture of the tape, consists in partly or wholly forming it of metal. This may be done by means of thin plates of metal, or woven metallic fabric, or by the introduction of fine wires, or an open woven metallic fabric, in the manufacture of the tape. It is preferred, however, to introduce any convenient number of fine wires (composed of copper and silver) in the warp of the tape. These wires are equally distributed throughout the width of the tape, one at or near each selvage, and the others at equal distances between them. By these means the tape is made more durable, and prevented from stretching.

The second part of the invention, viz., improvements in the boxes, for containing the tapes, is shewn in Plate XIII. Fig. 1, is a view of the tape-box, with one of the sides of the case removed, to shew the interior. Fig. 2, is a cross section of the same. The tape-measure *a, a,* is wound round a case or barrel *b, b,* through the centre of which the axle *c,* of the outer box or case, passes, and allows the barrel *b, b,* to turn freely. This case or barrel is shewn detached at fig. 3, and has a hollow raised centre *d,* furnished with a small hook *e*. One end of the upper spring *f,* in fig. 2, is held by this hook, the other end being connected to the spring-barrel *g, g,* shewn detached at fig. 4, by means of a stud on the spring, which stud enters a hole *h,* made for that purpose, in the spring-barrel. The lower spring *i,* in fig. 2, is connected to the lower end of the upright axle *c,* by means of a hook *j,* (see fig. 5,) similar to the hook *e,* in fig. 3. The other end of the lower spring *i,* is connected to the spring-barrel *g, g,* by means of a stud, taking into the hole *k,* in the same manner as the upper spring, but in a contrary direction.

From the foregoing description, the action of the springs will be understood. By drawing out the tape, the box *b*, *b*, revolves, and acts upon the centre coil of the spring *f*; this spring acts upon the box *g*, *g*, at *h*; the said box *g*, *g*, directly acts upon the external coil of the spring *i*, which is attached to the hook *j*, so that, in the action, the revolutions of the tape-winder are divided between the two springs. In order to keep the tape at any required length out of the box, the slide *l*, is pushed forward, by means of the stud *m*, and made to bear against the tape, and prevent it from moving.

The third part of the invention consists in applying the improved spring tape-measure, or any other description of tape-measure, to straight rules, sliding rules, or any other rule or instrument, requiring such an addition. Fig. 6, represents a method of applying a single spring tape-measure to a two-foot folding rule, so as to make it measure six feet when opened, and the tape drawn out; one spring being quite sufficient for this length. *a*, is the spring-box, and *b*, the tape-measure; the whole is covered over with a brass plate, and nothing is seen externally but the end of the tape. Fig. 7, represents a timber-scriber, with the improvement attached; it may also be applied to the handle of a knife, without making it cumbersome.

The fourth and last head of the invention is shewn at figs. 8, and 9. It consists in the application of one, two, or more revolving plates of metal to the improved tape-cases or boxes, of the ordinary construction. These plates may be lettered and figured, according to circumstances, or as may be required. In the drawing, an almanac or indicator, for ascertaining the day of the week upon which any day of the month will fall, is shewn, as applied to a tape-box; but it must be evident, that a ready-reckoner, or any other table or tables, may be employed with equal advantage. Sometimes, in place of any table, almanac, or other printed information, a plain sheet of paper, asses'-skin, or other material, is substituted; upon which, memoranda or calculations may be made, and effaced afterwards, when done with. The centre or axle *a*, fig. 8, of the box, is surrounded by a male-screw *b*, which fits into a female-screw *c*, on the under part of the side-plate, fig. 9; and when this side-plate is screwed on to the male-screw *b*, it protects the almanac, indicator, ready-reckoner, or calculating table, from injury.

The patentees claim, Firstly,—the method, above described, of making tapes for measuring, consisting either wholly of metal, or partly so, by the introduction of metal wires, open wire fabric, or plates of metal. Secondly,—the construction of spring-tapes, with two or more springs, for the purpose of obtaining sufficient power to wind up a long length of tape, instead of employing a single spring, with wheel-work, as described in the specification of the said James Chesterman's former patent of July 14th, 1829. Thirdly,—the adaptation, or application, of tape-measures to straight rules, either jointed or otherwise; and also to other articles, or instruments, requiring such addition. Fourthly,—the application of calculating tables, or plain sheets, for calculating, to tape-boxes of any construction whatever, in the manner set forth and described.—[*Inrolled in the Rolls Chapel Office, July,* 1842.]

Specification drawn by Messrs. Newton and Son.

To William Hancock, Jun., *of King-square, Middlesex, accountant, for an improved description of fabric, suitable for making friction gloves, horse brushes, and other articles requiring rough surfaces.*—[Sealed 3rd February, 1841.]

This invention consists in the production of a fabric for the above purposes, by weaving, in a similar manner to velvet weaving,—the warp of the fabric being composed of fine hempen or cotton yarn, or any other suitable material, and the pile of spun horse-hair, either alone, or combined with spun wool or cotton, or of long horse-hair unspun; the weft is made of fine spun hemp, wound on box-wood pipes, and fastened in the shuttle.

The loom, employed for making this fabric, is similar in many respects to the velvet-loom, but the harness is hung the same as in the ordinary mat-loom; and as the warp requires to be kept tightly stretched, during the operation of weaving, the warp-bar, warp-roller, breast-bar, and knee-roller of the mat-loom, are substituted for the warp-roller and breast-roller of the velvet-loom. The pile and warp pass from their respective rollers, over the warp-bar, and are entered through the harness and reed, the same as in velvet weaving, and braided down to a piece of sacking, which is brought up across the breast of the knee-roller. In order to fix the horse-hair with greater firmness in the fabric, a weak solution of gum tragacanth, in water, or a solution of caoutchouc, is spread over the warp, between the ground-bar and harness, and the weft is saturated with the same.

The fabric is woven, as above-mentioned, exactly the same as velvet, and the pile is cut in the ordinary manner.

The patentee claims the application of horse-hair, and of horse-hair in combination with other substances, for the production of the improved description of fabric, suitable for the various purposes mentioned; likewise the alterations in the ordinary velvet looms, when they are made and used in combination with the manufacture of the improved description of fabric.—[*Inrolled in the Inrolment Office, August,* 1841.]

To JOHN JAMES BAGGALY, *of Sheffield, in the county of York, seal engraver, for certain improvements in combs for the hair; and which are also applicable to combing other fibrous substances.*—[Sealed 29th January, 1842.]

THIS invention, of certain improvements in combs, consists in the construction and adaptation of a tubular chamber or reservoir, in or contiguous to the back of a comb; which chamber may contain any oily, coloring, or other liquid, that may be required to be applied to hair, or other fibres, in the act of combing. This chamber or reservoir is so constructed, that the oil, or other fluid, contained therein, may be regularly discharged and supplied, in small quantities, to the teeth of the comb, and, by that means, communicated to the hair, or other fibres, in the act of combing.

In Plate XI., fig. 1, is a longitudinal section of one of the improved combs, shewing the manner of connecting it with the reservoir; fig. 2, is a transverse section of the comb, with its reservoir connected, as in fig. 1; and fig. 3, represents the comb, detached from the reservoir. *a, a*, is a handle to the comb, having a tube, of a cylindrical or other form, containing the oily or other liquid; which liquid is poured in at one end, on removing a plug or screw-cap; and when full, the plug or cap is replaced. The other end of the tube is furnished with a piston *b*; by sliding which inwards, the liquid is expressed, through apertures, into a recess, formed in the middle of the comb *c, c*. The back of the comb is slit or cut vertically, forming a recess therein; which slit must be continued down into the teeth, as seen in figs. 1, and 2, whereby the liquid will be allowed to pass through and flow over the teeth. The slit, in the back of the comb, should be partially occupied with some porous material, such as woollen cloth, leather, or other suitable substance, for the purpose of regulating the supply of the oil, or other liquid, and preventing its flowing too abundantly on to the teeth of the comb. In order that the oil, or other liquid, may be supplied in a regular manner, it is necessary that the reservoir of the instrument should be made air-tight, except at that part which connects it with the back of the comb. The porous material may be applied in a different manner; such, for instance, as by passing it between the teeth of the comb, and, when pressed down to the roots, fastening it back to the sides, which will cause it to form a packing, and prevent the liquid from flowing out at the sides of the comb. Other methods of effecting this object may also be employed; but that found to answer best, is the porous material, assisted by the piston *b*, as shewn in the drawings. The patentee sometimes introduces stiff bristles between the teeth, or in place of the teeth, of an ordinary comb. After the instrument has been used, the piston should be drawn back, thereby withdrawing any superabundant fluid, and leaving the comb nearly dry.

The patentee claims the construction of combs, or instruments for combing hair, and other fibrous materials, in which a reservoir or chamber, for containing any oily, coloring, or other liquid, is applied to, or connected with, the comb itself; whereby the oily, coloring, or other liquid, may be delivered to the hair, or other fibrous material, in and during the act of combing, as above described.—[*Inrolled in the Petty Bag Office, July,* 1843.]

Specification drawn by Messrs. Newton and Son.

To William Edward Newton, *of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for certain improvements in the process, mode, or method of making or manufacturing lime, cement, artificial stone, and such other compositions, more particularly applicable to working under water, and in constructing buildings and other works, which are exposed to damp,—being a communication.*—[Sealed 3rd April, 1841.]

This invention, communicated by a certain foreigner residing abroad, consists, Firstly,—in the formation, by certain new processes, of an hydraulic lime and cement, which has the property of becoming hard and solid, when under water, or exposed in damp situations. Secondly,—in the application of the same principles to the hardening of soft stones, for the purpose of making hard artificial stones. Thirdly,—in the employment of the same process for hardening wood, and preserving iron from the effects of damp, &c.

The following is the principle upon which the invention is founded, and the methods employed for carrying it into effect:—The property which certain sorts of lime possess, of being hydraulic, or hardening under water, is caused by a certain combination of the lime with silica, alumina, and sometimes also with oxide of manganese, and oxide of iron. The object then of this invention, is to facilitate the combination of the lime with those oxides, by means of agents not hitherto employed. Thus, in operating by the dry method, as is generally the case, instead of calcining the lime-stone or lime with sand and clay, the inventor, in order to facilitate the combination of the silica and alumina with the lime, introduces a small quantity of potash or soda, in the state of carbonate, sulphate, or chloride, or of any other salt of these bases, susceptible of decomposition, or becoming a silicate, when such calcination takes place. The salt of potash or soda, the quantity of which varies from three to six per cent. to the quantity of lime, is employed in the state of solution, so as to penetrate and mix better with the alkaline salt in the chalk or slacked lime. Calcination effects the rest, in the ordinary manner.

In order to combine or incorporate more equally, by the dry method, the alumina, and the oxides of manganese, and of iron, with the lime, the sulphates of these bases are first decomposed by the slacked lime, by making a paste with a solution of the sulphates, mixed with the lime. This paste, into which the sulphates in question enter, in the proportion of from six to ten per cent. of the lime, is then calcined, in order to produce an hydraulic lime. All sorts of lime are made hydraulic, by the humid method, by mixing slacked lime with solutions of alum or sulphates of alumina; but the best method consists in employing a solution of the silicates of potash, or of soda, called liquor of flints or soluble glass. An hydraulic cement may also be made, which will serve for the manufacture of architectural ornaments, by making a paste of pulverized chalk, and a solution of the silicate of potash, or of soda: in working with this plaster, it becomes much harder than ordinary plaster.

These same silicates of potash or soda, dissolved in water, will also harden chalk, or soft and porous stones, and transform them, artificially, into hard stones. In order to do this, these soft stones, either rough, or cut into their proper forms, must be soaked in a solution of the silicate, either warm or cold, and allowed to remain there a longer or shorter time, according to the degree of hardness which it may be necessary to give them; after which, they must be taken out and left exposed to the air. At the end of a few days, stones, thus prepared, will have acquired a hardness equal to that of marble; and this quality, in a little time, pervades the whole mass; for if, for the purpose of polishing, the outer coat or surface be removed, the inner one, which at first is not so hard, will harden in its turn, by exposure to the air. This takes place as far as the silicate has been able to penetrate. A more superficial hardness is obtained, by applying the solution of the silicate of potash or soda, by means of a brush. It is in this manner that walls, constructed of chalk and mortar, may be hardened. Sculpture, and various other objects, which may be made or prepared in chalk, may be hardened, and afterwards serve for decorating buildings, and other purposes, without the fear of their becoming injured by frost or damp. Chalk, hardened in this manner, may also be used as a substitute for the stones now employed by lithographers. Plaster models may also be hardened, by placing them, for some time, in a solution of the silicate; but it would be still better to add a portion of the solution to the paste, at the time of making the model, or using the plaster. The silicate of potash or soda is prepared by fusing one part of white siliceous matter with from one and a half to two parts of potash or soda, in the ordinary reverberatory furnaces, or in a glass-maker's or iron crucible. The solutions may be used of any density for plaster; but they should be weaker for chalk. In the last place, the inventor has found that the silicates of potash or soda, when dissolved in water, decompose spontaneously in the air, and cover the objects, to which their solution has been applied, with a strong covering or layer; therefore, by applying the solution of silicate of potash, or of soda, to polished iron, and allowing it to dry in the air, the metal is preserved from oxidation. By soaking wood many times in this solution, and allowing it to dry in the open air, every time after it has been placed therein, it becomes so much penetrated with silica, that it acquires a considerable density and degree of indestructibility.

The solution of the silicate of potash is not the only substance which, by being injected into porous bodies, tends to harden them. A mixture, made from a solution of bicarbonate of ammonia, and of chloride of magnesium, may be successfully employed; or a mixture of the solutions of ammonia and chloride of calcium may be used. In these latter cases, instead of having siliceous injections, they are either magnesian or calcareous. Soft and porous stones may also be considerably hardened, and defended from the action of damp, by first well drying them, and then dipping or steeping them in sulphur, or some natural or artificial resinous or bituminous substance, rendered liquid by heat.

The patentee claims, Firstly,—the application of certain new means, to change or convert all descriptions of lime into hydraulic limes and cements, or such as become hard under water, or when exposed in damp situations, by combining these limes and cements with silica, alumina, the oxide of manganese, or the oxide of iron, either by the dry or humid method. Secondly,—the manufacture of hard artificial stones from chalk, plaster, and all porous stones in general, by injecting into them, or imbuing them with silica, or the carbonates of magnesia or lime, by any of the above-described processes; or by causing them, by virtue of their porous nature, to absorb either melted sulphur, or bituminous, resinous, or fatty matters, properly liquified by means of heat. Thirdly,—in the employment of the silicates of potash or soda, for making or forming a stony plaster or coating upon a variety of substances; thereby preventing iron from becoming rusty or oxidized, and rendering wood and other organic matters harder, and not liable to decay.—[*Inrolled in the Petty Bag Office, September*, 1841.]

Specification drawn by Messrs. Newton and Son.

To Edward Palmer, *of Newgate-street, in the city of London, philosophical instrument maker, for improvements in producing printing or embossing surfaces.*—[Sealed 15th January, 1842.]

The first part of these improvements consists in obtaining printing surfaces, in relief, by means of the electrotype process, or by casting; the subject being, in the first place, engraved or etched, through a white or light-colored composition, upon a black or darkened plate, and from it the printing surface is produced.

The plate, just mentioned, on which the etching ground is laid, is made of metal, (by preference of German silver or copper,) and its surface is blackened or darkened, by immersion in a weak solution of chloride of platinum, or hydrosulphuret of ammonia, or by any other suitable means. It is then covered with a layer of white or light-colored composition, of the same thickness or depth as the intended relief of the printing surface. The composition is formed by mixing together, with the aid of heat, one ounce of the clear part of Burgundy pitch, one ounce of resin, two ounces of white wax, and one ounce of spermaceti; but the patentee does not confine himself to these ingredients, as others might be used with equal advantage.

When the plate is cold, a small quantity of finely pulverized sulphate of lead is dusted over the surface of the composition, and rubbed gently in with a piece of soft linen; the composition is then exposed to a gentle heat, in order that the sulphate of lead may sink into it; and this process is repeated until the composition has become sufficiently white. The subject may now be engraved or etched in, by cutting through the white composition to the blackened surface of the plate, which, appearing at those parts that are cut away, will produce a representation of the subject, similar to the impressions from the printing surface (afterwards made from the prepared plate); so that the artist will be enabled to judge of the effect of his work as he proceeds. When the engraving or etching has been performed, those parts of the subject which are required to be much deeper than the rest, as in cases of "broad lights," are "built up" with white wax, dissolved in spirits of turpentine, and applied with a brush. The surface of the composition is now rendered a conductor of electricity, and copper is deposited upon it, by the electrotype process, until a plate, or suitable printing surface, is formed.

Instead of producing the printing surface by electrotyping, a cast may be taken, in plaster of Paris, of the subject engraved or etched on the prepared plate; and in that case, it will not be necessary to build up the lights, as before directed, for the parts where they come may be readily cut away from the plaster cast; then, by rubbing the surface of the cast with a lather of soap, and taking a reverse cast, in plaster, a mould is produced, from which a printing surface may be obtained by casting in metal.

The second improvement consists in two methods of producing metallic surfaces, with designs thereon, to be printed from, in the ordinary manner of line or sunk engraving.

The first method consists in engraving or etching the subject or design upon a tablet, formed of two layers of composition, the upper layer being white and the lower one black; and hence, as every line pierces through the white surface into the dark ground, each mark will appear as if it were drawn with black color. When the drawing is completed upon the tablet, a reverse is taken from it, in metal, by the electrotype process, and from the reverse as many printing surfaces or copies are taken as may be required.

The white composition is made by mixing sulphate of lead and white wax together, by means of heat, and a thin layer of it is poured over a plate of metal; when cold, a border is formed around it, and a sufficient quantity of the black composition, (consisting of white wax, mixed with black lead, or other coloring matter,) in a melted state, is poured upon it. The tablet is thus formed, and is separated from the metal plate by pouring cold water upon the back of the latter.

The second method of producing these metallic surfaces is as follows:—A polished plate of metal or glass is slightly oiled, and a border made around it, and from this a cast is taken in plaster of Paris; by which means, the surface is rendered much more smooth and level than can be effected in any other way. After the cast has been dried, the outline is traced on it with a black-lead pencil, and the subject is engraved; the artist occasionally dusting a small quantity of pulverized charcoal, or other dark powder, into the lines, in order to judge of the effect. From the engraved cast another is taken, either in wax, or in a mixture of five parts of resin and one of white wax, or in metal, (by the electrotype process,) and from it a printing surface is obtained by electrotyping.

The third improvement consists in a mode of manufacturing surface-blocks, or printing surfaces in relief, the subjects or designs of which are transferred from an engraved or etched plate.

The plate, from which the surface-block is to be obtained, is first freed from grease and dirt; and then coated with a mixture composed of a small quantity of printer's ink, and a very large portion of dryers, or Brunswick black; a thin but firm ground of this composition is spread over the plate, with a printer's ink-roller, care being taken that none of the light work is filled up. Over this coating a mixture of very fine oxide of iron and litharge (in equal portions, or two parts of the oxide and one of litharge) is sifted, and the plate is heated until the ground or coating is dry; when cold, the powder is brushed off with a soft brush, and this process is repeated until the ground is of sufficient thickness. When this has been effected, the oxide of iron and litharge are brushed out of the work; any of the lighter work, which may be filled up, is cleared out with the point of a needle; and the lights are built up, as before mentioned. The ground is now blackleaded, and a reverse, in metal, is obtained from it by electrotyping; then all that part of the surface which filled up the engraved work of the original plate is rubbed off with a flat piece of water of Ayre or snake-stone, in order to get the full breadth of the lines of the engraving; and a surface-block or printing surface is electrotyped from the reverse. Instead of the printing surface being obtained by the electrotype process, it may be cast in metal, upon a reverse, formed of plaster of Paris.

The last part of the invention consists in forming embossing surfaces, by sinking or engraving the subject on a surface of plaster of Paris, then taking a cast of it in wax, and electrotyping the embossing surface from it; or the cast may be made in plaster of Paris, and the embossing surface produced by casting from it in metal.

The patentee claims, Firstly,—the mode of obtaining surfaces for relief printing, by means of the electrotype process, or by casting, by causing the subject to be etched or engraved through a white or light-colored composition, placed on a black or darkened surface, as above described. Secondly,—the mode of obtaining metallic printing surfaces, with designs thereon, to be printed from in the ordinary manner of line or sunk engraving, by engraving or etching on a prepared surface of plaster of Paris, or other soft substance, and then electrotyping, or taking casts, and obtaining therefrom printing surfaces by the electrotype process, as above described. Thirdly,—the mode of obtaining surfaces for relief printing, by employing engraved or etched metallic plates or surfaces, in the manner above described. Fourthly,—the mode of obtaining embossing surfaces, by engraving or sinking the subject in a prepared surface of plaster of Paris, and then, by obtaining a cast therefrom, to produce an embossing surface by the electrotype process, or by casting, as above described.—[*Inrolled in the Inrolment Office, July,* 1842.]

To CHRISTOPHER NICKELS, *of York-road, Lambeth, in the county of Surrey, Gent., for his invention of improvements in the manufacture of plaited fabrics.*—[Sealed 10th February, 1842.]

IN making plaited fabrics for frills, and for other purposes, the folding and fastening of the plaits have been hitherto performed by hand, after the fabrics used have been woven. Now the object of this invention is to manufacture plaited fabrics by the act of weaving in a loom.

The patentee, in order to explain his invention, describes its application to a plain tabby weaving of linen, cotton, silk, or other yarn, or thread. If it be desired to have a fabric woven in an ordinary loom, with stripes of plaited fabric, of an inch and a quarter wide, and that there shall be stripes of fabric, also an inch and a quarter wide, as is shewn in Plate XIII., which represents a portion of fabric made according to this invention,—in such case, the warp employed would be placed on two warp-beams; that portion of the warp which goes to make the plaited fabric, as shewn at *a, a,* being warped on to one beam, and the parts of the warp which go to make the parts *b, b,* of the fabric, being warped on to another beam. By this arrangement, the two warp-beams can be differently weighted; that warp-beam which carries the spaces of warp which go to make the plaited fabric, being only lightly weighted, and the warp-beam which carries the spaces of the warp which go to make the parts *b, b,* of the fabric, being much more heavily weighted; care being observed, that as the warp for making the plaited fabric *a, a,* will be more quickly used up than the parts of the warp which go to make the parts *b, b,* of the fabric, that warp should be longer in proportion. The weaving is then to be carried on in the ordinary manner for weaving tabby; that is, equal warp-threads up and equal down, in forming the shed for receiving the weft, observing, however, that the taking-up of the work is so arranged as to be done only so fast as the parts of the warp *b, b,* of the fabric, are unwound from their warp-beam, which may be performed in any convenient manner.

The "take-up" is usually performed by means of weighted cords, attached to a small dancing roller, drawing the work, as it is produced, over the breast-beam, the work being, from time to time, wound up by a workman, or by any convenient means. The work, as it progresses, by the weft being successively thrown in and beaten up, will be formed into plaits at *a, a,* in consequence of the warp (which makes those portions of the fabric) being less weighted, for it will be readily understood, that when the weft is thrown in, and the reed is beating it up, the warp, for making the parts *a, a,* will be more readily unwound than the parts of the warp which go to make the parts *b, b*; the consequence of which will be, that so soon as a quantity of weft has been thrown in and beaten up, so that the further beating up will overcome the weight of the parts of the warp *a, a,* those parts will give way to the reed; and as the weighting of the parts of the warp, which go to make the parts *b, b,* of the fabric, will resist the beating up of the weft for a longer time, the further throwing in and beating up of the weft will cause the fabric at *a, a,* as made, to be formed into plaits, and the size of the plaits will, in some degree, depend on the difference of the weighting of the parts of the warp *a, a,* and *b, b,* for so soon as there has been a quantity of weft thrown in, which, in the beating up of the reed, will offer such a resistance as to overcome the weighting of the parts of the warp *b, b,* then the plaiting again commences; hence it will be seen, that the effect of plaiting the fabric will depend on the relative speeds at which the two sets of warp-threads *a, a,* and *b, b,* are unwound; for if they were equally weighted, or all delivered at the same speed, the fabric produced would be equal in all parts; but, as the one set *b, b,* is controlled, to be delivered slower than the other set *a, a,* the warp-threads *a, a,* will be more quickly used up, whilst the weft-threads will be more closely beaten up on the warp-threads *b, b.*

In the above description, the invention is explained in the simplest form; but it will be evident, that besides tabby weaving, twills, satins, and other plain, as well as ornamental weavings, may be made, either in the plaited or unplaited parts of the fabrics; and such plain and ornamental weaving will be performed in the ordinary manner, as is well understood; for a weaver will perceive, that the order in which the various threads of the parts *a, a,* of the warp are lifted, in respect of each other, so as to vary the pattern of fabric produced, will not interfere with the fabric *a, a,* being plaited according to this invention; and such is the case in respect to the fabric made by the parts *b, b,* of the warp-threads; and, although only two warp-beams or rollers are mentioned as being used, a greater number may be employed, care being observed to weight or regulate them correctly, according to the effect desired. In some cases it is desirable that the parts *b, b,* should be made double, so as to receive cotton, or other filling, or whalebone; in such cases, the parts *b, b,* are divided into two warps, in the ordinary way of making double fabric, as is well understood. By the manner of weaving, above described, plaited fabrics may be manufactured with facility, the plaits being securely held or tied by the intermediate portions of the fabric.

The patentee claims the mode of weaving plaited fabrics, by dividing the warp into separate sets or parts, and causing the separated sets or parts to be delivered, at different speeds, as the weaving with the weft proceeds.—*Inrolled in the Inrolment Office, August,* 1842.]

To CHARLES FARINA, *late of Leicester-square, in the county of Middlesex, but now of No.* 83, *Upper East Smithfield, in the county of Middlesex, chemist, for a new method of manufacturing soap, candles, and sealing-wax.*—[Sealed 15th April, 1842.]

THE improvements which constitute this new method of making soap, are two in number; the first consists in producing lees, by boiling in water, those alkalies commonly used in the manufacture of soap; care being taken to stir the mixture well, until the alkali is dissolved, to prevent the latter from adhering to the bottom of the vessel. The lees, when rendered caustic, by throwing them into an iron back, charged with salt and lime, are ready to be employed in the manufacture of soap.

When the lees, (prepared as above stated,) are spent, they are passed through a filter, to separate all impurities from them, and then run through a shoot into another back, charged with fresh lime; after passing through the lime, they are removed to the vessel in which the alkali is boiled, as above mentioned, and alkali is added until the lees have attained the required strength. The lees being now deprived of their color, by filtration through animal charcoal, are again ready for use.

The second improvement consists in a new combination of animal and vegetable matters with soap; and, likewise, in a method of depriving those matters of their color and smell; which is also applicable for decoloring and purifying grease, oils, and resin.

The animal matters, above alluded to, are bones, in a rough state, hoofs, horns, &c., which are, in the first place, purified by immersion in lime water; and, after being washed in clean water, are boiled, in a suitable vessel, until all the fat is separated from them. The fat is deprived of its color and smell, by boiling it with alumina and animal charcoal, and is then passed through a filter into a soap copper, and employed in the manufacture of soap. The animal matters are now dried, and ground into a fine powder, and the gelatine or glutinous matter is extracted from them, by boiling in water; when the gelatine has been removed, the animal matters, remaining, are boiled in water, acidulated with alum, or muriatic or sulphuric acid, and thereby dissolved. The liquid, thus produced, is filtered, and added to the gelatine, and the mixture, after being purified in the same way as the fat, is ready for making soap.

If the soap, manufactured from these materials, is required to be very white, the soap copper is charged with one-third of lime water, and two-thirds of purified grease, oil, or animal matters; the mixture is then boiled up gently, and chloride of lime is introduced, either in the state of vapour, or liquid. After boiling three or four hours, the water is pumped out of the copper, the requisite quantity of lees introduced, and the soap is finished in the usual manner.

The vegetable matters, such as potatoes, &c., after being well washed, are thrown into a wooden vat, furnished with steam-pipes, and boiled to a jelly, which is strained through sieves, to separate the husks; or, the vegetable matters are rendered thoroughly dry, and ground in a mill; and the fecula or farinaceous portions, being separated from the husks, by sifting, are moistened with warm water, and reduced to the consistence of a thin paste, which is well stirred, to prevent it from setting or becoming stiff until it is thoroughly mixed. A quantity of alum, of the same weight as the fecula, is dissolved in water, and added to the paste; this mixture is reduced to a jelly, by boiling, and then a like quantity of soda is gradually stirred in, and the mixture is boiled again until the soda is entirely dissolved. The water is then separated from it, by means of a sieve, and the substance, remaining in the sieve, is added to the soap in the crutching pan, or in the copper, after the soap is "fitted."

These compositions are mixed with the grease, oil, or tallow, used in making soap, in the proportions of from 20 to 25 per cent.

The new method of manufacturing candles and sealing-wax, consists in boiling gelatine with alumina and ivory-black, or animal charcoal, (in the proportions of 1 part of alumina, and 1 part of ivory-black, or animal charcoal, to 18 parts of gelatine,) for the purpose of purifying and whitening it. The gelatine is then filtered, and an equal proportion of resin, purified and prepared in the manner before described, is added thereto; after which, it is boiled with tallow or wax, and made into candles or sealing-wax.

Chloride of lime, in the state of vapour, or liquid, may be beneficially used in making candles and sealing-wax, in the manner described in the soap process.

The patentee claims, as his invention, the method of preparing lees, above described, together with the various combinations of materials, above mentioned, to be used in the manufacture of soap, candles, and sealing-wax.—[*Inrolled in the Inrolment Office, September,* 1842.]

To WILLIAM GROUNSELL, *of Louth, in the county of Lincoln, machine-maker, for improvements in apparatus for drilling corn, grain, pulse, and manure.*—[Sealed 12th June, 1839.]

THE first part of these improvements consists in an apparatus, to be applied to the ordinary drilling-machines, to enable them to drill seed and manure at intervals, and not in a continuous stream, as heretofore.

The apparatus is shewn in Plate XIII., at fig. 1; it consists of a long lever *a*, attached to a shaft *b*, at the front part of the machine, and suspended, at its hind end, by a chain *c*; in order that when the coulter *d*, which is fastened to it, meets with a large stone, or other obstacle, the lever may rise, and allow the coulter to pass over it. *e*, is the coulter-pipe, by which the seed and manure are deposited, at intervals, in the drills; this pipe is carried by the lever *a*, and the discharge of the seed and manure is regulated by means of a slide *f*, or by the valve *g*, fig. 2. When the slide is used, it works in a slit, at the lower part of the coulter-pipe, and is attached, by a pin-joint, to the lever *h*; whereas the valve acts against the bottom of the coulter-pipe, and is formed in one piece with the lever *h*.

The following is the mode by which the slide or valve is worked:—Upon one of the running-wheels of the machine a ring is fastened, with a number of studs projecting from its side; these are fixed at equal distances apart, and each, as the wheel revolves, strikes against the curved end of a short lever, fixed upon an axis at the front of the machine. From this axis another lever projects, furnished with a hook at its end, and connected, by a chain, with the hooked lever *i*, which, by means of the rod *j*, communicates motion to the lever *h*, causing it to turn on its axis and withdraw the slide or valve; the lever *h*, is afterwards returned to its first position by the weight *k*. When the machine is moved backwards, the studs act beneath the curved end of the short lever, and cause that end to rise, (turning on a pivot,) without motion being given to the axis on which the lever is fastened; by this means the discharge of seed and manure is prevented, until the machine is again drawn forwards.

The second improvement, which is represented at fig. 3, consists in a mode of supplying manure to the funnels or hoppers of drilling machines. *l*, is the receptacle for the seed; *m*, the manure-chest; and *n*, a revolving shaft, which carries a series of arms *o*, widened at their outer ends, in the direction of the length of the shaft. In the ordinary machines spoons or ladles have been used, instead of these arms, to throw the manure over the shaft *n*, into the funnel or hoppers of the coulter-pipe; but, in this instance, the shaft is turned in the opposite direction, and the projecting arms simply push the manure into the funnels.

The patentee claims, Firstly,—the mode of constructing drilling machines, by applying valves or slides, and suitable apparatus for working the same, as above described. Secondly,—the mode of applying manure to the funnels or hoppers of drilling machines, as above described.—[*Inrolled in the Inrolment Office, December,* 1839.]

To William Newton, *of the Office for Patents,* 66, *Chancery-lane, in the county of Middlesex, civil engineer, for an invention of certain improvements in regulating the flow of air and gaseous fluids,—being a communication.*—[Sealed 25th February, 1842.]

This invention consists of a peculiar construction of apparatus, in which, upon the slightest increase of pressure from the air or gas passing through it, the flow of the said air or gas is restricted and regulated in a novel manner, until the extra pressure has ceased.

In Plate XIII., fig. 1, is a vertical section, taken through the middle of the apparatus. Fig. 2, is a horizontal section of the same, taken in the line A, B, of fig. 1. Fig. 3, is a top or horizontal view, the lid or cover being removed; and fig. 4, is another horizontal section, taken in the line C, D, of fig. 1.

The working parts of the apparatus are contained within the metal casing *a, a, a, a,* which is furnished with a moveable lid or cover *b, b.* An annular moveable bell-shaped vessel *c, c, c, c,* is placed in the interior of the metal casing *a, a,* covering the aperture *d, d,* by which the gas or air enters, and through which its flow or passage is regulated, by means of the conical end *e,* of the hollow tube *f, f,* which is suspended, by means of the metal rod or chain *g*, from the inside of the bell-shaped vessel *c, c*. The aperture *d, d*, is formed at the upper circular end of the metal cylinder *h, h, h, h*. This cylinder is supported by the annular chamber or gallery *i, i, i, i*, and when once placed in its proper situation, it remains stationary, and is prevented from moving laterally, or out of its position, by the small blocks *j, j*. The apparatus is supplied with water from above, by removing the lid or cover *b, b*, and its level inside is seen by means of the glass tube *k, k*, outside the casing.

All the different parts of the apparatus, that are to be filled with water, are made to communicate with each other, the water passing, from the upper to the lower part, through the holes *l, l, l, l*, seen in fig. 4; and when the apparatus requires emptying, the water is allowed to flow out through the aperture *m*, by removing the screw. The bell-shaped vessel *c, c*, is suspended by rods or chains *n, n*, from the ends of the levers *o, o*, and the weight of the vessel *c*, together with the hollow tube *f, f*, is counter-balanced by the weights *p, p*, at the opposite ends of the levers *o, o*. Gas or air flows into the apparatus from the pipe *q*, and passes up the annular space *r, r, r, r*, in the direction of the arrows, and through the aperture *d, d*, into the upper part of the vessel *c, c*; from thence it passes down the annular passage *t, t*, and finally escapes from the apparatus through the pipe *u*. If the pressure of the air or gas into the apparatus is too great for the consumption, then it presses on the surface of the water, and against the domed part of the vessel *c, c*, thereby causing the latter to rise and draw the conical end *e*, of the hollow tube *f, f* up into the aperture *d, d*, which contracts the same, and prevents so great a quantity of gas from entering the vessel *c, c*. When, by the issue of the gas from the apparatus, the equilibrium or proper pressure is restored, then the vessel *c, c*, sinks again, and allows the conical end of the tube *f, f*, to descend also from the aperture *d*, and permit the gas to enter the apparatus as before.

The patentee does not confine himself to the precise forms of parts herein shewn, nor to the materials of which the same is to be composed, but he claims, Firstly,—the peculiar arrangement of apparatus, herein shewn and described, or any modification thereof. Secondly,—any apparatus for regulating the flow of air or gas, in which such regulation is effected, by means of a conical plug, or the conical end of a tube, either hollow or solid, rising into the aperture through which the gas passes, and thereby closing, or partially closing, the same, and preventing the air or gas from passing, as above described.—[*Inrolled in the Rolls Chapel Office, August,* 1842.]

Specification drawn by Messrs. Newton and Son.

To HENRY BEAUMONT LEESON, *of Greenwich, M. D., for improvements in the art of depositing and manufacturing metals and metal articles, by electro-galvanic agency, and in the apparatus connected therewith.*—[Sealed 1st June, 1842.]

THE first improvement consists in a new method of arranging and constructing a galvanic battery, in order that the intensity and quantitative effect of the galvanic current may be easily regulated.

In Plate XIII., fig. 1, is a longitudinal section of the battery; and fig. 2, is a plan view of the frame to which the metal plates are attached. *a*, is a rectangular wooden trough, containing a wooden frame *b*, formed with vertical grooves in its sides, to receive a series of porous cells *c*, *c*, *c*. The plates of the battery are suspended in the fluid or fluids by brass forks *d*, *d*, fastened to a wooden frame *e*, *e*; which rests upon the trough *a*, and is connected to the other frame *b*, by two pins *f*, when they are required to be raised together out of the trough *a*, *a*.

The battery may be charged, as usual, with one or two fluids; one of them, in the latter case, being contained in the porous cells *c*, *c*, *c*; and plates of copper and zinc, or any other suitable metals, may be employed.

The second improvement consists in cleaning copper and zinc plates, (after they have been used in a battery or batteries,) by the employment of a galvanic battery; and also in amalgamating, or coating with mercury, the surfaces of zinc plates, by the same means, to render them suitable for being used in the construction of galvanic batteries.

The third improvement consists in the employment of certain electrolytic fluids, for the purpose of exciting an electric current, to be used in the deposition of metals. These electrolytic fluids are produced by combining nitric, muriatic, or sulphuric acid with any of the following solutions or substances, viz:—impure ammoniacal liquor, as obtained from the gas works; lime liquor, after it has been used for purifying coal gas; impure alkaline sulphurets of potassium and sodium, produced from the sulphates of potash and soda, by calcination, in a furnace, with coal and chalk, or charcoal; sulphurets of calcium, barium, and strontium, produced from the sulphates of lime, baryta, and strontia; ammonia, potash, and soda, and their carbonates; and, lastly, the acid solution of sulphate of iron, (obtained by the decomposition of iron pyrites, in the manufacture of green copperas,) which is to be used with any of the last-mentioned alkaline solutions or sulphurets.

The fourth improvement consists in the application of what the patentee terms an "intensity arrangement," for depositing metal from solutions; whether the metal originally formed part of the solution, or became such by the action of some electrolytic solution upon a cathode, formed of the metal required to be deposited. The intensity arrangement or battery is constructed in the manner represented at fig. 1, and consists of from 18 to 90 pairs of plates; but a still greater number of plates may be employed, if required.

The fifth improvement is divided into three parts:—the first part consists in using an elastic mould, for obtaining casts in wax, stearine, tallow, and other similar substances; which casts are afterwards made conductors of electricity, and metal is deposited upon them. The mould is produced by applying to the article, which is to be copied, four or five coats of a solution of glue, about the consistence of treacle; it is then surrounded with a strip of thin metal, cartridge paper, or other material, at such a distance as will admit of a quantity of the solution being poured in, so as to give the mould sufficient strength, when cold. A solution of caoutchouc, and other gums and resinous substances, may be added to the glue; or a "leathery consistence" may be given to it, by the application of a solution of tannin. After standing from five to ten hours, the mould is removed from the article, and is ready to be used in forming casts.

The second part consists in manufacturing articles in silver, by depositing that metal upon moulds of wax, plaster of Paris, and other non-conducting surfaces, using, for that purpose, the intensity arrangement, and a strong solution of cyanide of silver and potassium; the solution is formed by dissolving from ten to twenty ounces of the pure salt in one gallon of distilled water, and then adding one ounce of cyanide of potassium.

The third part consists in methods of ensuring a smooth deposit of metal upon uneven surfaces. For this purpose, a pin or wire is attached to those parts which project much beyond the rest of the surface, in order that it may receive the rough deposit; after the operation is completed, the pin is cut off. When two portions of an article face each other, or are much undercut, the patentee connects wires, or other surfaces, of the same metal as that to be deposited, with the anode of the battery, and bends them into the space between the two parts. The deposition of metal on wax, or other non-conducting substances, may be facilitated by inserting conducting wires into the mould or model, so as to cause the deposit to take place on many points at once; and the cathode, or supply metal, should be so shaped, as to enclose the article at nearly an equal distance from every part of it.

The sixth improvement consists in obtaining a smooth external surface, and causing a greater amount of metal to be deposited in a given time, by communicating motion to the anode, or object to be deposited upon, (taking care that it does not revolve on its own axis,) or to the solution in whicb it is immersed.

The seventh improvement consists in forming the reflecting surfaces of parabolic and other reflectors and specula by electro-deposition. A mould is made of the required form, and upon it a sufficient thickness of silver, antimony, or other metal, or metallic alloy, is deposited; the front surface of it is then polished, and it is strengthened by depositing copper upon the back.

The eighth improvement relates to various methods of depositing metallic alloys:—the first method consists in connecting the anode, or article to be covered, to the terminal cathodes of as many batteries as there are different metals contained in the alloy, and immersing it in a solution, composed of similar salts of the different metals; this solution also contains a cathode plate of each of the metals composing the alloy, and each plate is connected to the anode of one of the batteries.

The second mode consists in the employment of one battery, with the "alternating cathode" represented at fig. 3. It consists of a beam *a*, mounted on the shaft *b*, which turns in bearings, carried by standards *c*; the beam communicates with the anode of the battery by the wire *d*, and a vibrating movement is given to it by the rod *e*, from the shaft *f*, which is driven by an electro-magnetic engine, or any other suitable prime-mover. *g*, *g*, are two vessels, containing mercury, connected by wires *h*, *h*, with the cathode plates of the two metals composing the alloy (but if the alloy is to consist of more than two metals, then more vessels *g*, will be required, one for each cathode plate); these plates are immersed in a solution, composed of similar salts of the different metals to be deposited, together with the anode, or surface to be deposited upon, which is connected by a wire with the cathode of the battery. A communication is established between the two cathode plates, or supply metals, and the anode of the battery, by means of the rods *i*, *i*, which are caused, by the vibration of the beam *a*, to dip, alternately, into either one or the other of the vessels *g*; and thus, each metal will be deposited on the article to be coated during the time that the connection is established between it and the battery, by the immersion of its rod in the vessel of mercury. The relative proportions of the two metals is adjusted by lengthening or shortening the rods *i, i*, as shewn in the drawings; so that they may be immersed for a longer or shorter period in the mercury.

A modification of the first method of depositing alloys consists in using two or more batteries, with an alternating cathode, by which they are brought into action alternately. Another mode consists in employing a mixed solution, as before, and connecting a cathode plate of each of the metals forming the alloy to the anode of the battery; but this the patentee does not recommend.

The last method consists in the use of any of the non-metallic electrolytic fluids to be described under the eleventh improvement, in combination with any of the above-mentioned arrangements.

The ninth improvement consists in preparing metallic surfaces for electro-deposition, by covering the same with a slight coating of metallic mercury, in order to produce greater adhesion of the metal afterwards deposited upon them, and a "deader" effect on the surface. It consists in dipping the article, after it has been properly cleaned, into a solution of a compound of mercury in water; by preference, a solution of cyanide of potash and mercury. By this means, a slight coating of metallic mercury is obtained upon articles of copper, and its alloys, zinc, and some other metals; and the article is afterwards placed in the electrolyte, and undergoes the process of electro-deposition.

The tenth improvement consists in arranging the articles, which are to be covered with metal, in a battery, so as to assist in generating and maintaining the galvanic current. The articles are disposed in a series, forming the anodes of the arrangement, and the cathodes are formed of the metal to be deposited; but zinc, or other oxidizable metal, may be employed.

The eleventh improvement consists in depositing gold, silver, platinum, lead, zinc, tin, nickel, cobalt, and mercury, by the aid of electrolytic solutions not originally containing such metals. The surface to be deposited upon is connected with the cathode of a galvanic battery, and immersed in an electrolyte, which does not contain the metal to be deposited, but is capable of acting on or combining with the cathode plate, or supply metal, likewise immersed in it, and connected with the anode of the battery; the electrolyte acts, in this case, as a carrier, to convey the metal of the cathode plate to the article which is to be coated. The soluble cyanides, ferrocyanides, ferridcyanides, sulphocyanides, hyposulphites, chlorides, bromides, iodides, fluorides, and sulphurets of potassium, sodium, calcium, barium, strontium, and ammonium, may be employed to form the electrolyte; likewise acids, soluble in or diluted with water; and the soluble salts of potassa, soda, ammonia, lime, baryta, and strontia.

The twelfth improvement consists in manufacturing or extracting platinum and other metals from their respective ores, by electro-deposition. A solution of the metal is obtained from the ore, and purified, if necessary, and from it the metal is precipitated, by the aid of a galvanic battery, upon any convenient metallic anode, using, for the cathode, a plate of platinum, or any other metal which will not be acted on by the solution. When extracting platinum from the ore, a cathode of any good conducting charcoal is used; or the platinum is prepared from the ore in the spongy state, by the process described by Dr. Wollaston, and the cathode formed of it; or a cathode of zinc, or other oxidizable metal, may be used. The solution, for depositing platinum, which the patentee prefers to use, is formed by dissolving the protochloride of platinum in muriatic acid. If an article or mould is substituted for the metallic anode, above mentioned, it will be covered or coated, without previously obtaining the metal from the ore in a separate state.

The thirteenth improvement consists in manufacturing articles in platinum, and covering surfaces with it, by electro-deposition. The surface to be coated, or the mould (made of wax, plaster of Paris, or other material,) in which the article is to be formed, is rendered a conductor of electricity, and a coating of platinum, sufficiently thick, is obtained, by electro-deposition; the patentee prefers to use, for this purpose, a cathode of platinum, and a solution of protochloride of platinum in muriatic acid.

The fourteenth improvement relates to the application of compounds of metals (not heretofore proposed to be used,) for the purpose of furnishing an electrolytic solution, to be employed in depositing the respective metals. The patentee prefers the soluble protosalts, and double protosalts; such, for instance, as the salts having a protoxide for the base, the protochlorides, protoiodides, protobromides, protofluorides, protocyanides, and protosulphurets; particularly the double salts, formed of the metals with the cyanides of potassium, sodium, ammonium, barium, calcium, and strontium; and also the double salts, formed by adding these cyanides to other acid salts. Organic compounds may also be added, with advantage, to many solutions of metallic salts and compounds, and especially to the persalts, which, without such addition, would not, in many cases, readily yield a metallic deposit, but would deposit a subsalt, or intermediate compound. The patentee concludes with a list of the salts and compounds of metals applicable for the purposes of electro-deposition, but which have not hitherto been used: the metals, included in this list, are platinum, palladium, rhodium, iridium, gold, silver, mercury, copper, zinc, tin, nickel, and lead.

The patentee claims, as his invention, Firstly,—the improved method of constructing a galvanic battery, herein described; and the particular mode of placing or constructing the metal bars, connecting the cathode and anode plates, so that one plate can be readily removed or changed, without disturbing the remainder; also the mode of separating and arranging the porous cells in one frame, so that the whole can at once be removed. Secondly,—the application of a galvanic battery for the purpose of cleaning the zinc and copper plates used in any battery; and for the purpose of depositing mercury upon the zinc plates. Thirdly,—the application of the electrolytic fluids, mentioned in the third part of this invention, for the purpose of exciting an electric current, to be used in the deposition of metal. Fourthly,—the use of what has been termed an "intensity arrangement," for the purpose of obtaining a good metallic deposit, consisting in the use of a galvanic battery, composed of more than ten pairs of plates. Fifthly, —the method of manufacturing works of art and other articles in silver, by depositing the metal upon moulds of wax, plaster of Paris, and other non-conducting or badly-conducting surfaces, by using a strong solution of cyanide of silver and potassium, prepared as hereinbefore described; also the use of elastic moulds, for the purpose of producing casts, to be employed in the process of electro-deposition; and also the peculiar method, described in the fifth part of this invention, of obtaining a deposit on badly-conducting surfaces. Sixthly,—the giving motion to the surface to be deposited upon, or to the electrolytic fluid in which such surface is immersed, during the period of electro-deposition. Seventhly,—the application of the electro-deposition of metals and metallic alloys to the formation of the reflecting surfaces of parabolic and other reflectors and specula. Eighthly,—the methods of depositing metallic alloys, hereinbefore described. Ninthly,—the method of preparing metallic surfaces for electro-deposition, by previously covering the same with a slight coating of metallic mercury. Tenthly,—the method of arranging the articles to be deposited upon, so as to assist in generating and maintaining the galvanic current. Eleventhly,—the method, herein described, of depositing metals, by the aid of electrolytic solutions, not originally containing such metals, as component parts thereof, when in conjunction with a cathode of the metal to be deposited. Twelfthly,—the use of electro-deposition, when employing the cathodes herein mentioned, as a means of manufacturing platinum and other metals from their respective ores. Thirteenthly,—the application of electro-deposition to the manufacture of vessels and other articles of platinum; also the method, described under this part of the invention, of covering metal and other surfaces with platinum. Fourteenthly,—the application of the compounds of the various metals, herein particularly set forth, as not having been heretofore used for the purpose of the deposition of such metals.—[*Inrolled in the Inrolment Office, December,* 1842.]

Since the inrolment of the above specification, the patentee has entered a Memorandum of Alteration, dated 25th March, 1843, for the purpose of correcting some clerical errors in that part of his fourteenth improvement which relates to the salts of silver. In three instances, the word "sulphate" is changed to "sulphite;" and, in one instance, "hyposulphite" is substituted for "hyposulphate;" and, lastly, "racinate," and "sulphoranate," are altered to "racemate," and "sulphorimate, or "*sulphovinate.*"

To PETER KAGENBUSCH, *late of the parish of Whitby, and now of Sandsend, in the parish of Lyth, in the county of York, dyer, for an improvement in the dyeing of wool, woollen cloths, cotton, silks, and other fabrics and materials.*—[Sealed 26th May, 1842.]

THIS improvement consists in producing a mordant, to be used for fixing the colors in cloths, silks, &c., by operating upon the residual mother liquors of alum-works; that is to say, the mother liquor of the alum-meal, rough alum, or alum for rocking, from which the Epsom salts have been taken in one or more crops. The patentee uses the residual mother liquor of that manufacture in which muriate of potassa has been employed for the alkaline base, in preference to the mother liquor of that wherein sulphates are used; and he also prefers the liquor of the alum from the natural rock or schist, to the mother liquor of the rough alum, from what is generally termed the "artificial alum process."

The method of operating upon the residual mother liquor is as follows:—A solution of common salt or brine is added to the mother liquor, when boiling, for the purpose of neutralizing the sulphuric acid contained in it; the quantity of brine, to be added, depends entirely upon the amount of sulphuric acid in the liquor; but, in general, a saturated solution of salt, equal in quantity to about one-twelfth of the mother liquor, will be found sufficient. The liquor is now ready to be used for dyeing all colors, with the exception of red; and if not sufficiently strong, it may be brought to the required strength by continued boiling and evaporation.

When the above product or mordant is to be conveyed from one place to another, it is boiled until sufficiently concentrated, and is then allowed to crystallize; the crystallized substance should be protected from the action of the atmosphere, and, when required for use, it is to be dissolved in water. In some cases, the solution of salt is added to the mother liquor, previous to taking the last crop of Epsom salts; that is, when boiling up for the last crop; when the salts have been removed, in the usual manner, the residual liquor is ready for use as a mordant.

The patentee claims the improvement in dyeing, by the use and application of the residual mother liquors of the alum works, and of the product obtained therefrom, as a mordant, as above described.—[*Inrolled in the Inrolment Office, November,* 1842.]

To Charles Searle, *of Bath, Gent., for improved preparations of tea, coffee, cocoa, and milk.*—[Sealed 9th June, 1842.]

This invention consists in a method of preparing milk for use on long voyages, &c.; and likewise in combining tea, coffee, and cocoa with milk.

The cream is first removed from the milk, and then the latter is put into a suitable vessel, with one-fortieth part of its weight of loaf sugar; and the aqueous matter, contained in it, is evaporated, by means of a water-bath, or any other suitable means of applying heat. Milk is thus obtained in a perfectly dry state, and may be preserved for a great length of time in closely stopped bottles or jars; the removal of the cream, previous to evaporation, having the effect of preventing the milk from being so easily injured by the action of climate or atmosphere as when it has been prepared without removing the cream.

When the milk is to be combined with tea, coffee, or cocoa, a strong extract of any one of these matters is obtained, by evaporation in vacuo, or by distillation; and this extract is added to the milk, as it approaches solidification, together with a suitable proportion of refined sugar, if desired. The evaporation of the compound is then continued, at a low temperature, in a glass, porcelain, silver, or other suitable vessel, immersed in a water-bath, until the whole is converted into syrup, paste, candy, or powder. By the addition of arrow-root, isinglass, Iceland moss, or similar substances, the compound may be rendered more nutritive; it may also be made into lozenges, with the addition of a little essence or spice to impart a flavor to it.—[*Inrolled in the Inrolment Office, December*, 1842.]

To John Garnett, *of Liverpool, merchant, and* Joseph Williams, *of the same place, manufacturing chemist, for an improved method of manufacturing salt from brine.*—[Sealed 9th November, 1841.]

This improved method of manufacturing salt from brine consists in the use of heated metal pipes, which are passed horizontally through the fluid, for the purpose of evaporating the aqueous particles; by this arrangement the cistern or pan, containing the brine, may be constructed of slate, slabs of stone, pottery-ware, wood, metal, or other similar substances; but those, on which the salt may be deposited without injury, and are also bad conductors of heat, are preferred. The plan usually adopted, is applying fire to the sides and bottom of the pan containing the brine; but triangular flues or chambers, having steam passed through them, have been also used; the patentees, therefore, limit their claim to the application of cylindrical or curved surface pipes or tubes, for conveying steam through brine.—[*Inrolled in the Inrolment Office, May*, 1842.]

To THOMAS BIGGS, *of Leicester, in the county of Leicester, merchant, for improvements in securing hats, caps, and bonnets, from being lost by the effect of wind or other causes.*—[Sealed 7th October, 1841.]

THESE improvements consist in securing hats, caps, or bonnets, by means of elastic strings or bands, passing under the chin; which bands contract, when not in use, and retire into the upper part of the hat.

Elastic strings or bands, produced by braiding over threads or strands of India-rubber, are preferred for the above purpose; they are applied to hats, &c., in various ways, care being taken that they are left of sufficient length to admit of their being drawn under the chin without injuring the elasticity of the India-rubber.

The patentee claims the mode of securing hats, caps, and bonnets, by the application of elastic bands, straps, or strings, made partly of India-rubber, as above described.—[*Inrolled in the Inrolment Office, April,* 1842.]

To HENRY BENJAMIN, *of St. Mary-at-Hill, fish-factor, and* HENRY GRAFTON, *of Chancery-lane, machinist, for improvements in preserving animal and vegetable matters.*—[Sealed 27th January, 1842.]

THIS invention consists in preserving animal and vegetable matters by the application of freezing mixtures, for the purpose of freezing or cooling them.

The patentees commence their specification by describing the method pursued by them for preserving fish, which is as follows:—The fish is placed in a copper or other metallic vessel, which is filled with cold water, and deposited in a wooden trough, containing a mixture of one part salt, and six parts of pulverized ice. When the fish has become frozen, it may be preserved for a considerable time, by continuing the application of the freezing mixture, and thus keeping it in a frozen state.

If it be required to preserve the fish for a short time only, it is placed in baskets, or on slabs, in a close room, from which the heat of the sun is excluded; and the air, contained in it, is caused to circulate around a number of metallic vessels, containing freezing mixtures, by means of rotary fans, or other apparatus; the object being to keep the air in constant movement, by which it will be found that the moisture, taken up by it, will, from time to time, become frozen on the surfaces of the metallic vessels, and must be brushed off, as it would otherwise prevent the air from being so effectually cooled. Meat and vegetables are preserved in the same manner as fish.

The patentees state, in conclusion, that they do not confine themselves to the relative proportions of salt and ice, above-mentioned; and that, although they prefer the freezing mixture to be composed of salt and ice, yet other freezing mixtures may be used.—[*Inrolled in the Inrolment Office, July,* 1842.]

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTION.

No. III.

ON THE PATENT LAWS OF AUSTRIA.

It is a matter of some surprise, considering the importance of the manufactures of Austria, that the Patent Laws of that Empire are so little known in England. The consequence is, that comparatively few British inventors have availed themselves of the opportunity of protecting their inventions there; and even the greater part of those who have obtained Austrian patents have, from indifference, arising from ignorance of the resources of the country, allowed their patent rights to expire, and become void from non-execution of the invention within the period required by law. This, however, is not so generally the case with French inventors, several of whom have worked their Austrian patents with considerable success and profit to themselves, thereby giving an impulse to the inventive genius of the manufacturers of the Austrian dominions.

The first law in Austria, relating to patents for inventions, was granted by his late Majesty Francis the First, and dated December 8th, 1820; but since then various alterations have been made, at different times, by the Government, both in the law itself and also in the official forms and regulations, which must be minutely attended to, in the various public bureaux through which a patent must pass before it is issued. These forms and regulations necessarily render the obtaining and substantiating an Austrian patent, an affair of some anxiety. The tax payable to Government, on an Austrian patent, is moderate; but to this must be added other expenses for stamps, town dues, &c. &c., not included in the Government tax, and of which no mention is made in the law. The official formalities and regulations through which every Austrian patent must pass, are exactly the same as those to which every law of the Empire is subjected; and the difficulties, consequent thereon, are further increased by the frequent variation of some of these regulations, in one or other of the several bureaux, according as the heads of these offices may deem necessary for individual or general security.

As the law of 8th December, 1820, is entirely remodelled, and some of its provisions abrogated, by a subsequent enactment, we have not thought it necessary to give this law in detail; we shall, therefore, briefly allude to it, and afterwards give a translation of the more recent law, by which it has been partially superseded.

By the act of 1820, any person, Austrian or foreigner, could legally become the proprietor of a patent in Austria, and the patent right extended over, not only the German and Italian Austrian States, but also over the Kingdom of Hungary and Transylvania; but latterly, the Hungarian Diet has questioned and disputed the right of the Austrian Crown to grant patents over that Kingdom; arrangements can, however, be legally effected between Austrian patentees and Hungarian subjects; by means of which, the want of patent rights over Hungary may, to a certain extent, be obviated.

As it may perhaps be interesting to the British inventor to know over what countries an Austrian patent extends, we have given below the names of such states, forming part of the Austrian dominions, as by a recent arrangement, have recognised the right of the Crown to grant patents; and, as the law now stands, the patentee is invested with an exclusive right over the following

States:—namely, the Archduchy of Upper and Lower Austria; the Kingdoms of Bohemia; Venetian Lombardy or Austrian Italy; Dalmatia; Galicia and Lodomania, or Austrian Poland; Illyria, including the Duchies of Corinthia and Carniole; together with the Government of Istria or Trieste. It also extends over the Duchies of Salzbourg; Styria; Silicia; the Margraviate of Moravia; and the Princedom of Tyrol. These different States contain manufactories and establishments of almost every kind. It was our intention to give a statistical account of the manufactures and produce of these various States, in order to point out their immense importance; but we find that, to give the subject the attention its importance deserves, would require more space than we can, at the present time, conveniently command.

The following is a translation of the law of 31st March, 1832, by which that of 1820 is abrogated, and the official formalities and regulations, connected with it, are annulled.

We, Francis the First, Emperor of Austria, &c. &c., have decreed as follows:—

CHAPTER I.

Subjects for Patents,—formalities to be observed in obtaining them.

Art. 1. Any individual, whether an Austrian or a foreigner, can obtain the privilege of the exclusive use of any discovery, invention, or improvement, in any branch of industry whatever.

Art. 2. No privilege will be granted for any preparation of meats, drinks, or medicines.

Whoever shall have obtained a patent in a foreign country, for a discovery or improvement, which he may wish to introduce into the Austrian States, can obtain a privilege for the same in Austria, either for himself or his assignee; but the duration of this privilege shall not exceed that for which the patent was granted in the foreign country, and in no case shall that term exceed fifteen years, without a special license from us.

The introduction into the Austrian States of an invention or improvement cannot form the subject of a patent, unless that invention or improvement shall be patented in a foreign country.

Art. 3. Whoever shall wish to secure to himself the exclusive use of a discovery or an improvement, must send to the authorities of the department in which he resides, a petition, stating the term of years for which he may wish to obtain a patent; he must also pay one half of the tax hereinafter mentioned, (Art. 12 to 17,) and must annex to his petition, under a sealed envelope, a detailed description of the discovery or improvement to be protected. The description should be written in German, or in the language of the province in which the petition is delivered. It should be written in such a manner, that any person who is expert in the branch of arts or manufactures to which it relates, can make the article protected with the help of the description alone. The subject of the patent must be therein distinctly and formally pointed out, in a clear and precise manner, and without any ambiguous expressions, calculated to prevent the subject patented being carried into effect. All concealment is strictly interdicted, whether it be in the means to be employed, or the process of working; as is also any description of more expensive means, or means which differ in any respect from those which are really employed, and any dissimulation or suppression of any one of the manipulations essential to the operation The description shall be accompanied by plans, drawings, or models, whenever they shall be required to explain the invention.

Art. 4. The authority, who receives the petition, delivers to the petitioner a certificate, stating the name and residence of the said petitioner, and the day and hour of the deposit of the petition, and containing a receipt for the payment of the first half of the tax, and an acknowledgment of the receipt of the description.

Art. 5. The right of the patentee commences from this moment, as relates to the priority of the invention or improvement; and any demand relating to the same subject, and made at a later date, will be of no effect.

Art. 6. The local authority must endorse, on the sealed envelope of the specification, the name and residence of the petitioner, the day and hour of the deposit of the petition, the amount of the tax paid, and the subject of the discovery or improvement. This endorsement should be made according to a prescribed form, and in the presence of the petitioner; the sealed description, and the amount of the tax received, should, within three days at the latest, be transmitted to the provincial authority.

Art. 7. The provincial authority does not take cognizance of the novelty or utility of the invention or improvement, but merely ascertains that its object is lawful, that it is not injurious to the welfare of the public, and that, according to the present state of the laws, it is capable of being protected. According to the result of this examination, the provincial authority either refuses or grants the privilege, and the document, granting the right, is then delivered to the petitioner; after which it is announced in the public journals, and published at the place of residence of the patentee, at the request of the authorities. In case of refusal, on the part of the provincial authorities, the petitioner can appeal to the imperial chamber.

Art. 8. Immediately after the grant and publication of a patent, the description or specification, which has hitherto remained sealed, is opened (unless the petitioner requests it be kept secret) and transcribed in a register kept for that purpose, which is open to the examination of the public, whenever desired.

When the petitioner requests that his discovery should be kept secret, the description, deposited by him, remains sealed during the term of his patent, unless it relates to some discovery or preparation affecting the public health; in which case, according to the laws, it must be previously submitted to the examination of a medical board or committee. Any patent granted for an illegal object, or contrary to the police regulations, or injurious to health, or to the interests of the State, is null and void, to all intents and purposes.

CHAPTER II.

Of the Advantages and Rights attached to Patents.

Art. 9. A patent of invention secures to the patentee the exclusive use of his discovery, invention, or improvement, as described in his specification, and for the term of years mentioned in his patent.

Art. 10. The patent gives to the proprietor the right of opening, for the exercise of his privilege, as many establishments, and of employing as many workmen as he may think fit; of forming, in any part of the Kingdom, establishments and warehouses for the manufacture and deposit of his goods; of granting licenses for the use of his discovery under the authority of his patent; of entering into partnerships; of extending his manufacture; of disposing, at pleasure, of his privilege, by bequeathing, selling, or letting it out; finally, of patenting his invention in a foreign country. These rights are limited to the particular invention, discovery, or improvement, which forms the subject of the patent, and cannot be extended to other objects under pretence of affinity or connection with it, or exercised in opposition to the laws of commerce, or to any other legitimate rights.

Art. 11. Every patent granted for an improvement, or alteration made in a patented invention, is limited to such improvement or alteration. It confers no right, either for the original invention or any process in the arts or manufactures which is open to the public; nor can the original inventor make use of any alteration or improvement which is the subject of a subsequent patent.

CHAPTER III.

Of the Tax on Patents.

Art. 12. The tax on patents is in proportion to the duration of the privilege. The petitioner himself decides on the length of time for which he wishes the patent to be granted.

Art. 13. The tax is ten florins for each of the first five years. Thus for—

Yrs.	Florins.	Yrs.	Florins.	Yrs.	Florins.
5	50	9	30	13	50
6	15	10	35	14	55
7	20	11	40	15	60
8	25	12	45		
				Total	425

(or about £45.) for fifteen years, which is the longest term for which patents are granted.*

Art. 14. One half of the tax is to be paid on presenting the petition, and the remainder by annual payments, at the commencement of each year, under penalty of forfeiture of the patent right.

Art. 15. In order to give to inventors the means of testing their inventions, and protecting their rights by a provisional privilege, any individual can demand a patent for *less* than fifteen years, and shall have the right, before the expiration of his patent, of demanding its prolongation to the term of fifteen years, on paying, in advance, one-half of the tax for the whole term of the prolongation, and the other half in yearly payments, payable at the commencement of each year.

Art. 16. The tax, once paid, is appropriated to the use of the State, and cannot be returned, even though peculiar circumstances should prevent the discovery from being carried into execution, unless this non-execution should arise from a refusal to grant the patent, or from the privilege being annulled for the good of the public; then, in these cases, the tax is returned to the petitioner.

Art 17. The duties to be paid to obtain a patent, consist of the tax above mentioned; also a fee of three florins for the engrossment of each patent; and further, the payment of stamp-duties, together with the cost of the enquiry, to ascertain that the invention is not injurious to the public welfare. The documents are delivered from the office in the same manner as all other authoritative enactments.

CHAPTER IV.

Commencement, Duration, Extension, Publication, and Expiration of Patents.

Art. 18. The maximum duration of patents is fixed at fifteen

* It must be remembered, that to this amount, which is merely the Government tax on patents, there are one or two other small fees to be added, such as stamps, town-dues, advertisements in the public journals, &c., as mentioned in Art. 17.

years. We reserve to ourselves the power of extending this term, in particular cases, and on the representation of the provincial authorities.

Art. 19. The term of the privilege commences from the date of the patent; but its effect, as regards the penalties incurred by any person infringing the patent, commences from the day of the publication of the patent in the public journals.

Art. 20. Patents are valid in all parts of the Empire where the present laws are in force.

Art. 21. Patents become void by forfeiture, or cease by the expiration of the term for which they were originally granted.—Forfeiture takes place in the following cases:—

When the description of the discovery or improvement does not fulfil all the conditions prescribed in Art. 3, of the present law.

When it can be proved, in a legal manner, that the discovery or improvement patented was not new on the day and hour when the privilege was granted, or that the discovery or improvement was introduced from a foreign country, and that the importer is not the patentee nor assignee of the patent in the foreign country.

When the proprietor of a *valid* patent, in full force, can prove that the invention or improvement, for which a subsequent patent was granted, is identical with his invention or improvement.

When the patentee, whether Austrian or a foreigner, has allowed one year to elapse, from the date of his patent, without carrying his improvement or invention into practice.

When the patentee, without lawful motives, ceases, for the term of one year, from carrying his invention or improvement into execution.

When the patentee does not pay the second half of the tax at the stated intervals.

The privilege, by lapse of time, lawfully ceases, except in cases of special prolongation.

The preceding regulations apply to the original inventor and his assignees or executors. On the expiration of the privilege, the invention or improvement is thrown open to public use.

CHAPTER V.

Of the Registration of Patents.

Art. 22. The proper authorities must see that all patents granted be entered on registers, kept for that purpose; the names of the patentees, their residence, and the date of the specification must also be registered at the same time; and the duration and term of each patent must likewise be stated there, in order that any individual, who may wish to obtain a patent, shall be able to examine all patents previously granted. There shall be, in each register, a column for remarks. The general register shall be kept at the department of the Minister of Commerce.

Art. 23. Whenevever a privilege is transferred, whether it be by sale, exchange, gift, bequest, lease, or any other means of alienation, notice shall be given to the proper authorities, who will note it on the back of the patent, enter it in the register of patents, and give notice of it to the Minister of Commerce.

Art. 24. Any patentee who may wish to exercise his patent under any other name but his own, must nevertheless declare his own name to the authority, who will enter it in the register next to that under which he has obtained the patent,— and in case this name shall have been adopted by another individual, he must prove the consent of the latter.

CHAPTER VI.

Of Lawsuits and Penalties.

Art. 25. The specification of the invention or improvement forms the *title* of the patentee, and is the foundation of his right, according to, and by which, all disputes which may arise, must be decided. A revival of any manufacturing process, formerly known, but since lost, or any hitherto unknown in Austria, is considered as a discovery. The production of a new article by new means, of a new article by known means, or the production of a known article, by means different from those hitherto used, for the production of the same article, is considered an invention.

Any new method or process, applicable to the manufacture or a known article, whether patented or not, and which gives rise to a better result, or to the production of that article at a less expense, is considered an improvement.

Any discovery, invention, or improvement, hitherto unknown in Austria, either from its application or from any printed work, is considered new; but the novelty of a discovery, invention, or improvement, cannot be called in question in consequence of a previous description in a printed work, unless that description be sufficiently clear and precise to enable a person, well versed in the trade to which it belongs, to carry it into practice.

Art. 26. The Government authorities have the power of refusing to grant, or of annulling the patent, for the benefit of the public, and of enforcing forfeiture, should the patentee fail to fulfil the conditions under which the patent was granted.

Art. 27. The ordinary judges take cognizance of actions for infringement or counterfeit; of the imposition of the penalties established by the law; of indemnities for damages resulting from the act of another; and of disputes relating to the validity of the patent, whether arising from priority of invention or from the effect of the peculiar wording of a patent. In such cases the ordinary laws are followed.

Any action, however, based upon want of novelty of the invention, or in the case of importation, upon the fact of the importer not being qualified, where it is not necessary to decide between two patentees, belong to the political authorities.

ART. 28. Any patentee, who believes himself aggrieved by infringement, can appeal to the tribunal within whose jurisdiction the residence of the defendant may be. When it relates to an invention, of which the description has remained secret, the infringer (should it be his first offence) will be ordered to abstain from the further manufacture or sale of the article patented. In case of a repetition of the offence, or of manufacturing the article of which the description has been entered in the register of patents, the complainant can demand the immediate seizure of the counterfeit article, whether it be in the hands of the manufacturer or in those of a third person, even should it have been imported from a foreign country. The judge must, to the utmost of his power, maintain the privilege. He must follow the laws of the code, and must observe, as far as analogy will admit, the *spirit* of the laws respecting seizures and injunctions. He must take care that no irreparable damage be needlessly caused to the defendant; and he must only put those precautionary measures in force which may have been ordered for the benefit of the plaintiff, when they are applicable to the article forming the subject of the dispute.

ART. 29. The infringer of a patent, of which the description has not been published, will, for the first offence, be ordered to abstain, for the future, from the manufacture of the article patented. In case of a repetition of the offence, the penalty will be a fine of not more than one hundred ducats, one-half of which is to go to the patentee, and the other to the poor of the district, aud the counterfeit articles will likewise be awarded to the party aggrieved.

ART. 30. The regulations of the ordinance of December 8th, 1820, are revoked (without prejudice to any rights created thereby) from the date of the present law, and also the regulations, published subsequently, for its execution.

(Signed) FRANCIS.

Vienna, 31*st March*, 1832.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 249, Vol. XXII.)

June 21, 1842.

JAMES SIMPSON in the Chair.

"The History of the Canal of Katwyk, (Holland,) with a Description of the principal Works."

By the Chevalier F. W. Conrad; translated by Charles Manby Secretary, Inst. C. E.

This communication is divided into three parts:—1, The introduction; 2, The history of the Canal of Katwyk; and 3, A description of the principal works.

1. The introduction gives the general outline of the locality of this canal, which is probably one of the most useful and extensive works undertaken in Holland, for the purpose of draining the lowlands, and rendering them capable of cultivation; it is carried in a north-east direction from the village of Katwyk-binnen through the sand-banks to the North Sea, where it is terminated by five sea locks. It was undertaken for the purpose of draining the district called "Rhynland," a succinct account of which is given, with details of the early attempts at draining, such as the embankments of Marendyk, those of Spaarndam, &c., tracing them up to the time of Count William the Second, king of the Romans, in the year 1253; at which period the level of the district was identical with that of medium tide, and each "Polder" (or spot of cultivated land) was separately protected from the spring tides by an embankment; a change has occurred in the relative levels, whether by the sinking of the land or the elevation of the sea, is, it appears, a subject of dispute, but it is certain that the level of the river Y, and of the Zuyder Zee, is now much above that of the Rhynland district. The natural consequence of this change, has been to increase the demand for artificial drainage by canals, and of windmills for pumping, and

also the establishment of local boards of direction, whose duty is the superintendence of the works for the protection of the lowlands.

The district of Rhynland contains 127,000 bonniers or 317,500 English acres, which is thus divided:—

	Bonniers.		English Acres.
1. Polders, or Districts embanked and drained by windmills	54,831	—	137,077·5
2. Lakes and Peat-bog already laid dry	15,262	—	38,155·0
3. Land without mills and sandbanks on the borders of the North Sea	32,630	—	81,575·0
4. Lakes, Canals, Ditches, Peat-bogs abandoned, &c.	24,277	—	60,692·5
	127,000	—	317,500·0

The drainage is effected by two hundred and sixty-eight windmills, working scoop wheels or Archimedean screws.

Within this district, is included the Lake of Haarlem, which alone extends over 18,000 bonniers or 45,000 English acres; the drainage of it is now commenced, and will restore a tract of very valuable land.

The enumeration of the original locks at Spaarndam and other places, is given, showing their incapacity for carrying off the waters, particularly when unfavorable winds prevented their free current into the Y, and hence the necessity for the canal of Katwyk, and the choice of that particular spot, which is not affected by the prevailing winds.

2. The historical portion of the memoir, treats of the naturally unfavorable position of the district for drainage; it mentions a project for a canal at Katwyk in the year 1404, as related by Professor Lulofs, on the authority of the historian Van Mieris; and enumerates all the various examinations of the levels, the projects of tunnels, canals, &c., the appointment of numerous committees, the local opposition to the several plans, the repairs of the embankments, which had become so expensive that the landholders abandoned their estates, rather than pay the cost of preserving them; the attempt to form a small canal through the sandbanks, which was either closed by a heavy storm or was suffered to fall to decay; and the effect of the siege of Leyden by the Spaniards in 1573-4, when, instead of draining the country, every attempt was

made to cause an influx of the waters to annoy the invading army. It appears that, subsequently, the expense of renewing the hydraulic works would have been so considerable, that they were in a great measure abandoned for a time. In 1627, attention was again given to the subject, and Katwyk was pointed out as the only spot for an effectual system of drainage. The map by Bolstra, which the author promises to send, shows all the plans with great precision.

The reports are then given of all the various engineers and scientific men, on the drainage of the Lake of Haarlem, in all of which the Canal of Katwyk is a principal feature. The very able tract by Mr. Twent, on the state of the drainage of Rhynland, and the necessity for a canal at Katwyk, is mentioned as one of the principal causes for its final construction. After the publication of this tract, Mr. Brunings, in the year 1802, caused the nomination of Mr. Conrad (the father of the author) and Messrs. Blanken, Jun., and Kros, to report upon the project; which they did with such effect, that, in May, 1804, it was ordered to be executed by the reporters, under the superintendence of Mr. Brunings, the director-general of the "Waterstaat;" the plan selected being that which was laid down by Mr. Conrad, In August of the same year, the works were commenced, and in 1805, were so far advanced, that in June the first stone of the inner lock was laid; Mr. Conrad, who, in consequence of the death of Mr. Brunings, had assumed the chief direction, carried on the works with such activity, that they were entirely finished by the month of October, 1807, without the occurrence of any accident, although they had to support several very severe storms during their progress. On one occasion, just as the masonry of the locks was finished, the level of the tide was raised by a storm 2·36 metres (2·54 yards) higher than usual, carrying away the external cofferdam, but such was the solidity of the masonry, that it resisted perfectly.

A steam-engine was fixed for pumping up a head of water for scouring the sand from the exterior canal; and the final opening of the canal took place with great ceremony on the 21st October, 1807, when a medal was struck to commemorate the event, a copy of which is given by the author to the Institution.

Mr. Conrad made a series of experiments which completely proved the efficacy of the works, and then was carried off within the short space of three months, from the termination of his successful labours, which will hand down his name to posterity, as the projector and executor of one the most useful engineering works on record.

A slight sketch is then given of the origin of the Lake Haarlem, the causes of its extension, and the works already executed in anticipation of its eventful drainage.

The third part consists of a detailed description of the principal works at Katwyk, with their dimensions, and the necessary references to the drawings which accompany the paper.

The length of the canal from the Rhine to the sand-banks near the lock, is 2260 metres (2471·53 yards) of an average depth of 2·20 metres (2·40 yards) beneath the conventional height of tide for the kingdom of Holland, from which all tidal measures are taken; it corresponds with the average tides of the river Y:—the common tide at Katwyk, falls 0·60 metres (0·65 yards) below, and rises 1·02 metres (1·115 yards) above that standard.

From that lock to the next, is 490 metres (535·86 yards) of the same depth; the additional canal is 1108 metres (1211·70 yards) long; the widths at the standard level vary between 13 and 40 metres, (14·21 and 43·74 yards) and the side slopes, which are all puddled and covered with turf, vary between 1 to 1 and 3 to 1.

The outer canal, which has been made chiefly by scouring, is 151 metres (165·13 yards) long, to low water mark, at a depth of 0·47 metres (0·5139 yards); below that point, it is 37·67 metres (41·19 yards) wide, and the sides are constructed of fascines covered with stone.

The principal works enumerated are,—

1st. The sea locks, (buiten sluis.)

2nd. The interior lock, (binnen sluis.)

3rd. A bridge of three arches at the sea locks, with balance gates and rising sluices.

4th. A bridge of two arches over the canal in the Noordwykerweg.

The five sea locks are each 19·78 metres (21·63 yards) long and 3·77 metres (4·12 yards) wide; with the mouths of the outfall culverts 1·88 metres (2·05 yds.) below the standard tide level. They are founded upon piles of red and white deal, with sleepers, and the whole faced and covered with deal plank sheathing.

The masonry of the foundations and of the principal part of the construction, is of blue limestone from Escosine, squared and well bedded. A hard stone, called "klinkers," is also much used for ashlar work, and an inferior quality of stone for rubble-work, with bricks.

The mortar used up to a short distance above the standard tide level, was made from stone lime, and above that, of lime made from sea-shells; cement was also used in several parts.

The modes of constructing these various works are given in minute detail; many of them, differing materially from the English method of construction, possess great interest; particularly those which relate to the embankments and the fascine work.

A description is then given of the Canal of Oegstgeest, which is a prolongation of the Canal of Katwyk, for the purpose of bringing into the latter, the waters from the Lake of Haarlem; as well as a means of carrying off the waters of a portion of Rhynland, during and after the drainage of the lake.

In consequence of the establishment of this canal, the Canal of Katwyk required to be enlarged, which was done to the extent of rendering it 52 metres (56·86 yards) wide, with an average depth of 2·20 metres (2·40 yards) below the standard level. The bridges were also enlarged, and it is now contemplated to add two openings to the inner lock, those of the sea locks being already of sufficient capacity.

Having described the works in detail, the author enters into some general remarks upon the effect produced by the canal, one of the principal being its beneficial use in determining the possibility of draining the Lake of Haarlem. Thirty-five years of experience have demonstrated that this canal is the surest remedy for the peculiar position of the district of Rhynland, with regard to drainage; the constant action of the North Sea has made no impression upon the simple but solid masonry of the sea locks; in fact, the Canal of Katwyk appears to be one of the most remarkable hydraulic works ever constructed for the protection of Holland.

The author concludes the Paper by stating, that although he could with difficulty spare the time from his professional labours on the Amsterdam railway, of which he is the engineer, he was induced to undertake the labour of drawing up this memoir, by the subject being one of those proposed by the Institution of Civil Engineers, in the list of Telford and Walker Premiums for 1842, and by the desire of doing justice to the memory of his father, whose early decease alone prevented his name from becoming as extensively known as his talents deserved.

The Paper is illustrated by nine comprehensive drawings and charts, with some lithographic views; a portrait of Mr. Conrad, Sen., and the medal which was struck on the occasion of the first opening of the sluices.

"On the Construction of the Bridges on the Bolton and Preston Railway."—By A. J. Adie.

This Paper, which was written at the request of General Pasley, and by him communicated to the Institution, contains a description of the bridges over the Cowlin Brook, the Lancaster Canal, and the Chorley Road, which alone possesses any peculiarities of construction; and they formed the types upon which the other bridges were built.

In Colonel Sir F. Smith's report upon the Cowlin Brook bridge, he advised great attention being paid to the bridge on account of its "unusual slightness, and the badness of the ground upon which it was founded." The author states, that the latter circumstance induced him to design the present proportions of the work, as he wished to reduce the weight of the piers as much as possible; he therefore ventured to deviate from the original design given by Mr. Rastrick. The result has justified his anticipations, as "after the most careful inspection not a single crack nor a splintered stone can be detected."

The ground where this bridge was to be placed, was found to be a rotten and compressible mixture of moss, decayed wood, and sand, with a few large stones; a foundation was made for each pier, by driving in piles, 20 feet long by 12 inches square; upon these were placed the footing courses of Limberick stone, 8 inches thick; the piers were built hollow, so that the utmost weight placed upon each superficial foot should not exceed 5½ tons, which the author states to be a light load for ashlar work:—"In Edinburgh there are old rubble walls, 34 inches thick and above 100 feet high, which in addition to all their proportion of eight floors, and a roof, have 6½ tons on each superficial foot of the bottom courses; and there is a brick chimney in Bolton, the bottom courses of which support 8½ tons on the superficial foot."

The bridge consists of eight arches, each of 30 feet span; the arch stones are 18 inches thick, of hard sandstone from the Whittle hills, except seven courses at the crown, which are from a better quarry at Ackrington, near Blackburn.

The author then mentions, as a precedent for such dimensions, some arches constructed, under Mr. Jardine's direction, on the Edinburgh and Dalkeith Railway; they were of Craigleith stone, semi-elliptical in form, of 24 feet span, with a rise of 4 feet, or $\frac{1}{6}$th of the span; the stones for these arches were 12 inches deep at the springing, and 9 inches deep at the crown; the abutments of one of them are founded on platforms of timber, without piles, resting upon soft plastic blue clay; they have been standing for upwards of ten years, and exhibit no signs of failure. Another arch is also mentioned, constructed by the same engineer, over the South Esk, near Dalkeith, the span of which is 55 feet, and the versed sine 12 feet; the key-stone is 18 inches deep, and the springers 21 inches in depth.

The author objects to placing a mass of earth upon the haunches of the arch, as, from the tremour caused by the passing of the railway trains, the earth has always a tendency to be wedged in between the side walls and to force them out; he therefore left voids above arch stones, allowing only sufficient weight of masonry upon the haunches, and thus securing the rapid hardening of the mortar; for this latter reason also the walls of rubble-work never much exceed 3 feet in thickness, and they have been much stronger in consequence.

The railway is carried over this viaduct on longitudinal bearers, 13 inches deep by 6 inches thick, laid on planks 3 inches thick; the bearers and planks are not fixed together with a view to diminish the vibration of the passing trains; this method of laying is stated to be very effective in this respect.

The Lancaster Canal Bridge was originally intended to have been a direct span of 60 feet, constructed of iron, but the directors subsequently decided on building a skewed stone arch, of 25 feet span on the right angle. The arch is semi-elliptical on the square, with a transverse axis of 41 feet 2 inches, and a semi-conjugate axis of 8 feet 9 inches; the arch stones are 2 feet 3 inches on the square at the springing, and 1 foot 6 inches at the key-stone; the bed joints intersect at right angles all the lines of sections of the intrados, made by vertical planes, parallel to the elevation; and it is that property that causes the chamfer lines of the beds of the stones to diverge from the springing to the crown. These lines of the curved joints are easily laid down on the sheeting of the centres, from a full-sized development, and by lines drawn at different heights, parallel to the springing of the arch. The lines of the radiating bed joints are always perpendicular to the tangent of an ellipse of the same form as the elevation of the bridge, the moulds used to form this, being applied in the plane of the elevation. The twist on the length of the beds of the courses was taken from full-sized skeleton moulds of the form of the oblique ellipse or elevation. The five courses, running parallel to the abutments, are all of the same form, and have the same amount of twist on the beds of each stone, except the end stones of the courses, which are varied in length to suit the general breaking of the joints of the courses resting together. The centre part of the arch is plain square work.

This mechanical method of finding the lines, and the twist of the radiating beds for an elliptical skewed arch, is destitute of the scientific accuracy of the mode by which Mr. Buck calculates his spiral lines for oblique bridges, of which the section at right angles to the abutment, is an arc of a circle; but the workmen had no difficulty in putting it in practice, and the author states that he would have had more trouble in constructing trussed centres for a flatter curve of a circular arc, and at the same time keeping the towing path of the canal open. He states that he has not met with any description of an arch executed in this manner, but he considers it the only true principle. Every very thin section, parallel to the elevation, is a proper elliptical arch, and there is a very great saving of stone, from the smallness of the twist on the curved beds, as compared to the common method of working them.

The Chorley Road Bridge is a compound of the common and skewed arches, which the author finds convenient and economical. He has execnted several upon this plan; they are as perfect as the best common arches, and free from skirting of the soffits of the stones. The section of this bridge, at right angles, shows a rise of 5 feet, with a span of 25 feet. The springers, at this part, are 15 inches deep, and the key-stone is 13 inches deep; on the oblique section, or the elevation, the span is 37 feet 9 inches, and the rise 5 feet; the springers are 24 inches deep, and the key-stone is 17 inches deep.

The straight part of the arch is formed with courses, about 10 inches on the soffit, and these are turned round in curved lines, which are portions of circles, the straight parts of the courses being then tangents; and they cut the lines of the elevations at right angles, so that there is no more tendency of the arch to sink at the elevation than would be the case with any elliptical segment of similar dimensions worked in the ordinary way. The part of the acute angle of the arch is formed with courses which converge from the elevation to the abutments, on account of being arcs cutting the elevations at right angles, and then becoming nearly tangential at the springing. The curves, for these courses, were transferred from the development to the sheeting, in the same way as those for the Lancaster Canal Bridge, and the twist of the beds was taken off full-sized sections of the arch, made in the directions of the converging lines of the extremities; so that at each of these places the beds were worked as if for part of a true elliptical arch; and the beds, between the points thus formed, were worked off with curved rules found from the development. After the masons got into the way of working this kind of arch, they, of their own accord, preferred it to the complete skewed arch. In brick-work, built in this way, it would be very easy to skew the ends of a long archway, by having the bricks moulded to the curvature of the key-course, as, with a very little alteration, they would fit any part of the concentric courses, and a few tapered bricks would facilitate the filling up of the fan-shaped part of the haunch of the acute angle.

The communication was illustrated by several detailed drawings, and a model of the bridge, with schedules of the prices and cost of the works.

"On some peculiar Changes in the Internal Structure of Iron, independent of, and subsequent to, the several processes of its manufacture."—By Charles Hood, F.R.A.S., &c.

The singular and important changes in the structure of iron, which it is the object of this Paper to explain, are those which arise in the conversion of the quality of iron, known by the name of "red short iron," which is tough and fibrous, into the brittle and highly crystallized quality, known by the name of "cold short iron." This change the author considers has never been attributed (as it ought to be) to the operation of any definite and ascertained law, but has generally, when observed, been supposed to arise from some accidental cause, and been considered as an isolated fact.

The fracture of railway axles, by which some of the most lamentable accidents have occurred, arises from this molecular change in the structure of iron, by which the axles lose a vast proportion of their strength.

The principal causes which produce this change are percussion, heat, and magnetism; and the author traces through a great number of practical cases of ordinary occurrence, the joint as well as the separate effect of these three causes; showing that the rapidity of the change is proportional to the combined action of these several causes; and that in some cases, where all the three causes are in operation at the same time, the change of structure is almost instantaneous; while, in other cases, where this united operation does not occur, the change is extremely slow, extending over several years before it becomes sensible. Among the examples given, and of which the causes are explained, are the conversion by means of heat, as in the case of wrought-iron furnace-bars, and other analogous cases, particularly when any vapour is present: the operation of the tilt-hammer, in the planishing of iron, by which both vibration and magnetism of the bar is produced, when the temperature is within a certain limit; beyond which limit the bar loses its magnetic power, and no crystallization occurs; and the instance of piston-rods and other cases, where, from any accidental circumstance, a peculiar jar or vibration has been given to particular parts. The effect of the continual jar or vibration upon the axles of common road carriages, is a case of the opposite kind, where, notwithstanding the continual vibration, this molecular change does not take place *when the axle is insulated from the effects of magnetism.* In railway axles, however, the case is very different. The rapid rotation of the axle produces powerful magnetic action, while the friction causes much heat; and these effects, added to the constant percussion which is produced by the peculiar motion of railway wheels, causes the crystallization to be produced with extreme rapidity; the effect being probably further increased in axles of locomotive engines by the magnetising power of the electricity generated by the effluent steam. The crystallized structure being the natural condition of iron, as well as of several other metals, the author considers, that in these changes we observe a constant effort to return from the artificial to the natural and primal condition of the metal, and the conclusion arrived at is, that this crystallization is not necessarily dependent upon time for its development, but is determined by other circumstances, of which the principal is undoubtedly vibration: that heat, although it assists, is not essential to it, but that magnetism, whether induced by percussion or otherwise, is an essential accompaniment of the phenomena. The paper concludes by pointing out the increased effects likely to result from the rigidity of the springs, the looseness of the brasses, and other causes, which increase the vibration on the axles of railway carriages.

Several samples of broken railway axles were exhibited; some of them being cut from different parts of the same axles, showed that at the journals, where the vibration was the most intense, the crystallization was increased to a great extent beyond what occurred in other parts of the same axle.

Mr. Moreland had frequently noticed, that pins for chains, and pump-rods, although made of the best iron, would, if subjected to concussion, after a certain time, break suddenly, and that the fracture would exhibit a large crystallized texture. This was also frequently observed in the broken axles of road carriages, although they were generally made of iron of the finest quality.

Mr. E. Woods had observed the crystallized fracture in all the broken axles on railways which he had seen.

Mr. Hood exhibited some specimens of broken axles, all of which showed a large crystallized fracture: he believed that the iron, from which the majority of them had been made, was of the best quality, and in the parts, not immediately subjected to concussion, the fracture was quite different. One of them had been in use only three months, and had become so brittle that, on attempting to break it, it jarred off at the shoulder of the journal, although an incision was made all round at the spot where it was intended to be broken.

Mr. York would account for the tendency of the axles to break at the journal, by that part being subjected, during the process of forging, to more hammering than the body.

Mr. Hood agreed that such might be the case, but he conceived that it was more probably produced by cold hammering. He had taken a sample from the body of a broken cranked axle, from the Grand Junction Railway, the iron of which was evidently of the best quality, but at the point of fracture, which was certainly at that part where it had been most hammered, the fracture presented a large crystallized texture.

A large anchor, which had been in store for more than a century, at Woolwich Dock-yard, and was supposed to be made of extremely good iron, had been recently tested as an experiment, and had broken instantly with a comparatively small strain; the fracture presented very large crystals: in this case, he believed the length of time which the anchor had remained in the same position had produced the same effects as magnetism and vibration.

Mr. Lowe stated, that at the gas-works, under his direction, wrought-iron fire-bars, although more expensive, were generally preferred; a pan of water was kept beneath them, the steam from which would speedily cause them to become magnetic: he had frequently seen these bars, when thrown down, break into three pieces, with a large crystallized fracture.

Mr. Miller had frequently seen in manufactories, that when the smiths had forged parts of engine-work, which, from their intricate forms, had required to be much hammered, the ends were jarred off while they were being worked upon. He instanced, particularly, the side rods of the engines for the 'Lord Melville' steamer, of which, while shutting up the middle, one of the ends of each rod was jarred off, and presented large crystals in the fracture;—being well assured of the good quality of the iron in the rods, he had the same ends welded on again, and although the circumstance had occurred twenty years since, they were still at work, and had not shewn any symptom of weakness. It must be evident that in this case, the fracture and the crystallized appearance of the metal must have been produced by the cold hammering to which it had been subjected.

Mr. York agreed with Mr. Hood in the fact of a change taking place in the texture of the iron, but he was of opinion, that it more frequently occurred during than after manipulation; he alluded more particularly to railway axles, in which he believed the injury to be done by the cold hammering or planishing after they were faggoted; he had frequently seen one end of an axle fall off while the other was being hammered: in all such cases, and in those of accidental breakage, such as recently occurred on the Versailles Railway, and in other places, the fracture always presented a crystallized appearance.

He then exhibited and described a railway axle, which he stated to possess the combined advantages of rigidity and toughness, and avoiding entirely the crystallization of the iron during the process of manufacture; this he described to be effected by maintaining the axle in a hollow state during the whole operation of hammering, thereby avoiding the vibration and concussion, to which cause he attributed the crystallization of the iron in solid axles, being of opinion that the repeated blows of the hammer on a solid mass, particularly during the process of "planishing," were the chief, if not the only cause of the ductile quality of the iron being destroyed. He stated, that he had made numerous experiments for the purpose of ascertaining this fact, and in every instance, when the axle was sound, the iron presented the same crystallized fracture, although the bars, previous to their being welded together, were of the most fibrous quality; but if the axle was not quite sound, and the bars not perfectly welded to the centre, then the fracture was somewhat fibrous, the axle being partially hollow, and thereby avoiding the vibration to a considerable extent.—This fact suggested to him the propriety of keeping the axle hollow; and the mode of manufacture he described to be, by taking two dished half-cylindrical bars of iron, of the entire length of the axle, putting them together and welding them under a hammer in swages, by which means the particles are not driven asunder by the heavy blows, and the axle or faggot lengthened, but are driven together and towards the centre. The axles produced by these means, he stated to be as perfectly ductile as the bars in the first instance. A further advantage, he stated to consist, in being able to make half the whole length of the axle at one heat, thereby avoiding, to a considerable extent, the danger of burning the iron by repeatedly heating it. The iron in the axle he described, as being an uniform cylinder in thickness, and consequently requiring an uniform heat; whereas the external bars of a faggot for a common axle were liable to be burnt, before the centre was heated to a welding state. The diameter of the hollow axle was increased from 3½ inches (the general size of a solid axle) to 4 inches, in order to give a proper degree of rigidity, but without increasing the weight.

The usual proof to which solid railway axles were subjected, was by allowing a weight of 6 cwt. to fall upon them from a height of 9 feet; with that force, they were frequently broken at the second blow, and sometimes by the first;—he had tried some of the hollow axles, by letting fall upon them a weight of 10 cwt. from a height of 15 feet, without breaking one of them.

Mr. Simpson expressed the obligation of the Institution to Mr. Hood, for bringing before the meeting such an interesting communication, upon a subject, which it is of the utmost importance to railways, should be carefully examined. It was to be regretted, that the late period of the Session had prevented the attendance of those members whose attention had been more particularly directed to railways; but on the renewal of the subject next Session, upon the production of the report upon the projected experiments, promised by Mr. Hood, a very useful discussion might be anticipated.

June 28, 1842.

The PRESIDENT in the Chair.

"An account of the Bridge over the Thames, at Kingston, Surrey.' By John Brannis Birch, Grad. Inst. C. E.

Previous to the year 1828, when the present bridge was opened to the public, the communication between the town of Kingston-upon-Thames, in Surrey, and the hamlet of Hampton-wick, in Middlesex, was carried on by an old and incommodious wooden bridge, which was so dilapidated, that any attempt to put it into a substantial condition for the service of the public, would have been equivalent to an entire rebuilding of the structure.

The corporation of Kingston, therefore, resolved upon erecting a new bridge, on a design by Mr. Lapidge, their architect, and in the year 1825, obtained an Act of Parliament, granting them the powers necessary for that purpose.

The trustees, appointed under the Act, applied to the Exchequer Bill Loan Commissioners, for pecuniary assistance to the amount of £45,000, but the application was not entertained until the working drawings, specification, &c. had been submitted to their engineer, the late Mr. Telford, when he gave the following opinion:—"Having carefully inspected all the working drawings, I consider it only justice to Mr. Lapidge to say, that they are very complete, and do credit to his judgment and assiduity; and as the blue clay has been found across the bed of the river, I am of opinion that with the precautions provided in the working drawings and specification, that the work is very practicable, and if well executed will prove a substantial and useful edifice." He also said, "I have gone through the detailed estimates, and compared the same with the proposal accepted by the corporation, and am satisfied that the works may be properly executed for the sum therein mentioned, viz., £31,300;" and he stated, "the amount of the general estimate, including the above sum—the expense of houses and ground—the flood-arches and roads of approach, &c., to be £47,457."

Upon receipt of this report, the Commissioners consented to make the required loan, but it being found that the Act limited the amount to be raised to £40,000, alterations in the structure were suggested by Mr. Lapidge, which received Mr. Telford's approval, and the works were commenced on the reduced scale.

The bridge is of Grecian architecture and consists of five elliptical arches; it is constructed chiefly of brick, with ashlar facing. The abutments are terminated by towers, and the structure is surmounted by a cornice and balustrade, with galleries projecting over the piers. The span of the centre arch is 60 feet, with a versed sine of 19 feet; the side arches are 56 feet and 52 feet span, and 18 feet 3 inches and 16 feet 6 inches rise, respectively. The highest flood rises 6 feet above the springing line, and the lowest summer level is about the same distance below it. The foundations are all laid upon the substratum of blue clay. The length of the bridge is 382 feet to the extremes of the abutments, and the width between the balustrades is 25 feet. The proportion of the piers to the span of the arches is about $\frac{1}{8}$th. The roadway is formed at an inclination of 1 in 40.

The author then describes fully the construction of the abutments, piers, arches, and the superstructure. The work occupied about $2\frac{3}{4}$ years to the completion, the first stone having been laid on the 7th of November, 1825, and the bridge opened in form on the 17th of July, 1828.

On the completion, Mr. Telford again made a report to the Exchequer Bill Loan Commissioners in these terms:—"With Mr. Lapidge, I examined the whole of the bridge and approaches, and taking it for granted that the foundations of the piers and abutments, which are under water, and which I had no opportunity of inspecting while in progress, are according to the working drawings, all the other parts are found in a very perfect state, and executed in a workman-like manner."

The bridge has in every respect answered the object for which it was intended, and it has justified the good opinion Mr. Telford originally formed of it.

During the fourteen years which have elapsed since its erection, it has required none other than the most trifling repairs, and the expectations of the trustees have been realized by the tolls having paid the allotted portion of the principal, up to the present time, as well as the interest of the money borrowed for its execution; and the cost of it did not exceed the amount of the estimate.

The communication was accompanied by seven remarkably well-executed drawings, showing accurately all the details of the construction, and the Paper contained all the quantities of materials in the work, together with Mr. Telford's reports upon it, with other documents of interest.

[*To be continued.*

List of Disclaimers
OF PARTS OF INVENTIONS AND
Amendments
MADE UNDER LORD BROUGHAM'S ACT.

William Cook,—disclaimer and memorandum of alteration to patent dated 22nd February, 1840, for "improvements in carriages." Filed 5th April, 1843.

Thomas Robinson Williams, Esq.,—ditto to patent dated 14th February, 1833, for "a new combination of fibrous materials, forming, by means of machinery, artificial skins, which may be applied to the purposes for which skins, leather, vellum, and parchments are now used." Filed 19th April, 1843.

Moses Poole,—ditto to patent dated 23rd August, 1839, for "improvements in introducing elastic materials into fabrics, to render them elastic or partly elastic." Filed 26th April, 1843.

List of Patents

Granted by the French Government from the 1st of January to the 31st of March, 1841.

(Continued from page 163, Vol. XXII.)

PATENTS FOR FIFTEEN YEARS.

Bapterosses, of Paris, for improved lamps.
Barthelemy, of Nancy, for an improved motive power.
Bérard, of Bayonne, for improvements in steam navigation.
Beslay, of Paris, for a new steam-engine.
Boyet, of Lyons, for an improved hydraulic machine.

Buisson, of Lyons, for manufacturing blue cheese.
Canning, of Paris, for a machine for raising water and other liquids.
Chapel and Charleroy, for improvements on rail-roads.
Delvigne, of Paris, for a safe proof against fire.
Douce, of Paris, for a new accordion.
Dusourd, of Saintes, for chalybeate sugar for the preserving of meat.
Féline, of Paris, for the application of bitumen as fuel.
Fitz-Patrick, of Lille, for improved headles for looms.
Frimot, of Paris, for an improved steam-engine.
Grimoud, of Paris, for an improved power.
Hartmann, of Paris, for a machine for folding every kind of fabric.
Jacquin, of Troyes, for improvements in knitting frames.
Janssen, of Brussels, for improved felt cloth.
Jochem, of Paris, for an improved clasp, adapted to clogs.
Kuhlmann, of Lille, for an improved hydraulic cement.
Lepage, Philippe, and Vasserot, of Paris, for an improved propeller for navigation.
Lesage, of Paris, for an improved press.
Maille, of Paris, for a process for drying wood.
Menu, of Paris, for an improved shade for wax candles.
Moineau, of Paris, for an improved winding-up apparatus, applicable to clocks.
Nicholson, of London, for improvements in steam-engines.
Paravicini, Maillard, and Sallin, of Valentigny, for a method of converting into use the gas escaping from ovens and fire-places.
Pecqueur, of Paris, for improvements on rail-roads and locomotives.
Serveille and Pecqueur, of Paris, for an excavating machine.
Cardif, of Paris, for improvements in eye-glasses.
Thebert, of Paris, for improved fire-arms.
Tissier, of Brest, for an extraction of soda from sea-weeds.
Vergniais, of Lyons, for a machine for opening and spinning silk simultaneously.
Vertel, of Paris, for a portable apparatus for carbonizing wood.
Weschniakoff, of St. Petersburgh, for a new fuel called "carboleine."

PATENTS FOR TEN YEARS.

Miles Berry, of London, represented in Paris by M. Perpigna, advocate, 2, ter: Rue Choiseul, for improvements in the mode of firing guns.

Miles Berry, of London, represented in Paris by M. Perpigna, for improvements in wheels used on rail-roads.

Chiffray, of Rouen, represented by M. Perpigna, for a machine for printing tissues in several colors.

Claudot, of Verdun, represented by M. Perpigna, for a new mode of carbonizing wood.

Perpigna, advocate, for an improved temple for weaving.

Roberts, of Calais, represented by M. Perpigna, for an improved mode of manufacturing soap.

Sudds, of Rouen, represented by M. Perpigna, for an improved jack.

Waldeiron, of Marseilles, represented by M. Perpigna, for an improved hydraulic machine.

Amerigo, of Oléron, for an improved framing for carriages.

Baudon Porchez, of Lille, for an improved calefyer.

Boquet, of Paris, for an improved ink-stand.

Bourbon, of Paris, for various products in terra cotta.

Bradshaw, of London, for an improved drilling machine.

Callard Davies, of London, for improvements in clocks.

Carbon, of Rheims, for the application of heat to the spinning of combed wool.

Chaudin, of Paris, for improvements in fire-arms.

Camus Rochon, of Paris, for a new method of uniting steel with iron, for the manufacturing of sharp instruments.

Delamotte, of Paris, for an improved boat.

Dehez and Vandelbulcke, of Paris, for new means of uniting sheets of metal used for water-shoots.

Demeure, of Lyons, for machinery for driving a calender by the strength of one man.

Desmaret, of Paris, for a machine for drawing out the printed tissues during the operation of printing.

Dive and Montauriol, of Charenton, for a mode of manufacturing a fatty substance for making candles.

Dupille, Horner, and Vaillant, of Paris, for a new mode of making extract of Kina.

Elmore, of London, for a mode of curing animal substances.

Foster, of London, for machinery for preventing accidents on rail-roads.

Fusz, of Paris, for an improved vehicle.

Gillardin, of Marseilles, for a mode of deriving a power from the action of the waves.

Godin, of Abbecourt, for a mode of drying up and preserving animal and vegetable substances.

Godin Lemaire, of Esquiheries, for an improved stove.

Grangier Brothers, of St. Chamond, for an improved batteu for manufacturing ribbons.

List of Patents

Granted for SCOTLAND, subsequent to March 22nd, 1843.

To Gregory Seale Walters, of Coleman-street, in the city of London, merchant, for improvements in the manufacture of chlorine and chlorides, and in obtaining the oxides and peroxides of manganese, in the residuary liquids of such manufacture,—being a communication from abroad.—Sealed 23rd March.

James Greenshields, of Monteith-row, Glasgow, Gent., for improvements in the manufacture of compositions for covering roads, streets, and other ways and surfaces, and in rendering fabrics waterproof,—to be used for covering buildings, bales, packages, and for other useful purposes.—Sealed 23rd March.

Andrew Barclay, of Kilmarnock, in the county of Ayr, Scotland, engineer and brass-founder, for certain improvements in lustres, chandeliers, pendants, and apparatus connected therewith, to be used with gas, oil, and other substanccs.—Sealed 24th March.

James Fletcher, of Salford, in the county of Lancaster, foreman at the works of Messrs. W. Collier and Co., engineers, for certain improvements in machinery or apparatus for spinning cotton and other fibrous substances.—Sealed 27th March.

William Henry James, of Martin's-lane, in the city of London, civil engineer, for certain improvements in railways and carriage-ways, railway and other carriages, and in the modes of propelling the said carriages, parts of which improvements are applicable to the production of friction in other machines.—Sealed 27th March.

Claude Edward Deutsche, of Fricour's Hotel, St. Martin's-lane, in the county of Middlesex, Gent., for improvements in combining materials to be used for cementing purposes, and for preventing the passage of fluids; and also for forming or constructing articles from such compositions of materials,—being a communication from abroad.—Sealed 30th March.

John Juckes, of Putney, in the county of Surrey, Gent., for improvements in furnaces.—Sealed 30th March.

Thomas Edge, of Great Peter-street, in the city of Westminster, gas apparatus manufacturer, for certain improvements in apparatus for measuring gas, water, and other fluids.—Sealed 30th March.

Robert William Sievier, of Henrietta-street, Cavendish-square, in the county of Middlesex, Gent., for certain improvements in looms for weaving, and in the mode or method of producing plain or figured goods or fabrics.—Sealed 3rd April.

James Byrom, of Liverpool, in the county of Lancaster, engineer, for an improved system of connexion for working the cranks of what are commonly called "direct action steam-engines."—Sealed 3rd April.

Peter Kagenbusch, of Wetter-on-Rhur, in Westphalia, in the Kingdom of Prussia, dyer, now residing in the parish of Lyth, in the county of York, in England, for certain improvements in the treatment of the alum rock or schist, and in the manufacture and application of the products derived therefrom.—Sealed 6th April.

Robert Farady, of Wardour-street, Soho, in the county of Middlesex, gas-fitter, for improvements in ventilating gas-burners, and burners for consuming oil, tallow, or other matters,—being a communication from abroad.—Sealed 6th April.

Charles Frederick Guitard, of Birchin-lane, in the city of London, notary public, for certain improvements in the construction of railways and of railway carriages,—being a communication from abroad.—Sealed 19th April.

New Patents
SEALED IN ENGLAND.
1843.

To James Fletcher, of Salford, foreman at the works of Messrs. W. Collier and Co., engineers, for certain improvements in machinery or apparatus for spinning cotton and other fibrous substances.—Sealed 30th March—6 months for inrolment.

Frank Hills, of Deptford, manufacturing chemist, for certain improvements in steam-boilers or generators, and in locomotive carriages.—Sealed 30th March—6 months for inrolment.

Paul Prevost Brouillet, of Hadley, Middlesex, Gent., for certain improvements in apparatus for warming apartments.—Sealed 30th March—6 months for inrolment.

John Aston, of Birmingham, and William Elliott, of the same place, button manufacturers, for improvements in the manufacture of covered buttons.—Sealed 4th April—2 months for inrolment.

Joseph Browne Wilks, of Chesterfield Park, Essex, Esq., for improvements in treating oils, obtained from certain vegetable matters.—Sealed 4th April—6 months for inrolment.

George Johnston Young, of Bostock-street, Old Gravel-lane, Wapping, engineer, for improvements in the construction of capstans.—Sealed 5th April—6 months for inrolment.

Edwin Whele, of Walsall, Staffordshire, for an improvement or improvements in machinery for preparing wicks used in the making of candles.—Sealed 6th April—6 months for inrolment.

James Boydell, Jun., of Oak Farm Iron Works, near Dudley, iron-master, for improvements in manufacturing bars of iron with other metals.—Sealed 7th April—6 months for inrolment.

Robert Hawthorne, and William Hawthorne, of the town of Newcastle-on-Tyne, civil engineers, for certain improvements in locomotive engines, parts of which are applicable to other steam-engines.—Sealed 7th April—6 months for inrolment.

John Michell, of Calenick, Cornwall, for improvements in extracting copper, iron, lead, bismuth, and other metals or minerals from tin ore.—Sealed 11th April—6 months for inrolment.

James Napier, of Hoxton, Middlesex, dyer, for improvements in preparing or treating fabrics, made of fibrous materials, for covering roofs, and the bottoms of ships and vessels, and other surfaces, and for other uses.—Sealed 11th April—6 months for inrolment.

Moses Poole, of Lincoln's-inn, Gent., for improvements in the manufacture of ornamented lace or net,—being a communication.—Sealed 11th April—6 months for inrolment.

Uriah Clarke, of Leicester, dyer, for improvements in the manufacture of narrow elastic and non-elastic fabrics of fibrous material.—Sealed 11th April—6 months for inrolment.

William Tindall, of Cornhill, ship owner, for certain improvements in the manufacture of candles.—Sealed 11th April—6 months for inrolment.

William Ranwell, of Bowling-green-row, Woolwich, artist, for improvements in machinery or apparatus for registering or indicating the number of persons which enter any description of carriage, house, room, chamber, or place ; and also the number of passengers and carriages that pass along a bridge, road, or way.—Sealed 13th April—6 months for inrolment.

William Henry Smith, of Fitzroy-square, civil engineer, for certain improvements in the construction and manufacture of gloves, mitts, and cuffs, and in fastenings for the same,—which may be applied to articles of dress generally.—Sealed 19th April—6 months for inrolment.

Charles Tayleur, and James Frederick Dupre, of the Vulcan Foundry, near Warrington, engineers, and Henry Dubs, of the same place, for certain improvements in boilers.—Sealed 19th April—6 months for inrolment.

James Byrom, of Liverpool, engineer, for an improved system of connexion for working the cranks of what are commonly called "direct action steam-engines."—Sealed 19th April—6 months for inrolment.

Carl Ludewig Farwig, of Henrietta-street, Covent-garden, tin-plate worker, for certain improvements in gas-meters.—Sealed 19th April—6 months for inrolment.

John George Bodmer, of Manchester, engineer, for certain improvements in locomotive steam-engines and carriages to be used upon railways, in marine engines and vessels, and in the apparatus for propelling the same; and also in stationary engines, and in apparatus to be connected therewith, for pumping water, raising bodies, and for blowing or exhausting air.—Sealed 20th April—6 months for inrolment.

John Rand, of Howland-street, Fitzroy-square, artist, for improvements in the manufacture of tin and other soft metal tubes.—Sealed 20th April—6 months for inrolment.

Edward Cobbold, of Melford, Suffolk, Master of Arts, clerk, for certain improvements in the means of supporting, sustaining, and propelling human and other bodies, on and in the water. —Sealed 20th April—6 months for inrolment.

Thomas Oram, of Lewisham, Kent, patent fuel manufacturer, and Ferdinand Charles Warlich, of Cecil-street, Middlesex, Gent., for improvements in the manufacture of fuel, and in machinery for manufacturing fuel.—Sealed 20th April—6 months for in-inrolment.

James Johnston, of Willow Park, Greenock, Esq., för improvements in the construction of steam-boilers and machinery for propelling vessels.—Sealed 20th April—6 months for inrolment.

Richard Prosser, of Birmingham, civil engineer, and Job Cutler, of the same place, civil engineer, for improvements in the machinery to be used in manufacturing of pipes and bars, and in the application of such pipes or bars to various purposes.—Sealed 20th April—6 months for inrolment.

John Mc Innes, of Liverpool, manufacturing chemist, for certain improvements in funnels for conducting liquids into vessels.—Sealed 20th April—6 months for inrolment.

François Constant Magloire Violette, of Leicester-square, Middlesex, late advocate, for improvements for warming the interior of railroad and other carriages,—being a communication.—Sealed 22nd April—6 months for inrolment.

Richard Greville Pigot, of Old Cavendish-street, Gent., for improved apparatus for supporting the human body when immersed in water, for the purpose of preventing drowning.—Sealed 25th April—6 months for inrolment.

James Moon, of Milman-street, Bedford-row, surveyor, for improvements in the manufacture of bricks, to be used in the construction of chimnies and flues.—Sealed 25th April—6 months for inrolment.

William Brockedon, of Devonshire-street, Queen-square, Middlesex, Gent., for improvements in the manufacture of wadding for fire-arms.—Sealed 25th April—6 months for inrolment.

William Mayo, of Lower Clapton, Middlesex, and John Warmington, of the Wandsworth-road, Surrey, Gent., for improvements in the manufacture of aerated liquors, and in vessels used for containing aerated liquors,—being a communication.—Sealed 25th April—6 months for inrolment.

Charles Forster Cotterill, of Walsall, Staffordshire, merchant, for certain improvements in the progressive manufacture of grain into flour or meal; the whole or part or parts of which improvements may be applied to the ordinary method of manufacture.—Sealed 27th April—6 months for inrolment.

John Winspear, of Liverpool, ship-smith, for an improved mode of reefing certain sails of ships and other vessels.—Sealed 27th April——6 months for inrolment.

CELESTIAL PHENOMENA FOR MAY, 1843.

D.	H.	M.	
1			Clock after the sun, 2m. 58s.
—			☽ rises 5h. 0m. M.
—			☽ passes mer. 1h. 20m. A.
—			☽ sets 9h. 48m. A.
	4	57	☿ in Perihelion
3	4	12	♂ stationary
—			Occul 3 Geminorum, im. 9h. 2m. em. 9h. 51m.
5			Clock after the sun, 3m. 25s.
—			☽ rises 8h. 45m. M.
—			☽ passes mer. 4h. 50m. A.
—			☽ sets 0h. 12m. M.
—			Ceres in Perihelion
—			Occul 3 Cancri, im. 10h. 27m.
	12	33	♄ stationary
6			♀ in Aphelion
7	8	24	☽ in □ or first quarter.
9	14	52	Vesta in □ with the ☉
—			Occul *e* Leonis, im. 8h. 39m. em. 9h. 39m.
10			Clock before the sun, 3m. 46s.
—			☽ rises 3h. 26m. A.
—			☽ passes mer. 9h. 4m. A.
—			☽ sets 2h. 19m. M.
11	13	5	☿ greatest Hel. Lat. N.
12			☽ in Perigee
13	10	34	Ecliptic oppo. or ○ full moon
14	19	22	Juno in □ with the ☉
—			Occul *i* Scorpii, im. 9h. 57m. em. 10h. 56m.
15			Clock after the sun, 3m. 54s.
—			☽ rises 10h. 11m. A.
—			☽ passes mer. 0h. 57m. M.
—			☽ sets 4h. 47m. M.
	9	17	♂ in conj. with the ☽ diff. of dec. 0. 17. S.
16			Occul Sagittarii, im. 12h. 8m. em. 12h. 40m.
—			Occul 26 Sagittarii, im. 13h. 38m. em. 14h. 29m.
17	5	17	♃ in □ with the ☉
18	0	0	♄ in conj. with the ☽ diff of dec. 2. 2. S.
19	2	35	♃'s fourth satt. will im.
20			Clock after the sun, 3m. 47s.
—			☽ rises 0h. 28m. M.
—			☽ passes mer. 5h. 28m. M.
—			☽ sets 10h. 38m. M.
20	13	36	♃ in conj. with the ☽ diff. of dec. 5. 25. S.
21	3	54	☽ in □ or last quarter
22			Occul 16 Piscium, im. 14h 37m. em. 15h. 44m.
23	2	2	♃'s second satt. will im.
23	13	30	♅ in conj. with the ☽ diff. of dec. 6. 28. S.
24	0	38	☿ greatest elong. 22. 42. E.
—			☽ in Apogee
25			Clock after the sun, 3m. 26s.
—			☽ rises 1h. 49m. M.
—			☽ passes mer. 8h. 56m. M.
—			☽ sets 4h. 16m. A.
26	0	37	♀ in conj. with the ☽ diff. of dec. 6. 46. S.
28	20	10	♀ greatest Hel. Lat. S.
29	6	55	Ecliptic conj. or ● new moon
30			Clock after the sun, 2m. 52s.
—			☽ rises 4h. 26m. M.
—			☽ passes mer. 1h. 0m. A.
—			☽ sets 9h. 30m. M.

J. LEWTHWAITE, Rotherhithe.

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No. CXXXVIII.

Recent Patents.

To JOSEPH PARTRIDGE, *of Bowbridge, near Stroud, in the county of Gloucester, dyer, for certain improvements in cleansing wool.*—[Sealed 23rd July, 1842.]

THESE improvements in cleansing wool consist in the adaptation of certain machinery for rolling, stamping, or beating and "swilling" the wool, after it has been passed through a scouring lye, or after it has been dyed; by means of which, the extraneous matter, adhering to the fibres of the wool, on its coming from the scouring or dyeing process, may be effectually removed.

The usual mode of washing or cleansing wool, after scouring or dyeing, is by putting it in small quantities into a swilling basket, or a swilling trough; the former consists of an oblong frame of wood, wicker, or other material; on each side of which is placed a fence of fine wire-work, and at each end, either wire-work or a fence of pierced wood, or of copper, or other metal; the latter, or swilling trough, is usually an oblong wooden box, with wire-work at one end, and through these vessels a stream of running water is made to pass, the wool being agitated or thrown about therein by a long rod, having generally an iron fork or prong at the end of it, for more effectually taking hold of the wool. This throwing or dashing about of the wool is usually continued until it is supposed that the wool has become sufficiently cleansed; but this method has been found to be very defective, leaving a large portion of the scouring lye or dyeing matters attached to the wool, which is found to be very detrimental to the working of it up into cloth, and occasions an unnecessary expenditure of soap and oil, and mill-power, during the process of manufacture.

The present improvements consist in forcing from the pores, tubes, or interstices of the wool, the soapy matter, or uncombined dyeing or other matter which it may contain. This is effected by the alternate compression and expansion of the wool whilst it is immersed in the stream of water, which is caused by passing it under rollers, stampers, or beaters, as the condition, color, or quantity to be cleansed, may require.

In Plate XIV., fig. 1, is a plan or horizontal view of the rolling apparatus, and fig. 2, a sectional elevation of the same. A circular trough of wood *a, a, a,* about eighteen inches wide, is constructed and placed perfectly level upon horizontal masonry; in which trough one two or more rollers *b, b,* are made to travel round, somewhat after the manner of a cider-mill. The diameter of the trough, and the number of the rollers to be employed, must depend upon the quantity of work required to be performed by the machine. The rollers may be made of wood, stone, metal, or any other suitable material, not liable to injure the wool; they should be of about three feet diameter, and not less than 400 to 600 pounds in weight. The axle of each roller may be inserted into the socket of a jointed arm *c,* extending from a vertical shaft *d,* and this shaft may be made to revolve, for the purpose of giving rotary motion to the rollers by bevil gear, as represented. A pipe or pipes *e, e,* will be required to conduct a continuous stream or streams of water into the trough, which may be done by means of pumps, or an elevated head of water, and perhaps will have the best effect, if introduced through the bottom, in the circular space in the centre of the trough. There are also sluices, weirs, or water-falls *f, f*, at the sides of the trough, covered with gratings, or wire gauze, or perforated plates, for the discharge of the foul water; and these may be regulated by sluice-gates, or moveable shutters.

The rollers should be made of such a width as would leave a free passage, on the side, for a portion of the water in the trough to recede, as the roller passes onward; and where two rollers are employed, as shewn in the figures 1, and 2, they should be so mounted on their axles, that one of them may roll round close to the outer periphery of the circular trough, and the other close to the inner periphery of the trough, by which means the whole of the mass of wool, in the trough, will be operated upon.

The wool, intended to be cleansed, is to be spread over the bottom of the trough, when becoming immersed in the running stream of water, the mass of wool will expand or open; that is, its fibres will be separated by the saturation. As the rollers travel round the trough, they will pass over the mass of wool, and compress it, thereby squeezing out the water, and with it the foul matters attached to the fibres; and as soon as the roller has passed, the water again enters into the mass of wool and expands it as before. Thus, by the alternate compression of the wool by the rollers, and its expansion by the water, the current is enabled to cleanse and carry off all foul or extraneous matters, and bring the fibres of the wool into a sufficiently clean state for use.

Where the supply of water is scanty, it has been found convenient to employ a stamping apparatus for cleansing wool, similar to that shewn in the two sectional elevations, figs. 3, and 4;—fig. 3, being a view, taken endways, and fig. 4, in front. A trough *a, a,* of about eighteen inches in width, and as long as may be convenient for the place in which it is to be situate, is to contain the wool; and *b, b,* are two stampers, raised and let fall perpendicularly by the agency of rotary tappet-arms *c, c,* or by any other convenient means. The sides of this trough may be made with strong perpendicular bars, at about one-eighth of an inch apart; or more open, if covered with perforated plates or wire gauze. The water, which is only required to keep the wool wet during the operation of the stampers, is introduced by jets, from a perforated pipe *d*, extending along the trough. The wool having been first washed, in the ordinary baskets, is placed in the trough *a*, *a*, under the stampers *b*, *b*, and the tappet-arms *c*, *c*, put in rotary action, by means of which the stampers will be raised and let fall in rapid succession. By thus beating upon the mass of wool, for a short time, the foul matters, upon its fibres, will be disturbed; after which, it is to be again washed in the ordinary basket, and by the repetition of these operations, a few times, the wool will become perfectly cleansed: this machine is chiefly useful where a fall of water cannot be conveniently obtained.

The third machine is designed for the more perfect cleansing and opening of wool, after it has been scoured or dyed. Fig. 5, is a plan or horizontal representation of the machine; fig. 6, a vertical section of the same, taken longitudinally through the trough, at a short distance from the side; and fig. 7, a transverse section, taken through the trough, near the beaters. It consists of an oblong trough *a*, *a*, *a*, rounded at the ends, (somewhat like the trough of a paper or flock mill,) in which there is a water-course, of about two feet six inches in width; and also weirs, waterfalls, or sluices, to drain off the foul water as it passes round.

The wool, to be cleansed, is placed in this trough, which is supplied with the needful quantity of water by one or more pipes, in any convenient way. Two peculiarly formed rollers *b*, *b*, are mounted in the sides of the trough, and made to revolve by bevil gear, connected to their axles, as shewn in the drawing. The peculiar construction of these rollers *b*, will be perceived by reference to the three last-mentioned figures of the drawing. Each roller has two, three, or more longitudinal ribs *c*, *c*, *c*, intended to operate as beaters upon the wool; and between these several beaters there are longitudinal rows of spikes or points *d*, *d*, *d*, intended to enter into and open or separate the locks or fibres of the wool. Both the beaters and points incline backwards at their operative parts, in order to prevent the wool being thrown over the roller. An adjustable bed *e*, occupies the bottom of the trough under the roller; which bed is capable of being slidden a little distance along the bottom of the trough, for the purpose of enabling the elevated part of the bed to be occasionally brought into closer approximation to the roller, in order that the wool may be more effectually operated upon by the rotary beaters and points, as it passes under them. This adjustment of the bed may be effected by a key, working in a recess below, as shewn; or by a rack and pinion, or other means.

The wool, to be cleansed, having been placed in the trough, and the flow of water supplied thereto, rotary motion is given to the rollers, which produces a circulation of the water, and of the wool floating in it, round the trough. In this course, the wool passes over the beds, and beneath the rollers, and is thereby operated upon by alternate compression and expansion. Passing over the curved surface of the bed, the rotary beaters strike the wool and compress it, and the points separate or open it; which alternating operations cause the soap, filth, or coloring matters, to be removed from its fibres by the current of water; and this water, as it becomes foul, escapes at the weirs, water-falls, or sluices, in the ends of the trough. This last-described machine differs from the flock or paper-mills, both in its construction and in the purpose to which it is applied, inasmuch as it has weirs, water-falls, or sluices, to drain off the foul water; spikes, affixed to the roller, for opening, parting, or scattering the wool; and beaters for compressing it; but it is not designed, and consequently has no contrivance for grinding the wool into flock. The number of beaters and rows of points upon each roller must depend upon the character of the wool required to be cleansed; and so must also the speed at which the rollers are to be driven. The adjustment of the beds also, that is as to their approximation to the rollers, must depend upon the like circumstances; and the openings of the sluices, by which the foul water is let off, must be regulated according to the foul state of the wool under operation, and the quantity of water admitted. The flow, however, should be ample, but the sluices or water-falls must be guarded by wire gauze, gratings, or perforated plates, sufficiently open to discharge the foul water, but not to allow the fibres of wool to escape.

The patentee claims the exclusive use of these machines, for the sole purpose of cleansing wool from the scouring lye, and from uncombined dyeing matter. The machines may be used either separately or alternately, (except for white wool, which is cleansed entirely in the last-described machine,) as the case may require; but the patentee considers the wool more perfectly cleansed from the dyeing matter, and rendered in much finer condition, when the first and third machines are alternately used.—[*Inrolled in the Petty Bag Office, January,* 1843.]

Specification drawn by Messrs. Newton and Son.

To WILLIAM GOLDEN, *of Huddersfield, in the county of York, gun-maker, and* JOHN HANSON, *of the same place, lead-pipe manufacturer, for certain improvements in fire-arms, and in the bullets and other projectiles to be used therewith.*—[Sealed November 2nd, 1841.]

THESE improvements in fire-arms, and in the bullets and other projectiles to be used therewith, consist, Firstly,—in the novel construction or arrangement of certain parts of rifles, and other fire-arms, constituting the lock or apparatus for discharging the same; and, Secondly,—in the peculiar form or construction of the bullet, or other projectile to be used therewith.

With reference to the first part of the improvements in fire-arms, the bullet or projectile is to be introduced on the upper side of the piece, just behind the breach, and by a suitable apparatus presented in a line with the barrel ready to be discharged; by being placed in a roller, or barrel, or any other known means. The lock or mechanism, for discharging the piece, is placed almost entirely inside the body, striking the charge in a direct line with the barrel, so that the rapidity of firing is greatly increased. With reference to the second part of the improvements, the bullet or other projectile to be discharged is made with a small recess or chamber, (either formed in the bullet or attached thereto,) in order that it may contain a charge of common fulminating powder, (such as that used in ordinary percussion caps,) which is mixed with a small quantity of common gun-powder, and attached to the bullet with cement, to prevent crumbling or falling out; and this charged bullet being struck by the horizontal action of the lock, hammer, or plunger, when released by pulling the trigger, will instantaneously be projected from the piece.

In Plate XIV., fig. 1, is a side elevation of a rifle, with the improvements applied thereto; fig. 2, is a top or horizontal view of the same; and fig. 3, a longitudinal section of the same, exhibiting the construction of the interior. The stock or end of the rifle is shewn at *a*, *a*, to which the body *b*, *b*, is affixed, and into this is screwed the breach of the barrel *c*, *c*. The bullet *d*, being first charged with the fulminating powder, is to be placed in the aperture *e*, in the upper side of the body, (the charged end being upwards,) and thus introduced into a revolving roller or barrel *f*, *f*, which is bored through to receive the bullet. There is a small hand-lever *g*, fixed upon one end of this roller *f*, which lies in a horizontal position by the side of the barrel *c*, *c*, prior to charging the piece; and by depressing this lever into the vertical position, as seen in fig. 1, the roller *f*, is turned a quarter of a revolution, and the bore or aperture in a situation to receive the bullet. Upon the other side or end of this roller *f*, is fixed a tumbler lever *h*, which is also turned simultaneously by the depression of the lever *g*, and this tumbler lever is also jointed to a pusher or arm *i*, by the pin *j*. The arm *i*, is connected to a horizontal plunger or hammer *k*, by means of the loose pin *l*, which slides in the mortice *m*, in the body, and thus the hammer *k*, is put back at the same time that the roller *f*, is presented in a position to receive the bullet, and is held or retained in that position by the catch or trigger *n*, compressing the helical or other spring *o*, between the two shoulders *p*, and *q*, the shoulder *p*, being fast upon the hammer or plunger, and retiring with it, and the shoulder *q*, forming the back of the body. The hand-lever *g*, is now to be returned into the horizontal position, and the roller *f*, will thus present the bullet *d*, in a line with the barrel *c*, *c*, ready for firing; it will be observed on inspecting the figures, that upon pulling the trigger *n*, and releasing the catch, the hammer or plunger *k*, will be projected by the expansion of the spring *o*, and by striking the fulminating powder, explode the bullet *d*, and thus the piece will be instantaneously discharged. A modification of these improvements in fire-arms is exhibited at figs. 4, and 5, the former of which is a horizontal view of a rifle, and the latter, a longitudinal section of the same.

The principal variation or improvement in this rifle, is dispensing with the revolving barrel for loading, and also the hand-lever for putting back the hammer, or cocking the piece. The hammer *k*, in this rifle, is to be put back, and the piece cocked merely by sliding the cylindrical bolt *r*, backwards in the mortice *s*, which bolt bearing against the shoulder *p*, on the hammer, will put back the hammer to be held by the catch or trigger *n*, when the bullet is introduced as shewn in fig. 4, and placed in the breach; the bolt is slidden forwards by taking hold of the finger-piece and turned aside into the angle or locking part *t*, of the mortice, out of the way; when, upon the trigger being released, the discharge takes place as before.

The bullets or projectiles to be used with these improved fire-arms, are shewn at figs. 6, 7, and 8; fig. 6, represents in elevation and section, a bullet with the charge of fulminating powder, placed in a chamber formed in the bullet: fig. 7, represents another bullet, with a small charge of gunpowder placed behind the fulminating powder, (and covered with a card or paper disc,) in order to increase the power of explosion; and fig. 8, represents a common spherical bullet, with a charge contained in a small paper, or other box, or chamber, and cemented to the bullet: fig. 9, represents a small charge, detached, which may be contained in a small paper box, and placed separately in the piece immediately behind the common bullet; or in place of this, a large copper percussion cap may be placed in a similar situation, and act as the charge; the bullet fitting rather tightly, and in all instances acting as the resisting medium or abutment against which the hammer strikes to effect explosion.—[*Inrolled in the Petty Bag Office, May* 1842.]

Specification drawn by Messrs. Newton and Son.

To Frederick Gye, Jun., *of South Lambeth, in the county of Surrey, Gent., for improvements in binding pamphlets, papers, and other documents.*—[Sealed 21st June, 1842.]

This invention consists in facilitating the binding of pamphlets, &c., by the employment of an instrument formed out of a piece of wire, the ends of which, being pointed, are passed through the sheets of paper, and bent in various ways, in order to bind the sheets together.

The instrument is made in various shapes, as shewn in Plate XIV. Fig. 1, represents one description of instrument, and fig. 2, shews its application, for the purpose of securing a limited number of sheets, as in the case of a small pamphlet; it is composed of a piece of wire *a*, formed with two loops or eyes *b*; the ends of the wire are bent at right angles, and, after passing through the backs of the sheets of paper, are again bent, as indicated by the dotted lines. In figs. 3, and 4, another instrument is represented, which is used for the purpose of binding or holding two or more pamphlets; the ends of the instrument are bent in three directions. A mode of connecting the sheets or pages of legal documents is shewn in figs. 5, and 6, in which the ends of the instrument, after being bent in two directions, are passed through the sheets at *c*, *c*, and are secured by again bending them at *d*, *d*. When the sheets are of considerable length, two instruments are employed, which are similar to the one first described, but have only one loop *b*; these loops are used for the purpose of filing the papers or documents.

The patentee claims, Firstly,—the mode of binding pamphlets, papers, and documents, by bending pieces of wire, and passing the ends through such papers, and folding or bending the ends of each piece of wire, as above described. Secondly,—the forming instruments *a*, each of a piece of wire, for binding pamphlets, papers, and other documents, when the same are formed with eyes or openings, as above described.—[*Inrolled in the Inrolment Office, December,* 1842.]

To William Ridgway, *of Northwood, in the county of Stafford, earthenware manufacturer, for his invention of a new method of conveying and distributing heat in ovens used by manufacturers of china and earthenware, brick, tile, and quarry makers.*—[Sealed August 18th, 1842.]

The mode usually adopted in the baking or burning of china and earthenware in potters' ovens, is to place the furnaces or mouths around a circular oven, and to convey a portion of the flames from the burning fuel, by vertical flues, to the inner surface of the oven, and to convey the other portion of the flames by horizontal converging flues, into a pit in the centre of the floor of the oven, from which they ascend to the aperture in the dome of the oven. The present patentee, on the contrary, so constructs his oven, as to convey the flames from the furnaces by parallel flues, both horizontal and vertical, and to reverberate the whole of the flame and heat upon the goods to be burned, after its ascension from the flues. To effect this, the oven is built of a square instead of a round form, and a fireproof partition wall is made across the middle of it, thus dividing it into two chambers, which are covered in by two parallel arches. The furnaces are placed in the two sides of the oven opposite to the partition wall; from these furnaces, narrow flues ascend the inner face of the wall, which distribute the flame in a sheet equally over the whole of its surface. The other portion of the heat is conveyed by many parallel or diverging horizontal flues, under and across the floor or hearth of the oven, to the middle or partition wall, over the surface of which is distributed equally the flame and heat which ascends from the numerous flues in immediate contact with the wall. This sheet of flame ascending, strikes the spring or shoulder of the arch, and is reverberated upon the saggers beneath, until it meets the reverberated flame from the opposite of the arch, and both escape by the vents at the summit of the oven; the same construction is also applied to the opposite chamber. For some purposes but one chamber is used, and the number of furnaces is varied as the magnitude of the oven may require. In some cases, the fuel is burnt upon an iron grate or bars in the furnaces; and in others, the fuel is laid upon the ground without any ash-pit. The method of constructing the improved oven, with all the peculiarities of the flues, is exhibited in Plate XV., in which *a*, represents the square walls or body of the oven; *b*, the partition wall; *c*, the furnaces, with their iron bars; *d*, the mouths of the furnaces, by which the fuel is supplied; *f*, the ash-pits; *g*, the horizontal flues, under the hearth of the oven; *h*, the vertical flues; *i*, the vents in the summit of the arches; *k*, the entrances to the chambers of the oven.

The patentee claims, Firstly,—conveying the heat by horizontal or diverging flues, and distributing it equally over the inside of the chambers of potters' ovens, by the means before described; and, Secondly,—reverberating the heat after it has crossed the floor of the oven and ascended the opposite wall, by means of the arch, before it escapes by the central vent; he also claims the exclusive right of applying the same mode of construction for the conveying and distributing of heat in single ovens; that is to say, ovens with one chamber only, without any partition wall.—[*Inrolled in the Inrolment Office, February,* 1843.]

To Antoine Blanc, *of Paris, in the Kingdom of France, merchant, and* Theophile Gervais Bazille, *of Rouen, in the same Kingdom, merchant, now residing at Sablionere's Hotel, Leicester-square, in the county of Middlesex, for certain improvements in the manufacturing or producing soda and other articles obtained by or from the decomposition of common salt or chloride of sodium,—being a communication.*—[Sealed 12th February, 1840.]

This improved process consists in decomposing sea-salt, by silica and water, under the influence of a strong heat. The action of silica on sea-salt, under the influence of water and heat, is a fact which has been long known in chemical science, but hitherto no application has been made of it, upon a large scale, in the arts for the manufacture of soda.

When in the laboratory an intimate mixture is made of sea-salt and sand, and when that mixture is exposed to the action of a cherry-red heat, in a large porcelain tube, a decomposition of the mass takes place, when the vapour of water is made to pass over it, and there results a neutral silicate of soda, insoluble in water, while hydrochloric or muriatic acid is disengaged, and may be received or condensed in water. The vapour of water, in decomposing, transforms the mass into a proportion, more or less considerable, of silicate of soda, at the extremity of the porcelain tube, to which a tube of glass may be adapted, destined to conduct the acid gas into a vessel full of distilled water. After some hours of ignition, the liquor becomes strongly acid, and this liquid muriatic acid is not colored in the least yellow, as the acid of commerce usually is by the presence of iron.

The mass withdrawn from the tube is to be lixiviated, to carry off all the undecomposed sea-salt, and the remainder is to be mixed with a little carbonate of soda. This mixture being fused in a crucible, forms a vitrified mass, consisting of a sub-silicate of soda, soluble in water. The sub-salt is to be dissolved in water, and transformed into carbonate of soda and gelatinous silica, as follows:—A stream of carbonic acid gas is passed through the solution, whereby white flakes of silica are deposited, and there remains, in solution, only carbonate of soda, which may be evaporated and calcined, and disposed of as dry soda, or soda-ash, or formed into crystals. Upon a large scale, the transformation of sea-salt into neutral silicate of soda, may be conveniently performed, as follows:—The calcination of sea-salt and siliceous sand may be made in cast-iron cylinders, placed in furnaces, so that the flame may pass around them and raise them to a cherry-red heat. The arrangement of these cylinders may be the same as those of gas retorts. The axis of each cylinder is occupied by a large tube, of the same length as the cylinder; which tube is pierced with a multitude of holes; this tube is inserted at one end of each cylinder, and into the other end of each cylinder a large porcelain, stone-ware, or glass tube, is adapted, through which the muriatic gas is allowed to pass off. Each cylinder is to be filled loosely, by very moderate pressure, with an intimate mixture of sea-salt and sand; and when the mass has arrived at a cherry-red heat, the steam of water is made to pass from a steam-boiler into the perforated tube, which traverses the cylinder. For the due success of the operation the workman, charged with its management, should allow the steam to pass very slowly and equally into the tube; for if too much steam were introduced into the tube, the iron cylinder might be forcibly expanded, and lose its shape; in fact, the steam should not be admitted so quickly as to lower the temperature of the mixture beneath a cherry-red heat; when this is attended to, the water is decomposed in the apparatus, and the transformation of sea-salt and sand into neutral silicate of soda goes on without risk, and in a complete manner.

The proportions of the materials to be employed, to obtain a good decomposition, are sea-salt 280 parts, and sand 200 parts.

As muriatic or hydrocholoric acid has a certain value in commerce, and as in certain localities large quantities are employed, especially for the manufacture of chlorine, it is frequently important to collect this gas instead of allowing it to pass off by the chimney. The tube adapted to the

carbonate of soda being formed, which
tion, and gelatinous silica being deposited,
nished whenever the carbonic acid ceases
the solution. This silicic acid may be
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to maintain uninterrupted combustion to the end of the process. — [*Inrolled in the Petty Bag Office, August, 1840.*]

Specification drawn by Messrs. Newton and Son.

To SAMUEL DOTCHIN, *of Myrtle-street, Hoxton, jeweller, for improvements in paving, or covering and constructing roads, ways, and other surfaces,—being a communication from his son, lately deceased.*—[Sealed 8th October, 1842.]

THESE improvements consist in paving roads, &c., with blocks of wood, or other suitable material, of the peculiar form represented in Plate XIV. Fig. 1, is a side view, and fig. 2, a plan of the block; the latter figure being encompassed by a circle, to shew that it may be cut out of a circular block or piece of timber. The improved block consists of six sides, and an upper and lower surface; the sides are all equal, but, instead of being formed perpendicular to the upper and lower surfaces, they incline alternately in opposite directions. The advantages to be derived from this form are, that each block will be supported by three of the adjoining blocks, and will also support three, as shown at fig. 3, which is a plan of part of cylinder, for the disengagement of the acid gas, should be very large, especially at its orifice, for otherwise it might be choked up by volatilized sea-salt. The tube that carries off the gas is to enter first of all into a large empty chamber, into which the volatilized salt may be condensed and deposited. This chamber is to communicate with a large cistern of wood or stone, having its bottom covered with water. By this arrangement and by employing sufficiently large vessels, the acid gas may be collected with little or no pressure, while the apparatus of Woulfe, usually employed in the preparation of muriatic acid, requires a series of twenty or thirty bottles, and considerable pressure.

Before proceeding to the transformation of the neutral silicate into sub-silicate, the mass is to be lixiviated, as above stated, in order to extract the undecomposed portion of sea-salt. The neutral silicate of soda, obtained in this first operation, being insoluble, it must be rendered a soluble sub-salt by combining it with an additional proportion of soda; sixty parts of carbonate of soda must be employed to convert one hundred parts of neutral silicate into sub-silicate of soda. There is, however, no inconvenience in employing a little excess of carbonate, as this salt is not liable to be decomposed by heat, and remains always in the solution. The apparatus destined to calcine this mixture is either an ordinary reverberatory furnace, or a large Hessian crucible. At a cherry-red heat the vitrification takes place, and the matter in this state is soluble in hot water. The insoluble silicate, however, may be employed in the manufacture of glass, with suitable additions of lime and alumina.

The vitrified sub-silicate of soda ought to be pulverized and thrown into hot water to effect its solution. This solution may be made in large wooden or stone reservoirs.

The process adopted by the patentee for obtaining carbonic acid, consists in extracting it from lime-stone by calcination in continuously acting lime-kilns. To the lime-kiln, a dome-top is adapted, furnished with a tube that passes into the vessels or vessel containing the solution of sub-silicate. The sub-silicate of soda is decomposed in this operation; carbonate of soda being formed, which remains in solution, and gelatinous silica being deposited, the operation is finished whenever the carbonic acid ceases to be absorbed by the solution. This silicic acid may be obtained as a white jelly when the carbonic acid is free from smoke, in which state it is well adapted for the manufacture of fine glass. Care must be taken not to employ too great a number of vessels in effecting the transformation of sub-silicate of soda into carbonate, because in that case the pressure would be too considerable, and would obstruct the flow of air through the lime-kiln, and the proper calcination of the lime.

With this view, the patentees prefer employing a single vessel of very large capacity, as the operation goes on perfectly well, and the draught of the furnace is sufficiently great to maintain uninterrupted combustion to the end of the process.—[*Inrolled in the Petty Bag Office, August,* 1840.]

Specification drawn by Messrs. Newton and Son.

To Samuel Dotchin, *of Myrtle-street, Hoxton, jeweller, for improvements in paving, or covering and constructing roads, ways, and other surfaces,—being a communication from his son, lately deceased.*—[Sealed 8th October, 1842.]

These improvements consist in paving roads, &c., with blocks of wood, or other suitable material, of the peculiar form represented in Plate XIV. Fig. 1, is a side view, and fig. 2, a plan of the block; the latter figure being encompassed by a circle, to shew that it may be cut out of a circular block or piece of timber. The improved block consists of six sides, and an upper and lower surface; the sides are all equal, but, instead of being formed perpendicular to the upper and lower surfaces, they incline alternately in opposite directions. The advantages to be derived from this form are, that each block will be supported by three of the adjoining blocks, and will also support three, as shewn at fig. 3, which is a plan of part of a pavement; the spaces between the upper parts of the blocks are filled with asphalte, sand, &c.

The patentee does not claim the use of blocks of wood, or other material, with six sides, generally, but only when the sides are caused to incline in opposite directions, as shewn in the drawing, in order that each block may support and be supported by the surrounding blocks. He claims also combining a series of blocks, of the figure above described, for paving or covering, and making roads, ways, or other surfaces.—[*Inrolled in the Inrolment Office, April,* 1843.]

To JOHN MULLINS, *of Battersea, in the county of Surrey, surgeon, for certain improvements in making oxides of metals, in separating silver and other metals from their compounds with other metals, and in making white-lead, sugar of lead, and other salts of lead, and salts of other metals.*—[Sealed 27th October, 1842.]

THIS invention consists, Firstly,—in causing oxides to form on the surface of or in melted metals, heated to the temperature of their respective points of oxidation, by forcing gas or air, or allowing gas or air to pass through the body of the melted mass, either by a forcing or exhausting apparatus, and then skimming off, or otherwise removing from the surface of the melted metals, the said oxides, whereby the patentee is enabled, in the event of there being any admixture of metals, as in lead for instance, which contains a portion of silver, so to surcharge the melted mass with the foreign metal or matter, as to make a subsequent process of separation easy and valuable. Secondly,—in the manufacturing of white-lead, by exposing oxide of lead, so obtained, as aforesaid, to the vapour of vinegar, and of carbonic acid gas, as hereinafter described. Thirdly,—in the manufacturing of white-lead, by exposing a solution of acetate of lead, or other suitable salt of lead, made from oxide of lead, obtained as aforesaid, to an atmosphere of carbonic acid gas, as hereinafter described. Fourthly,—in the use of common soot, as a deoxidating agent, in the reducing of the said oxides, so obtained, as aforesaid, and of other metals and ores, or the oxides. And Fifthly,—in the application of magnets, for separating iron from other metals, as hereinafter described.

In Plate XVI., A, A, A, fig. 1, is the brick-work of the furnace for heating the metal (which, in this case, is supposed to be lead) in the pan B, B, with the elongated lip C, C: the flame from the fire, in the furnace-grate, passing along and under the lip C, C, is carried off by the flue D. Into the pan B, B, is immersed a tube of iron, porcelain, or other suitable material *a*, fig. 2, which is in connection with the iron vessel *b*. Into this vessel is condensed, by means of the pump *c*, air or gas, or a mixture of air and gas, the which, when the stop-cock *i*, is opened, passes through the tube *a*, into the metal, and rises to the surface, oxidizing the metal through which it passes. The oxide, being of less specific gravity than the metal from which it is formed, floats on the surface of the metal, and is continually in the course of removal, by means of the skimming-plates K, K, (fig. 1,) attached to the endless flexible chain E, E, which works round the toothed wheels F, F. These skimming-plates, being kept in constant but slow motion, remove the oxide as it is made, thereby preventing the admixture of unoxidized metal with the oxide; and this is further effected by means of the inclined plane G, G, up which it is drawn. This inclined plane is formed of round bars, which are placed a short distance apart, as shewn in the plan, fig. 3, at G, G; these bars being kept hot, by reason of the body of heated metal below them, if any unoxidized metal remain in that portion of the oxide which is removed by the skimming-plates, it runs through into the lip C, C, of the pan B, B. When the oxide reaches the summit of the inclined plane, it is delivered, by means of the spout H, into the receiver I. The flexible tube *f*, fig. 2, is for the purpose of enabling the operator to raise, or lower, or otherwise shift the air-tube, as may seem most convenient. *g*, *g*, are safety-valves; *d*, a mercury-gauge, to ascertain the pressure of air or gas in the vessel *b*; this is necessary to enable the operator to know when there is sufficient pressure to overcome the resistance offered by the column of metal through which it has to pass, and to keep up a constant current. The pipe *h*, is for the purpose of forming a connection between the pump *c*, with a gasometer or other reservoir of gas, when gas is employed instead of atmospheric air. When atmospheric air is used, this pipe may be disconnected at the union-joint *k*. The piston of the pump *c*, is worked by the vibrating stirrup-rod *c*, I.

At fig. 9, is shewn an apparatus, for the more effectual prevention of the admixture of unoxidized metal with the oxide. The plate A, A, made of iron or other material, is attached to the air-pipe B, a little above the diffuser C. When the current of air leaves the diffuser, it strikes against the plate A, and passes onwards to the edge, as shewn at F. By this means, any agitation on the surface of the metal, where the oxide is collected, is prevented, the air having a tendency to blow away the oxide from the place where it makes its exit. When this plate is used, the skimming apparatus must be accommodated to it.

At fig. 10, is shewn another method of oxidizing metals; in this case the oxygen is generated below the surface of the metal. Into the pan or pot A, is put black oxide of manganese or other material, from which oxygen may be obtained. The holes F, are drilled in the bottom of the iron pot A, for the purpose of allowing the heated metal, (supposed in this case also to be lead,) to enter. E, is the top or cover, having some fine holes drilled therein; it is retained in its place by the cross-bar D. When the pot is immersed in the metal, the metal enters at the bottom holes, shewn at F, and fills up the unoccupied space, and the manganese or other material, when sufficiently heated, gives off gas, which will combine with the metal and form an oxide.

The oxides, thus formed, if desirable, may then be treated by grinding, sifting, washing, or heating, to produce the various oxides of commerce, as the yellow pigment massicot, red-lead, and litharge, or for the manufacture of salts of the respective metals, as the operator may desire.

The metal or metals, when so oxidizing, as aforesaid, should all be melted and heated to the temperature of their respective points of oxidation.

By the mode of oxidation, herein described, if the metal used, be lead or other metal, and should contain any silver or other metal, the latter, being less oxidizable than the former, will remain unoxidized in the pan B, B, and will be continually accumulating therein; and when the operator judges necessary, such silver or other metal can be drawn off through the pipe M, fig. 4, by withdrawing the valve-plug N, and it will then pass away into any vessel placed for its reception below the outlet O, to be further purified or separated. The pipe M, can be heated, if necessary, by the small furnace R, beneath.

The oxide of lead, formed by the herein described process, (attention being paid to the heat of the metal in the pan B, B,) is neither vitrified nor semi-vitrified, as is the litharge and some of the oxides of lead of commerce; and, for this reason, is far more readily acted upon by chemical agents, and, consequently, is preferable for the manufacture of the acetate, carbonate, nitrate, and other salts of lead, because of its more quickly combining with the several acids.

In manufacturing white-lead or ceruse, the patentee uses the oxide so formed, having first carefully washed and elutriated it in the usual manner. Into chambers, made of any suitable material, (as wood, lined or not with sheet lead,) and of any suitable size or shape, and having moveable air-tight lids or covers, are placed, horizontally, several trays, supported, one above the other, with spaces between, which trays may be made of wood, and lined with sheet lead, or made of slate, or other suitable material. On these trays the oxide of lead, made and prepared, in the manner herein described, (the litharge and vitrified massicot of commerce not answering,) slightly moistened with distilled water, is placed about one inch deep. These trays are introduced into the chambers, and the lid or cover secured down; and then the vapour of vinegar, together with carbonic acid gas, is made to enter the said chambers through suitable pipes. The vinegar, or acetic acid of commerce, is put into a vessel, in effect similar to the common distilling apparatus, and heat applied, in the usual way, and the vapour thereof is directed, through a pipe or pipes, into the said chambers; and at the same time, by means of another pipe, communication is made with a gas-holder or reservoir, containing carbonic acid gas, (made after any of the usual methods,) which gas is made to enter freely into the chambers. The room, where the chambers are placed, is kept at a temperature of about 100° or 120° Fahrenheit; and the vapour generators, and the gas-holder, are erected in an adjoining apartment. When the lids or covers of the chambers are about to be taken off, the vapour of vinegar and the gas must be turned off, by means of stop-cocks in the pipes, or by other means. By this arrangement, which is exemplified at fig. 5, the oxide of lead becomes, in due season, converted into ceruse or white-lead.

Another method of manufacturing ceruse or white-lead is shewn at fig. 6. In chambers, or large jars of earthenware or other material, are suspended several large sponges or other like substances. These sponges are supported in the jars by strings of worsted or other like substance, or by other means, so as not to touch the sides of the jars, or one another. Having made a saturated, filtered, and neutral solution of acetate of lead, or of other suitable salt of lead, from the oxide obtained as aforesaid, and placed this solution in a vessel above the top of the jars, as on an adjoining shelf, and having moistened slightly the sponges with the solution, and also the worsted strings suspending them, the strings are then made to dip into the solution contained in the vessel above the jars, and by the power of capilliary attraction the sponges are kept constantly moist by a supply of the solution descending down the worsted strings; and the supply can be regulated at pleasure, by the size of the strings or otherwise. Evaporation is continually going on, and crops of salts of lead are formed on the surface of the sponges. The jars are made to communicate with a gas-holder, or other reservoir, containiug carbonic acid gas, which gas is made to fill the jars, in order that the sponges may be surrounded with an atmosphere of carbonic acid gas. By the action of the gas, the salt of lead on the sponges is readily converted into ceruse, assisted probably by the decomposition of the acid of the original solution. When it has been ascertained that a sufficient quantity of the ceruse has been formed, the sponges or other material are removed and washed in a vessel of pure water; and if the sponges contain any undecomposed soluble salt of lead, which is generally the case, the water dissolves it, but the ceruse falls to the bottom, on the water remaining at rest. The water is to be reused, for forming the solution, when decanted from the precipitated ceruse. The sponges or other materials are then replaced, as before, and the process continues.

Instead of sponges, a frame of wood, with cloth or other matter of like nature, strained across and suspended, vertically or otherwise, in a proper vessel, in an atmosphere of carbonic acid gas, may be used, and supplied with the solution of the salt of lead as before, by capilliary attraction, or by a dropping apparatus, which will permit only a certain quantity to drop on the top of the frame of cloth or other substance, as occasion may require.

In reducing the oxide of metals, so obtained, as aforesaid, to the metallic state, and in extracting metal or ore, the process is much facilitated, and in certain localities more cheaply effected, by the use of common soot, mixed up in about the proportion of half the weight of the oxide, metal, or ore, to be acted on at one operation.

If any oxide of metal should be found to coutain iron, and it is desirable to remove it, such removal may be effected in the manner following:—A tray or trays of wood, or other non-conducting material, is to be formed with a series of magnets, with their poles projecting through openings made in the bottom of such tray, to fit them. The tray may be worked by machinery, and fixed at an angle of about thirty degrees, as shewn at figs. 7, and 8, having a slow lateral sieve-like motion, and the oxide being supplied through a hopper to the higher end, will, in its passage, come in contact with the poles of the magnets, and leave any iron that may be contained in the oxide attached thereto.

The patentee claims, "Firstly,—the manufacturing of oxides of lead and of other metals, by passing currents of atmospheric air, or oxygen gas, or other suitable aeriform matter below the surface of or through the metal, when in a melted state, at the temperature of their respective points of oxidation, whereby, in the case of lead, silver is accumulated and rendered more easy of separation, as aforesaid. Secondly,—the acting on oxide of lead, so formed, as aforesaid, by the vapour of vinegar and carbonic acid gas, as hereinbefore described, for the purpose of manufacturing what is commonly called white-lead. Thirdly,—in the manufacture of white-lead, by exposing a solution of acetate of lead or other suitable salt of lead, made from oxide of lead so formed, as aforesaid, to an atmosphere of carbonic acid gas, as hereinbefore described. Fourthly,—the application of common soot to deoxidize the oxide of lead, produced as aforesaid, and generally in the reduction of metals from their ores or oxides. Fifthly,—the application of magnets to separate iron from the oxide of lead, or of other metals, produced as aforesaid."—[*Inrolled in the Petty Bag Office, April,* 1843.]

To WILLIAM PALMER, *of Sutton-street, Clerkenwell, manufacturer, for improvements in the manufacture of candles, —being partly a communication.*—[Sealed 9th November, 1841.]

THESE improvements are four in number; the first consists in preparing wicks for candles, by coating them on one side with paste, starch, or other matter, which will cause them to bend out of the flame, as the candle burns down; the wicks will thus be effectually consumed, and the inconvenience of snuffing, from time to time, will be avoided.

The second improvement consists in a mode of forming an instrument for placing wicks in candles. Fig. 1, in Plate XV., represents the instrument, which is made of wire, and consists of a stem *a*, with a notch *b*, at one end, and a loop or handle *c*, at the other; the loop is formed by bending the wire in the manner shewn, and brazing or soldering the parts together at *d*, leaving the end *e*, to form a clip, for holding the two ends of the wick. When the instrument is used for placing wicks in candles, the wick is doubled, and the loop or doubled part is caught in the notch *b*; the wick is then passed up the two sides of the stem *a*, and the ends are secured by the clip *e*. The two parts of the wick are thus kept separate, during the operation of making the candle; after which, the ends of the wick are released, and the instrument is withdrawn. If the wicks have been prepared, according to the first improvement, their pasted sides must come in contact with the stem *a*, in order that the ends may bend outwards from each other, in consuming.

The third improvement relates to what are termed, "fence-rings," which are placed on the wicks of candles, and slide down them, as they become consumed; it consists in forming a slit, or a hole, or holes, in the ring, through which the melted tallow flows to the wick, instead of flowing over the upper edge of the ring, as is the case at present. In some cases, the upper part of the ring has a number of slits in it, as represented at fig. 2, and is formed by stamping out of sheet metal a piece *f*, fig. 3, similar to a comb, and then bending it into a ring.

The fourth improvement relates to wick-carriers or holders. *g*, fig. 4, is the wick-carrier, which consists of a hollow cone of metal, containing a short wick or wicks, and having slits or openings in its upper part, for the admission of the melted tallow to the wick. Down the centre of the candle a cylindrical passage is formed, and in the upper part of it the conical end of the wick-carrier is inserted; so that, as the candle is consumed, the carrier will descend, and, by reason of its conical form, will prevent the melted tallow from running down the passage, and filling it up.

The patentee claims, Firstly,—manufacturing candles with wicks prepared by applying a suitable material or materials to one side thereof, for the purpose of causing them to bend out of the flame, when burning. Secondly,—the mode of forming an instrument for placing wicks in candles, as described. Thirdly,—the mode of making fence-rings for candles with a slit or opening; and also the mode of making such fence-rings with an open upper surface. Fourthly,—the mode of applying wick-holders to candles, as above described.—[*Inrolled in the Inrolment Office, May,* 1842.]

To William Palmer, *of Sutton-street, Clerkenwell, manufacturer, for improvements in the construction of candle-lamps.*—[Sealed 4th March, 1842.]

The usual mode of applying candles to carriage-lamps, is by placing the candle in a tube, which forms part of the frame of the lamp, and is immoveable. Much inconvenience has, however, been experienced in cleaning a lamp of this construction, as the application of heat is required to remove the tallow from the tube. In order to remedy this evil, the patentee places the candle in a separate tube, which is afterwards inserted in the ordinary one, from below; and thus the candle-tube can at any time be removed and cleaned with great facility.

A vertical section of a carriage-lamp, with this improvement applied to it, is shewn in Plate XIV. *a*, is the candle-tube, furnished with a spring for forcing up the candle, and having a nozzle *b*, screwed on the top, as usual; it has also two collars *c*, *d*, and in the collar *c*, two perpendicular grooves are made, opposite each other; one groove *e*, extending quite across the collar, and the other only half-way across. The tube *a*, is inserted in the outer tube *f*, from below, the groove *e*, allowing the collar to pass a pin *g*, represented by the dotted circle; and then the tube *a*, is secured, by turning it round until the half-way groove or notch comes over and receives the pin *g*.

The second improvement consists in the employment of a metal cone or deflector, for supplying air to candle-lamps in general. *h*, is the cone, which surrounds the nozzle *b*, and the upper part of the tube *f*; its upper edge is level with the top of the nozzle, and should be distant from it about three-sixteenths of an inch. The air enters through openings in the lower part of the lamp, and ascending, in the interior of the cone, is deflected on to the flame.

The patentee states, in conclusion, that he is aware that cones or deflectors have been applied to gas and oil-lamps, for the above purpose, and he does not, therefore, claim such means of introducing air, generally, to lamps. He claims, as his invention, Firstly,—the mode of constructing candle-lamps for carriage-lamps, wherein tubes are employed for receiving the candles, which tubes are separate from the other parts of the lamp, as above described. Secondly,—the mode of introducing air to candle-lamps, above described.—[*Inrolled in the Inrolment Office, September*, 1842.]

To THOMAS BANKS, *of Manchester, in the county of Lancaster, engineer, for certain improvements in the construction of wheels and tyres of wheels, to be employed on railways.*—[Sealed 13th June 1842.]

THESE improvements in the construction of wheels, to be employed upon railways, consist, Firstly,—in a peculiar method of constructing the nave or boss of such wheels, for the purpose of securely fastening the wrought-iron arms or spokes in the nave, and preventing their becoming loose.

In Plate XV., fig. 1, is a section, taken vertically through the nave of a railway wheel, constructed according to this improvement. The wrought-iron arms or spokes are shewn at *a, a*, which may be formed according to any of the well-known plans already in use. These spokes or arms are then to be welded, rivetted, or otherwise securely attached to a wrought-iron ring *b, b*, and then the boss or nave *c, c*, is formed by casting or running melted metal entirely around the ring *b*, so as to embrace and enclose the inner ends of the spokes *a, a,* and the ring *b, b,* as shewn in the figure.

By securing the wrought-iron arms to a ring of wrought-iron, previously to casting the metal around the ends of such arms to form the nave or boss, an increased security will be given to the arms in the nave or boss, and greater strength and durability will be obtained.

The second part of the improvement consists in placing or inserting a hoop, bar, or segments of steel, iron, or hard metal, in a groove, turned or otherwise formed, entirely around the outer rim or periphery of a railway wheel, such groove being properly shaped to receive the steel or other hard metal. Fig. 2, represents a section, taken transversely through a railway wheel. *d, d, d,* represent the rim or periphery, arms, and nave. The improvement consists in forming a groove *b, b,* either dove-tailed, (as shewn in the figure, or otherwise,) shaped entirely around the outer rim or periphery, whatever the material of the wheel; and in placing or inserting therein a hoop, bar, or segments of steel, iron, or hard metal, either in one entire piece around the circumference of the wheel, or in smaller pieces or segments, placed together, end to end, so as to fill the groove formed round the periphery of the wheel. Fig. 3, represents, in section, a portion of the felloe or rim and tyre of a railway wheel; and fig. 4, is a similar section, excepting that in the latter the steel bar, hoop, or segment *c,* is represented as about to be placed in the groove *b, b*; which groove is shewn as it is cut or formed in the felloe or rim, previously to the steel being inserted. The bar, hoop, or segments of steel, or other hard metal, being heated, are introduced into the groove, and spread laterally, so as to fill or become tight in the groove, by hammering or other pressure, as represented in fig. 3.

Steel or other hard metal, as above described, may be applied to the working surface of the flange of the tyre. A separate groove may be made in the flange, or the groove shewn in the drawing may be extended further towards the flanged side of the wheel, so as to steel that part of the flange on which the friction, against the edge of the rails, principally takes place. In applying this improvement to the tyres of wheels, whether new or old, made according to the usual method, it will be necessary to form the groove to the requisite size and shape; or if a groove be left, when the tyre is formed, it may be enlarged, according to the wishes of the manufacturer, to receive the steel; and the above-mentioned hoop, bar, or segments of hard metal, may be easily removed when worn, and renewed from time to time, as long as the general fabric of the wheel is sufficiently firm for use.

The patentee, in conclusion, states that he is aware of steel having been used, before the date of his said letters-patent, for the tyres of wheels, to be employed on common roads and railways, by other persons, and under letters-patent, granted to Daniel Gooch,* bearing date on or about the 28th day of May, 1840, for the use of steel in wheels for carriages and locomotive engines, to be used on railways, by forging or welding together bars of iron and steel; that he does not, therefore, claim the use of steel generally on tyres for railway wheels, or the use of steel on such tyres, when the iron and steel are welded together in the formation of the tyre-bar; but he does claim the improvement in the tyres of wheels, to be employed on railways, by inserting a hoop, bar, or segments of steel, or other hard metal, in a groove, turned or formed entirely round the rim or tyre of such wheels, as above described.—[*Inrolled in the Petty Bag Office, December,* 1842.]

Specification drawn by Messrs. Newton and Son.

To MOSES POOLE, *of Lincoln's Inn, Gent., for improvements in treating, refining, and purifying oils, and other similar substances,—being a communication.*—[Sealed 21st February, 1842.]

THESE improvements consist in purifying and refining oils, and other similar substances, by means of alkaline and acid solutions. The place in which the operation is car-

* For Specification of this Patent, see Vol. XVIII., p. 84, Conjoined Series.

ried on is kept at a temperature of from 70° to 80° Fahr.; and thus the congealed portions of the oil, if any, become melted, and the grosser parts deposited, previous to the purifying process. When the precipitated matters have been separated from the oil, a solution of potash or soda, containing from four to eight per cent. of the alkali, is stirred up with it for about an hour: this solution may be rendered caustic, if considered necessary, by the addition of lime. The oil is then drawn off, and after being allowed to rest for from twenty-four to thirty-six hours, the scum, which will appear on the surface, is removed. After this, about ten per cent. of water, containing four or five per cent. of concentrated sulphuric acid, and heated to from 110° to 120°, is added to the oil, and the mixture well agitated for about a quarter of an hour; it is then allowed to rest for about forty-eight hours, and is afterwards filtered.

The patentee claims the mode of purifying animal and vegetable oils, and such like substances, by subjecting them to acid and alkaline solutions.—[*Inrolled in the Inrolment Office, August,* 1842.]

To Frederick Theodore Philippi, *of Belfield Hall, in the county of Lancaster, calico printer, for certain improvements in the production of sal-ammoniac, and in the purification of gas for illumination,—being a communication.*—[Sealed 21st July, 1842.]

The chief object of this invention is to purify coal gas, by removing from it, by means of a double chemical decomposition, all the ammoniacal substances with which it is combined, and at the same time separating from it a large quantity of naphtha, or naphthaline, both of which substances render its smell very disagreeable. Ammonia is found in coal gas, combined with hydrosulphuric acid, carbonic acid, sulphurous acid, hydrocyanic acid, hydrosulphocyanic acid, &c., &c. Now, if the gas is subjected to the action of a saline metallic solution,—for instance, of manganese, iron, zinc, copper, lead, antimony, &c.,—the

result will be a double decomposition: the formation of a metallic sulphuret or carbonate, sulphite, cyanuret, &c., which will be precipitated, whilst the ammonia will be held in suspension by the solution employed. The sulphate or chloride of manganese is preferred to be used in the formation of the solution, on account of its cheapness. The solution should not be acid, as that would cause a decomposition of the hydrosulphates, carbonates, sulphates, and the disengagement of the acids. It is rendered neutral by using the condensed ammoniacal water from the gas-works, and should be reduced by this means to the strength of 20° Beaumé. In order to obtain the double decomposition, the gas is passed through the solutions mentioned above, contained in suitable cisterns or apparatus. This apparatus consists of three cisterns, or wash boilers, one placed higher than the other; through these the gas passes, and is washed. The cisterns or wash boilers are cylindrical, and made of wrought or cast-iron; the lids should be so much above the level of the liquid, that the bubbling, due to the passage of the gas, should not reach them; they should be easy of removal, and be closed with a water-joint.

The pipes for admitting and letting off the gas are placed at the side, and the remark, made with reference to the distance of the lids, is partly applicable to the letting-off pipes, which might be covered by the precipitate. If preferred, the lids may be fixed, and provided with a man-hole for inspecting and cleansing the cistern. The pipe for admitting the gas descends, at least, two inches below the surface; the gas is separated in its passage, in order to increase the surfaces of contact, and this is effected by perforated plates of metal, or other like partitions. There is in each cistern an agitator, which is so constructed, as to put in motion all the deposit, particularly at the bottom and sides of the apparatus, when the cistern is to be emptied. The pipes and taps for emptying should be large, and capable of being removed, when necessary. There is an escape-pipe attached to each cistern, to prevent an increase of pressure, in case the level of the liquid should by any cause ascend;

from the worm of the still. The action of the acid on the alkali liberates a certain quantity of empyreumatic oil, which is partly carbonized, and which discolors the liquor. This may be avoided by allowing the liquor to repose or to dry up before it is evaporated to crystallize. If the alkali is not pure enough for commerce, it is distilled again on lime, potash, or soda. For obtaining the hydrochlorate, some hydrochloric acid gas may be introduced, before it is condensed, into the mixture, and instead of using water to condense, the alkali in question may be used, by avoiding evaporation: there may be also introduced into a leaden chamber, some alkaline vapours of hydrochloric acid; the connexion is formed, and the salt deposits itself against the sides in the form of powder. In substituting carbonic acid for hydrochloric acid gas, carbonate of ammonia is formed. Instead of the alkali thus obtained, the ammoniacal waters may be used for condensing the hydrochloric acid gas, and thus hydrochlorate is produced. These remarks about the ammoniacal condensing waters for gas, are also applicable to all liquids containing ammoniacal or volatile salts, &c.

With regard to the distilling apparatus before mentioned, it must be remembered, that the liquid from the second boiler is removed into the first one, when its liquid has lost its ammonia; that is, the warm liquid that surrounds the worm, which is received into the second boiler, has been expelled by the cold liquid which enters at the bottom of the refrigerator; also that this refrigerator is hermetically sealed, and its upper side or lid is furnished with a pipe, which enters the acid about a quarter of an inch, that it may absorb the ammonia, which would be disengaged with the vapours, owing to the high temperature of the upper parts. Fig. 2, in the drawing, is a sectional elevation of the apparatus for distilling ammoniacal liquids; *a, a, a,* are sheet-iron boilers, with flat bottoms, the first of which is placed over a furnace, or heated by the injection of steam. The second boiler *a,* is heated by the remainder of the flames and the smoke; *b, b, b,* are agitators, which may be constructed with rakes, to keep the lime in motion and prevent any sediment. *c, c, c,* the man-holes; *d, d, d,* shafts of the agitators, passing through stuffing-boxes; *e, e, e,* lids supported by screws, for the purpose of putting the lime into the boilers; *l, l, l,* leaden pipes, for conducting the vapours from the lower to the upper boilers; *i, i, i,* pipes for emptying the boilers; they are provided with taps or valves. *k,* a pipe or worm placed in a refrigerator *z, z,* which is closed hermetically; it conducts the heated vapours from the ammoniacal liquids into the acid. *m,* the reservoir for the ammoniacal liquors, from whence they are conducted to the bottom of the refrigerator by the tap *n,* and the funnel and pipe *p*;—*h,* a pipe with a tap for conducting the hot liquors into the boiler *a*; *o,* a leaden vessel, provided with a tap *v,* placed a little above the level of the bottom, and of the escape-pipe *r*; this vessel, in which is deposited the condensed ammonia, is in communication with the vessels *o, o,* by means of the pipes *w,* forming altogether one of "Woolf's apparatus," in which the ammoniacal gas that escapes is dissolved; *x,* a tap for drawing off, when necessary, the liquid contained in the refrigerator. — [*Inrolled in the Petty Bag Office, January,* 1842.]

' **Specification drawn by Messrs. Newton and Son.**

To THEOPHILL ANTON WILHELM, COUNT DE HOMPESCH, *of Rurich Castle, near Aix-la-Chapelle, in the kingdom of Prussia, for improvements in obtaining oils and other products from bituminous matters, and in purifying and rectifying oils obtained from such matters.*—[Sealed 4th September, 1841.]

THE bituminous matters referred to in the title, are schist or clay slate, and asphalte; this invention consists, firstly, in an improved mode of obtaining oil from these matters; and secondly, in an improved process or processes by which the refuse of these substances, after the oils have been separated, are rendered available for various useful purposes. The patentee states that he is aware various methods have been resorted to for the purpose of extracting oil from these matters; but the quantity obtained is small, the quality inferior, and the smell offensive; whereas, by his improved process, the quantity is increased, the quality improved, and the smell removed, or greatly modified.

With respect to schist, he states that by experiment he has found the oil, obtained from this substance, is of three different characters; viz., essential oil, intermediary fat oil, and thick oil. These are separated from the schist by the apparatus represented in section at fig. 1, in Plate XV., consisting of a furnace, containing four retorts; each retort is made in four pieces *a, b, c, d,* and has at at one end a hopper *e,* and chamber *f,* and at the other a chamber *g,* in which the carbon or coal of the schist is allowed to cool, previous to discharging it from the apparatus. *h,* is the fire-place; *i, j, k,* three pipes, leading from the retort to three larger pipes *l, m, n,* which extend across the furnace, and communicate by other pipes with three separate condensers; *o,* is an Archimedean screw, contained in the parts *a, b,* of the retort, and caused to revolve therein, when required, by means of the wheel *p,* turned by the handle *q,* and gearing into the wheel *r,* on the end of the screw.

The operation of extracting the oil from schist is conducted in the following manner:—the schist, after being reduced to powder, and sifted, is deposited in the hopper *e,* and the operator, by drawing back the slide *s,* allows it to descend into the chamber *f*; the slide *s,* is then closed, the slide *t,* drawn back, and the charge falls into the retort: the movement of the slides *s, t,* is effected by the revolution of the wheel *u,* which takes into the two racks of the slides. By the revolution of the screw *o,* the charge is pushed partially forward, and heat being applied, until the temperature reaches 100° Reaumur, the essential oil rises in the state of vapour through the pipe *i,* into the pipe *l,* and thence proceeds to the condenser. At the expiration of half an hour, the charge is pushed farther on, by turning the screw, and is exposed to a heat of 200° Reaumur, by which the intermediary fat oil is separated, and passes through the pipes *j*, and *m*, to its condenser. After the charge has been subjected to this temperature for about half an hour, it is moved onwards to the end of the part *b*, of the retort, where it becomes of a red heat, and the vapour, arising from it, yields the thick oil, when condensed. The carbonization is now complete, and the refuse passes on to the end of the retort; the slide *v*, is then drawn back, by turning the wheel *w*, and the refuse or carbon of the schist falls into the chamber *g*, where it remains until cool.

Every time the workman moves the schist forward, he draws back the slides *s*, *t*, in the manner before mentioned, and allows a fresh quantity of schist to descend into the retort; so that the process may be carried on, in its different stages, without interruption.

The apparatus for extracting oil from asphalte is shewn in longitudinal section at fig. 2; it consists of a furnace, containing five retorts *a*, twelve feet in length, and one foot in diameter, and, having at their front ends two pipes *b*, *c*, which communicate with two separate condensers, by the pipes *d*, *e*. The essential oil rises in the state of vapour (at a temperature of 130° Reaumur,) through the pipe *b*, into the pipe *d*, and thence passes into its condenser; and when the temperature reaches 250° Reaumur, the intermediary fat oil and the thick oil are extracted from the asphalte, and conducted by the pipes *c*, *e*, into the other condenser. The refuse is a black coal, which may be employed for the same purposes as the refuse of schist, hereafter referred to.

The combined oils, contained in the condenser belonging to the pipes *c*, *e*, are distilled in an iron retort; and, by this means, the intermediary fat oil is separated from the thick oil or tar, which can be employed in the preparation of varnish, and for all purposes where the bitumen of India is now used.

The intermediary fat oil is now mixed with the intermediary fat oil obtained from the schist, and the rectification of the mixed oil, for manufacturing purposes, is effected by the apparatus represented in fig. 3. It consists of a vessel *a*, for containing the mixed oil, from the lower part of which a pipe *b*, descends into the vessel *c*, and terminates in a perforated nozzle *d*. The vessel *c*, contains a number of metal plates *e*, finely perforated, and supported by the brackets *f*, and rods *g*; the upper part of the vessel is furnished with a pipe *h*, which is formed into a worm, and immersed in a vessel *i*, filled with cold water. Steam, at a pressure of three atmospheres, is admitted into the lower part of the vessel *c*, by the pipe *j*, and ascending through the perforated plates *e*, meets with the intermediary fat oil, which enters the vessel through the nozzle *d*, and descends through the perforated plates; the steam carries off any essential oil that may remain, into the worm *h*, where it is condensed, and the intermediary fat oil falls to the bottom of the vessel *c*, and is drawn off through the pipe *k*, into the chamber *l*. The intermediary fat oil, thus prepared, is passed through a filter, and is then ready to be applied to all kinds of machinery.

The essential oil, obtained from the schist and asphalte, is now distilled in a common retort, heated by steam, the temperature being gradually raised from 100° to 300° Reaumur. The different kinds of essential oil, obtained by the different temperatures, are applicable for dissolving caoutchouc, the manufacture of varnishes, the separation of colors, and other similar purposes. A small quantity of tar may remain in the essential oil, after this distillation, and it is now carbonized and precipitated by the addition of twenty per cent. of concentrated sulphuric acid to the oil, whilst in an agitated state, and at a temperature of 66° Reaumur. The mixture is allowed to rest for some time, and then the essential oil is drawn off, washed with fresh water, and ten per cent. of caustic potash lees added thereto, for the purpose of purification.

The treatment of the refuse, resulting from the above operations, constitutes the last part of this invention. The refuse consists, Firstly,—of the ammoniacal water, formed in the distillation of the schist,—this may be used in the manufacture of ammonia by the ordinary methods. Secondly,—of the acidulated tar, forming the residuum after the rectification of the essential oil,—this, by the addition of chloride of sodium, will be rendered applicable for producing sulphate of soda. Thirdly,—of the coal or carbon, remaining after the distillation of the schist and asphalte.

The carbon of schist contains much pyrites, and is placed, when taken from the retort, in well-closed boxes, to prevent the air from coming in contact therewith; when cold and dry, it is thrown into a leaden vessel, filled with water, acidulated at 66° Reaumur with sulphuric acid. After soaking for twenty-four hours, it is washed with cold water, until no trace of acid remains, and re-carbonized in the apparatus shewn at fig. 1, (but the vapour is not condensed, as in the distillation of the schist); it is then reduced to powder and sifted. The carbon of asphalte does not contain pyrites, and therefore only requires to be pulverized and sifted.

The carbon, thus prepared, may be used as a discolorant in sugar-refining; as a manure; and as a black color. As a manure, it has a great affinity for ammoniacal matter, and the gases proceeding from putrid matters; and it absorbs, in large quantities, the azote and ammoniacal gas contained in the air. If mixed with animal or putrid matters, it forms a most powerful manure, without any smell, and continues in force for a long time: the best proportions are forty parts of animal matter to one hundred parts of carbon.

The patentee claims the making of manure from the carbon of schist and asphalte, although such carbon may be obtained by processes different from those above described. The carbon of schist also possesses powerful disinfecting properties, and is therefore useful in hospitals, and other places where infectious diseases occur.

The claims made by the patentee are, Firstly,—the process carried on by means of the apparatus or machinery exhibited in fig. 1, for obtaining oil, of the three characters before described, from schist or clay-slate. Secondly,—the process carried on by means of the apparatus or machinery exhibited in fig. 2, for obtaining oil, of the characters before described, from asphalte. Thirdly,—the process carried on by means of the apparatus or machinery exhibited in fig. 3, for purifying and rectifying the oil, and adapting it for manufacturing purposes. Fourthly,—the process for rendering the refuse of the schist and asphalte, after distillation or carbonization, subservient to manufacturing and agricultural purposes, as hereinbefore described. Fifthly,—the following products, as obtained by means of the several processes before described: 1st,—the several oils of schist and asphalte, as well before as after rectification; 2nd,—the tar, produced by the distillation of the thick oil of asphalte; 3rd,—the carbon or black refuse of schist and asphalte; 4th,—the acidulated tar, remaining after the rectification of the essential oil; and 5th,—the ammoniacal water. Sixthly,—the application of these several products to the several manufacturing, commercial, and agricultural purposes before described, and to any similar purposes to which the same may be found applicable.—[*Inrolled in the Inrolment Office, March,* 1842.]

On the 16th of July, 1842, Count de Hompesch attached a Memorandum of Alteration* to the specification of his patent of September, 1841; in which memorandum he commences by saying, that whereas he did declare, in the specification referred to, that the bituminous matters, to which his invention related, were schist or clay-slate and asphalte; he is now desirous of *confining* and *limiting* the description, by substituting the terms 'bituminous schists, shales, or slates, or other rocks or minerals, containing bitumen, or bituminous substances,' in every part of the said specification, for the term 'schist or clay-slate;' and also by substituting the terms 'solid and other bituminous substances, such as mineral pitch, mineral tar, and naptha,' for the term 'asphalte.'

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* For the information of the Patentee, we would inform him that until this Memorandum of Alteration is enrolled with the Clerk of the Patents, his invention is liable to be infringed, without the possibility of obtaining redress, although the assent of the Solicitor-General has been given to the alteration.

To John Bevan, *of Whitehead's Grove, Chelsea, Gent., for an improved mode of expelling the air from certain cases or vessels, used for the preservation of various articles of food.*—[Sealed 6th April, 1842.]

This mode of expelling the air consists in connecting the cases or vessels, by pipes, furnished with stop-cocks, with a vacuum-chamber, or other exhausting apparatus, and with a vessel containing gelatine, or other suitable material, in a fluid state; so that upon the communication being opened by turning the cocks, the air will rush from the case into the vacuum-chamber, and the gelatine will flow in to supply its place. The case is made of tin, and, after receiving the matters to be preserved, is placed in a water-bath, heated to 120° Fahr., and the cock upon the pipe, leading to the vacuum-chamber, is opened. By this application of heat, the air in the case is exceedingly rarified, and the animal or vegetable substance becomes cooked; and after a short time (say about fifteen minutes for a fowl) the fluid gelatine, being admitted into the case, expels the remainder of the rarified air, and occupies its place. The case is then hermetically closed, and the operation is finished by submitting it to the action of boiling water for a few minutes. The vacuum-chamber is a hollow metal sphere, which is first filled with steam, and then a vacuum is produced in it by condensing the steam; the gelatine is kept in a fluid state by placing the vessel, which contains it, in a warm bath.

The patentee claims the use of an exhausted or vacuum-chamber, for the purpose of expelling the air from cases employed for the preservation of animal and vegetable substances, to be used as articles of food; and, where the articles are such as will admit of it, the introduction of gelatine, or other like substance, into the said cases, as described.—[*Inrolled in the Petty Bag Office, October,* 1842.]

To Robert Hazard, *of Clifton, near Bristol, for improvements in ventilating carriages and cabins of steam-boats.*—[Sealed 3rd September, 1842.]

The improvements in ventilating carriages consist in removing the vitiated or impure air, by means of a rotary fan, or like apparatus, which receives motion from one of the wheels, or any other suitable mover. The air enters through an opening in the front of the carriage, and passes from the interior into an air-chamber in the roof and back, from whence it is drawn off by the fan or ventilator, fixed beneath the carriage: the fan may be placed in any other convenient situation.

The object of this invention is to enable the inmates of the carriage to ride, for any length of time, with the windows closed, to exclude the dust and damp, and yet enjoy perfect ventilation.

The patentee has, in his specification, omitted to describe his improvements in ventilating the cabins of steam-boats. He claims the mode of ventilating carriages, by means of fans or exhausters, as described—[*Inrolled in the Inrolment Office, March,* 1843.]

To Frederick Bowles, *of* 61, *Moorgate-street, in the city of London, for a new method, by machinery, of preparing flour from all kinds of grain and potatoes, for making starch, bread, biscuit, and pastry,—being a communication.*—[Sealed 15th September, 1842.]

The first part of this invention consists in separating the starch from the gluten of wheat, or from the mucilaginous and other constituent parts of rice and maize, without putrid fermentation, by the use of water, in a suitable machine.

The wheat, rice, or maize, is ground, bolted, and made into a paste, which should contain one-third of its weight of cold water; this paste, being placed at the bottom of a semicircular trough, is kneaded or worked by a fluted roller, whilst several streams of water are permitted to flow upon it. The starch is thus separated from the paste, and is carried off, by the water, through two wire sieves (consisting of one hundred and twenty meshes to the inch), into two gutters, by which it is conveyed to a bucket, and is thence transferred into a vat or tub. After the starch has been washed, it is submitted to a slight fermentation, to destroy any gluten that may remain therein; then the washing is repeated, and it is dried by cold air, and finished by the application of hot air.

The gluten, &c., after the starch has been extracted, may be used in the manufacture of bread, biscuits, and every kind of pastry.

The second part of the invention consists in separating the farina from the residue of potatoes, after they have been peeled by the machine hereafter described; and in preparing the farina, for the manufacture of bread, &c., by breaking the envelopes of the small globules which contain it. The potatoes are first cleansed, by being passed through a "washer," consisting of a cylindrical framing, partly immersed in a vessel of water, and revolving upon its axis, in an inclined position; they are then stripped of their skins by a "peeler," which is a machine similar to the washer, but somewhat longer, and having its interior covered with metallic brushes; the skins, which will carry with them some portions of farina, sink to the bottom of the vessel. When the skins have been removed, the potatoes are submitted to the action of a cylindrical rasp, and carried from thence, by chain-cups, to an endless travelling sieve, upon which a number of jets of water act, and divide the farina from the residue. The envelope, or case of the farina, is broken by a slight washing in acidulated water, and the acidity, which it may imbibe during the process, is removed by rinsing in cold water; it is then dried by cold or heated air. Instead of this method, the envelope may be broken by crushing it, in a machine, with a metal roller or cylinder; or by submitting the farina to a heat of sixty-five centigrades, or more.

The last part of the invention consists in preparing the residue of potatoes for being used, with other materials, in making bread and sea-biscuits. After the residue is removed from the bottom of the peeler, it is bleached, by washing in cold water, and passed through a press; from the press it is removed to a drier, and thus the disengagement of its carbon is prevented. When the residue is dry, it is reduced to flour, by a mill, consisting of a grooved cylinder, working in contact (or nearly so) with a grooved plate; the latter is kept cool by a current of water, or cold air, at the back of it, and thus the flour is prevented from becoming heated during the grinding.

If the operator prefers to employ the residue in a moist state, as it comes from the peeler, it is passed through a press, and then mixed with the other substances used in making dough, before a sufficient time has elapsed for its carbon to become disengaged.—[*Inrolled in the Inrolment Office, March,* 1843.]

To William Henry Fox Talbot, *of Lacock Abbey, in the county of Wilts, Esq., for improvements in coating or covering metals with other metals.*—[Sealed 25th November, 1842.]

The first of these improvements consists in preparing the surfaces of metallic articles, intended to be gilt, by giving them a very thin coating of silver. This may be done by dipping them into a weak solution of silver in hyposulphite of soda; but any other suitable method may be adopted.

The second improvement consists in a method of preparing the surfaces of metallic articles, which are to be gilt or silvered. When the article to be coated has been well cleaned, it is attached to one of the poles of a voltaic battery, and then both the poles are plunged into a vessel, containing a mixture of water with any suitable acid or salt. The battery is so arranged that decomposition of the water ensues, and the article gives off hydrogen gas for some time; it is then quickly detached from the battery, and being thrown into a vessel, containing a proper solution of gold or silver, it receives a coat of one of those metals. It is after this washed in pure water; and this process is repeated, until a coating of sufficient thickness is obtained.

The patentee claims preparing the surface of articles, intended to be gilt or silvered, by causing them to give off hydrogen, being connected with the poles of a voltaic battery, as aforesaid.

The third improvement consists in gilding metallic articles by dipping them into a mixed solution, containing gold, and one of the baser metals; those metals being excluded which would precipitate gold.

The patentee claims, under this head, employing a mixed solution of gold, and one of the baser metals, (with the exception of mercury,) for the purpose of gilding metallic articles.

The fourth improvement consists in using a solution of chloride of gold, mixed with a solution of boracic acid, for the purpose of gilding articles of brass or other metal; by which means a more pleasing color is produced than when the chloride is used alone. Boracic acid may also be added to other solutions of gold.

The fifth improvement relates to a method of removing the dark tint which metallic articles acquire when they have been dipped into a solution of gold not altogether suitable for gilding. It is removed by dipping the articles into a very weak solution of nitrate of mercury, in water, which soon causes the surface to brighten; the articles may then be dipped into the solution of gold, and again into the solution of mercury, and so on, alternately, until the desired coating is obtained. Any excess of mercury may afterwards be removed by an acid, assisted by voltaic action.

The patentee claims the use of a solution, containing mercury, for the purpose of improving the appearance, or brightening the surface of articles which have been gilt imperfectly, or of too dark a color; and the method, above described, for removing the excess of mercury from gilt articles, by voltaic action.

The last part of this invention has reference to the fact, that if metallic articles are dipped into a solution of silver, they only receive a coating of limited thickness; the effect ceasing after a time, and no more silver being deposited, in consequence of the metal, on the surface of the article, having become similar to that in the solution; but, if made again dissimilar, the effect is, to a certain extent, renewed. The improvement consists in creating such dissimilarity, by dipping the article into a different solution of silver, or into a solution of some other metal, and then replacing it in the first solution of silver; these dippings are to be repeated alternately. This method, of alternate dipping, may also be applied to the solutions of gold.

The improvements, above described, are more especially applicable to the coating of brass, copper, silver, German silver, iron, and steel.—[*Inrolled in the Inrolment Office, May,* 1843.]

To CHARLES ROBERT AYERS, *of John-street, Berkeley-square, architect, for improvements in ornamenting and coloring glass, earthenware, porcelain, and metals,—being a communication.*—[Sealed 23rd July, 1842.]

THESE improvements consist in ornamenting glass, &c., by the application of color, in the state of powder, through perforated screens of metal, or other suitable material, or through lace, or other open fabric, in a similar manner to stencilling; or by impressing a design upon the glass, by means of an engraved or ornamented block, with any suitable adhesive matter, and then depositing the color upon it.

The mode of coloring glass, &c., by means of perforated screens, or open fabrics, is as follows:—A coat of adhesive matter (the patentee prefers essence of lavender) having been applied to the glass, or other substance, with a soft brush, the screen, or open fabric, is laid over it; the pulverized color is then deposited upon the screen, which, with the superfluous color, is afterwards carefully removed, leaving only that portion of the color which has found its way through the perforations, and adheres to the glass; the color is then permanently fixed by " firing," as usual.

When wooden or other blocks are used, the design is printed, with adhesive matter, upon the substance to be ornamented, and the color is dusted upon it; those portions of color which are not deposited on the adhesive matter, constituting the design, are then removed by means of a pair of bellows, or in any other convenient way, and the remainder of the color is fixed by the " firing" process.

If it be required to ornament a convex, or other surface, not flat, yielding-screens, or patterns, are employed, such as ornamental lace, or perforated paper screens; these are employed as before directed, and, being left on the article, are consumed during the fixing of the color.

The colors used in coloring glass and china by this process, are, in all cases, those generally employed for the same purpose; and the method of applying color, which the patentee prefers, is by agitation in a closed box, so as to cause it to be held in suspension; the article being then placed at the bottom of the box, will receive an even deposit of color.

The patentee claims, Firstly,—the mode of coloring or ornamenting glass, china, earthenware, porcelain, and metals, by applying color, in the state of powder, through perforated screens, or through lace, or other open fabrics, when combined with the fixing of such colors by heat. Secondly, the mode of coloring or ornamenting glass, china, earthenware, porcelain, and metals, by causing the surface to be impressed with the desired pattern, by a wooden or other block, with adhesive matter applied thereto, and then dusting over the desired color, in the state of powder; when such process is combined with the subsequent process of fixing the colors by heat.—[*Inrolled in the Inrolment Office, January,* 1843.]

To Julius Bordier, *of Austin Friars, in the city of London, merchant, for certain improvements in preparing skins and hides, and in converting them into leather,—being a communication.*—[Sealed 13th January, 1842.]

This invention consists in a novel mode of conducting the process of tanning, and in the employment of certain mixtures or compositions, in place of the ordinary tanning liquid, by which means a very considerable economy in time, labour, and cost of material is effected; and another advantage resulting from this invention is, that skins or hides, prepared in the manner hereafter described, are rendered impermeable, or nearly so, to water; and, further, the cuttings and parings of skins and hides, dressed in this manner, and also the leather itself, after being used for various operations, may be applied to other useful purposes, whilst the cuttings and parings of skins and hides, prepared in the old manner, would be perfectly useless.

The skins and hides, after having undergone the operations of washing, removing the hair, and swelling, are submitted to the action of such metallic, saline, and earthy substances, as may be decomposed by the skins and hides, or may combine with the same. Among these substances, the one that seems preferable is the bibasic sulphate of sesquioxide of iron, or the basic red sulphate of iron, or the sub-sulphate of peroxide of iron.

The basic red sulphate is prepared by boiling 15¼ gallons, imperial, of water in a copper boiler, and dissolving therein 2 cwt. of green copperas, (protosulphate of iron,) in the following manner:—The copperas is pounded by beaters, and passed through a sieve, with apertures of about one inch square, and then the above quantity of pounded copperas is gradually introduced into the 15¼ gallons of water; the bottom of the boiler being stirred, and the ebullition being kept up. When the whole of the copperas is dissolved, and the liquor boiling, it is poured into a deal tub or vat, of the capacity of about 44 gallons, but not very deep, and to it about 44 lbs. of sulphuric acid, concentrated at 66°, or sp. gr. 1.848, are added; the mixture is then agitated, and about 44 lbs. of finely pulverized peroxide of manganese are added by degrees. The agitation is continued until the swelling has ceased, and is repeated at intervals, until the mixture is cold; when cold, it is lowered to the degree required, by the addition of water.

Instead of using sulphuric acid at 66°, the 2 cwt. of copperas may be dissolved in a mixture of 66 lbs. avoirdupoise, of non-concentrated sulphuric acid, at 50°, or sp. gr. 1.530, and 132 lbs. of water; but then the dissolution must be effected in a boiler made of lead, in order to resist the action of boiling sulphuric acid. This process may be also conducted in the following manner:—Pound the green copperas, sift through a sieve, with holes of about one-third of an inch square; take 22 lbs. of this copperas, put it in a great stone jar, and add thereto a mixture of 2¼ lbs. of nitric acid, at 36°, or sp. gr. 1.333, and about 3 lbs. 1 oz. of sulphuric acid, at 66°, or sp. gr. 1.848. Agitate with a wooden spatula, heat the jar by steam, continuing the agitation until the cessation of nitrous vapours, and the complete dissolution of the copperas take place; remove the jar, and continue to stir the mixture, from time to time, until it coagulates into a paste, or at least until it is perfectly cold; let it rest for about 24 hours; add to it water, and mix it carefully; pour in a sufficient quantity of water to bring the mixture to the degree it ought to be for use; add then to it a sufficient quantity or excess of hydrate of peroxide of iron, recently prepared; agitate the liquor well, every two hours, during two or three days, and then it may be employed for the preparation of skins and hides.

The yellow precipitate, obtained when the liquor is prepared by the first process, may be employed instead of the hydrate of peroxide of iron, to finish the preparation of the liquor last described. This precipitate may moreover be easily converted into a solution of bibasic sulphate of red oxide of iron, by adding to it, when in a pasty state, a sufficient quantity of concentrated sulphuric acid; the mixture becomes very much heated, all the basic salt is dissolved, and, when cold, the liquor is brought to the proper density by diluting it with water; and enough of the yellow precipitate, or of hydrate of peroxide of iron, is added, to render it as much basic as possible. The mixture, after being stirred, at intervals, for two or three days, is allowed to settle, and the liquor, thus obtained, may be immediately used for the preparation of skins and hides. The liquor, from which the skins and hides have extracted all the bibasic sulphate of sesquioxide (red oxide) of iron, and which contains only sulphate of manganese, and a little protosulphate of iron, may be decomposed, either by milk of lime or magnesia, or caustic or carbonated soda; by which means colors of various hues are produced; and also saline substances, of low price, as chemical products, for which there is a daily demand.

From these various compositions results a reddish liquor, which is to be lowered down to the proper density by the addition of water; and in it the skins and hides are immersed, after having been washed, swollen, and freed from hair, by the ordinary processes. The skin and hides are immersed in the liquor for periods varying according to their thickness, (thus three days will suffice for thin skins, such as calf skins, while ox skins will require from six to eight days,) and, when removed from it, are completely imputrescible; but they are as permeable to water as the leather tanned by ordinary processes.

The currier's process, and other known means of rendering the leather impermeable, must now be employed to give to the skins, prepared as above stated, what they still want,—namely, the proper degree of tenacity, solidity, and impermeability.

Thus, in fifteen or twenty days, or even, if necessary, in a shorter space of time, leather of all kinds may be obtained, and especially thick leather for soles of shoes and boots, which is more durable than that produced by the ordinary means.

The skins, thus prepared, have, besides, this advantage, that when worn out by use, they may be easily freed from the basic salts and the fatty substances which render them imputrescible and impermeable, and may then be used for the making of glue, as is now done with the parings and cuttings of raw skins and hides, before they are tanned.

In conclusion, the patentee claims the preparation and application of the above-mentioned combination of chemicals to the preparation of skins and hides, in the place of the tanning liquor heretofore employed.—[*Inrolled in the Petty Bag Office, July,* 1842.]

Specification drawn by Messrs. Newton and Son.

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTION.

No. IV.

ON THE PATENT LAWS OF RUSSIA.

Of all the countries of Europe, or in fact of the civilized world, none is perhaps so little known in England as the immensely extensive and overgrown empire of Russia. Many causes may be assigned for this, but none perhaps has had so great an influence in thus, as it were, severing this great and mighty empire from intercourse with other nations, as the want of legitimate and certain protection for the industry and ingenuity of its inhabitants, and the despotic and arbitrary manner in which the laws, or rather the decrees of the Emperor, are administered and carried out by the Government officials.

The consequence of this mal-administration of the various manifestos and orders from St. Petersburg, amounting sometimes to extreme rigour, and at other times to extraordinary laxity, has been, that the natural energy and enterprise is damped, and all tendency to improvement and amelioration is checked, in such a manner as to leave the people far behind their neighbours in the advantages that are usually derived from civilization. This want of security, patronage, and protection, has induced many of the more enterprising to invest both capital and talent in neighbouring states; where, under better administered, although sometimes more stringent laws, they could calculate upon a certain protection and security. That the Russian people are not behind other nations in the genius and enterprise required to devise and carry out important mechanical inventions, the lists of patents granted in our own country (in which the name of Russian inventors frequently occur,) will abundantly testify; it is therefore a matter of surprise that such a country, the inhabitants of which have shewn themselves to be possessed of considerable skill in the arts and manufactures, should not have, until lately, possessed a law by which inventions or discoveries might, by patent or privilege, be secured to the original inventor. It was not until the year 1812, that the Russian Government even condescended to think of this subject; and when, after repeated petitions from various bodies in different parts of the empire, a law of some kind *was* ultimately drawn up for the protection of inventors, this law was neither properly understood nor carried out by the officers to whom its operation was entrusted. In consequence of this laxity, both on the part of the people as well as the Government officers, it was found necessary, in the year 1829, to make certain regulations in council, and issue proper instructions for the *modus operandi* of the law, in order to remedy and prevent the confusion that had arisen in the bureaux.

The Russian law, as enacted, may be justly termed a good and useful law, the Government tax not being excessive; but the official forms and regulations, together with the extra fees, it is sometimes found necessary to pay, and lastly, the uncertainty of obtaining a patent or privilege at all, render the application an extremely harassing affair. As we before stated, it is not always by the letter of the law that its utility and practical working are to be considered, as although the law distinctly states that patents may be obtained for three, five, or ten years, and gives no power to the minister to refuse either term that an inventor may select, yet a foreigner can very seldom obtain a longer term than six years. The following is a translation of the law of 1812, together with the Report of the Council of the Empire; and an Imperial Ukase, issued in 1829, relating thereto, is also given.

ALEXANDER, by the Grace of God, EMPEROR AND AUTOCRAT OF ALL THE RUSSIAS.—Having taken into consideration the petitions presented to us, relative to privileges granted for divers inventions and discoveries in the arts and manufactures, and being desirous of establishing a permanent law, which may secure advantages to private individuals, encourage inventors, and be of general utility.—Having heard the opinion of the Imperial Council, we have thought fit to make the following regulations :—

SECTION I.

Of the Nature of Privileges for Inventions and Discoveries.

Art. 1. The privilege granted for inventions and discoveries in the arts and manufactures, is a certificate which states that the invention therein mentioned was at the time presented to the Government, as the property of the person named in the said grant.

Art. 2. In granting this privilege, the Government does not guarantee that the invention or discovery is really the property of the person presenting it; but only bears witness as to the state of the invention or discovery when presented.

Art. 3. Provided nevertheless, that the privilege granted by Government shall not take away from any other person the right of proving according to law, that the invention or discovery does not belong to the person presenting it.

Art. 4. Provided also, that until this right has been legally contested, the person obtaining the privilege enjoys the following rights.— 1st. He may, during the time specified in the privilege, make use of the invention or discovery as exclusive and indisputable property. — 2nd. He may introduce the said discovery or invention, and make use of it himself or sell it to others, and also grant licenses to use it.—3rd. He may bring an action against any person or persons counterfeiting the same, and claim damages for the loss which he may have sustained by such counterfeit or infringement.—4th. That will be considered a counterfeit which resembles the invention or discovery in all its parts, even if some trifling alterations be made therein, which do not materially alter it.

Art. 5. At the same time a person desirous of obtaining a privilege is obliged,—1st. To present to the Government an exact description of his invention, or discovery, with all essential details; the manner of putting it into operation, with the plans and drawings thereto belonging, without keeping any thing back relative to its effective operation.—2nd. To pay the usual tax laid upon privileges.

Art. 6. No privilege will be granted for any invention or discovery, unless an exact and full description of the same, as above mentioned, has been previously presented.

Art. 7. No privilege will be granted for inventions which are not only of no utility to the empire, or to private individuals, but which may even prove injurious.

Art. 8. Privileges may be obtained for inventions and discoveries made in foreign countries, of which the specification has not been published, and which has not yet been made use of in Russia.

Art. 9. Privileges granted for such introductions or applications, are as valid as those granted for inventions made in Russia, if it cannot be proved that the invention had been introduced or used in Russia before obtaining the privilege; or, that at the time the petition praying for a privilege was presented, it was published in the public papers, or in books, so that it could be put into operation without any further description.

SECTION II.

The Course to be taken in obtaining Privileges.

Art. 10. The person desirous of obtaining a privilege, must present a petition to the Minister of the Interior, annexing the description mentioned in Article 5, which must state the benefit or utility to be derived from the invention or discovery.

Art. 11. The Minister of the Interior having examined the petition and laid it before the council belonging to his department, and being convinced that the invention or discovery will really be useful, presents, under these circumstances only, his opinion to the Imperial Council of the Empire.

Art. 12. After the examination of the petition praying for a privilege, the Minister of the Interior must get information, in the first place, if a patent has not been already granted for similar inventions, or discoveries; and in the event of two petitions being presented for the same discovery, the privilege is granted to the person who made the first application, and all subsequent petitions for the same invention are rejected.

SECTION III.

Of the Form of Privileges.

Art. 13. The privilege bears,—1st. The name of the inventor.—2nd. The day of presentation.—3rd. The description of the invention.—4th. The term for which it is granted.—5th. The amount of tax paid upon it.—6th. The signature of the Minister of the Interior.—7th. The Seal of the Minister of the Interior.

Art. 14. The privileges are written on parchment, and the expenses are included in the fees paid for obtaining them.

SECTION IV.

Of the Term of the Grant and the Duty.

Art. 15. Privileges are granted for three, five, and ten years, from the time of solicitation, but for no longer turm than 10 years.

The Government tax is as follows :*—

Years.	Roubles.
For 3 - - - - - -	300
5 - - - - - -	500
10 - - - - - -	1500

SECTION V.

Of Privileges becoming void.

Art. 17. Privileges become void.—1st. By the expiration of the term.—2nd. If it be proved in a court of law, that, at the time the petition praying letters patent was presented, the same invention or discovery was or had been described in any Journal or Work published in Russia, or out of the empire, in such a manner, that it could be put into operation without any further description.—3rd. If it be proved that it is impossible to attain the desired object, by following the instructions of the specification, even under the superintendence of the inventor.—4th. At the expiration of the term, for which the privilege was granted, a notice therof is immediately published by the Foreign Department, in the Gazettes of the two capitals; after which, every one has a right to make use of the discovery for which the privilege was granted.

SECTION VI.

Of Proceedings at Law.

Art. 18. Questions of right, with regard to privileges, are heard before the Council of the Interior Department, in conjunction with experienced persons, chosen by the litigants, an equal number on each side.

Art. 19. The question is decided by a majority.

Art. 20. An appeal lies from the judgment of this court to the senate, where all proceedings are definitively settled, according to the established rules.

* In addition to the Government tax, there are some small extra official fees incurred when the invention is imported from abroad, such as an official certificate of the registration of the documents, and the power of attorney, authorizing a resident to act in the name of the petitioner, &c. &c.

Art. 21. All the decrees or regulations, made in this *Ukase*, are in force from the date of its publication.

Sventsiany, June 17th, 1812.

Signed in the original by His Imperial Majesty's own hand. } Alexander.

(L. S.) Printed at St. Petersburg, at the Senate, July 1st, 1812.

His Imperial Majesty has condescended to confirm and order to be put in force the opinion of the Council General of the Empire, on some points relative to obtaining privileges, not hitherto decided, for want of the necessary information.

For the President of the Imperial Council,

April 24th, 1829. (Signed) Prince Alexis Kourakine.

Opinion of the Council of the Empire.

The Council of the Empire, in the Department of Economy, and the General Assembly, having examined the proposition of the Minister of the Interior, as to some points relative to certain privileges, which remain at the Ministry of the Interior undecided in consequence of the non-presentation of the necessary information.—The Council of the Empire, seeing by this report, that the four cases relating to privileges, which are now at the Ministry of the Interior, and still remain undecided; (one by reason of the non-presentation of the drawings and description, two by reason of non-payment of the duty, and one by reason of the invention not having undergone a trial,) has taken into consideration the following observations.

a. By Article 5, of the supreme manifesto, with regard to privileges, the person desirous of obtaining one, must present to the Government an exact description of his invention or discovery, with all essential details, the manner of putting it into operation, with the models and drawings belonging to the description, without concealing anything relative to its full operation, which is confirmed by Article 10.

b. We find by Article 6, that no privilege will be granted for inventions, of which an exact and full description has not been presented.

c. By Article 5, a person desirous of obtaining a privilege, is obliged to pay the established tax, but it is nowhere stated that this tax must be paid on presenting the petition, and the non-payment of this tax is not mentioned as one of the reasons for refusing a privilege.

d. The petition, demanding a privilege, depends entirely on the will of the inventor, who, consulting his own interest, may demand the privilege or keep back his petition.

With regard to the preceding observations, the Council of the Empire, having referred to the manifesto concerning privileges, is of opinion,—1st. That petitions from persons desirous of obtaining privileges, will not be accepted, unless they have annexed to them all that is required by Articles 5 and 10 of the manifesto. Petitions presented to the Interior Department, without the said appendages, will be immediately returned to the petitioner.—2nd. Petitions sent by post, will not, under any circumstances, be attended to; and the inventors will be warned by advertisement, that in case of absence, they must give a power of attorney to some person to present the petition with the requisite appendages.—3rd. The person holding the power will be answerable for the payment of the tax, in case the Government should grant the privilege.—4th. If any other person present a petition, with the necessary documents, for a similar invention or discovery, which has not been used in any part of Russia, and for which the first petitioner has not annexed to his petition the necessary documents,—in this case, according to the supreme manifesto, and the decision of the Minister of the Interior, the privilege will be granted to the second petitioner, provided always, that if the first wishes to defend his right, they may take their inventions into court, according to the strict meaning of Article 3, of the said manifesto, which says, " that the privilege granted by Government does not take away the right of any person to prove, in a court of law, that the invention or discovery, therein mentioned, is *not* the lawful property of the person who presented it."

Signed by the

PRESIDENT AND THE MEMBERS.

Ukase of His Imperial Majesty, Autocrat of all the Russias, emanating from the Directing Senate.

Pursuant to the Ukase of His Imperial Majesty, the Directing Senate, having heard the Report of the Minister of the Interior, in which he states, that on petitions being presented to the Ministry of the Interior, for obtaining, by virtue of the supreme manifesto of June 17th, 1812, privileges for divers inventions and improvements in agriculture, and the arts and sciences—it happens that some persons have presented neither detailed descriptions, nor the drawings of their invention or discovery, and do not pay the established tax for the privilege; that others, when additional information is required of them, notwithstanding the warning of the respective local authorities, either do not present themselves at all, or answer very reluctantly to the questions put to them on the subject; and that sometimes it is very difficult, and even impossible, to find out their place of abode, seeing that they change their residence; these circumstances, depending on the petitioners themselves, having caused several matters relating to privileges to remain for a long time undecided at the Ministry of the Interior; and as it may happen in the meanwhile that other persons may seek to obtain privileges for the same objects,—the Minister of the Interior, to prevent delay in the decision of the said matters, and not to injure others in obtaining privileges for similar objects, has presented to the Council of the Empire, a proposal for an addition to the imperial manifesto on privileges.

This day the Secretary of State, Martahenko, performing the functions of Secretary of the Empire, having communicated the opinion of the Council of the Empire on this subject, which received the supreme sanction on the 24th April last, and having demanded the required depositions, in order to publish the said opinion, of which a copy was annexed, he was ordered to forward printed copies of the said opinion of the Council of the Empire, sanctioned by His Imperial Majesty, to all the viceroys, judges, &c. in the kingdom.

Made the 16th May, 1839, pursuant to the opinion of the Council of the Empire, confirmed by His Imperial Majesty, relative to an addition to the supreme manifesto of the 17th June, 1812, as to privileges granted to divers persons for inventions.

Report from the Commissioner of Patents of the United States, showing the operations of the Patent Office during the year 1842.

(From the Franklin Journal for March.)

PATENT OFFICE, Jan. 1843.

SIR,—

In compliance with the law of Congress, the Commissioner of Patents has the honor to submit his annual report.

Five hundred and seventeen patents have been issued during the year 1842, including *thirteen* re-issues, and *fifteen* additional improvements to former patents, of which classified and alphabetical lists are annexed.

During the same period, three hundred and fifty-two patents have expired.

The applications for patents during the year past amount to *seven hundred and sixty-one,* and the number of caveats filed was *two hundred and ninety-one.*

The receipts of the office for 1842, amount to 35,790.96 dollars, from which 8,086.95 dollars may be repaid on applications withdrawn.

The ordinary expenses of the Patent Office for the past year, including payments for the library and for agricultural statistics, have been 23,154.48 dollars, leaving a net balance of 5,264.20 dollars to be credited to the patent fund.

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For the restoration of models, records, and drawings, under the act of March 3, 1837,—14,060.02 dollars have been expended.

The whole number of patents issued by the United States, previous to January, 1843, *was twelve thousand nine hundred and ninety-two.* The continuance of the depression of the money market, and the almost universal prostration of all business, operate very disadvantageously on the receipts of this office, as many hundred applications are delayed solely from the want of funds or difficulty of remittance. The patents granted for the year, however, exceeded those of the year previous by *twenty,* though there have been less applications by *eighty-six.*

The Digest of Patents, continued and brought down to January, 1842, has been printed, and 700 copies distributed to the respective States, and 200 copies deposited in the library, in compliance with the resolution of Congress directing the same.

The accommodations granted during the last year for the reception of the articles received through the exploring expedition, intrusted to the National Institute, must seriously thwart, if not suspend, the design of Congress in the reorganization of the Patent Office, which enacts, section 20, act of July 4, 1836, "that it shall be the duty of the Commissioner to cause to be classified and arranged, in such rooms and galleries as may be provided for that purpose, in suitable cases, when necessary for their preservation, and in such manner as shall be conducive to a beneficial and favorable display thereof, the models, and specimens of composition and fabrics, and other manufactures, and works of art, patented or unpatented, which have been, or shall hereafter be deposited in the said office."

*   *   *   *   *

It is a matter of sincere congratulation, that the Patent Office has so far recovered from its great loss in 1836, by the conflagration of the building, with all its contents. A continued correspondence with 11,000 patentees, and untiring efforts on the part of all concerned with this bureau, have accomplished much; indeed, to appearance, the models are better than previous to the fire. Although something yet remains to be done, enough has been accomplished to remove the past embarassment, and afford applicants the means of examination as to the expediency of applying for a patent.

The loss to the library, sustained by the fire, is not yet fully repaired; and, since the law of 1836 makes it a duty to examine all applications for patents, with reference, also, to foreign inventions, it is absolutely necessary that the library should be extended.

It is true that the library of Congress possesses some books on scientific subjects, useful for reference in the labours of this bureau, but no permission is given to take out books from that library; and, if such liberty were granted, it would be bad economy to send an examiner to the capital to look up similar cases. If applications are to be examined, it will promote the dispatch of public business, protect against spurious patents, and give public satisfaction, if the Patent Office library is well supplied with necessary books.

Already hundreds of applicants are satisfied by the comparatively imperfect examinations now made by referring to books on hand, not to take out a patent; and when, in the rejection of cases, reference is made to foreign patents, there is an impatient desire to see the description of the invention that is to cut off the hopes of so many years of toil and labour. I would therefore most earnestly recommend an appropriation of 1,200 dollars from the surplus fund, to add to the Patent Office library.

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Signed, H. L. ELSWORTH.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 328, Vol. XXII.)

"Description of a Self-acting Signal for Railways."—By Charles Berwick Curtis (of Acton), Assoc. Inst. C. E.

The object of this invention is, that notice shall be given by a marked signal, both by day and night, to the trains on the railway, that they may proceed with safety, and to regulate their speed. The signal being worked by machinery, the policemen would not be required, as at present, to remain on one spot, but could extend their sphere of inspection; and thus, by fixing the apparatus at given intervals along the line, the passage of the trains could be arranged with such precision as to render collision less frequent.

The apparatus consists of a round signal, composed of glass, the upper third part red, and the remainder green, descending into view from a casing of three colours, such as black, green, and red, in equal divisions: upon the signal is a white plate, which projects in front of and through a slit in the casing; and in order that the signal may be used by night as well as by day, a lamp is placed immediately beneath the centre of the casing.

On the near side of the rail, at a suitable distance, and at a proper height to be cleared by the steps of the carriages, is fixed a trigger, which is attached to a horizontal shaft revolving on bearings, with a counterweight, and these are connected by suitable shafts and levers with the signal-field. When an engine passes and depresses the trigger, the signal-field is released, and falls below the casing; by this means the machinery is set in action, and in a given time (which is regulated by clock-work) gradually raises the signal-field up again within the casing, indicating by the coincidence of the coloured compartments of the casing with those of the signal, the length of time which has elapsed since the trigger was depressed. When the signal has returned entirely into the case, the apparatus has resumed its original state, ready to be again acted upon.

Several ingenious modifications of the apparatus are described; and it is stated, that the signals which have been at work for a considerable period at the London and Birmingham and Great Western Railways, have fully answered the expectations entertained of their efficacy. Detailed drawings of the signals and machinery accompany the paper.

"Description of the Harbour of Port Talbot (Glamorganshire)." By Henry Robinson Palmer, V. P. Inst. C. E.

The harbour described in this communication is situated upon the outfall of the river Avon, on the eastern shore of Swansea Bay. The adjacent mountainous district terminates abruptly at about half a mile from the shore, in a tract of marshy land, for the most part composed of sand, with detached beds of clay and peat of various thickness, at about 10 feet below the surface.

The river, which, at its issue from its rocky channel, had been diverted from its course by accumulations of sand, nearly at right angles with its point of discharge into the sea, would appear at some period to have had a direct channel thither. It has been the object of the author, by whom the works were designed and executed, to restore this obvious course for the land water, and by means of embankments, to convert into a dock that portion of the old channel which extends through the marshes. A new channel has also been formed from the outfall to a convenient part of the dock, with a lock 45 feet in width for the passage of vessels.

As the works were undertaken by a few private individuals, every proper economy was enjoined; and in order to diminish the expense of excavating by manual labour, a channel of 100 feet wide and a mile in length, Mr. John Vigurs (whose extensive tin-plate and copper works are situated in the adjoining valley) proposed that the new channel should be formed by the force of the land floods, which descend with great impetuosity. A trench of 20 feet wide by 10 feet deep, was therefore cut in the line of the proposed channel; and a few days after it was finished, a heavy land flood descending from the mountains rushed through it, carrying out to sea from the sides and bottom of the trench an immense quantity of the soil. Every succeeding flood increased the size of the trench, and by judicious guidance of this natural excavator, the channel was formed of the requisite dimensions; and it is now generally kept clear from accumulation by the land floods, but in dry seasons by the sluices in the lock-gates. The bed of the channel is stated to form a regular inclined plnne of more than a mile in length, free from a shoal or any other impediment.

The confluence of the two channels has been rendered permanent, by a pier of copper slag, with an active slope of five to one. When finished, this pier will extend full half a mile in length.

The paper then describes generally the ordinary modes of construction adopted in the works, and more particularly the lock, the cill of which is 23 feet below the level of an ordinary spring tide: the coping is 2 feet above that level, and the gates are 25 feet 6 inches high.

The fabric of the lock is composed of hard silicious sandstone, cemented with blue lias lime mortar. The ashlar work of the walls is 4 feet in thickness, with counterforts, and the spaces between them are filled with rubble, grouted with lime and sand. The whole thickness of the walls may therefore be taken at 8 feet, excepting at their bases, where they are 10 feet. The walls rest in part upon an inverted arch, three feet in thickness, and the whole mass, including the invert, rests upon a concrete of large and small rubble.

The harbour is stated to be in immediate connexion with extensive copper and tin-plate works, and also with a great extent of coal-beds bordering the valley of the Avon, and the trade is rapidly increasing, its position in the Bristol Channel being highly favourable to a foreign trade.

A plan of the harbour, with the streams and channels, and a transverse section of the lock, accompanied the paper.

"Description of the Calder Viaduct, on the Wishaw and Coltness Railway, with the Specifications, Estimates, and a series of Experiments to ascertain the Deflection of two of the Strutted Beams."—By John Macneill, M. Inst. C. E.

When first the author was called upon to carry out the extension of the Wishaw and Coltness Railway, he found that the funds for that purpose were very limited, and that it was necessary to construct the works in the cheapest manner possible. To accomplish this it was necessary to design and lay out a single line of railway, which would be sufficient to carry on the trade by horse power, but if possible, and consistently with limited funds, to construct the viaduct over the valley of the Calder (the principal work on the railway) in such a manner as to be able to widen it hereafter, and to make it suitable for locomotive power, in the event of the trade being increased, or of the railway forming a part of the great line of communication between England and the West of Scotland. Having these objects in view, and being so restricted in funds, he was obliged to lay out the works in the first instance, very differently from what he otherwise would have done, if there had been ample funds.

The valley of the Calder, which the railway had to cross, was nearly half a mile in length, and the elevation of the line over the surface of the ground, varied from 50 to 130 feet. The first intention was to construct a viaduct, 480 feet in length, of stone arches, 60 feet span and 12 feet wide between the parapets; but as this mode of construction would have been the cause of much expense, when it became necessary to widen the viaduct for a double line of railway, and would also have involved an embankment of nearly 60 feet in height, composed of clay and marl, which was considered unsafe and likely to slip, an effect which subsequent experience on other portions of the line, has since fully proved would have been the case,—it was determined to extend the viaduct to about 1200 feet in length, and to construct it of timber resting on stone piers, which allowed the means of widening and strengthening it hereafter, without stopping the trade or incurring more expense than would have been necessary in the first instance, if built to the full dimensions.

The piers and abutments are built hollow, of grey freestone, from the adjoining quarry of Dalziel; the trussed wooden beams rest in metal sockets, and the springing plates are laid, for supporting the under arches of bent timbers, which are now in progress of construction, to render the viaduct capable of supporting safely the weight of locomotives and heavier trains than now pass along it by horse power. The usual load for horses is four waggons, each weighing 1¼ ton, and carrying 3½ tons of coal; there are frequently three of these trains on a single arch of the viaduct at the same time, and thirty loaded waggons weighing 120 tons, exclusive of the engine and tender, have frequently been taken over; on one occasion, a train consisting of sixty-five loaded waggons, of 4 tons each, making a gross load (including the engine and tender) of 279 tons, was taken over the viaduct, but the usual load is restricted to 30 tons, until the under arches are fixed.

The details of the construction of the general work are then given, and the total cost of the single width is stated to be about £15,000; this sum includes the metal castings for the future widening, and when the strengthening and widening of the whole will be completed, the total cost will not exceed £25,000, which is stated to be a low price for a viaduct of 1200 feet long, and varying from 50 to 130 feet in height.

A description is then given of the experiments upon the deflection of a trussed beam. Two stone piers were erected 100 feet apart, with metal caps and sockets built into them; two beams were laid and strapped together and the struts fixed, precisely as they would have been in the bridge; along each side of these beams, but quite unconnected with them, posts were driven in the ground, to which a horizontal beam was attached; six rods of deal, carefully divided into inches and tenths, were then screwed to the outside faces of the beams. The beams were, in the first instance, brought as near as possible to a horizontal line, by means of a spirit level, and the zero point on the rods made to correspond with a fixed line on the horizontal bar. When the beams were loaded, and the deflection from the original level took place, it was marked by the divisions on the index rods, which being firmly screwed to the beams, rose or fell with them, and showed the quantity of deflection as marked by the line on the horizontal bar; after each load was put on the beams, it was allowed to remain an hour or two before the deflection was measured; and after the load was taken off, the deflection was again measured at an interval of some hours to ascertain the permanent set, before another load was put on. The load made use of was railway bars; they were distributed over the beams in various situations, and in various quantities, varying from 1 to 60 tons; the results of which are stated in a series of elaborate tables: and a large collection of diagrams show the situation and form of the load and the space covered at each experiment. By examining these diagrams, the situation of the load, its weight, and the deflection caused by it, will be at once seen; the results of these weights are given in the tables in feet and decimals, which will be more satisfactory than the diagrams alone would be, to those who may wish to make any calculation, or to form a practical rule upon them for their own guidance.

The appendix contains the specifications for all the artificers' work, with the dimensions of the several parts and the priced estimates;—the drawings accompanying the paper were executed by Mr. Macniel's assistant, George Ellis, Assoc. Inst. C. E.

"Description of the mode adopted for sinking a Well, at Messrs. Truman, Hanbury, Buxton, and Co.'s Brewery." By Robert Davison, M. Inst. C. E.

The author commences this communication, by stating that one of the principal objects of the brewers, is to obtain a constant supply of water at a low temperature, for the purpose of cooling the worts, particularly during the summer months. The quantity of water to be obtained from the land-springs has (he says) been represented as not to be depended upon; this would probably be correct, if required, as frequently proposed, for the supply of all the wants of a city; but if a well is properly sunk, there can be no doubt of obtaining a supply of 80 to 100 gallons per minute.

With regard to the quantity of water obtainable from the chalk stratum, the author believes it to be more precarious; for while instances occur occasionally, where a considerable opening is found in the chalk and a plentiful supply is obtained,—the cases it is believed are as frequent, where fissures are not met with and a failure ensues.

He then proceeds to give a narrative of the facts which occurred during the progress of an attempt to sink a cast-iron cylinder from the surface down to the chalk, a depth of about 200 feet, intending to admit the springs at the different levels, as might be considered most advisable.

The well was commenced in the middle of a land-spring well, 16 feet diameter, and in order to avoid the usual inconveniences of pumping and excavating, Mr. Clark, of Tottenham, performed a large part of the work with the "Miser," instead of by the usual methods of well-sinking.

The land-spring well was drained January 25, 1839, and the excavation of a well, 11 feet diameter, was commenced; this was carried down of a clear diameter of 8 feet 6 inches inside the brick steening, and when it had arrived at the depth of 115 feet 3 inches, the first cast-iron cylinder was lowered, and others were gradually added, shutting out the springs as they were passed, until April 3, when, at the depth of 135 feet, in a bed of yellow clay and pebbles, the water overpowered the excavators, and after trying many methods of continuing the excavation, the use of the "Miser" was resorted to, when the cylinders had gone down to 144 feet. On the 11th of May, the oyster bed was reached, at 163 feet depth; and after some deliberation, it was resolved to continue sinking down to the chalk. For seven days the men were employed in "jumping" a heavy chisel bar to break through the hard rocky crust of this oyster bed; at length, between the 25th and the 27th of May, the cylinders suddenly sunk 5 feet 6 inches; the misering was continued until the depth of 189 feet 10 inches was attained, and the cylinders were found to be completely fixed. A pressure of nearly 100 tons, applied by powerful screws, was tried, without producing any effect; it was therefore determined to fill all the space between the steining and the exterior of the cylinder with concrete, although a portion of the steining was discovered to have given way; it was supposed that the cylinders would have been held up by the pressure against the steining and the earth; the pump-work was therefore fixed, and after a time the pumping commenced. On the 21st October, after no more than the usual pumping, (the water generally containing sandy sediment,) it was observed that the pavement around the well had given way; the machinery was stopped, and immediately there occurred a rumbling noise within the cylinders, which lasted probably four or five minutes; on examination, it was found that the cylinders had sunk 4 inches, the main girders, across the top, were broken, and on sounding the well, it was discovered that an extensive "blow" of sand had taken place, and filled the bottom of the well for nearly 28 feet; this was cleared out by misering, and after recommencing pumping for some time, on the 14th December a separation of the cylinders, about 2½ inches wide, was discovered at about 73 feet from the surface. Mr. J Braithwaite and Mr. J. Simpson were consulted as to the best method of proceeding; the former was of opinion that there was such a subsidence behind the cylinders, as would endanger the safety of the surrounding buildings. The latter did not take so serious a view of the matter; but he suggested the sinking of an internal cylinder, if the original one could not be forced down.

After this examination, a portion of one of the cylinders was cut away at 72 feet from the surface, where the soft part of the clay commenced, and a doom was constructed with brick and cement all round the exterior of the cylinder, with the intention of supporting the brick steining and strata above, and also to carry off the water, and prevent its softening the clay and the concrete.

On the 18th of March, 1840, an internal cylinder of 2 feet diameter was lowered, within the original cylinder, and continued sinking until it reached the chalk, into which it was driven 4 feet; the space between the large and small cylinders was then filled in with granite paving-stones for 5 feet in depth, and then with smaller stones, broken bricks, &c. mixed with hydraulic cement, to the depth of 25 feet, thus forming an effectual barrier against any future "blow" of sand from the original bottom of the well.

After all was imagined to be secure and the pumping had recommenced, a second separation, to the extent of 4 inches, was discovered in the cylinder. The gap thus formed was first filled in completely with wooden wedges, and a cast-iron cap was afterwards bolted within side. The well was then drained, and 400 holes, ¼ inch diameter, were drilled in the cylinder, immediately beneath the oyster bed, to admit the water from that level. It was ascertained also by experiment, that the quantity of water obtained from the 2-feet bore in the chalk, was about 22 gallons per minute. The bore was then continued for a depth of 200 feet, making the total depth of the well and the bore from the surface, nearly 400 feet, when a supply of water was obtained of 33 gallons per minute. Some of the joints of the cylinders were then picked out to admit the water, and, from all the sources combined, the quantity of water obtained was about 81 gallons per minute, or 135 barrels per hour; that is, 55 barrels from the chalk-spring, and 80 barrels from the sand-spring, per hour.

The cost of the well and the bore was £4444, to which must be added the expense of a 12-horse steam-engine and pumps, £1351, making a total cost of £5795.

Appended to the paper is the report of Mr. James Simpson, which gives a very clear account of the state in which he found the well, and the remedies which he suggested for the accidents which had occurred.

It is illustrated by two drawings, showing in detail a vertical section of the well, with all the pumps and machinery, and also the tools used in the excavation and the bore.

SESSION 1843.

January 10.

The PRESIDENT in the Chair.

THE business of the meeting was commenced by reading an abstract of Mr. Davison's Paper, (No. 539,) describing the mode adopted for sinking a well at Messrs. Truman, Hanbury, Buxton, and Co's. Brewery, which was published in the Minutes of Proceedings of the session 1842, and the following observations were made.—

Mr. Braithwaite described the difference between the method employed in sinking the well for Messrs. Truman and Co., and that for Messrs. Reid and Co. In the former the bore was small, and would, therefore, only produce as much water as was procured from the veins through which it passed vertically; while the latter, by its larger diameter, permitted lateral galleries to be driven in the direction of the fissures in the chalk: thus forming feeders for the well, and, at the same time, capacious reservoirs wherein the water accumulated when the pumps were not at work.

He attributed the comparative failure at Messrs. Truman's, to errors in the mode of sinking: the length of the cylinders which had been attempted to be forced down was too great, and the lateral pressure had prevented them from reaching the chalk; so that when the pumps were set to work, an undue quantity of sand was drawn up with the water, causing a cavity behind the brick-work, which at length fell in. The water having been pumped out to a lower level than was proper, the equilibrium between the water and the sand around the cylinder had been disturbed, and the "blow" of sand had ensued.

The New River Company had been advised to sink a well of sufficient diameter to enable them to excavate lateral galleries, but they had sunk their well in the Hampstead Road, of a small diameter, as described in the paper by Mr. R. W. Mylne, published in the third volume of the Transactions of the Institution; and although fissures had fortunately been traversed, which gave an ample supply of water, many of the difficulties encountered would, he contended, have been avoided by adopting the larger diameter, and sinking the cylinders into the chalk, before the pumping was commenced.

The supply of water at Messrs. Reid's well had been sensibly affected by the recent proceedings at the Hampstead Road well, which was now being constantly pumped in order to sink it deeper.

Mr. Davison explained, that a bore of small diameter had been adopted, because it was calculated that a supply of water, sufficient for the wants of the brewery, would have been obtained by it. The excavation to within 5 feet of the chalk was suggested by the sudden dropping of the cylinder. He believed that when (contrary to his express instructions) the level of the water was reduced, by pumping, to below a given point, the sand from beneath the oyster-bed rushed in to restore the equilibrium within the cylinder, and thus caused the difficulties which he had to contend with.

During the last year the pumps had been at work 1616 hours, in which time 300,000 barrels, or 50,000 tons of water, had been drawn from the well.

Mr. Farey believed that the casualites in well sinking, generally arose from the sources which had been mentioned. Mr. Woolf encountered them when sinking the well at Messrs. Meux' (now Messrs. Reid's) Brewery. The pumping up of sand with the water, was there carried to such an extent as to cause an accumulation of sediment 2 feet deep in the liquor back, in 14 days, and ultimately the new well broke into the old one adjoining it.

Mr. Braithwaite explained, that in the year 1814, the well at Messrs. Meux' was pumped "to clear the spring," which caused a cavity of nearly 40 feet from the sides of the well, and endangered the stability of the buildings around. Piles were therefore driven to support the upper ground, and upon them the brick steining was carried up. If the cylinders had in the first instance been carried down to the chalk, before the pumping had commenced, this accident would not have occurred.

Mr. Vignoles remarked, that the same question, as to the relative merits of boring or sinking, had been discussed at Liverpool, for wells, in the red sandstone; and in practice it had universally been found that, by the latter system, the best supply of water had been procured, particularly when side-drifts had been made.

Mr. Mylne said, that the works at the well in the Hampstead Road, which had been repeatedly stopped from accident, were now resumed as an experiment. The quantity of water obtained was more than could be drawn by a pump 12 inches diameter, 6 feet stroke, making 10 strokes per minute (= 294 gallons per minute). The spring was struck at about 234 feet below the surface of the ground, and when the engine was regularly at work, the water generally stood at within 20 feet from the bottom of the well. He coincided in the opinion of the advantage of a well of large diameter over one of small bore, as it permitted side excavations to be made in search of water. This plan had been pursued with success at Brighton.

Mr. Taylor observed, that another of the advantages of the large diameter was, that the proceedings could be watched, and accidents could be more readily remedied. The opinion of all practical miners was, that the large diameter was cheaper, as well as better, than the small bore.

Mr. Clark promised an account and drawings of a well now sinking by him at the Royal Mint. The advantages of a large diameter were manifest to all practical men, particularly when the auger, or "miser," was used, as it enabled the operation to be continued without pumping. The cylinders, in lengths of not more than 30 feet each, followed the "miser" down regularly, and as soon as they reached the chalk, the operation was considered safe; and as the "miser" did not excavate more than was due to the area of the cylinder, the equilibrium between the water within and the sand without the cylinder, was never disturbed. In a well sunk by him at Messrs. Watney's Distillery, the cylinders were 11 feet diameter. The "miser" used was 5 feet diameter, and was turned by twelve men at a time.

Mr. Braithwaite concurred in the advantages of using the "miser." He invariably employed it, and generally with success.

Mr. Farey believed that the "auger," or "miser," was first used in this country by the late Mr. Vulliamy, of Pall Mall, for sinking an Artesian well, into which there was an irruption or blow of sand, the effect of which was only overcome by this instrument.

No. 548. "An Experimental Inquiry as to the Co-efficient of Labouring force in Overshot Water-wheels, whose diameter is equal to, or exceeds the total descent due to the fall; and of Water-wheels moving in circular channels."

By Robert Mallet, M. Inst. C. E.

This paper is partly mathematical, and partly experimental.

The investigation which it details, the results of which are given in ten tables of experiments, had in view principally to obtain the definite solution of the following questions:—

1st. With a given height of fall and head of water, or, in other words, a given descent and depth of water in the pentrough, will any diameter of wheel, greater than that of the fall, give an increase of labouring force (*i. e.*, a better effect than the latter), or will a loss of labouring force result by so increasing the diameter?

2nd. When the head of water is necessarily variable, under what conditions will an advantage be obtained by the use of the larger wheel, and what will be the maximum advantage?

3rd. Is any increase of labouring force obtained by causing the loaded arc of an overshot wheel to revolve in a closely fitting circular race, or conduit; and if so, what is the amount of advantage, and what the conditions for maximum effect?

The author briefly touches upon the accepted theory of water-wheels, the experimental researches of Smeaton, and the recent improvements in theory, due to the analytic investigations of German and French Engineers.

Smeaton, in his Paper on Water-wheels, read to the Royal Society in May, 1759,—and Dr. Robinson, in his Treatise on Water-wheels,—lay down as a fixed principle, that no advantage can be obtained by making the diameter of an overshot-wheel greater than that of the total descent, minus so much as is requisite to give the water, on reaching the wheel, its proper velocity.

The author, however, contends, that while the reasoning of the latter is inconclusive, there are some circumstances which are necessarily in favour of the larger wheel, and that conditions may occur in practice, in which it is desirable to use the larger wheel, even at some sacrifice of power; and that hence it is important to ascertain its co-efficient of labouring force, as compared with that of the size assigned by Smeaton for maximum effect.

The author states, first, the general proposition, that the labouring force ("travail" of French writers, or "mechanical power" of Smeaton,) of any machine for transferring the motive power of water, "is equal to that of the whole moving power employed—minus the half of the *vis via* lost by the water on entering the machine, and minus the half of the *vis via* due to the velocity of the water on quitting it." He deduces from the theory, the following results, coinciding with the conclusions obtained by experiment.

1st. If the portion of the total descent passed through by the water before it reaches the wheel, be given, the velocity of the circumference should be one-half that due to this height.

2nd. If the velocity of the circumference be given, the water must descend through such a fraction of the whole fall before reaching the wheel, as will generate the above velocity.

3rd. The maximum of labouring force is greater, as the velocity of the wheel is less; and its limit theoretically approaches that due to the whole fall.

General equations are given, expressing the amount of labouring force in all the conditions considered, and their maxima.

One of the principal advantages of using an overshot wheel, greater in diameter than the height of the fall, is the power thus afforded, of rendering available any additional head of water occurring at intervals, from freshes or other causes, by admitting the water upon the wheel at higher levels.

The first course of experiments is dedicated to the determination of the comparative value of two water-wheels, one of whose diameter is equal to the whole fall, and the other to the head and fall, or to the total descent; by the head, being in every case understood the efficient head, or that, due to the real velocity of efflux at the shuttle, as determined according to Smeaton's mode of experimenting.

The apparatus employed in this research consisted of two accurately-made models of overshot wheels, with curved buckets. These were made of tin-plates, the arms being of brass, and the axles of cast-iron. Special contrivances were adopted to measure the weight of water which passed through either wheel during each experiment, to preserve the head of water strictly constant, and to determine the number of revolutions and the speed of the wheels.

One wheel was 25·5 inches diameter, the other 33 inches diameter. The value of the labouring force was determined directly by the elevation of known weights to a height, by a silken cord over a pulley; the altitude being read off, on a fixed rule, placed vertically against a lofty chimney; and in other experiments, relatively, by the speed of rotation given to a regulating fly, or vane. The depth of the efficient head was in all cases 6 inches.

The weight of water passed through either wheel, in one experiment, was always 1,000 pounds avoirdupoise.

All the principal results given in the tables accompanying the paper, are the average of five good experiments. From the large scale upon which these were conducted, the accurate construction of the apparatus, and the care bestowed on the research, which was undertaken with reference to an actual case in the author's professional practice, he is disposed to give much confidence to the results.

The weight of water contained in the loaded arc of each wheel is accurately ascertained, and in the tables which accompany the paper, the results of the several experiments are given at length.

The velocity of the wheels, under different circumstances, is carefully noted and discussed, with respect to the maximum force.

The author next ascertains the value of the circular conduits, and states that generally, in round numbers, there is an economy of labouring force, amounting to from 8 to 11 per cent. of the power of the fall, obtained by the use of a conduit to retain the water in the lower parts of the buckets of an overshot wheel, whose diameter is equal to the fall. The velocity of a water-wheel working thus, may vary through a larger range without a material loss of power; and a steady motion is continued to a lower velocity than when it is working in a free race.

The author finally arrives at the following general practical conclusions :—

1st. When the depth of water in the reservoir is invariable, the diameter of the water-wheel should never be greater than the entire height of the fall, less so much of it as may be requisite to give the water a proper velocity on entering the buckets.

2nd. Where the depth of water in the reservoir varies considerably and unavoidably, an advantage may be obtained by applying a larger wheel, dependent upon the extent of fluctuation and ratio in time, that the water is at its highest and lowest levels during a given prolonged period; if this be a ratio of equality in time, there will be no advantage; and hence, in practice, the cases will be rare when any advantage will be obtained by the use of an overshot wheel, greater in diameter than the height of fall —minus, the head due to the required velocity of the water reaching the wheel.

3rd. If the level of the water in the reservoir never falls below the mean depth of the reservoir, when at the highest and lowest, and the average depth be between an eighth and a tenth of the height of the fall, then the average labouring force of the large wheel will be greater than that of the small one; and it will, of course, retain its increased advantage at periods of increased depth of the reservoir.

Dr. Robinson's views, therefore, upon this branch of the subject, should, he contends, receive a limitation.

A positive advantage is obtained by the use of the conduit, varying with the conditions of the wheel and fall, of nearly 11 per cent. of the total power.

The value increases with the wheel's velocity up to 4½ feet per second, or to 6 feet per second, in large wheels. Hence, he argues, that it is practicable to increase the efficiency of the best overshot wheels, as now usually made, at least 10 per cent. by this application. The only objections urged against the use of the conduit are of a practical character, relating to the difficulty of making it fit close, of repair, &c.; but however these may have applied to the rude workmanship of the older wooden wheels, with wood or stone conduits, they are unimportant, as referring to modern water-wheels, made of iron. The conduits may be also made of cast-iron, provided with adjusting screws, and are hence capable of being always kept fitting, readily repaired, and of being withdrawn from the circumference of the wheel in time of frost, &c.

The paper is illustrated by a drawing, giving the elevation and partial sections of the experimental apparatus, and by a diagram shewing the full size of the loaded arc of each model.

[*To be continued.*

List of Patents

Granted by the French Government from the 1st of January to the 31st of March, 1841.

(Continued from page 331, Vol. XXII.)

Huard, of Paris, for an improved mode of shutting milk cans.
Hullmandel, of London, for improvements in lithographic printing.
Houel, of Vadencourt, for an improved nail machine.
Kocher, of Paris, for a lithographic press.
Levy, of London, for an improved gas-meter.
Massot, of Lyons, for an improved loom.
May and Landesmann, of Paris, for water-proof fabrics.
Monneyres, of Nantes, for a mill for grinding tan.

Nicolle Carpentier, of Valenciennes, for an improved mode of dyeing flax.

Nobletson, of Seignelay, for an application to clock-work of the metal called alloyed nickel.

Pape, of Paris, for improved castors.

Paris, of Amiens, for an improved cement.

Parpaite, of Messencourt, for an improved loom.

Perinet, of Paris, for an improved bugle.

Poissant, Girod, and Co., of Besançon, for an improved stove.

Poole, Moses, of London, for improvements in ploughs.

Poole, John David, of London, for an apparatus for evaporating water.

Proeschel, of Paris, for a system of waterproofing.

Robert, of Bordeaux, for an improved chimney.

Remaud, of Paris, for an improved lamp-glass.

Ruolz, of Paris, for a method of gilding without quicksilver.

Ryton, of London, for a method for forming by pressure iron tubes.

Sollier, of Lyons, for improved cushions for billiard tables.

Sulot, of Dijon, for improvements in musical instruments.

List of Patents

That have passed the Great Seal of IRELAND, from the 17*th March,* 1843, *to the* 17*th of May,* 1843, *inclusive.*

To Goldsworthy Gurney, of Bude, in the county of Cornwall, Esq., for certain improvements in the production and diffusion of light and heat.—Sealed 24th March.

John Stephen Bourlier, of Sherborn-street, Blandford-square, in the county of Middlesex, engineer, for certain improvements in machinery used for printing calicos, silks, paper-hangings, and other fabrics,—being a communication from a certain foreigner, residing abroad.—Sealed 3rd April.

Joseph Beaman, of Smethwick, in the parish of Harborne, in the county of Stafford, iron-master, for an improvement in the manufacture of malleable iron.—Sealed 4th April.

Wilton George Turner, of Gateshead, in the county of Durham, Doctor in Philosophy, for improvements in the manufacture of alum.—Sealed 4th April.

Robert William Sievier, of Henrietta-street, Cavendish-square, in the county of Middlesex, Gent., for certain improvements in looms for weaving, and in the mode or method of producing plain or figured goods or fabrics.—Sealed 5th April.

James Byrom, of Liverpool, in the county of Lancaster, engineer, for an improved system of connection for working the cranks of what are commonly called direct action steam-engines.—Sealed 2nd May.

Moses Poole, of Lincoln's-inn, in the county of Middlesex, Gent., for certain improvements in dressing mill-stones,—being a communication from a certain foreigner, residing abroad.—Sealed 4th May.

William Longmaid, of Plymouth, in England, accountant, for improvements in treating ores and other minerals, and in obtaining various products therefrom, certain parts of which improvements are applicable to the manufacture of alkali.—Sealed 4th May.

Edward Bell, of the College of Civil Engineers, Putney, in the county of Surrey, Professor of Practical Mechanics, for improvements in applying heat in the manufacture of artificial fuel, which improvements are applicable to the preparation of asphalte, and for other purposes.—Sealed 7th May.

John Thomas Betts, of Smithfield Bars, in the county of Middlesex, Gent., for improvements in the manufacture of metal covers for bottles and certain other vessels, and in the manufacture of sheet metal for such purposes,—being a communication from a certain foreigner, residing abroad.—Sealed 7th May.

Matthew Allen, of High Beech, in the county of Essex, Doctor in Medicine, for an improvement in producing uneven surfaces on wood,—being a communication from a certain foreigner residing abroad.—Sealed 13th May.

List of Patents

Granted for SCOTLAND, subsequent to April 22nd, 1843

To William Edward Newton, of the Office for Patents, 66, Chancery-lane, London, civil engineer, for certain improvements in the construction of boxes for the axles or axletrees of locomotive engines and carriages, and for the bearings or journals of machinery in general; and also improvements in oiling or lubricating the same,—being a foreign communication.—Sealed 26th April.

Nicolas Henri Jean François, Comte de Crouy, of Connaught-terrace, London, for certain improvements in rotatory pumps and rotatory engines.—Sealed 28th April.

Henrick Zander, of North-street, London, for certain improvements in steam-engines, boilers, and furnaces, and in the methods of feeding the same; as also the machinery for applying steam-power to propelling purposes.—Sealed 2nd May.

Pierre Pelletan, of Bedford-square, London, for improvements in the production of light.—Sealed 4th May.

William Mayo, of Lower Clapton, and John Warmington, of Wandsworth-road, London, for improvements in the means of and apparatus for manufacturing gaseous liquors, and for filling bottles and other vessels used for holding the same, and retaining the contents therein, and emptying the same when required, — being a foreign communication.—Sealed 4th May.

Isham Baggs, of Wharton-street, London, chemist, for improvements in the production of light.—Sealed 9th May.

André Eustache Gratien Auguste Maurras, of Cornhill, London, for certain improvements in the process and apparatus for filtering water and other liquids; a part of which improvements are his invention, and the remainder communicated to him by a foreigner residing abroad.—Sealed 17th May.

New Patents
SEALED IN ENGLAND.
1843.

To James Stewart, of Gloucester Crescent, Gloucester Gate, St. Pancras, piano-forte maker, and Thomas Lambert, of Albany-street, St. Pancras, piano-forte maker, for improvements in the action of piano-fortes.—Sealed 29th April—6 months for inrolment.

Moses Poole, of Lincoln's-inn, Gent., for improvements in making decoctions of coffee and other matters,—being a communication.—Sealed 29th April—6 months for inrolment.

James Hesford, of Great Bolton, Millwright, for improvements in the manufacture of certain bowls or rolls.—Sealed 2nd May —6 months for inrolment.

Josiah Longmore, of Regent-street, Kennington, silversmith, for certain improvements in pens, pen-holders, and pencil-cases, part of which improvements are applicable to other useful purposes.—Sealed 4th May—6 months for inrolment.

Edward Morewood, of Thornbridge, Derby, merchant, and George Rogers, of Chelsea, Gent., for improved processes for coating metals.—Sealed 4th May—6 months for inrolment.

Francis Daniell, of Camborne, Cornwall, assay master and analytical chemist, and Thomas Hutchinson, of Rosewarne, in the same county, Esq., for certain methods of obtaining or manufacturing lime from a substance or substances not hitherto made use of for that purpose.—Sealed 4th May—6 months for inrolment.

John Turnbull, of Hollywell Mount, Shoreditch, card maker, for improvements in the manufacture of horse-shoes.—Sealed 6th May—6 months for inrolment.

James Roose, of Wednesbury, Stafford, for an improvement or improvements in the mode or method of manufacturing welded iron tubes.—Sealed 9th May—2 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improvements in the construction of boxes for the axles or axletrees of locomotive engines and carriages, and for the bearings or journals of machinery in general; and also improvements in oiling or lubricating the same,—being a communication.—Sealed 15th May—6 months for inrolment.

John Tappan, of Fitzroy-square, Gent., for certain improvements in machinery for preparing and spinning hemp, and such other fibrous materials as the same is applicable to,—being a communication.—Sealed 15th May—6 months for inrolment.

Robert Alexander Kennedy, of Manchester, cotton spinner, for certain improvements in machinery for grinding and sharpening cards, used in carding cotton or other fibrous material.—Sealed 15th May—6 months for inrolment.

John Lucena Ross Kettle, of Upper Seymour-street, Portman-square, Esq., and William Prosser, Jun., of Shaftsbury-terrace, Pimlico, Gent., for improvements in the construction of roads, and in carriages to run thereon.—Sealed 16th May—6 months for inrolment.

Joseph Burch, of the City-road, engineer and machinist, for certain improvements in machinery for printing on cotton, silk, woollen, paper, oil-cloth, and other fabrics and materials; and certain apparatus to be used in preparing the moulds and casting surfaces for printing; and for certain modes of preparing surfaces, previous to the design being delineated upon them.—Sealed 16th May—6 months for inrolment.

William Mills, of Foster-lane, glove manufacturer, for improvements in fastenings for gloves and other wearing apparel, and in the mode of attaching the same.—Sealed 16th May—6 months for inrolment.

John Thompson, of Albury, near Guildford, Doctor of Medicine, for certain improvements in bedsteads and couches for invalids. —Sealed 16th May—6 months for inrolment.

Joseph Mazzini, of King's-road, Chelsea, Gent., for improvements in typographical printing, combining the advantages of moveable types with the stereotype process, by substituting, for distribution, a special font for each new work, by means of a pneumatic machine for casting, and a uniplane machine for composing,—being a communication.—Sealed 16th May—6 months for inrolment.

John Winter Walter, of Stoke-under-Ham, Somerset, glove manufacturer, for improvements in the manufacture of gloves.—Sealed 16th May—6 months for inrolment.

Robert Walker, Jun., of Glasgow, merchant, for certain improvements in propelling ships and boats.—Sealed 18th May—6 months for inrolment.

Charles Maurice Elizee Sautter, of Austin Friars, London, Gent., for improvements in the manufacture of borax.—Sealed 22nd May—6 months for inrolment.

Christopher Nickels, of York-road, Lambeth, Gent., for improvements in the manufacture of fabrics, made by lace machinery. —Sealed 22nd May—6 months for inrolment.

Alfred Poole, of Mornington-place, Camberwell-road, Gent., for improvements in drying malt and grain.—Sealed 25th May —6 months for inrolment.

Henry Austin, of Hatton Garden, civil engineer, for improvements in wood pavements, floorings, and veneers.—Sealed 25th May—6 months for inrolment.

George Johnson, of Tottenham, tallow chandler, for improvements in the manufacture of candles.—Sealed 25th May—6 months for inrolment.

John Nisbett, of Elm-street, Long-lane, Bermondsey, engineer, for improvements in preparing hides and skins, in the manufacture of certain descriptions of leather.—Sealed 25th May—6 months for inrolment.

Sarah Beadon, of Hope Corner, Taunton, Somerset, for improvements in apparatus for regulating the inclination of vessels, for the purpose of drawing off liquids contained therein, in the construction of casks and such like vessels, and in the means of drawing off liquids; part of which improvements are applicable for regulating the inclination of looking-glasses and other articles,—being a communication.—Sealed 25th May—6 months for inrolment.

Moses Poole, of Lincoln's Inn, Gent., for improvements in the deposition of certain metals, and in apparatus connected therewith,—being a communication,—Sealed 25th May—6 months for inrolment.

John Gillett, of Brailes, in the county of Warwick, farmer, for an improved machine or apparatus for cutting or boring ricks.—Sealed 25th May—6 months for inrolment.

John Bushby Gibson, of Nantwich, Cheshire, Esq., for certain improvements in the manufacture of salt.—Sealed 25th May—6 months for inrolment.

Elijah Galloway, of Seymour-street, Euston-square, civil engineer, for certain improvements in the machinery for propelling ships and other vessels.—Sealed 25th May—6 months for inrolment.

Alexander Bain, of Oxford-street, mechanist, for certain improvements in producing and regulating electric currents, and improvements in electric time-pieces, and in electric printing, and signal telegraphs.—Sealed 27th May—6 months for inrolment.

Richard Henry Billiter, of Maze Pond, Southwark, oil merchant, for improvements in filtering oils.—Sealed 27th May—2 months for inrolment.

Arthur Hill, of the Slad Parsonage, near Stroud, Gloucestershire, clerk, for an improved shower-bath.—Sealed 27th May—2 months for inrolment.

CELESTIAL PHENOMENA FOR JUNE, 1843.

D.	H.	M.	
1			Clock after the sun, 2m. 35s.
	—		☽ rises 6h. 35m. M.
	—		☽ passes mer. 2h. 47m. A.
	—		☽ sets 10h. 46m. A.
	—		Occul *g* Geminorum, im. 8h. 47m. em. 9h. 40m.
	13	7	♃'s third satt. will em.
3			Occul *h* Leonis, im. 8h. 45m. em. 9h. 42m.
	12	50	♃'s first satt. will im.
4	1	3	☿ in the descending node
5			Clock after the sun, 1m. 57s.
	—		☽ rises 11h. 47m. M.
	—		☽ passes mer. 6h. 8m. A.
	—		☽ sets Morn.
	2	35	☽ in □ or first quarter.
6	0	15	♂ in oppo. to the ☉
	2	43	☿ stationary
8	13	33	♃'s third satt. will im.
8	17		☽ in Perigee
10			Clock after the sun, 1m. 2s.
	—		☽ rises 6h. 41m. A.
	—		☽ passes mer. 10h. 40m. A.
	—		☽ sets 1h. 52m. M.
	14	44	♃'s first satt. will im.
11	6	36	♂ in conj. with the ☽ diff. of dec. 1. 13. S.
12	7	11	Ecliptic oppo. or ○ full moon
14	4	38	☿ in Aphelion
	7	27	♄ in conj. with the ☽ diff of dec. 2. 2. S.
14			Mercury R. A. 5h. 58m. dec. 20. 43. N.
	—		Venus R. A. 3h. 26m. dec. 17. 12. N.
	—		Mars R. A. 17h. 19m. dec. 24. 25. S.
	—		Vesta R. A. 10h. 19m. dec. 17. 13. N.
	—		Juno R. A. 21h. 48m. dec. 1. 16. S.
	—		Pallas R.A. 8h. 42m. dec. 7. 0. N.
	—		Ceres R. A. 9h. 37m. dec. 23. 37. N.
	—		Jupiter R. A. 22h. 0m. dec. 13. 11. S.
	—		Saturn R. A. 19h. 46m. dec. 21. 11. S.

D.	H.	M.	
	—		Georg. R. A. 0h. 9m. dec. 0. 9. N.
	—		Mercury passes mer. 0h. 30m.
	—		Venus passes mer. 21h. 59m.
	—		Mars passes mer. 11h. 11m.
	—		Jupiter passes mer. 16h. 28m.
	—		Saturn passes mer. 14h. 15m.
	—		Georg. passes mer. 18h. 37m.
15			Clock before the sun, 0m. 1s.
	—		☽ rises 10h. 30m. A.
	—		☽ passes mer. 2h. 21m. M.
	—		☽ sets 7h. 5m. M.
17	0	20	♃ in conj. with the ☽ diff. of dec. 5. 43. S.
	—		Occul *k* Aquarii, im. 15h. 12m. em. 16h. 26m.
18	16		☿ in inferior conj. with the ☉
19	8	30	☽ in □ or last quarter
19	22	31	♅ in conj. with the ☽ diff. of dec. 6. 34. S.
20			Clock before the sun, 1m. 30s.
	—		☽ rises 11h. 54m. A.
	—		☽ passes mer. 6h. 10m. M.
	—		☽ sets 0h. 55m. A.
21	15	3	☉ enters Cancer, — Summer commences
	16		☽ in Apogee
	—		Occul 101 Piscium, im. 15h. 26m. em. 15h. 46m.
23	23	2	♅ in □ with the ☉
	13	40	♃'s second satt. will im.
	—		Occul ζ Arietis, im. 15h. 26m. em. 16h. 27m.
25			Clock before the sun, 2m. 8s.
	—		☽ rises 1h. 35m. M.
	—		☽ passes mer. 9h. 58m. M.
	—		☽ sets 6h. 28m. A.
25	3	25	♀ in conj. with the ☽ diff. of dec. 3. 27. S.
26	9	53	☿ in conj. with ☽ diff. of dec. 5. 25. S.
	13	1	♃'s first satt. will im.
27			☉ eclipsed, invis. at Greenwich
	7	20	Ecliptic conj. or ● new moon
	11	57	♃'s fourth satt. will im.
28			Juno stationary
30	6	14	☿ stationary

J. LEWTHWAITE, Rotherhithe.

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No. CXXXIX.

Recent Patents.

To John Clay, *of Cottingham, in the county of York, Gent.*, *and* Frederick Rosenborg, *of Sculcoates, in the county of York, Gent., for improvements in arranging and setting-up types for printing.*—[Sealed 21st March, 1842.]

These improvements in arranging and setting-up types for printing, consist in the construction and employment of peculiar combinations of mechanism, hereafter explained; the first of which is for arranging the types, that is, performing the operation commonly called "distributing," in a peculiar manner, so that they are arranged, after they have been used for printing, according to their several characters, in distinct columns, ready for insertion into the second, or composing, or setting-up machine; which machine is also peculiarly constructed, as will be hereinafter explained. By means of these improvements, the several types are first arranged, and then selected and brought into lines, forming words and sentences.

In Plate XVII., fig. 1, represents a side elevation of the arranging or distributing machine. A, A, A, are the standards and frame-work, supporting the mechanism; B, is the main horizontal rotary shaft, carrying a pulley C, from whence (passing over guide-pullies D, D,) an endless band is conducted up to a pulley E, upon the end of another horizontal shaft F, F, in front of the machine, and by means of which endless band that shaft is made to revolve. Rotary motion may be given to the main shaft B, by a winch, or other means; and there is a fly-wheel G, fixed upon the main shaft, for regulating the motions. Fig. 2, is a horizontal view of a portion of the top of the machine, drawn upon an enlarged scale, in order to shew the principal working parts more clearly. Fig. 3, is a view of part of the front of the machine. Fig. 4, represents, in vertical section, a portion of the machine, near the pulley E, in fig. 1; and fig. 5, is an elevation of the back part of what may be denominated the sliding frame, seen extending horizontally upon the top of the machine, at H, H, H, in figs. 1, and 2.

In order to arrange or distribute, that is, select the types, and place all those of one letter or character in a distinct column or row, in its own particular groove of the horizontal plate, shewn at I, I, I, in fig. 2, a page, or other convenient quantity of the types or matter, is brought from the printing-press in a galley, and placed in the machine, as at K, in the two detached figures 6, and 7. This galley is supported by a bracket L, at the left-hand side of the machine, and is made fast thereto by a pin, passed through an ear, fixed to the under part of the galley. A small sliding piece or block *a*, is brought up by hand against the end of the page of types, for the purpose of keeping the types together, and forcing them forward. At the front end of the galley there is affixed an upright piece *b*, in which a sliding plate *c*, works vertically; the under edge of this sliding plate is covered with leather, or other soft substance, to prevent it from injuring the type.

A portion of the page of types to be distributed is represented at *d*. These types stand in lines, as when in use on the table of the printing-press; they are to be slidden forward in the galley, by pushing up the block *a*, in order to bring the lines of types, in succession, over a long slot or opening *e*, cut across the bottom of the galley, at its end. When the types arrive at this position, the slider *c*, must be raised, as shewn in the drawing; and upon the depression of the slider, the front line of types will be forced down through the opening *e*, out of the galley, and into the groove of the sliding frame H, placed beneath to receive them. Here the types are held and constantly pressed forward along the groove in the frame H, by a small sliding pusher *f*. This pusher *f*, is, by a pin, connected to an endless chain *g*, attached to the periphery of a pulley M, the axle of which pulley is made fast to the inner end of a convolute spring, contained in the box N, affixed to the side of the sliding frame H. Hence it will be perceived, that by the power of the spring, continually acting, the chain *g*, will be made to carry the pusher *f*, forward, and force the types up against a stop-plate *h*, at the end of the groove of the sliding frame H. The first type in the line will thus be brought immediately over one of the apertures *i*, *i*, *i*, fig. 2, formed by vertical grooves in the face of a horizontal plate P, P, which is fixed upon standards *k*, and extends across the machine, over the front part of the grooved plate I. This plate P, has two rebated ledges *l*, *l*, forming a groove, in which the carriage *m*, *m*, of the frame H, containing the line of types, may be slidden to and fro, across the machine. For the convenience of moving this sliding frame H, on the plate P, a handle Q, is affixed to the carriage, by which the workman shifts, laterally, the position of the sliding frame, for the purpose of bringing the front type of the line, held in the groove, over any one of the apertures *i*, as may be required. The form of these vertical grooves *i*, *i*, *i*, is partially exposed to view in the perpendicular face or front of the plate P, at fig. 3. In order to admit the type freely, the grooves are made wide at top, but toward the lower part the space is contracted to nearly the size of the type, in order to conduct it accurately to the bottom of the groove; and these grooves are severally cut to different depths, according to the thickness of the bodies of the respective types intended to be slidden down them. The grooves *i*, are covered, except at their lower parts, by a face-plate *n*, *n*.

The shaft F, is mounted in brackets, affixed to the vertical part or front edge of the plate I, and carries a series of cams or excentrics *p*, *p*, *p*, best seen in figs. 3, and 4. Each of these cams works in the lower or open part of one of the vertical grooves *i*, *i*, *i*, for the purpose of pushing back any type that may have passed down its groove, and for forcing the type into the horizontal groove of the plate I; which will be best seen in fig. 2, and in the detached section, fig. 4.

In front of the machine, a semi-cylindrical bar R, R, is affixed, which carries the axle of a series of bent levers or keys *q*, *q*, *q*; each of which keys has reference to a certain letter or type, as marked thereon in figs. 2, and 3; and a rack, or series of notches, cut in the said bar, forms the guides in which these levers or keys work. On the side near the end of the carriage *m*, of the sliding frame, a piece *r*, is affixed, having a perpendicular descending arm; and to the front end of this piece, against the descending arm, is appended a bent lever *s*, hanging upon a fulcrum-pin, inserted therein, as seen best in fig. 3. To the upper end of this bent lever, a rod *t*, is attached, by a joint; and the reverse end of this rod *t*, is connected in a similar way to a horizontal slider *u*, acting at the back of the stop-plate *h*, as seen in fig. 2. A little in advance of the piece *r*, there is also affixed to the carriage *m*, a stud, upon which is mounted a bent lever *v*. The end of this lever *v*, as the carriage *m*, *m*, slides to and fro in the groove of the plate P, P, works upon the upper edge of an indented rib *w*, *w*, extended along the plate. This rib *w*, is formed, on its upper edge, with certain elevations, corresponding in height to the thickness of the bodies of the respective types to which such elevations relate; and the end of the said lever *v*, acts upwards against the tail of a crank-lever *x*, mounted upon a stud, fixed in the side of the carriage *m*, as seen in figs. 2, and 5. The vertical arm of this crank-lever *x*, is connected, by a joint-pin, to a rod *y*; which rod, at its reverse end, is in like manner attached to a slider *z*.

Let it now be supposed that a line of types has been forced down from the end of the galley K, by the depression of the slider *c*, as described above, and that the said line of types is situate in the groove of the sliding frame H, as shewn in fig. 2; the workman reads the line of types so situate, and finding the first type of the line to be the letter (h), he applies a finger of his left-hand under the lever or key, marked (h), and lifts that key; by doing which, the upper part of the lever comes against the face-plate *n*, and forms a stop to the sliding frame H. The right-hand of the workman having hold of the handle, now slides the carriage and frame H, toward the left, until the vertical part of the piece *r*, strikes against the side of the projected key (h), by which the progress of the frame H, is arrested. The same movement brings also the lower end of the pendant lever *s*, against the stop, and thereby causes it to move the slider *u*, forward, and to push the first type of the line sideways, out of the groove in the frame H, into a small recess, formed opposite to the end of the slider *u*. But before this type can be so detached from the groove of the frame, the recess must be formed to receive it; and this is done by the end of the lever *v*, having passed on to an elevation of the rib *w*, which has raised it, and thereby lifted the crank-lever *x*, and drawn back the slider *z*, to such a distance as shall leave a sufficient recess for the body of the type to be passed into; the capacity of this recess depending upon the height of that part of the rib *w*, which is then acting upon the lever *v*; and this is so formed as to correspond, in its height, to the thickness of the particular type or letter to which it belongs. The type, thus brought into the situation described, now slides down the vertical groove *i*, in the face of the plate P, and is conducted, in an erect position, to the bottom of the groove, as described and shewn in fig. 3. Whilst this is going on, the shaft F, is kept constantly revolving, by the means before explained, and the cam or excentric *p*, coming round, forces the type back from the vertical groove *i*, into the horizontal groove of the plate I. Supposing the next letter of the line of types to be (o), the workman, having slidden back the carriage and frame H, towards the right, now lifts the key (o), and brings the piece *r*, as before, up to the stop, when the type is in the same way delivered into one of the vertical grooves *i*, and then, by its rotary cam, pushed back into its horizontal groove, in the plate I. By these means, all the types of the line are, in succession, brought up and stopped by the key answering to its letter or character; and thus the letters, of the same character, are successively distributed and introduced into their own proper groove in the horizontal plate, and by that means are "arranged" in columns, ready to be placed in the composing machine, and to be operated upon in the manner about to be explained.

It is only necessary further to say, that on inserting every fresh line of types into the groove of the sliding frame H, the pusher must be brought back, which will wind the convolute spring, in the box, up to tension; the spring will thereby acquire the power of turning the pulley, and working the chain, so as to force the pusher forward, and keep the types up against the stop plate *h*, as long as any remain in the groove of the slide.

If thought desirable, the sliding carriage of this distributing machine may be dispensed with, and the types distributed into a case, by hand, in the ordinary manner; and by making the bottom of each compartment of the case in the form of a funnel, the types will be carried down by their own gravity through an aperture, made for that purpose, of the proper shape and size, at the bottom of the funnel. When the types pass through these apertures, they are conveyed, by channels or grooves, into the grooves of the plate I, where they are ranged in columns or rows, in the manner above described. Or the following method may be employed, the sliding carriage and the keys being dispensed with:—Instead of placing the plate P, fig. 3, (in which the grooves *i*, *i*, *i*, are made,) in a vertical position, this plate may be placed in an inclined position, as seen in figs. 8, and 9; fig. 8, being a front view, and fig. 9, a sectional view of this arrangement of the distributing machine. It will be seen, upon referring to these figures, that instead of placing the openings of the grooves *i*, *i*, all in one row, as in figs. 2, and 3, there are two rows, one placed behind and above the other. By this means, the apertures, in which the types are deposited, can be made of greater dimensions, so that the distribution may be effected by hand. When the workman drops a type on to the face-plate, in one of the compartments, the type descends by its own gravity, as in the other machine, and is forced along the groove in the plate I, by excentrics, mounted on a longitudinal shaft, as at figs. 3, and 4.

The machine for "composing," that is, setting-up types, in the order of words, lines, and pages, is shewn in the following figures of the drawings:—Fig. 10, is a front elevation of the machine, complete, and in working order; fig. 11, is an elevation of the same, as it would appear if viewed at the left-hand end of the machine; fig. 12, is a horizontal view of the same, as seen from above, a portion of the cover being removed, for the purpose of exposing parts of the works beneath; fig. 13, is a vertical section, taken longitudinally through about the middle of the machine, in the dotted line A, B, of fig. 12, parallel to the front; and fig. 14, is a vertical section, taken transversely in the line C, D, of the same figure.

The frame-work of the machine is represented at A, A, A, upon which are fixed two horizontal standards B, B, and upon these are mounted two parallel longitudinal plates C, C, placed edgeways, with their upright framings carrying a horizontal longitudinal bar D, having a groove along the middle of its upper surface, in which groove the types are slidden, when the machinery is in operation. On the upper edges of this bar D, two flat longitudinal plates *a*, *a*, are affixed, which carry the two upright rack-frames *b*, *b*, that contain the types intended to be operated upon. These types are arranged in vertical columns; each compartment of the rack being respectively filled with a column of types of a certain letter or character; and the columns of types descend by their own gravity, as the single types are severally driven out of the column, at its lower end, by the operations of the machinery about to be explained.

The rack-frames *b*, *b*, are formed by a series of upright grooved rails, which, upon referring to fig. 13, will be seen to have a space, about the thickness and length of the type in each column, cut away at the bottom of the grooves, formed by the rails *b*, *b*, in order to allow the types to be pushed out on to the endless belt or chain. The height of these spaces in the grooves must correspond with the thickness of each type, so that not more than one type may be pushed out of the column at one time. When a number of these rails are ranged together, side by side, so as to form the rack-frame, shewn in fig. 13, a number of compartments are formed, which are wider than the length of a type; so that when a column of type is placed in one of these compartments, the types descend, as above mentioned, by their own gravity. Two series of keys E, E, E, and F, F, F, are ranged horizontally in front of the machine, as seen in figs. 10, and 12. These keys severally hang, as levers, upon fulcrum-rods *c*, *c*, extending along the machine, as shewn in fig. 14; and the inner extremities of these keys are severally connected, by upright rods *d*, *d*, to one of the small T-formed levers *e*, hanging upon fulcrum-rods in brackets *f*, affixed to the longitudinal plates C, C. The upper end of the cross of each T-formed lever *e*, acts through a slot in a horizontal sliding pusher *g*. These pushers move transversely to and from the several columns of types upon the plates *a*, *a*. It will hence be perceived, that on the compositor striking one of the keys with his finger, the depression of the front part of the key will cause the rod *d*, at its reverse end, to rise, and vibrate the small lever *e*; thereby forcing inward the upper end of its cross, and consequently sliding the pusher *g*, against the lowest type in the column corresponding to that key. The type, thus acted upon, will, by these means, be pushed out of its column, in the rack, into the longitudinal groove, cut in the bar D, where it is to be slidden along into the receiver.

In the receiver the types are formed into lines, by the following means:—An axle G, mounted in the lower part of the frame-work, seen in figs. 13, and 14, carries two pullies H, and I, and also a fly-wheel J. Over the pulley H, an endless belt or chain *h, h, h,* is passed, and also over a series of carrier-pullies *i, i, i.* This belt or chain, as the pullies revolve, is made to travel, horizontally, along the lower part of the groove in the longitudinal bar D; and hence, whenever a type is projected, as above described, from one of the columns into this groove, it necessarily falls upon the upper surface of the band or chain, and is, by the longitudinal progress of the band or chain, carried onward to the receiver, at the left-hand end of the machine. It will be perceived that there are two series of keys, E, and F, and also two series of T-formed levers, *e, e,*—the one series of levers in front of the bar D, the other series at the back of the bar,—and that there are likewise two series of columns of types, ranged in the double rack-frame *b, b*; consequently, by striking the keys E, the front series of levers *e,* and the types of the front columns, will be projected into the groove of the longitudinal bar D; and by striking the keys F, the back series of levers *e,* and the types of the back columns, will be acted upon in a like manner. In the middle of the double rack-frame, between the front and back columns of type, there are, loosely pendant, a series of thin strips of tin *k, k, k,* (see figs. 13, and 14,) the lower extremities of which extend into the groove of the bar D, a little above the upper surface of the belt or chain *h.* These pendant strips are for the purpose of stops, preventing the types being pushed beyond the groove; and there are small pins, extending across the groove, on a level with the plates *a, a,* to support one end of each of the types, when so projected, and prevent its turning over; the other ends of the types falling on to the travelling chain or belt *h*; by the progress of which, they are drawn off the pins, and conducted onward toward the receiver, in the proper positions for depositing them correctly in line, with the face of each type in the same direction.

The several types, for forming words, and for forming the spaces between the words, having thus been successively brought out from the columns of the racks, by the means described, and deposited upon the travelling endless belt or chain *h, h,* they are conducted onward, by the progress of the belt or chain, to the carrier-pulley *i**, and over a transverse triangular guide-bar or bridge, on to a roller *k**, seen near the left-hand end of fig. 13; by which last-mentioned roller, the type is deposited upon the top of a T-formed vertical slider *l*; and as the several types, in succession, come into this situation, they are piled one upon another, forming a line of types, the slider *l*, receding as the types accumulate thereon. In order that the successive types may thus be accurately deposited upon the top of the slider *l*, a roller *m*, mounted in a bracket, is placed over the slider, to act as a presser-roller. A small endless chain *n*, *n*, *n*, which is distended over the roller *m*, and over the pullies *o*, and *p*, also assists this operation. On the axle of the pulley *p*, a spring-lever *q*, hangs loosely, carrying a roller at its end, which presses the chain down upon the roller *k**; and also another spring-lever *r*, carrying a roller, by its pressure keeps the endless chain *n*, always tightly distended. Rotary motion is given to the endless chain *n*, by an endless band *s*, *s*, *s*, passed over the pulley *o*, and over carrier pullies *t*, *t*; which band is actuated by the pulley I, upon the main axle G; and the roller *k**, receives a simultaneous rotary motion, by a small endless band, from a pulley *u*, on the same shaft as that of *o*, represented in figs. 11, and 12.

Another arrangement of this part of the machine is shewn, on an enlarged scale, in the detached figure 20; in which the endless chain *n*, instead of passing round the pullies *m*, *o*, and *p*, as seen in fig. 13, merely passes round the two pullies *p*, and *p**. The types are brought on to the T-shaped slider *l*, by the endless chain *h*, in the same manner as that described in reference to fig. 13; but instead of being forced down to their proper position on the slider *l*, by means of the chain *n*, passing round the pulley *m*, a small snail or wiper *m**, is used; this wiper is mounted on the axle of a band-pulley, and receives a rapid rotary motion from the pulley *o*, by means of a band, and thereby forces the line down, as each type is brought forward and piled on the slider *l*, by the endless chains *h*, and *n*. The endless chain *n*, is also actuated by a band from the pulley *o*, passing round a pulley on the axle *p*. Thus it will be perceived, that as the types are brought onward by the travelling belt or chain *h*, they are successively deposited or piled one upon another, on the top of the slider *l*; and that the slider, by the accumulation of the types, pressed upon by the chain *n*, and roller *m*, or by the cam *m**, in fig. 20, is gradually depressed, until a sufficient number of types have been built up upon it to form a line of the composition. It is necessary here to observe, that a face-plate must be placed against the slider *l*, to prevent the line of types dropping out, as the composition goes on; which plate is shewn at *v*, in the front elevation, fig. 10. For the more perfect illustration of this part of the mechanism, the receiver is shewn, on an enlarged scale, detached from the machine, at figs. 15, 16, 17, and 18.—Figs. 15, and 16, exhibit the receiver and its appendages, as seen in figs. 10, and 13; fig. 17, is an end or edge view of the same; and fig. 18, a back view.

In order to ascertain when a sufficient number of types have been accumulated upon the slider *l*, to form one line of a page of composition, a counting or measuring apparatus is attached, as shewn in the several figures 10 to 14. This apparatus consists of a dial-plate a, seen in front of the machine in fig. 10, immediately under the rest-frame L, on which the compositor places his copy. Through the centre of this dial-plate an inclined shaft b, passes to the back of the machine, as seen in fig. 14. At the hinder part of this shaft there is a pulley c, carrying an endless chain, shewn in fig. 13; which chain passes round another pulley d, seen in fig.12, fixed upon a transverse shaft e. Upon this shaft e, there is also a similar pulley f, situate at the back of the receiver, seen best in the detached figure 18. To this pulley is affixed the end of a chain g; the reverse end of which chain is appended to the lower end of a vertical sliding rod h, constituting the back guide of the T-formed slider *l*, on which the line of types are built up, as described in reference to fig. 13; and upon the shaft e, is also affixed a pulley i, having a weighted friction-band passed over its periphery, to retard partially the descent of the slider. The face of the dial a, is graduated with a scale, representing inches and parts of an inch, in order to shew, by the rotation of the index, how far the slider has descended, when the apparatus is at work, and consequently the length of the line of types accumulated on the top of the slider *l*; an adjustable index is likewise placed upon the face of the dial, as a mark for the workman to regulate the length of each line.

A ratchet-wheel k, with an adjustable click or catch, (see figs. 10, 11, and 12,) is placed upon the axle e, for the purpose of causing a hammer to strike a small bell k*, as a warning, a little time before each line of types is completed upon the slider. Thus one line of types having been built up upon the top of the slider *l*, as indicated by the coincidence of the hands upon the dial-plate, the compositor turns the winch 1, on the shaft e, for the purpose of lowering the line of types to the bottom of the receiver. In order to transfer this line of types into the adjusting-stick, after it has been thus lowered, the compositor moves a horizontal jointed lever m, seen under the keys in figs. 10, 11, and 14. This lever is connected by a rod n, with an arm p, attached to the slider q, which is a flat plate, moveable longitudinally on the face of the receiver, as shewn in figs. 10, 13, 15, and 16. The receiver is constructed of a flat upright plate r, r, against which the T-formed slider *l*, works up and down, and in front of it is attached the face-plate *v*, before mentioned, leaving a narrow space between them for the sliders and line of types to pass, as shewn in fig. 17. At the end of the receiver r, is attached, by a joint, the adjusting-stick s, which is a box, formed by two parallel plates, turning up and down upon a pin t. The adjusting-stick s, being placed upright at the end of the receiver r, as in figs. 10, 13, and 16, and held fast in that situation by a catch u, the slider q, is moved laterally by the lever p, as before said, which forces the line of types out of the receiver into the adjusting-stick. The T-formed slider *l*, may now be again raised to the top of the receiver, by turning the winch 1; and it will then be ready for a fresh line of types to be built upon it, by the means before explained. The adjusting-stick s, is now to be turned down into the horizontal position shewn at figs. 15, and 18, where an assistant compositor corrects any errors that may be necessary; and having done this, he raises the galley v, to the under part of the adjusting-stick s, by turning a handle, with an excentric w, into the situation shewn at fig. 15, and then draws, horizontally, a slider x, by which the types are allowed to descend into the galley, as shewn in fig. 18. The galley is mounted upon a horn-shaped frame y, fixed at the end of the machine, and is suspended by pivots, upon a sliding frame z, which turns horizontally upon the horn-frame, by means of a pin-joint at its end. These parts are best shewn, upon an enlarged scale, at fig. 19. The galley, being occasionally drawn aside by the assistant compositor, is to be slightly inclined, for the purpose of having the lines of type spread out to the required breadth of the page, and leads introduced between the lines, when required.

The patentees, in their specification, shew a slight variation in the endless belt or chain, which conducts the types to the receiver; the chain, in this case, is made sufficiently broad to receive two types abreast, and a longitudinal bar, as a partition between the two types, extends along the machine, operating as a stop, when the types are severally projected from the racks, instead of the pendant strips of tin, shewn at *k*, *k*, *k*, in fig. 13.

Figs. 21, and 22, represent, in two views, an instrument which is denominated a "feeding stick," by means of which a column of types may be lifted from a groove of the distributing machine, and inserted in the proper compartment of the rack of the composing machine.

In these figures, *a*, *a*, is a straight rectangular bar, having a lip or flange *b*, at one end, and a slider or clip *c*, with a similar lip, moveable upon the bar *a*; this slider is made fast upon the bar by a thumb-screw, (when the feeding stick has been charged with types,) and a straight rod *d*, is passed through holes in both the clips *b*, and *c*; which rod must be withdrawn when a column of types is to be taken from one of the grooves of the distributing machine.

In taking up a column of types by this apparatus, the bar *a*, is laid close alongside of the type standing in the groove of the distributing machine, the lip *b*, being in contact with one end of the column; then the slider *c*, is pressed up to the reverse end of the column, and made fast there by the thumb screw. The column of types is thereby clipt tight at its ends, and the rod *d*, is then introduced, to prevent the type from falling out. The feeding stick, with the types thus held, may be carried to the composing apparatus, and slidden down one of the perpendicular compartments of the rack; when, on withdrawing the rod *d*, and unscrewing the clip, the apparatus may be withdrawn, leaving the column of types inserted in the rack ready for use.

The following are the claims made by the patentees:—First,—the peculiar arrangement of mechanism or combination of parts constituting a machine for performing the operation called "distributing" the types; one form or construction of which is shewn in figs. 1 to 9, inclusive.

Second,—the use of the grooved plates I, I, I, (as part of the first improvement,) in which the types are arranged in rows or columns: this plate, although shewn in a horizontal position in the drawings, may be placed in an inclined or perpendicular position.

Third,—the method shewn in figs. 7, and 8, of lowering the types, line by line, from the galley into the travelling carriage.

Fourth,—the use of a travelling or sliding carriage, by means of which, each type is consecutively brought over the proper opening through which it descends into its grooved plate.

Fifth,—the indented rib *w*, and those parts of the sliding carriage which form a recess of the proper width to suit the thickness of the type, and into which the type is pushed, as shewn in the drawings.

Sixth,—the use of the bent levers or keys *q*, whereby the sliding carriage is stopped over the proper aperture through which the type is to descend; and which keys, at the same time, act upon the pusher of the carriage, and thereby force the last type out of the line into the recess, which is formed of the proper width by the indented rib *w*, already mentioned, acting upon a spring lever, connected to the sliding carriage, and which regulates the width of the recess.

Seventh,—the method shewn of forcing the types along the grooves of the grooved plate, by means of the shaft F, and a series of cams or excentrics, as at *p*; whether these cams are used by themselves, or in conjunction with levers or pushers for this purpose.

Eighth,—the method shewn and described in reference to figs. 8, and 9, in which the sliding carriage and keys are dispensed with, and the types deposited, by hand, in openings or grooves *i*, *i*, made in the face of a plate or plates, placed in an inclined position; down which grooves, the types descend, by their own gravity, into the grooves or channels of the plate I, I, I.

The patentees also claim distributing the types, by hand, into a case, (somewhat similar to a compositor's case,) from which they descend, by their own gravity, through openings made in the bottom of each compartment of the case, into grooves, channels, spaces, or receptacles, in which they are arranged in columns or rows, ready for the composing machine.

Ninth,—(in reference to the composing machine,) the general arrangement of the mechanism, shewn in the drawings.

Tenth,—the peculiar method of pushing out one single type from a column in the rack frame, by means of pushers *g*, which are acted upon by the T-shaped levers, in connexion with the keys; so that when any key is depressed, it may, by any mechanical contrivance, push forward the corresponding pusher *g*, and thereby force out the type on to the endless band, which runs in a longitudinal groove at the back of the column of type; and by this means, the type is conveyed to one end of the machine, where it is deposited in the receiver, in the manner described.

Eleventh,—the peculiar construction of rack frame, (as shewn in the drawings,) in which frame, the columns of types are arranged on both sides of the channel or groove, along which, the types, when pushed out, are carried to the receiver.

Twelfth,—the mode in which the types are forced down in the line, after they are brought to the receiver by the endless belt; whether it be effected by means of the small endless chain or belt *n*, *n*, in conjunction with the pulley *m*, round which the chain passes, as seen in fig. 13, or by means of a snail cam, (as shewn in fig. 20,) or other excentric; and whether the said cam or excentric acts itself directly on the type, or through the medium of a lever or pusher.

Thirteenth,—the manner in which the line of types is lowered from the receiver into the galley.

Fourteenth,—the manner in which the galley is mounted in the machine, as shewn in fig. 19.—[*Inrolled in the Petty Bag Office, September,* 1842.]

Specification drawn by Messrs. Newton and Son.

To Charles Callis Baron Western, *of Rivenhall, in the county of Essex, for an improvement in drills, for the purpose of drilling corn, grain, seeds, pulse, and manure.*—[Sealed 3rd November, 1838.]

This invention relates to those drilling machines which are commonly known by the name of the "Suffolk lever drill," and consists, firstly, in the application of an improved fore-axle and wheels, combined with apparatus for guiding the machine. On the periphery of each of the fore-wheels a "feather edge" or rib, in the middle, is formed, to divide the clods of earth which might impede the progress of the machine; and the axle, to which they are attached, is arched or curved: it turns readily upon a centre pin, beneath the front frame of the drill, and near its left end an upright standard is fixed. The upright part of the standard is connected to the lower end of an inclined rod, which has a screw formed upon it, near its upper end; this screw works in a nut, secured to the foot-board of the seat on which the man sits who guides the machine, and the rod terminates in a handle or handles. The machine is guided, in the desired direction, by turning the rod, and thus moving the left-hand end of the fore-axle towards or away from the front part of the machine.

The second part of the invention consists in connecting the levers of the drill (which carry the coulters and coulter-pipes) with their axis, by means of the improved hinge, represented in Plate XVIII. Fig. 1, is a front view, and fig. 2, a section of the hinge. *a*, is part of one of the levers, attached to the hinge by the bolts *b*, *b*, passed through the openings *c*, *c*, and secured by nuts *d*, *d*. The hinges turn on the axis *e*, and the outer ends of the levers are suspended by chains, as usual; so that if the coulters meet with a large stone, or any similar substance, the levers will rise, and allow them to pass over it. Any lateral movement of the levers is prevented, by the insertion of filling-pieces *f*, fig. 3, into the spaces between the barrels *g*, of the hinges; the barrels being made sufficiently long to keep the levers perfectly parallel to each other, and in a line with the course of the machine.

An improvement in the method of fastening the coulters to the levers is also described in the specification; it consists in applying metal sockets to the levers, and securing the coulters therein by means of wedges. Fig. 4, is a plan view, and fig. 5, a longitudinal section of part of a lever, furnished with one of these sockets. *h*, is the socket, which is attached to the lever *a*, by the bolts *i*, *i*, and nuts *j*, *j*; and *k*, is part of the coulter, fixed in the socket by the wedges, *l*, *l*.

The patentee claims, Firstly,—the addition to a drilling machine of a fore-axle and pair of fore-wheels, of a peculiar construction, and of an apparatus for guiding and directing the course of the machine, so as to counteract the unequal draught of the horses, and keep the machine in its proper course, in order that the rows of corn shall be perfectly straight and parallel to each other; and, by which means, in many cases, the horse-hoe may be safely used, and, in all cases, the hand-hoe may be used more readily and effectually than heretofore. Secondly,—the application of the improved metallic joints or hinges to the levers, by which they are kept perfectly parallel to each other, and in a line with the course of the machine. Thirdly,—the application of metal sockets to the levers, by which the share or coulters are fastened thereto, in lieu of the mortices formerly made in the levers.—[*Inrolled in the Inrolment Office, May,* 1839.]

To Alexander Mac Rae, *of the London Coffee-house, Ludgate-hill, for improvements in machinery for ploughing, harrowing, and other agricultural purposes, to be worked by steam or other power.*—[Sealed 24th December, 1839.]

The improved agricultural machinery, above referred to, is intended to be used in the colony of British Guiana, where the cultivated land is flat, or nearly so, and the fields are separated by navigable canals, which run parallel to each other, at a distance of from 240 to 360 feet apart.

The machinery consists of a steam-engine and drum, contained in a punt or other vessel on the canal, at one side of the field, and of a large pulley, contained in a punt on the canal at the other side of the field. The ploughs or other implements are secured to a carriage, mounted on four large wheels, and to this carriage one end of a rope or chain is attached, which passes twice or three times round the drum and then proceeds beneath the carriage to the pulley in the other punt, and, after passing round it, returns to the carriage, and is secured. When the drum is caused to revolve, by the power of the engine, it draws the carriage and implements across the field; and on the motion being reversed, the carriage returns to the other side of the same. This operation is repeated over the whole of the field; the punts and carriage being moved a short distance onward, each time that the motion is reversed.—[*Inrolled in the Inrolment Office, June,* 1840.]

See Heathcoat's specification for cultivating bogs and marshy land, by steam-power, Vol. VIII., page 329, of our Conjoined Series.—Editor.

To William Hensman, *of Woburn, in the county of Bedford, machinist, for improvements in ploughs.*—[Sealed 30th December, 1840.]

These improvements consist in securing the coulter to the plough-beam, in such a manner that its point may be readily moved to or from the land-side of the furrow, whilst at the same time the distance of the coulter from the end of the beam may be easily adjusted.

One of the modes of fastening the coulter is represented at figs. 1 and 2, in Plate XVIII.; fig. 1, being a side view, and fig. 2, a transverse section of part of a plough-beam. The beam *a*, is partly embraced by a plate or clamp *b*, through which the ends of two eye-bolts *c*, *c*, pass, and are secured by two nuts *d*, *d*; these eye-bolts hold the coulter *e*, firmly against the projection *f*, on the beam *a*; and hence, by screwing one eye-bolt tighter than the other, the point of the coulter will be moved to or from the land-side of the furrow. By making the projection *f*, sufficiently long, the coulter may be set at any required distance from the end of the plough-beam *a*.

Another method of attaching the coulter is shewn at fig. 3. *g*, is a plate, on which the projection *f*, is formed, for giving the side motion to the coulter, instead of its being on the beam *a*, as shewn at figs. 1, and 2; against this projection the coulter is held by the eye-bolts *c*, *c*, and the lower bolt, passing through the plough-beam, serves as an axis to the plate *g*. To the front end of the plate a screw *h*, is attached, by a pin-joint, and after passing through the projection *i*, on the side of the beam *a*, receives a nut *j*; by turning which, the end of the plate *g*, is elevated or depressed, and the coulter is thus adjusted to any required degree of inclination or depth of cut.

The patentee claims, Firstly,—the mode of adjusting the coulters of ploughs, by the combined means of a projection *f*, and screws *c*, *c*, as described. Secondly,—the mode of adjusting the coulters, by means of a plate *g*, and adjusting and holding-screws *c*, *c*, and *h*, in combination with the other parts, above described.—[*Inrolled in the Inrolment Office, June,* 1841.]

To WILLIAM NEWTON, *of the Office for Patents,* 66, *Chancery-lane, in the county of Middlesex, civil engineer, for an invention of improved machinery for cleaning wheat and other grain or seeds from smut or other injurious matters,—being a communication.*—[Sealed 11th January, 1841.]

THIS improved machinery, for cleaning wheat and other grain or seeds from smut or other injurious matters, consists of an external cylindrical chamber, within which a peculiar form of fan or beater is made to revolve, for the purpose of agitating the corn, grain, or seed, as it passes through the machine, and also producing a very rapid current of air, by which the smut or other impurities are effectually removed.

The body of the machine is of a cylindrical form, standing in a vertical position upon suitable legs. It consists of an outer cylinder, which is stationary, and within it a second cylinder, constituting a fan, is made to revolve rapidly. Into the space between these two cylinders the grain to be cleaned is fed through a suitable tube, formed for that purpose, and which enters through the side of the outer cylinder, near the upper end. As the grain descends towards the lower part of the machine, it is forcibly beaten by a number of strips or beaters, of metal, fixed round the periphery of the inner cylinder, which is put into very rapid rotary action, thereby forcibly beating the smut-balls, white-caps, and other deleterious substances, of a texture softer than the grain. The rapid rotation of the inner cylinder also produces a strong current of air between the two cylinders, which carries off, through openings in the upper part of the machine, all such light matters as have been separated from the grain; whilst the grain itself, by its superior weight, gradually descends, and passes out through an opening in the bottom of the apparatus.

In Plate XIX., fig. 1, is a vertical section of the machine, taken through its axis; fig. 2, is a section of a part of the outer or stationary cylinder, shewing the arrangement of the longitudinal and oblique ridges formed within it, and with which its whole interior surface is indented; and fig. 3, is a representation, in perspective, of the interior or revolving cylinder. In each of these figures, where the same parts are represented, they are designated by the same letters of reference.

The machine is proposed to be generally made of cast-iron; but the wings and beaters are sometimes of wrought or plate-iron, and attached to the periphery of the cylinder. The general arrangement of the parts of the machine is best shewn in the vertical section, fig. 1. In this, and in the other figures, A, A, is the outer cylinder, which may be thirty-four inches in length, and sixteen inches in its diameter. The lower part of the cylinder is contracted, as shewn at A^1, A^1, and assumes a funnel form, for a depth of about three inches, terminating at A^2, in an open bottom of about ten inches in diameter, through which the cleaned grain falls to the floor, and the current of wind passes up into the machine; the current being rendered much more effective by this contraction at bottom. An inverted bridge *a, a,* sustains the step of the shaft of the inner cylinder, and the legs *b, b, b,* that support the machine, are made fast to the flanch B, B, which may extend out four inches from the body of the cylinder. A similar flanch C, C, extends also from the upper end of this cylinder, between which and the cap-plate D, D, the smut, chaff, and other light substances, are blown out; the flanch and cap-plate being connected together by legs or bars *c, c, c,* which are secured by nuts, and keep the flanch and plate parallel to each other, at a distance of about two inches and a half apart. F, F, is the inner cylinder, which is made to revolve on the shaft E, E. This cylinder is sometimes formed of wood, and covered with sheet-iron; but it is preferred to be made of cast-iron, having the wings and beaters cast with the pieces of which its periphery is composed. These pieces may be made in stave-like strips, of the length of the cylinder, and may be put together by screwing them on to discs of wood G, G; the shaft E, E, being square where it passes through these discs of wood, and being firmly keyed, or otherwise affixed thereto. The inner cylinder is about thirty-one inches in length, and thirteen inches in diameter, and it rises about two inches and a half above the top of the outer cylinder. Sixteen, or any other number of beaters *d, d, d,* extend out radially from this cylinder, passing along it from its lower nearly to its upper end, where they are expanded into vanes or wings, which occupy and revolve within the space between the flanch C, and the cap-plate D. These beaters consist of thin plates, which may be an inch and a quarter in width; and when the cylinder F, is inserted within the cylinder A, the edges of the beaters should stand at the distance of about half an inch from the internal surface of the cylinder. They extend more than halfway up the cylinder, in a vertical direction, and then turn off obliquely; the oblique portions, which are marked d^1, d^1, may be about eight inches in length, and form, at their terminations, angles of from 12° to 20°, with a vertical line. It has been found advantageous to let these oblique portions of the beaters gradually increase in breadth, from their junctions with the vertical parts; so that, at their upper ends, they shall nearly touch the interior of the cylinder A. The wings or vanes *e, e, e,* consist of elongations of the beaters, projecting out from them, so as nearly to fill the space between the flanch C, and the cap-plate D, as shewn in fig. 1. By the rapid revolution of the cylinder F, to which the beaters are attached, these wings expel the air from the upper part of the machine, and, consequently, by producing a partial vacuum within the cylinder A, create a strong draught upwards through it, so as to effect the object of discharging the smut, chaff, and other light substances, as above stated. Under the lower end of the revolving cylinder, there are usually placed four vanes *f, f,* which aid in producing the upward draught; the machine will, however, act well without this addition.

The interior of the cylinder A, is cut into ridges, as shewn in the section fig. 2; these ridges ascend, in a vertical line, from the lower end of the cylinder to within eight or ten inches of its upper end, where they take an oblique direction, forming an angle of about 12°, with a vertical line.

A section, across these ridges, would present a form something like that of the teeth of a saw, as they rise at unequal angles from their base; and it has been found to produce the best effect when the grain is made to strike against those sides of the ridges which are most acute. The obliquity of these ridges, and also of the beaters towards the upper end of the machine, is essential to its proper action, as the grain is thereby beaten downwards, whilst a large portion of it would otherwise be blown out with the smut, &c.

The grain to be cleaned is fed from a hopper, through the tube H, which conducts it into the space between the two cylinders, at the distance of about seven or eight inches from the upper end of the outer cylinder. The inner cylinder makes six hundred revolutions or more in a minute.

The lower end, or gudgeon, of the shaft E, E, has its step in the enlargement I, of the inverted arch or bridge *a, a*, its lower end bearing upon a steel screw *h*, by means of which the height of the cylinder may be accurately adjusted. The part *i*, of the step I, constitutes an oil-cup, and is furnished with a cover *j*, over which a leather collar *k*, is placed. By means of this arrangement, the gudgeon is kept constantly oiled, and the entrance of dust is effectually prevented.

The upper end of the revolving cylinder is supported by and turns upon a hollow cylindrical steel bolt *l*, the upper end of which is held firmly in the bridge-piece J, J; the opening (in which it is confined) in the bridge, having been bored out, so as to coincide exactly with the axis of the shaft E, E. The gudgeon or bolt *l, l*, is surrounded with a leather collar, immediately below the bridge J, J, and being hollow, oil is poured through it into the space or receptacle *n*, in the upper part of the shaft E.—K, is a pulley or rigger, affixed to the head of the revolving cylinder, for the purpose of driving it by a strap.

The particular features of novelty, which the patentee claims, are, Firstly,—the manner of producing a strong upward current of air, by the contraction at the lower end of the outer or fixed cylinder, and the wings or vanes at the upper end of the revolving cylinder. Secondly,—in combination with the foregoing, the peculiar form and direction of the ridges made within the outer cylinder, and surrounding the inner cylinder with peculiar beaters, capable of throwing the grain against the said ridges; such beaters consisting of flat radial strips of metal, which extend vertically along the lower portion of the cylinder, but are inclined towards their upper ends; and Thirdly,—the adaptation of the stationary bolt or hollow gudgeon *l*, *l*, as connected with the receptacle for containing oil, in the manner arranged and connected with the machine.—[*Inrolled in the Petty Bag Office, July,* 1841.]

Specification drawn by Messrs. Newton and Son.

To JOSEPH HALL, *of Cambridge, grocer and draper, for a seed and dust disperser, which is particularly applicable to the freeing of corn and other plants from insects.*—[Sealed 14th January, 1841.]

THIS machine may either be employed for the removal of insects from the leaves of plants, or, by making certain alterations in it, as exhibited in Plate XVIII., it can be transformed into a drill, and used for depositing seed and manure.

Fig. 1, is a side view of the machine, suitably arranged for removing insects. It consists of a frame or body *a*, carried by two wheels *b*, and containing a large bellows, with its case; the lever of the bellows being worked by a rod *c*, connected by a link *d*, with the pinion *e*, which receives motion from the axle *f*, through the wheels *g*, and *h*. Behind the bellows-case is a box, for holding powdered lime, or other suitable dust, and from it a number of tubes *i*, descend; the lower ends of which are furnished with nozzles or dispersers *j*, and are connected with pipes *k*, which descend from the wind-chest of the bellows. Within each of the tubes *i*, a rod or wire, attached to a crank-shaft *l*, is suspended, and into these rods a number of short pieces of wire (bent into the shape of the figure 8,) are inserted. *m*, is a screw, which works through a nut-plate *n*, and is used for supporting the gudgeons of the seed and dust-box, when the machine is used as a seed and dust disperser.

The action of the various parts is as follows:—As the machine is drawn forwards, the wheels *g*, *h*, and pinion *e*, revolve, and set the bellows in motion; and at the same time rotary motion is communicated to the crank-shaft *l*, by the wheel *g*, and pinion *o*. By the rotation of the shaft *l*, the rods or wires are moved up and down in the tubes *i*, and the dust, being thus agitated, is caused to descend to the lower parts of the tubes; it is there acted on by the wind from the bellows, and impelled through the nozzles, in an upward direction, against the under surfaces of the leaves of the plants, with sufficient force to remove or destroy any insects that may be upon them.

When the machine is to be used as a seed and dust disperser or drill, various alterations are made in it, as represented at fig. 2. The bellows-case and dust-box, with their appendages, are removed, and, instead of them, a box, for containing seed and dust or manure, is placed in the hind part of the body *a*. A transverse section of the seed and dust-box is shewn at fig. 3; it is divided, longitudinally, by a partition *p*, and in each compartment is a shaft *q*, carrying a suitable number of scoop or cup-wheels *r*; the wheels revolve in separate cells, and above them, at each side of the box, a slanting partition *s*, is fixed, forming receptacles for the seed and dust. The seed is placed at one side of the box, and the dust or manure at the other, and they descend through openings in the partitions *s*, into the cells; which openings are increased or diminished in size, by means of the slides *t*, when required. The seed and dust are raised from the cells by the rotation of the cup-wheels, and delivered through the funnels *u*, into a series of hanging funnels *v*, beneath each pair of cells, and thence, through a large funnel *w*, (inserted into each of the coulters *x*, as represented in fig. 4, which is a detached sectional view of one of them,) into the furrows formed by the coulters; the earth is then raked into the furrows by the rakes *y*, and pressed down by the roller *x*, which follows them.

The coulters, rakes, and roller, are all attached to a frame 1, composed of two semicircular sides, connected together by bars, and fastened to the shafts 2, by suitable bolts. Motion is communicated to the shafts *q*, *q*, by the wheel *g*, and pinion 3, taking into the wheels 4, 4, on the ends of those shafts.

The delivery of the seed and dust can be stopped, when requisite, by turning the funnels *u*, partly round, so as to move the projecting portions of their upper ends out of the range of the cup-wheels, and thus prevent them from receiving the seed and dust, which will fall back again into the cells.

The patentee claims the machine or apparatus, herein described, consisting of parts (such as the frame-work) which are common to it under all circumstances, and of others which are in duplicate, the one or the other being made use of, according as the machinery or apparatus is employed for dispersing seed only, or dust only, or both conjointly; also the exclusive use thereof as a seed and dust disperser, and, more particularly, its application to the freeing of corn or other plants from insects.—[*Inrolled in the Inrolment Office, July,* 1841.]

To JAMES HENRY SHAW, *of Charlotte-street, Blackfriars-road, jeweller and watch-maker, for improvements in setting wheat and other seeds.*—[Sealed 19th June, 1841.]

THESE improvements consist in drilling or setting seed, by the aid of the machine represented in section, at fig. 1, in Plate XVIII. The machine consists of a frame *a*, carried by two large wheels *b*, and two smaller ones *c*; it is drawn by a horse, attached to the shafts *d*, and is guided by the handles *e*. At the front of the machine are a series of ploughs or pressers *f*, which form the furrows for the reception of the seed, and are connected to the frame *a*, by the arms *g*, and wedges *h*. A plan of one of the ploughs is shewn in fig. 2. The seed is contained in a cylinder *i*, mounted upon the shaft *j*, and divided, transversely, into a number of compartments, corresponding to the number of ploughs employed. Around each compartment, twelve tubes *k*, for depositing the seed, are fixed, having each a valve *l*, which is kept closed by a spring *m*, pressing against an arm that projects from the back of the valve.

When the machine is drawn forward, a revolving motion is given to the cylinder *i*, by the cog-wheel *n*, upon the nave of one of the large wheels *b*, taking into the cog-wheel *o*, upon the end of the shaft *j*; and as each tube *k*, in succession, comes over the ploughs, its valve is opened, and a certain quantity of seed is discharged. This is effected by a small roller *p*, carried by the arm of each valve, coming in contact with the inclined end of a curved bar *q*, which causes the roller, with its valve-arm, to move towards the periphery of the cylinder *i*, and open the valve, in opposition to the action of the spring *m*. When the roller has passed the inclined end of the bar *q*, the spring *m*, closes the valve again. The quantity of seed discharged from each tube is regulated by turning the screw *r*, and thus changing the position of a spring-plate, within the tube, so as to contract or enlarge the opening for the egress of the seed. The discharge of seed is stopped, when required, by allowing the cog-wheel *o*, to turn loosely upon its shaft *j*, (with which it is connected by means of a clutch-box) without communicating motion to that shaft, or to the cylinder *i*.

The patentee claims the mode of combining mechanical apparatus into a machine, by applying depositing apparatus, and parts connected therewith, to a revolving cylinder, as above described.—[*Inrolled in the Inrolment Office, December*, 1841.]

To JOSEPH WARREN, *of Heybridge, in the county of Essex, agricultural implement maker, for certain improvements in ploughs.*—[Sealed 9th May, 1842.]

THE first improvement consists in a method of raising or lowering the point of the plough-share, and of regulating the height of the plough-beam.

In Plate XIX., fig. 1, represents the plough-share, and fore part of the plough-frame, with the mould-board removed, to shew the arrangement of parts for raising or lowering the share. *a*, is a wedge, the smaller end of which is inserted beneath the hind end *b*, of the share, and to the back of it a screw *c*, supported by the projections *d*, is attached; *e*, is a bell-crank lever, mounted upon a centre-pin *f*, at the lower part of the plough-frame *g*; the hind end of this lever rests upon the conical part of the screw, and the other end is attached to the mould-board. When the screw *c*, is turned, the wedge is caused to advance or recede, and, by raising the hind end of the share, to depress the point, or *vice versa*; the mould-board is at the same time depressed or elevated by the bell-crank lever, which is worked by the movement of the screw *c*.

In order that the height of the plough-beam may be regulated, the hind end of it is attached to the frame by two bolts, passed through two slots, which are made sufficiently long to admit of the beam being secured at any required height; and it is connected to the front part of the frame by a regulating screw, which passes upwards through the beam, and has a nut upon its end, to prevent the front part of the beam from rising above the desired height.

The second improvement is a modification of the first, and consists in regulating the height and inclination of the beams, and the depth of the shares and mould-boards of ploughs, by securing the beam to the top part of the frame, and connecting the latter with the handles, by means of shifting bolts, and regulating screws, as above described.

A mode of depressing the point of the share, by raising the hind end of the plough-frame, constitutes the third improvement. *i*, fig. 2, is the sole of the plough, connected with the frame *g*, by a pin-joint, at *j*, and having a vertical screw-bolt *k*, secured to it in such manner that the bolt will turn freely. The bolt *k*, passes through a nut *l*, and a bearing *m*; and the upper end of it is squared to receive a handle for the purpose of turning it, and thus raising the hind end of the frame from the sole.

The fourth improvement relates to plough-shares for stony soils, and consists in making the share of the form represented in fig. 3.

The fifth improvement is shewn in figs. 4, and 5; fig. 4, being a plan view, and fig. 5, a back view of a double-breasted plough. It consists in curving the mould-boards of double-breasted ploughs, in such manner as to present an outline continually diverging outwards from the base to the upper extremity.

The last part of this invention consists in an improved construction of drain-plough. Fig. 6, is a side view of the improved plough; it is secured to a frame *n*, carried by four wheels *o*. At the hind part of the frame is a rack *p*, and at the front part is another rack *q*, fastened to the axle of the fore-wheels; these racks are worked by two pinions *r*, *s*, mounted upon two horizontal shafts *t*, furnished with handles *u*. When both the shafts *t*, are turned, the plough will be raised or lowered; but when only one of them is caused to revolve, the point of the plough-share will be raised or lowered.

The patentee claims, Firstly,—raising and lowering the beams of ploughs by the combination of the parts herein described; that is to say, by means of shifting bolts, and a regulating screw. Secondly,—regulating the depth of the shares and mould-boards of ploughs by the combination of parts represented in fig. 1; that is to say, by the combination of a wedge, screw, and crank; or by the combination of the wedge with any other means of equivalent effect to the said screw and crank. Thirdly,—depressing the shares of ploughs by the movement represented in fig. 2. Fourthly,—the mode, herein described, of regulating the height and inclination of the beams, and the depth of the shares and mould-boards of ploughs, by securing the beam to the top part of the frame, and connecting the top part of the frame with the handle, by means, in both cases, of shifting bolts, and a regulating screw. Fifthly,—the particular form of plough-share, adapted for stony soil, represented in fig. 3.

Sixthly,—the making of double-breasted ploughs with mould-boards of the continually diverging form or outline, represented in figs. 4, and 5. Seventhly,—the wheel-plough, for cutting drains, represented in fig. 6, in the general combination of parts in which the same consists.—[*Inrolled in the Inrolment Office, November,* 1842.]

To RICHARD GARRETT, *of Leiston Works, near Saxmundham, in the county of Suffolk, agricultural implement manufacturer, for improvements in the construction of horse-hoes, scarifiers, drag-rakes, and drills, for cultivating land.*—[Sealed 13th June, 1842.]

THESE improvements, in the construction of horse-hoes, scarifiers, drag-rakes, and drills, for cultivating land, consist in certain novel arrangements and adaptations of the working parts of those machines, the particulars of which are shewn in Plate XVIII.

As respects the horse-hoe, the first feature of the improvement is a mode of suspending the guide-bar, which supports the levers, (a series of independent arms, carrying the respective hoes,) by means of chains, passed over excentric pullies, whereby the hoes may be raised and lowered when required; secondly, a contrivance for communicating to the hoes lateral movements, by the hands of the conductor, for the purpose of guiding them in any particular course, independently of the direction pursued by the draught-horse; thirdly, a mode of extending or contracting the distance apart of the running-wheels of the machine, to suit the ridges of the land; fourthly, a method of giving different inclinations to the cutting edges of the hoes, so that they may be adapted to work in the land to the required depth, whether the ground be in a hard or soft state; and fifthly, a mode of attaching the blades of the hoes, in order that they may be readily removed and replaced, when worn.

As respects the scarifiers, intended to be employed for crushing the clods of earth, and rendering the surface of the ground of a more uniform character, the improvement is in the means of lowering or raising the crushing or scarifying-roller or rollers, in the frame or carriage that supports them; in order that the roller or rollers may be made to cut or press more or less deep into the ground, and to lift it, or them, entirely off the ground, when out of operation, and moving from place to place.

The improvement in drag-rakes consists in a method of shifting and regulating the positions of the tines; that is, placing them more or less erect, or at a greater or lesser angle with the surface of the ground, as may be required to suit different work.

The first feature of improvement in drills, for cultivating land, is a mode of steering their carriage, independently of the course of the horse, for the purpose of causing them to pass over the required tracks, so that the rows of seed may be placed parallel to each other, in the successive courses of the drill. The improvements consist, secondly, in an apparatus for agitating the manure in the box of the drill, in order that it may descend in uniform quantities with the seeds; thirdly, an apparatus, by means of which two kinds of grass, or other seed, may be delivered at the same time, through the respective spouts or tubes, and which apparatus may be adapted to an ordinary drill, if required; fourthly, a mode of guiding the coulters, and depositing-tubes, accurately, so as to keep them constantly upon the middle parts of the ridges; and fifthly, the means of adapting rollers upon a stationary axle, for forming and regulating the shape and height of the ridges.

Fig. 1, is an end elevation of the horse-hoe, and fig. 2, is a transverse section, taken near the axes of the running-wheels. As many of the parts of the frame-work are not new, it will be unnecessary to refer to them particularly. The several levers, of which there are a series shewn at *a, a, a*, are each attached at one end, by a joint, to a horizontal bar *b, b*, and at the reverse end they are weighted, and hang loosely in a staple or slotted socket *c, c, c*, affixed to a back horizontal bar *d, d*. These levers *a, a, a*, severally carry the stems *f, f, f*, of the hoes, which are secured to the levers by wedges. The front horizontal bar *b*, is held by bracket-arms *g, g*, affixed to the front of the carriage, and the back horizontal bar *d, d*, is suspended by chains *h, h*, attached to and passing partly over excentric pullies *i, i*, fixed on a transverse shaft *j*, supported in stationary bracket-arms *k, k*, extending from the back of the frame-work. In order to raise or lower the hoes, the workman applies his hand to the winch *l*, for the purpose of turning the shaft *j*; by which means the pullies *i, i*, are made to turn and draw up or let down the chains *h*, and bar *d*, that support the back parts of the levers *a*.

The frame, that carries the levers *a, a*, (consisting of the two bars *b*, and *d*, connected together by braces *m, m*,) is capable of lateral movements, by swinging from the chains *h*, behind, and hanging on the bracket-arms *g, g*, in front, which arms are jointed. These lateral movements, however, are governed and directed by the workman applying his hands to the handles *n, n*, by which he is enabled to turn the longitudinal shaft *p*, supported by stationary brackets. From this shaft there extends downwards an arm *q*, to the ends of which chains *r, r*, are attached; the outer extremities of the chains being made fast to the ends of the bar *b, b*. Hence, as the longitudinal shaft *p*, is turned, the arm *q*, vibrates, and the chains *r, r*, are caused to draw the bars, with the levers and hoes, to the right or left, as may be required for guiding the hoes in the proper course, independently of the track of the horse.

For the purpose of occasionally widening the distance between the running wheels, to suit the breadths of different rows upon the land, the axes of the wheels are formed by studs or pins, extending from angular pieces or brackets *s, s*, attached to the hinder rail of the frame-work. In fig. 2, this will be seen most clearly. That part of the bracket-piece which lies immediately in contact with the under part of the frame, is held thereto by a metal strap or staple *t*, and bolt *u*. This bolt is passed perpendicularly through a long slot, formed in the rail; and when the nut of the bolt is loosened, the bracket of the axle may be slidden, so as to move the wheels outward to any required distance, and the nut being again made tight, the wheel will retain its position.

In the figures of the horse-hoe referred to, the stems *f*, of the hoes stand nearly in perpendicular positions, and the cutting edges of the hoes at certain acute angles or inclinations to the surface; but should the ground be particularly hard, it will be desirable to cause the cutting edges of the hoes to form greater or more obtuse angles with the ground; and this is done by lowering the bracket-arms *g*, in the front frame-work, which will cause the bar *b*, and the front or jointed ends of the levers *a*, to be depressed, and consequently the stems *f*, to incline from their erect positions, and thereby set the cutting edges of the hoes at a greater angle with the surface of the ground.

In order to afford the means of readily changing the hoes, when worn, the cutting parts are formed in distinct pieces from the stems, to which they are attached by bolts and screws, as shewn in the detached figures 3. These cutting tools are made of iron, and converted into steel after they have been so formed.

The scarifiers, to which these improvements particularly apply, are those formed by a series of indented wheels, fitted loosely upon a square shaft; which wheels, in passing over the ground, break the clods of earth, and loosen the surface. The improvement consists in mounting the axle or shaft of the crushers or scarifiers in a frame, supported upon running-wheels, as shewn in the two end elevations, figs. 4, and 5. *a, a*, are the crushing-rollers; *b, b*, the iron frame-work or carriage, in which the axle of the crushing-rollers is mounted, and turns freely. On the sides of the end-frames there are bosses *c*, through which a perpendicular rod *d*, slides. The lower part of this rod is turned horizontally at a right angle, forming a stud for the running-wheel *e*, to revolve upon; and the upper end of the rod has a worm or thread cut round it, which works in a screw-box *f*. In order to regulate the depth to which the crushing roller shall be permitted to penetrate into the ground, or to raise it completely off the ground, a sufficient height for transporting the machine upon ordinary roads, the screw-box must be turned by a winch, or other means, which will draw up or let down the running-wheels, as shewn in the figures 4, and 5.

Fig. 6, represents a sectional elevation of a drag-rake. *a, a,* are the tines of the rake, fixed in a wooden lever or arm *b.* These levers and tines, of which there are to be a series, have their fulcra or joints upon a horizontal rod *c,* supported by bracket-pieces *d,* and upright stems *e,* made capable of sliding in sockets, fixed to the wooden frame-work. When the tines *a,* are required to stand in nearly upright positions, as shewn in the figure, the rod *c,* of the levers, must be depressed; but when the tines are required to stand in inclined positions, the rod is raised, by sliding up the brackets *d,* and stems *e,* in their sockets. The outer ends of the levers *a,* are severally connected, by chains, to a transverse bar *f,* fixed upon levers, turning on the same fulcrum-rod *c*; and to this transverse bar, two other chains *g,* are attached, which are made fast to excentric pullies *h.* By drawing down the lever *i,* the pullies are made to turn, and hence draw up the levers, with the tines, sufficiently off the ground to discharge the accumulated grass, stubble, or other material.

For the purpose of steering the drills with greater certainty than can be attained by the draught of the horse, the shafts are attached to the frame of the carriage by a joint-pin, and the carriage, with the drills, is turned horizontally upon that pin, by means of toothed gear. Fig. 7, is a horizontal view of the carriage, the drill being removed. *a, a,* are the shafts, the back parts of which are connected by a curved bar of iron *b,* and in the centre of this bar, passed through an eye, is a vertical pin *c,* fixed into the transverse rail *d,* or axletree of the carriage. To the sides of the drawing-shafts chains *e, e,* are affixed, which pass round guide-pullies, set under the frame-work, to wheels *f, f,* firmly fixed upon a transverse axle *g.* The ends of the chains *e, e,* are secured to the wheels *f, f,* but they pass over the wheels in opposite directions, so that, by turning the axle *g,* the chains *e, e,* will draw the carriage a little toward one side. The steering is effected by the attendant applying his hand to one of the winches or handles of the axle *h*, which causes the bevilled toothed wheel *i*, to work the bevilled wheel and longitudinal spindle *k*; at the end of which spindle there is a worm, or endless screw, taking into a wheel on the axle *g*, carrying the pulley-wheels *f*, *f*. Fig. 8, is a side elevation of the same arrangement. This effect may also be produced by means of a rack and pinion connecting the shafts with the carriage, instead of the chains.

The manure, required to be deposited with the seed, being apt to adhere together in the box of the drills commonly used, and consequently fall very irregularly, the patentee has introduced, as an improvement, an extra stirrer or agitator, which, being worked by an excentric, keeps the material continually in motion. Fig. 9, is a side view of the drill; fig. 10, a partial section of the box containing the manure; and fig. 11, is a front view of the drill; part of the box being removed, to exhibit the interior. A horizontal shaft *a*, carries the ordinary forked arms or prongs, which, being made to revolve, stirs up the material. Upon the axle of this shaft, two excentrics *b*, *b*, are affixed, which, as the shaft revolves, raise and depress the arms *c*, *c*. To the upper ends of these arms a horizontal bar *d*, is attached, carrying another series of prongs, of any form suited to the kind of manure to be discharged. As the ordinary stirring-shaft *a*, revolves, the excentric *b*, raises and depresses the bar *d*, and thereby causes the upper portion of the manure to be kept in continual agitation, which prevents it from forming into masses.

When two different sorts of small grass seed are required to be sown together, they will, if previously mixed, be very apt to separate by the motion of the drill, and the heavier descend to the bottom; in order, therefore, to ensure a regular delivery, the two kinds of grass seed are placed in separate compartments, as shewn at *a*, and *b*, in the sectional figure 12; and the following contrivance is adopted for depositing them in the ground:—At the same time that the seeds from the compartment *a*, are let fall into the spout *c*, by the rotation of the cups on the wheel *d*, the simultaneous rotation of the brush-roller *e*, conducts the seeds from the compartment *b*, and hence they both fall down the spout together. This rotation of the cup-wheel, and brush-roller, is effected by any ordinary coupling gear, connected to their axles; and the quantity of each kind of seed discharged may be determined by means of adjustable sliding shutters, represented in the box, at fig. 13.

The mode of guiding the coulters and spouts, for the purpose of enabling them to deposit the seeds accurately upon the middles of irregularly ploughed ridges, from a two-row drill, is shewn at fig. 9; it consists in attaching the coulters *x*, and spouts *y*, to horizontal rods *z*. These rods are made to swing upon vibrating levers *w*, which are worked by a crank-rod *u*, and handles *v*, under the command of the conductor. This mode is new in its adaptation to a one or two-row drill, as each works independently of the other. The concave rollers, shewn in figs. 9, and 11, at *s*, *s*, are mounted, and slide loosely upon a horizontal shaft, acting as a fore-carriage, and supporting part of the weight of the drill. These rollers are for forming and equalizing the shape and height of the ridges, and by freely sliding in lateral directions, accommodate themselves to any irregularity in the parallelism of the furrows.—[*Inrolled in the Petty Bag Office, December,* 1842.]

Specification drawn by Messrs. Newton and Son.

To William Brook Addison, *of Bradford, in the county of York, manufacturer, for certain improvements in machinery for spinning worsted and woollen yarn.*—[Sealed 10th February, 1842.]

This invention relates to the production of cops of worsted or woollen yarn, (spun on throstles, or machines acting similarly to throstles,) to be used as weft for weaving. It consists in constructing the cop by the working of the throstle, or other machine, as the yarn is produced; thus dispensing with the machine usually employed for unwinding the yarn from the bobbins, and forming it into cops.

To render the throstle suitable for effecting the above operation, the ordinary uniform copping movement is removed, and the improved movement, represented in Plate XIX., at fig. 1, is substituted. *a*, is the copping or traverse-rail, connected with and supported by the lever *b*, which moves on the shaft *c*, as a fulcrum, and has a constant tendency to elevate the rail *a*, by reason of the counterpoise-weight *d*; but the position of the lever is determined by the cord *e*, which is connected to the pulley *f*, and passes from thence over the carrier-pulley *g*, and the vibrating-pulley *h*, to the lever *b*. The pulley *h*, is carried by a spring *i*, to which a vibrating motion is imparted by a heart-shaped piece *j*, on the shaft *k*, (driven by gearing from the main shaft,) acting on a projection *l*, on the upper surface of the spring; and thus a uniform alternating movement is communicated to the pulley *h*. The shaft *k*, carries a worm *m*, by which a slow motion is given to the worm-wheel *n*, on the shaft of the pulley *f*; this motion causes the chain *e*, to be gradually taken up by the pulley *f*, and the copping-rail, through the agency of the lever *b*, is slowly depressed. By this means, and by the slight rising and falling movement which the vibrating pulley *h*, communicates to the copping-rail, the yarn is wound on the bobbin in the manner represented in the section, fig. 2, aud the cop, thus produced, is ready to be employed as weft in weaving cloth.

When the bobbin is filled, a small lever *o*, on the shaft *c*, comes in contact with the spring-catch *p*, and forcing it out of the notch in the guide *q*, permits it to throw off the driving-strap in the ordinary manner. At the same time the pulley *f*, is disconnected from its shaft, by another lever *r*, on the shaft *c*, and giving off the chain *e*, allows the weight *d*, to descend, and the copping-rail *a*, to rise; the various parts, with the exception of the spring-catch *p*, are then in the positions shewn in the drawing, ready to re-commence spinning.

Fig. 2, shews the mode by which the pulley *f*, is disconnected from and connected with its shaft. The pulley is held in a proper position for spinning by a spiral spring *s*, in the box *t*, and is connected to its shaft by a pin *u*, projecting from the disc *v*, on the shaft, and taking into one of a series of holes in the side of the pulley. The dotted lines indicate the position of the pulley when it has been moved a short distance along its shaft by the bent end of the lever *r*, and thus disconnected from the disc *v*, and pin *u*. The bobbins used in this improvement have no flange at their upper ends, in order that the yarn may come off freely in the process of weaving.

The patentee claims the mode of producing cops of worsted or woollen yarn, suitable for the shuttle, by causing the cops to be built up progressively, as herein described, as the yarn is spun in a throstle, or in any other spinning machine, acting similarly to a throstle.—[*Inrolled in the Inrolment Office, August,* 1842.]

To John Osbaldeston, *of Blackburn, in the county of Lancaster, metal heald maker, for improvements in looms for weaving.*—[Sealed 15th February, 1842.]

The first part of these improvements consists in a mode of applying springs to the back of the slay, in order to allow a little play when the slay is beating up the cloth. The springs are affixed to the slay-swords, their upper ends resting against the back of the slay; and as the slay moves freely at the upper part of the swords, in a direction from the front of the loom to the back, the strength of the beating-up will depend upon, and be governed by the springs.

The second improvement relates to another mode of applying springs to act on the slay; in which mode, instead of the springs being carried by the slay-swords, they are applied to the rods that connect the crank-shaft with the slay. The connecting-rod is formed of two pieces, one sliding a short distance into the other, so as to admit of the rod becoming shorter when the beating-up takes place, and between the ends of the two pieces a spring is applied; this spring resists the shortening of the rod, and thus gives the desired elasticity to the beating-up of the slay.

The third improvement relates to a mode of stopping the beat-up of the loom, when the shuttle is not thrown into the shuttle-box; it consists in applying two horizontal levers, working upon vertical axes, under the shuttle-box. *a, a,* fig. 1, Plate XIX., are the two levers, turning on the axes *b, b,* and connected, in their movements, by the rod *c,* which extends across the width of the loom. When the shuttle enters the box, it strikes against a "bulge" in the side of the box, from which a finger projects downwards, and causes that finger to press against one of the inclined planes *d, d,* at the hind ends of the levers *a, a,* and force those ends outwards, thereby moving the front ends of those levers inwards. But when the shuttle fails to enter the box, the levers remain in the position shewn in the drawing, and their front ends coming in contact with the front framing of the loom, prevent the beating-up from taking place.

The fourth improvement consists in a mode of stopping the loom, when the weft is not properly supplied. The stoppage is caused by the slay, when unresisted by the weft, (on account of its absence,) striking against a projection on a spring, attached to the guide or fork that throws the strap off the driving-pulley; thereby releasing that spring from the notch in which it was held, and stopping the loom.

The fifth improvement relates to a mode of winding-up the cloth as it is produced. It consists in fixing on the axis of the cloth-beam a wheel, on the periphery of which are two rows of broad teeth, the teeth in one row being opposite the spaces between the other row of teeth; to this wheel motion is communicated by two levers, with wedge-shaped ends, which alternately enter the spaces, and move the wheel round. The levers are worked by means of crank-pins, fixed round a wheel which receives motion from the crank-shaft.

The sixth improvement consists in a mode of giving off the warp from the warp-beam with a uniform degree of tension. This is effected by means of an endless chain of teeth, which passes round two small rollers, one above and the other below the warp-beam, and takes into a cog-wheel on the end of that beam; the upper roller works in a spring-bearing, and the lower one rests on the bottom of the endless chain, having a weight attached to it; by this means the requisite resistance to the delivery of the warp is obtained.

The seventh improvement relates to another mode of regulating the giving off of the warp from the warp-beam. Upon the axis of the warp-beam is fixed a wheel, similar to that described in the fifth improvement; between the teeth of which the wedge-shaped ends of two elbow-levers alternately enter, and, by their resistance, prevent the warp from unwinding too fast.

The eighth improvement consists in facilitating the delivery of the warp from the warp-beam, by the employment of two fluted rollers, between which the warp is pressed and held, and by their revolution is drawn off the beam.

The ninth improvement relates to the driving parts of the loom, and consists in applying a wheel between the two end framings, (fixing it upon the crank-axis that gives motion to the slay,) in place of at one end, as heretofore, and giving motion to the treadles by means of pins, projecting from the side of the wheel.

The tenth improvement relates to a mode of constructing and working temples. Fig. 2, is a plan of one of the improved temples, and fig. 3, is a longitudinal section, taken on the line A, B, of fig. 2. *e, e,* are the jaws which hold the cloth firmly, and keep it extended; the upper jaws are mounted on the axes *f, f,* and have, at all times, a tendency to open, by reason of the weights *g, g,* being attached to them. *h,* is a crank-axis, which receives motion by means of a ratchet-wheel *i,* mounted thereon; this ratchet-wheel is driven by a catch, attached to one of the slay-swords. The axis *h,* is formed with two excentric portions *j,* and *k,* and is connected to the lower jaws by the links *l, l*; the excentric portions *j,* and *k,* close the jaws of the temples, by acting under the hind ends of the upper jaws; and by the links *l, l,* the temples, when closed, and holding the cloth, are moved sideways and endways. The excentric portions *j*, and *k*, are so formed, that the jaws will be always opened by their weights, as they go in towards the cloth, and will then be closed by the excentric portions, and moved by the links *l*, *l*, in the manner before mentioned.

The eleventh improvement relates to an arrangement of revolving temples, by which the cloth is held and stretched out as it is made. Fig. 4, is a side view of the revolving temple. *m*, is a wheel, provided with a number of spikes *n*, which move in the slots *o*, *o*; the stems of the spikes pass through the boss of the wheel *m*, and rest against a roller *p*. Rotary motion being communicated to the wheel *m*, the spikes *n*, approach the cloth, in succession, and having penetrated it, are caused by the roller *p*, to move outwards, and stretch the cloth; they are afterwards withdrawn from it by the inclined surface *r*, against which they move. "*q*, is a spike-wheel, wherein the spikes are all fixed;" but why it should be exhibited in connection with the wheel *m*, is not shewn in the specification, the above words being all that are used with reference to it.

The twelfth improvement is for the purpose of stopping the loom, when any of the warp-threads break, and become entangled with each other. It consists in applying to the shuttle a lever, which forms part of a cutting apparatus, and being acted on by the entangled warp-threads, cuts the shoot, and thus brings into action suitable machinery for stopping the loom when the weft is not properly supplied.

The following are the patentee's claims: First,—the mode of applying springs to the slay of a loom, and arranging the slay that it may move freely on the swords, and be acted on by such springs, as described. Second,—the application of springs to connecting-rods, to give elasticity to the beat-up. Third,—the mode of stopping the beat-up of a loom, when the shuttle is not thrown across into the shuttle-box. Fourth,—the mode of stopping a loom, by combining the spring with the fork, and striking such spring with the slay, as described. Fifth,—the mode of taking up the cloth, as it is produced, by the application of the wheel, described under the fifth improvement, and parts for moving the same. Sixth,—the mode of giving off the warp, by means of an endless chain of teeth, and parts connected therewith. Seventh,—the mode of regulating the giving off of the warp, by means of the wheel mentioned under the seventh head, and parts for moving the same. Eighth,—the mode of giving off the warp by means of grooved rollers. Ninth,—the mode of applying a wheel, and parts connected therewith, for giving motion to the treadles. Tenth,—the mode of giving motion to temples, in addition to closing and opening them. Eleventh,—the mode of constructing revolving temples, by giving motion to the points or spikes. Twelfth,—the mode of applying apparatus, to be acted on by yarn sticking in the shed, in order to cut the shoot.—[*Inrolled in the Inrolment Office, August*, 1842.]

To Edmund Tuck, *of the Haymarket, in the county of Middlesex, silversmith, for certain improvements in the covering or plating, with silver, various metals and metallic alloys.*—[Sealed 4th June, 1842.]

This invention consists in the use of either of the two carbonates of ammonia, (namely, the sesquicarbonate and the bicarbonate,) as one of the ingredients in the mixtures or compounds employed for covering or plating various metals and metallic alloys with silver, by the action of electricity.

The material of which the articles usually plated with silver are composed, is either copper or its alloys, and of those alloys, that commonly called German silver is most frequently used. The plating or covering is effected by the aid of a solution, composed (according to the present invention) of the sesquicarbonate or bicarbonate of ammonia and a salt of silver; but the patentee finds it advantageous to vary the salt of silver, according to the nature of the metal or alloy to be plated; thus, for the common kinds of German silver, a mixture of a solution of bicarbonate of ammonia with sulphate of silver; and for plating on copper, or good German silver, a mixture of a solution of bicarbonate of ammonia with cyanide of silver, is preferred to be used.

The plating mixture is prepared by dissolving one equivalent (seventy parts by weight) of bicarbonate of ammonia in distilled water; then adding thereto one equivalent (one hundred and fifty-six parts by weight) of sulphate of silver, or one equivalent (one hundred and thirty-four parts by weight) of cyanide of silver, and boiling the liquor until the salt of silver is entirely dissolved. The strength of the solution, that is, the proportion of water, must be regulated by the strength of the galvanic battery employed. The strongest solution which the patentee has had occasion to use, when coating bad German silver, was composed of half an ounce of sulphate of silver and one hundred and seven grains of bicarbonate of ammonia, dissolved in one pint of water. The battery which the patentee prefers, is a modification of "Daniell's constant battery."

The article to be plated is cleaned before submitting it to the action of the battery, by immersing it, for two or three hours, in a cold solution of carbonate of potash in water, then washing it in cold water, and afterwards dipping it into a mixture of aquafortis and water; the proper strength of which depends on the nature of the metal or alloy used in the manufacture of the article. After this it is washed and dried, and then well rubbed with rotten-stone on a rag, or piece of leather; and immediately before it is immersed in the plating liquid, it must be dipped into a solution of common salt, in which a little gum has been dissolved. The quality of the alloy of German silver may be known by its appearance when taken out of the pickle, or mixture of aquafortis and water; the best kinds having a perfectly white surface, and the inferior kinds being more or less darkly colored.

The patentee claims the use of either of the two carbonates of ammonia, namely, the sesquicarbonate, and the bicarbonate, as one of the ingredients in the mixtures or compounds employed for covering or plating with silver various metals and metallic alloys, by the action of electricity.—[*Inrolled in the Rolls Chapel Office, December,* 1842.]

To John Stephen Woolrich, *of Birmingham, in the county of Warwick, chemist, for improvements in coating with metal the surface of articles formed of metal or metallic alloys.*—[Sealed 1st August, 1842.]

These improvements consist in giving a metallic coating to articles made of metal or metallic alloys, by means of a magnetic apparatus, used in combination with metallic solutions.

The magnetic apparatus is represented in Plate XIX., fig. 1, being a side view; fig. 2, a plan view; and fig. 3, an end view of the same. *a*, is a compound horse-shoe magnet, fixed upon the table *b*; and *c*, is an armature, fixed upon the shaft *d*, opposite the poles *e*, *e*, of the magnet. The armature is formed out of a flat bar of soft iron, and around each of its ends about fifty yards of copper wire *f*, *g*, one-tenth of an inch thick, and covered with silk thread, are wound in a spiral direction; the wires are soldered together at *h*, and their other ends are connected to what the patentee terms a divider. It is shewn detached from the apparatus at fig. 4, and consists of a brass tube *i*, rivetted to a bent piece of brass *j*, which is attached to the armature by screws; at the other end of the tube *i*, is a cylinder of box-wood *k*, and on each end of it is a curved piece of copper *l*, situated diametrically opposite to each other. Each of these pieces *l*, extends nearly half-way round the cylinder *k*, and the wires *f*, *g*, are attached to them; the wire *f*, being fastened to that piece of copper which is nearest to the magnet, and the wire *g*, after passing through the tube *i*, is fastened to the other piece. *m*, *m*, are four brass springs, secured by screws to four brass pillars *n*, *n*, fixed on the table *b*; these springs press upon the cylinder *k*, and its pieces of copper, and they are so adjusted, that while two of them are pressing upon the pieces of copper, the other two are pressing upon the surface of the cylinder *k*. In the lower part of each pillar a hole is drilled, and a piece of copper wire, one-tenth of an inch thick, is passed through the holes of the two pillars on each side of the divider, and secured by binding screws; these wires are marked *o*, and *p*.

The mode of using this apparatus, for coating articles with metal, is as follows:—The article to be coated is connected with the wire *o*, and immersed in a suitable metallic solution, (hereafter described,) contained in an earthenware vessel; then a plate of metal, similar to the metal of which the solution is composed, is connected with the wire *p*, and rotary motion is communicated to the shaft *d*, with its armature and divider, by means of an endless band, passing round the pulley *r*.

The metallic solutions, employed by the patentee, are three in number, viz., the silvering liquor, the gilding liquor, and the coppering liquor, which are all produced by the aid of a fourth, termed the solvent. The solvent is made by boiling twenty-eight pounds (avoirdupois) of the pearlash of commerce with thirty pounds (avoirdupois) of water, in an iron vessel, until the pearlash is dissolved; the solution is then poured into an earthenware or other suitable vessel, and, when cold, fourteen pounds (avoirdupois) of distilled water is added thereto; after which it is saturated with sulphurous acid gas, and, having been again filtered, is ready for use.

The silvering liquor is prepared by dissolving twelve ounces (avoirdupois) of crystallized nitrate of silver in three pounds of distilled water, in an earthenware vessel, and then gradually adding the above-mentioned solvent to the solution, so long as a whitish-colored precipitate is produced. The supernatant liquor being then drawn off, the precipitate is washed in distilled water, and mixed with as much of the above solvent as will dissolve it, and one-sixth more, so that the solvent may be in excess. After this, the mixture is allowed to rest for twenty-four hours, and is then filtered.

In order to make the gilding liquor, four ounces (troy) of fine gold are dissolved in a mixture of eleven ounces of nitric acid, of specific gravity 1.45; thirteen ounces of muriatic acid, of specific gravity 1.15; and twelve ounces of distilled water; the solution is then evaporated and crystallized, and the crystals, thus produced, are dissolved in one pound of distilled water. The gold is then precipitated by pure magnesia, and is washed, first, with distilled water, acidulated with nitric acid, and afterwards with distilled water alone; after which the washed precipitate is dissolved in a suitable quantity of the solvent, and then one-fifth more of the latter is added, in order that it may be in excess. The preparation of the liquor is finished by allowing it to rest for twenty-four hours, and then filtering it.

The coppering liquor is produced by dissolving seven pounds (avoirdupois) of the crystals of sulphate of copper in thirty pounds of distilled water, and adding thereto a solution of carbonate of potash, in water, until precipitation ceases. The precipitate is then collected by filtering, and, after being washed with distilled water, is placed in an earthen vessel, and dissolved in the solvent above mentioned. One-third more of the solvent is then added to the solution, in order that the solvent may be in excess, and the solution is allowed to rest for twenty-four hours, and is afterwards filtered.

The patentee claims, Firstly,—the method of coating with metal the surface of articles formed of metal or metallic alloys, by means of magnetic apparatus, in combination with metallic solutions; and Secondly,—the application of solutions, in water, of that class of salts known to chemists as the sulphites, for dissolving the preparations of silver, gold, and copper, for the purpose of coating with metal the surface of articles formed of metal or metallic alloys.—[*Inrolled in the Inrolment Office, February,* 1843.]

To CHRISTOPHER NICKELS, *of York-road, Lambeth, in the county of Surrey, Gent., and* CALEB BEDELLS, *of Leicester, manufacturer, for their invention of improvements in fabrics produced by lace machinery.*—[Sealed 15th September, 1842.]

THIS invention relates to manufacturing those descriptions of fabrics which are produced by lace machinery, wherein a series of threads, placed side by side, in the form of a warp, are, by suitable apparatus, caused to be looped together on needles; thereby producing various descriptions of looped fabrics. The present improvement consists in a method of manufacturing such descriptions of warp fabrics, by applying threads or yarns of cotton, silk, or other suitable fibres, which have been first printed with ornamental patterns or devices; whereby looped warp fabrics, made in lace machines, may be made of a more elegant description than when such fabrics are made with yarns or threads of the same color from end to end. This invention also relates to the application of printed yarns or threads in the lace fabrics manufactured by twist lace machines.

The first improvement consists in using warp threads with printed patterns thereon, which are to produce fabrics by being looped together. The second part of the invention consists in using printed warp threads, which are to run longitudinally of the fabrics made; but such printed warp threads are not caused to be looped on the needles, but are threads simply laid into the looped fabrics produced by other warp threads; such fabrics, being made of an open character, will show the ornamental printed patterns on the inlaid warp threads through the same. The third part of the invention consists in inlaying threads or yarns, which have been previously printed with ornamental patterns, transversely of looped fabrics produced in warp lace machinery. The fourth part of the invention consists in manufacturing looped warped fabrics, by causing threads or yarns, each of one color, to be inlaid, either longitudinally or transversely, into looped warped fabrics, made with threads or yarns previously printed with ornamental patterns; and the fifth part of the invention consists in the application of printed yarns or threads, as warp or bobbin threads, when making fabrics in twist lace machines.

It is well known that in manufacturing looped warp fabrics in lace machines, that the length of warp, used for producing a given length of fabric, will depend on the length of the loops, and on the more or less open character of the work produced on a given gauge of needles; hence, in printing warps of thread or yarn, which are to be looped into each other to form fabrics, the patterns or designs must be of such increased length, as will cause the designs or patterns to assume their correct outlines and figures, when they are worked up into a fabric. This additional length of the pattern or design, to be produced in a fabric, prevails to some extent, when weaving fabrics with warp and shuttle, where the warps used are previously printed; but this lengthening of the figures, designs, or patterns, on warps which are to be formed into fabrics, by looping them into each other, will require that the designs printed on the warps, should be more elongated than when used for weaving with warp and shuttle; and this additional length will depend on the particular gauge of needles used, and the character of the fabric to be produced; but the workman, knowing the length of warp required for producing a given quantity of fabric of a particular texture on a certain gauge of needles, will direct the pattern to be printed of a length proportionate to the length of warp used up in producing a given quantity of fabric.

When making looped warp fabrics which have looped pile on one surface, (as is now sometimes the case,) the elongation of the design will require to be still greater than when making the ordinary looped warped fabrics; but when using threads or yarns which have been previously printed, for the purpose of being laid into looped warp fabrics, in the progress of their manufacture, in a longitudinal direction, or in a transverse direction,—in general, the figures, designs, or patterns, may be printed of the size which it is desired they should appear in the fabrics in which they are to be inlaid; for patterns in such cases, will be very slightly distorted, as the printed threads, or yarns, will be very little bent out of a straight line.

The workman having introduced his warp into the machine, proceeds to work in the ordinary manner, and he will produce very elegant fabrics, with ornamental patterns or designs, presenting a peculiar character, differing from all fabrics heretofore made; and although it would be impossible to describe all the variety of fabrics which may be produced when using printed warps as the inlaid threads, it may be desirable to give an instance of the peculiar characters of fabric which may be so produced:—Thus, supposing the texture of the looped fabric were an open lace-work, of any of the variety of patterns which this class of machinery is capable of making, and of one color, or in stripes of various colors, and that the inlaid printed warp were of a different color,—in such a case, the fabric would offer the appearance of a tracery of lace over a printed fabric; and this would also be the case when the inlaid threads are not printed, and printed threads are employed as looping-threads; then the fabrics produced would offer the appearance of printed lace fabrics over a ground of other fabric; and thus, by varying the colors of the warps, great varieties of effects may be obtained, or the color of the ground of the printed warp, and the color of the unprinted warp, may be the same. In some cases, strands of either covered or uncovered India-rubber thread may be introduced, in a longitudinal or transverse direction, in the same manner as it has heretofore been introduced into looped warp fabrics, when elasticity is required to be given.

In producing fabrics, according to this invention, in twist-lace machines, the printed threads or yarns may be either used for warp or for bobbin-threads, care being observed to print the patterns or designs much longer than they are to be when manufactured into a fabric, as the length of thread used up in either case is greater than the length of the fabric produced; when used as warp-threads, the additional length of the design or pattern will not be considerable, whilst the threads, used for bobbin-threads, will require the patterns or designs to be considerably longer. In using printed threads as warp-threads, much care must be observed in introducing the warp into a machine, that the pattern should not be distorted; and when using printed threads as bobbin-threads, much attention should be paid to winding the threads on to the bobbins, and to see that each of the springs of the bobbins may offer, as nearly as possible, the same pressure, in order that each thread may be used up as fast as the other; and although it will be generally too expensive to obtain a design of any degree of intricacy, when the bobbins traverse, yet, when the threads are printed, at regular intervals, with different colors, in the traversing and twisting with the warp-threads a very peculiar effect will be obtained.

In making what are called straight down nets, that is, where the bobbins do not traverse from selvage to selvage, the bobbin-threads may be printed with more elaborate patterns; and when there is more or less close or ornamental patterns of cloth-work, the printed patterns of the bobbin-threads will be brought out with more or less distinctness.

The patentees claim, Firstly,—the mode of manufacturing looped warp fabrics in lace machines, by applying warps of yarn or thread, previously printed with ornamental patterns or designs. Secondly,—the mode of manufacturing looped warp fabrics in lace machines, by applying longitudinal warp-threads or yarns, previously printed with ornamental patterns or designs, as inlaid threads or yarns. Thirdly,—the mode of manufacturing looped warp fabrics in lace machines, by introducing threads or yarns, previously printed with ornamental patterns or devices thereon, transversely of such fabrics. Fourthly,—the mode of manufacturing looped warp fabrics in lace machines, made with threads or yarns, previously printed, by introducing unprinted threads or yarns, longitudinally or transversely into the fabrics in the progress of their manufacture. And, Fifthly,—the mode of manufacturing fabrics in twist lace machines, by applying threads or yarns, previously printed with patterns or devices, as warp-threads or bobbin-threads.—[*Inrolled in the Inrolment Office, March* 1843.]

To WILLIAM COLEY JONES, *of Vauxhall-walk, in the parish of Lambeth, practical chemist, for improvements in treating or operating upon a certain unctuous substance, in order to obtain products therefrom, for the manufacture of candles and other purposes.*—[Sealed 8th November, 1842.]

THE unctuous substance, above alluded to, is cocoa-nut oil; and the improvements consist in first obtaining the acids of that oil by saponification, and then decomposing the soap so obtained; also in distilling and separating the acids of cocoa-nut oil.

To obtain the acids of cocoa-nut oil by saponification, &c., the patentee proceeds as follows:—One ton of cocoa-nut oil is placed in a vessel, which is provided, at its lower part, with a wrought-iron worm, or other suitable arrangement of pipes, perforated with numerous holes, for the purpose of admitting steam into the matter under operation; the vessels and steam-pipes, used in this process, being similar to those employed in the manufacture of the stearic acid of tallow. Steam is admitted into the vessel, until it begins to pass off through the melted matter, and then a quantity of cream of lime (quick lime, slacked until it becomes of the consistence of cream) is introduced, and the boiling is continued, by means of the steam-pipes, until the substance is converted into a hard solid soap, which will be in about six, or from that to eight hours. Alkalis may be used for saponifying the cocoa-nut oil; but the patentee prefers to employ lime, in the proportion of from sixteen to twenty pounds of quick lime, to one-hundred-weight of oil.

The soap, thus formed, is dug out of the vessel above mentioned, and thrown into another vessel, furnished with steam-pipes, in which it is decomposed by a suitable acid, in a similar manner to that practised in the manufacture of the stearic acid of tallow. The acid, employed in the present instance, is sulphuric, of about 1.8 specific gravity, which is diluted with twenty times its weight of water; it is used in the proportion of two pounds of the concentrated acid (1.8) to each pound of the quick lime, before mentioned. The diluted acid is run into the vessel containing the soap, and the contents of the vessel are boiled, by the admission of steam through the perforated pipes, until the sulphuric acid combines with the lime; which will be in about four hours. When the decomposition of the soap has been properly effected, the steam is shut off; the sulphuric acid and lime will then gradually settle to the bottom of the vessel, in a combined form, and the cocoa-nut oil will have been converted into an acid state, which is termed the acid mixture. This mixture is drawn off or pumped into another vessel, provided with steam pipes, and is boiled with one hundred gallons of water, for about an hour, by the admission of steam; after which, the steam is shut off, and the mixture allowed to settle; the water is then drawn off from the lower part of the vessel, and the acid mixture is again boiled for about an hour, with one hundred gallons of fresh water, by means of steam, as before.

The acid mixture of cocoa-nut oil, obtained by the abovementioned or other suitable processes, is formed into a soap, by being well stirred up with a suitable oxide, till a perfect mixture is effected; in order that, by the subsequent distillation of the soap, a material for the manufacture of candles may be obtained, of a higher melting point than any that has as yet been extracted from cocoa-nut oil. A thick cream of lime is preferred to be used for this purpose, in the proportion of twenty pounds of quick-lime to one hundred pounds of acid mixture. The soap is distilled in a retort, (similar to those employed in the manufacture of coal gas,) and the fatty product, distilled over, is condensed; it is then boiled for six or eight hours by means of steam, with water slightly acidulated by oxalic or sulphuric acid, and is then allowed to cool very gradually, in a suitable vessel, into which it is run off, in order that it may become crystallized.

The fatty product is now divided into portions of about fourteen pounds each, and these portions are each enclosed between two pieces of any suitable woven fabric (the material termed "coir matting" being preferred); they are then piled in heaps, and left to harden in a temperature of 50° Fahr. for a period varying from six to twelve hours; after which, the portions of fatty matter, still enclosed in the pieces of woven fabric, are placed in a powerful hydraulic press, of ten-inch ram, and are separated from each other by wrought-iron plates, twenty-six inches square, and one-fourth of an inch thick, being placed between them. Pressure is then applied slowly, for about twenty-four hours, at a temperature of 58° Fahr., and the fatty matters are, after that, transferred to another press, and pressed still more slowly, for forty-eight hours, at a temperature gradually rising to 110° Fahr. The fluid, expressed by this operation, is subjected to a second purification in water, acidulated with oxalic or sulphuric acid, and may then be used for burning, or for mixing with other oils; the concrete product, after a similar purification, may be employed for making candles.

Another mode of performing this part of the invention is to distil the cocoa-nut oil in a retort, after the first saponification, and without the intermediate process of decomposing the soap, and combining the acid mixture with lime: the soap is cut into small pieces, and washed in water, in a vessel furnished with steam-pipes, previous to being introduced into the retort.

The acid mixture of cocoa-nut oil, obtained by the above or any other suitable processes, may also be distilled without the addition of lime.

The last part of the invention relates to the distillation of cocoa-nut oil, for the purpose of obtaining it in the form of acids. During the process, a jet of steam is admitted into the still, and the product of the distillation is treated in a manner similar to that hereinbefore described.

The patentee claims, Firstly,—the mode of obtaining products of cocoa-nut oil, by submitting the acids thereof, or their products, to pressure, between surfaces of woven fabrics. Secondly,—the combining of lime with cocoa-nut oil, when such combination is subsequently either decomposed by acid, or distilled; also the using of diluted sulphuric acid to decompose saponified cocoa-nut oil, as a means of obtaining acids of cocoa-nut oil; and likewise the distilling of saponified cocoa-nut oil. Thirdly,—the mode of treating acids of cocoa-nut oil, by combining lime therewith. Fourthly,—the distilling of acids of cocoa-nut oil, and their products, without first submitting them to be dissolved in alcohol; also the application of metal retorts, stills, or vessels, for the distillation of acids of cocoa-nut oil, and their products. Fifthly,—the pressing of acids of cocoa-nut oil, and their products, in separate layers, when subjected to artificial heat, in order, more readily and completely, to separate the same. Sixthly,—the combining of steam with cocoa-nut oil, when saponifying the same, or when decomposing the soap. Seventhly,—the distilling of cocoa-nut oil, in order to obtain the same in the form of acids.—[*Inrolled in the Rolls Chapel Office, May,* 1843.]

To HENRY BEWLEY, *of the city of Dublin, licentiate, apothecary and chemist, for an improved chalybeate water.*—[Sealed 23rd June, 1842.]

THIS invention consists in the preparation of a chalybeate water, or organic saline solution of iron, which will not be readily impaired by carriage, or keeping, and is rendered very agreeable to the palate by being combined with carbonic acid gas.

The chalybeate water is made in the following manner:—One pound of crystallized sulphate of iron is dissolved in a mixture of ten pints of water, and three ounces and a half of sulphuric acid, of specific gravity 1.840, contained in a stone-ware or other suitable vessel, set in a sand-bath; the heat of the solution is then raised to the boiling point, and nitric acid, of specific gravity 1.340, is added thereto, at intervals, (the solution being stirred at the same time,) until it ceases to give off vapours of an orange color, which is an indication that the iron has attained the state of peroxide. The solution is then mixed with ten gallons of water, and the peroxide of iron is precipitated, by the addition of water of caustic ammonia, while the liquor is being agitated; the precipitate is collected on a filter, and afterwards washed in water. Eight ounces of crystallized citric acid are now dissolved in about four times their weight of water, in a stone-ware or other suitable vessel, placed in a sand-bath, the temperature of which is raised to 160° or 180° Fahr., and the peroxide of iron, in a moist state, is gradually added to the solution, (which is at the same time stirred,) until it ceases to be dissolved.

The strength of the solution of citrate of iron is ascertained by evaporating a certain quantity to dryness, and weighing the dry ferruginous salt; a weak syrup of sugar (flavored according to the taste, if required) is then added to the solution, in such proportions that each fluid ounce of the mixture shall contain about thirteen grains of citrate of iron. One ounce of the mixture, and five ounces of water, are introduced into a seven-ounce bottle, and this solution being charged with four or five times its volume of carbonic acid gas, by means of a soda-water machine, the bottle is then corked, and the cork secured in the ordinary manner.

The improved chalybeate water is also prepared with a modified triple combination of the citric acid with the oxide of iron, by adding to the above described citrate of iron, some alkali, as ammonia, potash, or soda. Instead of the citrate of iron, other suitable organic salts of iron, (such as the tartrate or lactate,) combined or not combined with an alkali, may be employed.

The patentee claims the manufacture of an improved chalybeate water, of the nature aforesaid; whether such chalybeate water be prepared by the particular method or process hereinbefore described, or by any other analagous method or process.—[*Inrolled in the Inrolment Office, December,* 1842.]

ON THE LAWS RELATING TO LETTERS PATENT FOR INVENTIONS.

No. V.

ON THE PATENT LAWS OF HOLLAND AND BELGIUM.

Although these two countries now form separate and distinct nations, yet many of the laws in force at the present time, in both states, are of the same origin; no alteration having been made in them since Holland and Belgium were divided into two kingdoms. This observation applies more particularly to the laws and regulations relating to the industrial arts, manufactures, commerce, and agriculture; and under this head, the Laws relating to Patents for Inventions may be properly classed. The enactment, which we now lay before our readers, was passed and promulgated in 1817, in the kingdom of the Netherlands, and is the law under which patents or privileges are granted in both countries, at the present time; the two governments have, however, (since the separation) made many alterations in the administration of the law, although no direct legislative change has taken place in either country. In Belgium, the government appear to have adopted a system of rigour against the importation of foreign inventions, by raising up many difficulties, whilst Holland treats them with marked favor. For instance, in Belgium, the government will, on no account, grant a patent for a foreign invention, for a longer term than five years; but they reserve to themselves the liberty of prolonging the privilege, if, at the expiration of this term, it should appear desirable. In Holland, however, an inventor may obtain a patent for five, ten, or fifteen years, either of which terms he may express in his petition; and if he obtain a patent for a short term, he may, as in Belgium, by memorializing the government, obtain a prolongation. Again, in Belgium the patent is issued without payment of the tax, which may remain unpaid for two years; at the end of which time, the patentee may either pay the amount, chargeable upon a five years patent, or allow the invention to become public property; but in Holland the tax must be paid before the patent is issued; in fact, the demand for a patent must be accompanied by a declaration, duly witnessed, whereby the applicant binds himself to pay the amount of the tax, and release the patent within three months; without this document, no notice whatever will be taken of the petition. This regulation the Dutch Government have found it necessary strictly to enforce, in consequence of the number of applications that were made for patents, and were not further attended to by the parties applying.*

A copy of the order in council, referring to this subject, is subjoined to the law.

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* We must beg to direct particular attention to this fact, as a contrary statement has been, by interested parties, very industriously circulated among inventors, which is calculated to deprive them of their rights; for every application that is made to the Dutch Government, without the document, binding the petitioner to pay the tax, is for a short time laid aside, and if the tax be not then paid, the invention is thrown open to the public.

Law of the 25th of January, 1817, relative to the Granting of Exclusive Rights for Inventions or Improvements in the Arts and Sciences.

WE, WILLIAM, by the Grace of God, KING OF THE NETHERLANDS, PRINCE OF ORANGE NASSAU, GRAND DUKE OF LUXEMBURG, &c. &c.

To all to whom these presents shall come, greeting, be it known,—

Having taken it into consideration that it is to public interest to establish general regulations for the granting of exclusive rights for inventions or improvements in the arts and sciences.—

Accordingly, having heard our learned Council of State, in common with the general states, we have enacted, as by these presents we do enact:—

ART. 1. That exclusive rights may be granted by us for a limited time, by letters patent, under the title of patents for invention, (upon petition being made,) to those in the kingdom, who have discovered an invention or made an essential improvement in any branch of the arts or sciences; as also to those who shall first introduce, or carry into execution in the kingdom, an invention or improvement made abroad.

ART. 2. The granting of patents for inventions will be without prejudice to the acquired right of a third person, and will be null, if it be proved that the invention or improvement, for which any person may have had a patent, has been employed, put into practice, or exercised by another in the kingdom, before the obtaining of the patent.

ART. 3. Patents for inventions will be granted for the space of five, ten, or fifteen years. The duties to be paid by the patentee, will be proportioned to the duration of the patent, and the importance of the invention or improvement; but never exceeding 750 florins, nor less than 150.

ART. 4. A patent for an invention, granted for the space of five or ten years, may also be prolonged at the expiration of that term, should any good reasons exist for consenting to the petition made to this effect; but the whole duration must never exceed the term of fifteen years.

ART. 5. Patents for the introduction or the application of inventions or improvements, made in foreign countries, in which their authors may have a patent, shall not be granted for any longer space of time than the duration of the exclusive right granted in the foreign country, for these objects, and shall contain an express clause that the objects mentioned, shall be manufactured in this kingdom.

Art. 6. The patents for inventions shall secure to their possessors, or those in possession of the right, the privilege,—1st: Of working and selling exclusively throughout the whole of the kingdom, during the time fixed for the duration of the patent, the objects therein mentioned, or of causing them to be worked or sold by any others, authorized by the patentee.—2nd: Of bringing an action against any one who should infringe upon the exclusive right granted to them, in order to obtain the confiscation to the patentee, of any articles which may have been manufactured and not yet sold, and the profit of those already disposed of, and also the right of bringing an action for damages and costs.

Art. 7. A person presenting a petition for the purpose of obtaining a patent, must annex thereto a sealed description, signed by himself, setting forth correctly, and in detail, the invention or discovery for which the patent is demanded, accompanied by the necessary plans and drawings, &c.; this description will be published at the expiration of the term for which the patent is granted, whether it be an original or extended patent; or sooner, in case it should be declared null and void, for any of the reasons hereafter mentioned.

The government may, nevertheless, defer this publication, if deemed advisable.

Art. 8. A patent for an invention shall be declared void for the following causes:—

1st: When the patentee, in the description annexed to his petition, shall have maliciously omitted to make any mention of any part of his secret, or shall not have shewn it perspicuously.—2nd: Should it appear that the object for which a patent has been granted, was, previously to the date of the grant, described in any printed and published work.—3rd: When the patentee, for the space of two years, reckoning from the date of his patent, has made no use of it, without having reasons, which the government shall deem sufficient.—4th: If any one who shall have obtained a patent in this country, should afterwards obtain one for the same invention in a foreign country.—5th: If it should appear that the invention for which a patent may have been granted, was, by its nature, or in its application, dangerous for the safety of the kingdom or of its inhabitants.

Art. 9. A separate account shall be kept of the fees paid by those obtaining patents, and the produce thereof shall be employed in premiums or rewards for the encouragement of the arts and sciences.

Art. 10. Be it enacted, by these presents, that the existing rules and regulations for patents for inventions, and other similar exclusive rights, be abrogated and made of none effect; it being understood, nevertheless, that those to whom patents have been delivered and granted, up to this time, shall maintain the enjoyment of all their rights and privileges.

We desire and order that the present law be inserted in the official journal, and that our Ministers and other authorities, whom it concerns, punctually attend to its fulfilment.

Given at Brussels, the 25th of January, 1817, in the Fourth Year of our Reign.

(Signed) . WILLIAM,
By the King.
A. R. FALCK.

Regulation concerning the Administration of the Law passed the 25th of January, 1817, and also the Granting of Patents for Inventions, Importations, and Improvements.

ART. 1. Any one wishing to obtain a patent for an invention, importation, or improvement, must deliver to the Registrar of State of his province, a petition addressed to the King, containing the general object of his request, his christian and surname, and dwelling place; also the term for which he desires to obtain a patent, and the term for which the same object may have been already patented abroad. To which also must be added, under seal, an exact detailed description of the invention or discovery, for which the patent is solicited, accompanied by the necessary plans and designs, conformably to Art. 7, of the law of January 25th, 1817.

ART. 2. The Registrar of State of the province will make a memorandum on the back of the parcel, or paper, of the date when the petition and description of the invention, were deposited, which shall be signed by himself and the petitioner, to whom a duplicate will be delivered.

ART. 3. The Governor will, immediately, and at the latest within ten days from the time in which the deposit was made, address to the Commissary-General of Instruction and of the Arts and Sciences, all the petitions for a patent for an invention, importation, improvement, &c.

ART. 4. The Commissary-General will present to the King the petition for a patent for an invention, improvement, importation, &c., accompanied by his own report; and when such report shall be favorable to the granting of the patent, he will annex thereto the brevet for affixing the Sign Manual.

ART. 5. When the King shall think fit to reject the petition, or to refer it either to the Royal Institution of the Netherlands, or to the Royal Academy of Science and Literature, at Brussels, due notice will be given of it to the petitioner.

Art. 6. The brevet shall contain the description of the invention, and shall point out the privileges afforded to the patentee, in conformity with Art. 6 of the law of the 25th of January, 1817, and shall mention, expressly, that the government, in granting the patent, guarantees for nothing, either as to the priority or the merit of the invention; reserving the privilege of declaring it void for any one of the causes indicated in Art. 8 of the law. The patent for importation for an object already patented abroad, shall contain, moreover, an express mention that the government does not guarantee the truth of the assertion made by the petitioner upon the duration of the patent granted in a foreign country. It shall contain also the clause prescribed by Art. 5 of the law, that the objects mentioned shall be manufactured in the kingdom.

Art. 7. Any one wishing to obtain a prolongation of a patent, of five or ten years, (Art. 4,) must make the request to the Commissary-General of Instruction, and of the Arts and Sciences, who will make his report to the King. These prolongations will also be signed by the King.

Art. 8. Every proprietor of a patent, who, by any new discoveries, may have perfected that for which a patent has already been obtained, may obtain either for the duration of the first patent only, or for one of the terms fixed by Art. 3 of the law of the 25th of January, a new patent for employing these new means or methods.

Art. 9. In order to obtain this patent, the same formality must be gone through as for the others. With respect to the duties to be paid in this instance, they will be regulated in proportion to the length of time for which the new patent may be granted, and also according to the importance of the proposed improvement.

Art. 10. Any person making an improvement upon an invention already patented, may obtain a patent for the sole use and exercise of the said improvement, without being allowed, under any pretext, to make use of the principal or original invention, so long as the patent granted for the same shall remain in force and unexpired; and on the other hand, the original inventor shall not be allowed to make use of the improvement.. Neither change of form, or of proportions, nor any kind of ornaments, will be classed amongst improvements.

Art. 11. Patentees wishing to assign either the whole or part of their rights, shall be bound to obtain, previously, the authority of the King. They must, under penalty of forfeiture, cause this assignment to be enrolled with the Registrar of their province, where a certificate will be drawn up, which shall be immediately transmitted to the Commissary-General of Instruction of Arts and

Sciences. This certificate shall be consigned to the register hereinafter to be mentioned.

Art. 12. Persons who, by right of succession, might become proprietors of a patent, previous to their enjoying its privileges, shall be bound to enroll, with the Registrar of their province, a document stating the same, upon which a certificate will be drawn up, which shall be immediately transmitted to the Commissary-General of Instruction, and of the Arts and Sciences. This certificate shall be consigned to the register hereinafter to be spoken of.

Art. 13. On the expiration of any patents for inventions, or on any patent being declared null from any one of the causes specified in Art. 8 of the law of the 25th of January, the Commissary-General shall take proper measures for giving publicity to the discoveries and inventions which may have been patented.

Art. 14. If on the expiration of a patent, or by virtue of any of the causes specified in Art. 8, the Commissary-General of Instruction should not consider it advisable, from political or commercial reasons, to make the discovery or invention public, he shall give in his report to the King, who will decide upon it.

Art. 15. The Commissary-General of Instruction shall send the patents for inventions, importations, or improvements, granted and signed by the King, to the Governor of the province in which the petitioner dwells, pointing out to him the sum to be paid for the brevets. The Governor will transmit them to the petitioners, when the latter have proved that the duties, determined by the tariff, have been lodged with the appointed receiver.

Art. 16. The tariff of the duties to be paid for obtaining patents, is regulated in the following manner:—

For a patent for 5 years, 150 florins.

For a patent for 10 years, 300 or 400 florins, according to the importance of the invention or improvement.

For a patent for 15 years, 600 or 750 florins, according to the importance of the invention or improvement.*

For an assignment or acquisition of a patent, by right of succession, 9 florins.

Art. 17. When any patent is pronounced null, for either of the causes mentioned in Art. 8, of the law of the 25th of January, the duties that were paid on this patent shall be returned in proportion to the time it still had to run.

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* Since the separation of the two Kingdoms, this table of fees can only be correctly applied to Holland. In Belgium the government tax is fixed at a certain sum, according to the duration of the privilege, and does not vary as in Holland, according to the importance of the invention.

The tax in Belgium on a patent for 5 years is, francs 317.46....for 10 years, 634.92....and for 15 years, 1587.30.

ART. 18. The Minister of the Finances shall annually furnish the Commissary-General of Instruction with an exact account of the sums arising from the duties paid for obtaining patents for inventions, importations, or improvements. The Commissary-General shall propose to the King the employment of this fund, agreeably to the 9th Article of the law of 25th January.

ART. 19. There shall be a register kept open at the office of the Commissary-General of Instruction, in which all the patents that are granted shall be inserted, as well as the certificates of assignment, or transfer of rights. This register may be consulted by persons purposing to solicit a patent.

ART. 20. Mention shall be made, in the official schedules, of the patents which are granted, and of the names of those who have obtained them.

Copy of the Decree of 17th August, 1827.

WE, WILLIAM, &c. &c.

In reference to the report of our Minister of the Interior, dated last June, relative to the steps to be taken to correct the negligence of persons who obtain brevets of invention, and who neglect to pay the tax upon these brevets and take them away,—We, adopting the the suggestions contained in the said report, and with the advice of the Privy Council, have thought proper to authorize and do hereby authorize our Minister of the Interior,—1st: To demand and obtain from the applicant (when he deposits his petition and the other necessary documents to obtain a patent) a declaration, by which he binds himself to take away the brevet, if it be granted, and pay the fees or tax within three months from the date thereof, in default of which, the brevet will be annulled, and the invention, for which it was granted, will be published and become public property.—2nd: To require every one, who shall have obtained a brevet, to put the invention to work, in the time stated by the law, under penalty of seeing the brevet annulled, and the invention become public property. A copy of the present, as well as the before-mentioned report, shall be sent to our Minister of the Interior, to be put in execution.

Laacken, Aug. 17*th*, 1827.

WILLIAM,

By the King,—STREEFKERK.

J. G. DE MEY VAN STREEFKERK.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 409, Vol. XXII.)

Mr. Farey observed, that the result arrived at by the experiments, appeared to correspond nearly with those recorded by Smeaton, who had experimented upon, and used practically both kinds of wheels. The buckets of the model wheels, used in the experiments, did not appear to be of the best form, and they were entirely filled with water; hence an apparent advantage had been obtained, by the use of the circular conduit, to retain the water in the buckets. But that would not be realized in practice, for as the form of the bucket regulated the point at which the water quitted it, and it was the practice of the modern millwrights to make the wheels very broad, in order that the buckets should not be filled to more than one-third of their depth, the circular conduits became less useful, and in fact were now seldom used. Smeaton's practice was to entirely fill the buckets with water, but he never adhered to the slow velocity of revolution which he recommended, theoretically, in his Paper to the Royal Society.

Mr. Fairbairn had adopted broad wheels, with an improved form of bucket partially filled, and had obtained a more regular motion, particularly at high velocities.

Mr. Farey promised to present to the Institution a copy of the method of calculation, adopted by Smeaton, for water-wheels.

Mr. Taylor corroborated Mr. Farey's statement of the advantage of using broad wheels, with the buckets of a fine pitch and partially filled; circular conduits then became unnecessary: this was practised among the millwrights in North Wales with eminent success, and a velocity of 6 feet per second was given to the wheel.

Mr. Homersham believed, that in Smeaton's latter works, he increased the velocity of his wheels to 6 feet per second.

Mr. Rennie gave great credit to the author for the ingenuity of the apparatus with which the experiments were tried, and for the clearness of the tabulated results; but, owing to the necessary limited size of the model wheels, he feared the results could not be relied upon for application in practice to large wheels. The experiments of Borda, Bossut, Smeaton, Banks, and others, were all liable to the same objection.

The best modern experiments were those by the Franklin Institute, by Poncelet, and by Morin.

The result of these might be taken thus :—

Undershot wheels, the ratio power to effect, varied from - - -	0·27 to 0·30
Breast wheels - - - -	0·45 to 0·50
Overshot wheels - - - -	0·60 to 0·80
Average - - - - - -	0·60

The velocity of the old English water-wheels was generally about 3 feet per second, the American wheels 4 feet, and the French 6 feet; this latter speed was now adopted by the best millwrights in England. Mr. Hughes (at Mr. Gott's factory at Leeds) and Mr. Fairbairn, had found advantage from it; the latter also had a particular contrivance for carrying off the air freely from the buckets.

It was important to regulate the thickness of the sheet of water running over the shuttle upon the wheel. The best maximum depth was found, in practice, to be from 4 to 5 inches.

The object being to utilize the greatest height of fall, and the greatest available quantity of water, by means of properly constructed openings and such sluice-gates as were first introduced by the late Mr. Rennie for the breast-wheels constructed by him,—instead of penning up the water in a trough, it was made to flow, in a sheet of regular thickness, over the top of the shuttle, and, by a self-regulating apparatus, to adjust itself, at all times, to the height of the water. Thus obtaining the advantage of the full height of the fall at its surface, and obviating the necessity for the apparatus proposed by Mr. Mallet.

Mr. Mallet begged to dissent from the validity of the objections which had been made to the practical value of his experiments. With respect to the form of the bucket,—that used by him could not, he contended, be called a bad form, although it might be susceptible of improvement; but as the experiments were altogether comparative, it was foreign to the question whether the form was bad or good, the same having been used in both wheels.

As it was shown, that a certain relation subsisted between two water-wheels, with the same total descent, but with different diameters, as to their co-efficient of labouring force, a proportional relation would exist with any worse or better form of bucket. The results, considered as absolute measures of effect, being obtained with a form of bucket which approached nearer to the best forms now in use, than did those of Smeaton or any other experimenter, were more applicable to modern practice, and therefore he must consider his results as not without utility.

With regard to the custom of only partially filling the buckets, it must be remarked, that buckets of the best forms begin to spill their contents before arriving at the lowest point of the loaded arc; the partial filling could therefore only palliate the evil which the circular conduit was designed to remedy. He must, however, argue, that a positive disadvantage attended a partial filling. A permanent loss of fall was produced, equal to the distance between the centres of gravity of the fall and of the empty portion of the top bucket, at the moment it had passed the sluice; this distance could be but little varied by the fineness of pitch of the bucket, and depended more upon the depth of the shrouding. That there was a constant loss of labouring force, by a practical diminution of the effective leverage, or a reduction in the "moment" of the loaded arc; that as the wheel revolved, the centre of gravity of the fluid contained in each bucket, as it approached the lower portion of the loaded arc, was transferred to a greater distance from the centre of motion even before the contents commenced spilling; but the angular motion, of the centre of gravity of any one bucket, was at first that due to its distance from the centre of motion of the wheel, or to its radius; and as the radius increased, a greater angular velocity would be acquired by the water which had changed its position on approaching the lower point of the wheel; but this increased velocity was given at the expense of the power of the wheel, and hence a partially filled bucket would, he believed, be always attended with a loss of labouring force. To the last objection, a full bucket was not liable.

From these reasons he felt justified in concluding, that the use of the circular conduit was more advantageous than the practice of partially filling the buckets.

With respect to the shuttle delivering the water over the top,— where the head of water and the fall were constant, no advantage could be obtained by the use of a wheel greater in diameter than the total descent; it was assumed, that this form of shuttle would be used, in order always to deliver the water as high as possible upon the periphery of the wheel; but the question was, "If the head be variable, what should be the diameter of the wheel to secure the best effect?" The paper showed that a wheel, whose diameter was equal to the total descent, when the head was a maximum, did not always give the greatest average labouring force. The question was therefore independent of the sort of shuttle used; it assumed the power of always admitting the water upon the wheel at the highest point of the total descent, and sought to establish the best relation between the diameter of the wheel and the whole descent, when the head alone was variable, according to given conditions. The results of this part of the investigation, therefore, while they admitted the full value of Mr. Rennie's shuttle, went further, and pointed out the limits of its useful application.

He was fully aware of the prejudice which existed against the circular conduit, and he once participated in it; but his attention had been forcibly drawn to it in his professional practice, and having used it very beneficially upon wheels of 40, 50, and 60 horses' power, which he had constructed for mining purposes, he wished to draw the attention of Engineers to the consideration of its practical merits when adapted to good wheels.

February 7, 1843.

The PRESIDENT in the Chair.

No. 558. "Description of a Drawbridge, at Bowcombe Creek, near Kingsbridge, Devon."

By George Clarisse Dobson, Assoc. Inst. C E.

This Drawbridge spans one of five openings in a stone bridge, built across a navigable branch of Salcombe Harbour; it is in one leaf, 15 feet 9 inches wide, and 32 feet long, from out to out, supported upon a cast-iron shaft or axle, placed 7 feet 6 inches from the inner end, working in the abutment pier, which is built hollow to receive it, and thus the part within the axle-end acts as a counter-weight.

To the centre of the end cross-beam of the counter-part, a chain is attached, and after passing over cast-iron sheaves in the masonry of the face of the abutment, is coiled on a drum fixed on a horizontal shaft, carrying on one end a pinion, worked by a rack, attached to the piston of the hydraulic press; by this means, motion is given to the shaft and drum, and consequently to the leaf of the bridge. Balance-boxes are hung to the counter-end, by which the shutting is regulated. The struts for supporting the leaf, when raised, are also thrown in and out of their places by a rack and pinion.

The hydraulic press used for opening and closing the bridge, is simple in its construction, and the whole works so easily, that a female can open and close the bridge in about 15 minutes, without difficulty. The fresh water used for the pump is contained in a cistern, beneath, and seldom wants replenishing, as it is returned into the reservoir every time after being used.

The bridge was designed and erected by Mr. J. M. Rendel, about 12 years since, when he was engaged in improving the turnpike road, in the south of Devon.

The expense of repairing, oiling, packing, &c., since its erection, has averaged under £7. per annum, including a small salary to a neighbouring millwright for occasional inspection.

The communication is accompanied by a drawing, showing a plan and sectional elevation of the bridge and the machinery.

No. 589. "An Investigation of the comparative loss by Friction, in beam and direct-action Steam Engines."

By William Pole, Assoc. Inst. C. E.

In consequence of the comparatively recent introduction of direct-action steam-engines on board the steam-vessels of the Royal Navy, the attention of engineers has been drawn to the advantages or disadvantages they possess, when viewed in comparison with those constructed with side levers. The object of this paper is to investigate the value of an apparently formidable objection which has been frequently urged against the direct-action engine, namely, "that from the more oblique action, consequent upon the shortness of the connecting rod, the loss by the increase of friction is so considerable as to constitute a serious objection to this form of engine."

After explaining to what extent mathematical analysis is applicable for determining the amount of friction, the paper proceeds to show that it may be satisfactorily used in the present case, as it is only the friction caused by the strain, or load, which is involved in the objection, and this is more adapted for theoretical than experimental determination.

The three general laws of friction, as established by the best experiments, are,—

1st. That the friction caused by one solid body rubbing upon another, is independent of the velocity with which the rubbing surface moves.

2nd. It is also independent of the area of the rubbing surface.

3rd. It is proportional to the pressure upon this surface.

From these it will follow, that if the pressure upon a moving body be multiplied by a certain co-efficient of friction (whose value is dependent upon the nature of the rubbing surface), the product will be the resistance from friction; and this multiplied again into any space the rubbing surface moves through, will give the amount of "power, work, or labouring force," expended in overcoming the friction through that space.

If the pressure upon the moving body be variable throughout its motion, the differential calculus must be employed, but the principle of calculation is still the same.

The paper proceeds to deduce general mathematical expressions for the amount of friction on each bearing of an engine, by finding, first, by ordinary statical rules, the pressure thrown on each particular bearing, by a given force applied to the piston, and then combining this with the space through which the rubbing surface moves.

This is done for the beam-engine, and for three modifications of the direct-action engine. Equations are also added for the oscillating or vibrating engine, and for an arrangement in which the connecting-rod is supposed to be indefinitely lengthened.

The numerical values of the expressions for friction thus found, are then calculated for an engine upon each of these different constructions, supposing them to be similar in all other respects, having the cylinders 66 inches in diameter, with a length of stroke of 6 feet; and the results are shown in a table, distinguishing the friction of every bearing.

From this it appears that as respects the friction caused by the strain, if the beam engine be taken as the standard of comparison—

The vibrating engine	has a	gain of	1·1	per cent.
The direct-action engine with slides	,,	loss ,,	1·8	,,
Ditto with rollers	,,	gain ,,	0·8	,,
Ditto with a parallel motion.	,,	gain ,,	1·3	,,

This difference being so trifling, it is contended that the objection to the direct-action engine, on the ground of its alleged increased friction, has, when investigated, no adequate foundation.

Mr. Field believed that the paper was correct in its view of the comparative amount of friction of the two kinds of engines. He was of opinion that an excessive allowance for friction had hitherto been generally made in calculating their effective power. It was found practically, that when the pressure upon the piston was about 12 lbs. per square inch, the friction did not amount to more than 1 lb. or 1½ lb. per square inch. This was easily ascertained by the indicator, when the engine was working without a load, but when loaded, he knew of no accurate experimental mode of showing it.

At the engines of the Blackwall Railway, the experiment had frequently been tried, by casting off all the load, and so regulating the steam, that the engines should make only the regular number of strokes per minute; the result had invariably shown about 1 lb. per square inch for friction.

Mr. Taylor confirmed the preceding remarks; it had been the custom formerly, in large pumping engines, to allow one-fifth for friction, but modern practice had shown that this was not necessary, particularly since greater precision had been introduced into the construction of all kinds of machinery.

Mr. Miller agreed that the friction of engines generally had been over-rated; he believed that as a simple comparison of the friction of the main parts of two kinds of engines, the results arrived at, in the paper, might be received as correct; but there were several other questions which must be considered, if it was intended to establish a general comparison between the beam and the direct-action engines; this, however, he believed was not the intention of the author.

Mr. Murray contended that the second proposition in the paper which assumed that "friction was independent of the area of the rubbing surface," although supported by Coulomb and the early experimenters, had been proved by Vince and others to be incorrect: it was natural to suppose that, in proportion to the hardness and smoothness of the bodies, there would exist a different ratio for the best proportion of surface to weight for every different body; if a surface carrying a given weight was of less than the due area, the surfaces would cut into each other, become rough, and thus increase the friction : on the other hand, if the surfaces were unduly enlarged, there must be a loss from the additional amount of friction caused by the extended surface. He conceived that the calculations in the paper must be affected by the incorrectness of the data upon which they were based.

The simple mode of comparing the beam engine with the direct-action engine appeared to be, to suppose two engines of the same length of stroke and diameter of cylinder; the proportions being good, it would be indifferent whether the power was transmitted through a direct connecting-rod, or through side levers; the cylinders, air-pump, arrangement of parallel motion, &c., being supposed to be alike, the friction of these parts would be alike in all cases, and the comparison would be limited to the parts employed in transmitting the power from the piston-rod cross-head to the crank-pin; both connecting-rods have the same number of bearings, which in both cases travel with friction over nearly the same distances: it is allowed that the bearings of the shorter connecting-rod have a larger amount of friction, and that from the greater angle it assumes, more friction is thrown upon all the bearings of the parallel motion, on account of the greater force required to retain the piston in a vertical position. To counterbalance the increased friction on these parts of the direct-acting engine, allowance must be made in the beam engine, for the friction of the beam centres, and of the top and bottom necks of the side rods. The friction being directly as the distance moved through, and the distance in the side-rod ends being so very small, it follows that the amount of friction must be very trifling. The distance travelled by the beam centres is greater, but it is not of importance, as it is the angular distance due to the vibration of the beam, measured on the circumference of the gudgeon. Under these considerations Mr. Murray was disposed to give the preference (if any existed) to the side-lever engine.

In a pamphlet published in 1840, by Mr. John Seaward, it is stated that four-fifths of the whole friction of an engine were absorbed by the packings of the piston, and air-pump bucket, by the slide-valves and by the different packings or glands; consequently one-fifth was due to the whole of the necks or bearings throughout the engine. Now on considering the large proportion of this amount of the friction that is due to the bearings of the main shafts, of the crank-pin, and of the bottom end of the connecting-rod, and of all those other bearings common to both sorts of engines, it must be evident that the total amount of the friction due to those parts in which a difference between the engines exists, must be but a small portion of this one-fifth. Taking one-tenth or ten per cent. of the whole power of an engine, as the amount of power required to overcome the friction of the engine itself, which was allowed to be ample, one-fifth of this would be two per cent.: and therefore the degree in which either engine could surpass the other in the amount of friction, could only be, as already stated, a small portion of this two per cent.

In comparing the efficiency of these engines, it would thus appear that neither could be said to possess advantages over the other, as regards friction, in such a degree as to be appreciable in practice, or to render the point of importance, in a choice between the engines; and that if the one kind of engine had advantages over the other, they must arise from other causes than difference in friction.

Having taken this view of the case with a supposed side-lever engine, of the same length of stroke and diameter of cylinder as the direct-action engine, if manufacturers varied in a slight degree from this proportion, it was for the purpose of obtaining a better proportion of stroke and diameter of cylinder, and consequently a better engine than the one supposed to exist for the purpose of making the observations.

Mr. Vignoles looked upon the second proposition assumed by the author, as being overthrown by the results of the experiments of Wood and others, as to the ratio of friction to the area of rubbing surface; and it was well known practically, that the application of various unctuous substances materially altered the amount of the friction. A certain proportion was requisite between the area of the surface exposed to the friction, and the pressure upon it, to bring it within the general law. For practical purposes, he submitted that the law should be received with limitations.

Mr. Gravatt said, that even allowing, for the sake of argument, that the second proposition, assumed by the author, was incorrect, still, as the paper was only a theoretical examination of the comparative friction of those parts of two kinds of engines, which were most subjected to strain, supposing them both to be of similar power and dimensions, equally well-proportioned and constructed, and the same sort of lubrication of the bearings employed, he would contend that the circumstances being equal,

equal results would be obtained, and that the conclusions arrived at by the author should be received as correct.

Mr. Pole observed, that the objections brought forward were important, as they referred principally to the fundamental laws of friction.

He would first give some explanation respecting the communication itself.

The investigation was commenced at the request of his late friend, Mr Samuel Seaward; it was originally intended to have especial reference to the Gorgon engine, but had subsequently been extended to others.

The paper, necessarily containing much mathematical reasoning, could only be read in abstract, and might, therefore, have been partially misunderstood, both as to its objects and results.

The object was not to enter into a discussion of the whole question of the respective merits or defects of beam and direct-action engines, but simply to ascertain the value of the one objection named.

The whole friction of an engine at work, with its load upon it, might be divided into two distinct parts. 1st. The friction due to the engine itself, or such as would be produced by the working of the engine, if unloaded. 2nd. The additional friction caused by the strain consequent upon the load; for it must be evident, that when the engine had its work upon it, the friction upon the bearings, through which the strain passed, must be increased, and additional friction produced beyond that which would exist when the engine was working without a load. The latter of these alone required to be calculated, and to this, mathematical analysis was more peculiarly adapted. The friction of the engine unloaded, might be ascertained by the indicator, as described by Mr. Field; but as he had remarked, there was no practical method of finding what was the additional friction when the load was applied; indeed, it would be as difficult to find the latter by experiment as the former by theory.

He then explained the manner in which the amount of friction upon each bearing had been calculated, and engines of different constructions compared with each other. He had adopted precisely the plan suggested by Mr. Murray, namely, by taking engines of the same length of stroke and diameter of cylinder, supposing them to be equally well proportioned and constructed, and in equally good condition. But instead of assuming, as Mr.

Murray had done, that there was somewhat more or less friction on any particular bearing, his object had been to ascertain what was its actual value. If it were impossible to measure the pressures, and spaces moved through, an approximation might be received; but since these quantities were ascertainable, it was more satisfactory to obtain results deduced from them.

The conclusions drawn from the paper accorded, however, with Mr. Murray's, viz., that "neither construction could be said to possess advantages over the other, in such a degree as to be appreciable in practice, so as to render the point of importance in a choice between them." The difference between Mr. Murray's process and that in the paper, was, that what the former only assumed, the latter endeavoured to prove.

Mr. John Seaward's pamphlet on the Gorgon engine had been referred to. The conclusions he there drew, were more favourable to the direct-action engine, but were derived, like Mr. Murray's, merely from approximate consideration, rather than from strict investigation. Mr. Seaward confessed, that the friction caused by the strain was difficult to be calculated, and had therefore contented himself with assuming, that those gudgeons, through which the strain passed, had three times as much friction as was due to the others. He also assumed, that the friction was proportional to the area of the rubbing surface, a principle which no experiments had ever shown. On these grounds, it was contended that Mr. Seaward's results were open to objection.

Mr. Pole then proceeded to notice the objections urged against the fundamental laws of friction which he had stated, and to give authorities for them.

The first of these had not been questioned since the days of Vince, by whom it was proved; it might therefore be considered as established. With regard to the second and third, it must be noticed that they depend, in some measure, upon each other, for it could be proved, that if the third was true, the second must be true also.

The principal experiments, which had been made upon the friction of solids, were those by Amontons, in 1699; Coulomb, in 1779; Vince, in 1784; Wood, in 1818; Rennie, in 1828; and Morin, in 1831, 32, and 33.

Amontons was the first who devoted any considerable attention to the subject, and he found that friction was not augmented by an increase of surface, but only by an increase of pressure.

Coulomb's researches were more elaborate, the experiments were on a large scale, and were submitted to a great variety of trials; they fully proved that the friction was proportional to the pressure, and that the extent of surface did not affect it.

These results were further confirmed by the experiments of De la Hire, Ximenes, Boistard, Rondelet, and others.

Mr. George Rennie's experiments were very valuable, as having been condncted on a large scale, and with much care; they were also of a comparatively recent date. The results were conclusive on the point in question, for he found, that when the surfaces were to each other as 6·22 : 1, the friction remained the same; and one of the general conclusions he deduced was, "that the amount of friction was as the pressure directly, without regard to surface, time, or velocity."

The last and most extensive series of experiments were those by M. Morin; they were conducted at Metz, by order of the French Government, and extended over a period of three years, (1831, 1832, and 1833,) no expense or trouble having been spared to render them conclusive and satisfactory.

The results were given by Professor Moseley, in his new work on the Mechanical Principles of Engineering. They proved that "the friction of any two surfaces was directly proportioned to the force with which they were pressed perpendicularly together," and that "the amount of friction was, in every case, wholly independent of the extent of the surfaces of contact."

The before-mentioned experiments all agreed, that the friction was proportional to the pressure, and was independent of the extent of surface. In opposition, however, to these, stood the experiments of Professor Vince, of Cambridge, which led him to the conclusion, that the friction increased in a less ratio than the pressure, and that it was not altogether independent of the area of surface. These experiments were probably conducted with care and accuracy; but it was also probable that equal precision had been used in those which proved the contrary; and if this was allowed, the majority of coinciding experiments might, as in all other cases, be safely received in preference to one dissentient. But if the particulars of Professor Vince's experiments were examined, many circumstances appeared which would render them less worthy of regard than others. It was not shown that he experimented upon metals, but that he used pieces of wood, either bare or covered with paper; and the experiments were on a small scale, the moving bodies being at the utmost a few ounces weight: while Coulomb, Rennie, and Morin, had extended their trials to all kinds of materials, and had used considerable weights. Professor Vince himself, although satisfied with the method of conducting his experiments, did not seem equally so with their results, as regarded the influence of surface and pressure, for he had remarked, "that no general rule could be established to determine it, even for the same body."

Quotations were then given from Gregory, Brewster, and others, corroborating this view of the inconclusive and unsatisfactory nature of Vince's experiments.

The law of the influencce of pressure and surface upon friction, was occasionally modified by accidental circumstances, two of which might be noticed, as they had been expressly treated of by Rennie and Morin.

1°. It was only applicable within the limit of pressure which would not injure and abrade the surfaces; for when heating and undue attrition commenced, it was natural that the law would not hold good. Well-constructed machinery, however, was never supposed to pass this limit, and therefore this cause of irregularity might be rejected in calculation.

2°. Another modification was produced by the application of unguents; this was treated of by Mr. Wood, whose experiments showed, that when unguents were introduced, there was a certain area of bearing surface, proportioned to the weight, which was peculiarly favourable as regarded the loss by friction, but that when this area was preserved, the friction was in strict ratio to the pressure.

It could not, however, have been Mr. Wood's intention, from these results, to impugn the applicability of the established general laws to the purposes of calculation, but only to show the existence of modifying cirumstances under certain conditions; for the formula he had given, assumed the friction to be as the weight, and had no element in it expressing the area.

Mr. Rennie and M. Morin had also examined the influence of unguents, and had found that that their introduction did not materially alter the general laws of friction, but only affected the value of the co-efficient or multiplier to be used in ascertaining its numerical amount.

Having thus brought before the meeting the results of the principal experiments on friction, Mr. Pole concluded by adducing the testimony of writers on mechanics, who, guided by these results, had promulgated the laws deduced from them. He gave quotations from the following authors in corroboration of his views, viz.—Emerson, Playfair, Tredgold, Barlow, Lardner, Farey, De Pambour, Poisson, Pratt, Whewell, and Mosley. With the last mentioned author Mr. Pole had taken an opportunity of conversing upon the points in question, and the principles adopted in the paper had received the Professor's full approbation, as corresponding with those made use of in his own treatise.

Mr. Vignoles thought that great praise was due to Mr. Pole, for the research and mathematical reading exhibited in treating the question of comparative friction. In the former remarks he had made, it was not his intention to impugn the accuracy of the abstract proposition, "that friction was independent of the area of bearing surface," any further than to qualify it in its practical application, with the proviso, "that proper proportions were maintained between the area and the pressure, according to the description of mechanism, subjected to friction." He therefore desired to consider the question, as to how far, in practice, one kind of engine varied from the other in the general amount of friction, and to examine how far the areas of the bearing surfaces were in proportion to the insistent weight, caused either by the strain of any angle, or by the direct weight on any of the journals of the moving parts; this inquiry should precede the abstract mathematical investigation. The friction of different substances would not follow the mathematical rule, unless the due proportion between area and pressure was ascertained and observed; these proportions would be very different in heavy machinery, such as marine steam-engines, and the axles of railway carriages. With these qualifications he agreed with the general propositions laid down by Mr. Pole.

Mr. Murray agreed with Professor Vignoles in thinking that the extent of surface in machines materially affected, in practice, the amount of the friction.

He did not mean to advocate the correctness of Professor Vince's experiments, but he would draw attention to the results quoted by Dr. Gregory, in which the difference of Vince's experiments and those of other writers on the subject, was attributed to their not taking into account the cohesion of the bodies experimented upon. Their experiments were made with inclined planes, which were raised until the bodies began to move, and the amount of friction was then deduced from the angle of inclination that had been given to the plane: from this mode, it was contended that no definite laws could be laid down.

Mr. Murray acknowledged that on dry surfaces, within certain limits, the amount of friction was not influenced by the extent of surface; but he contended that in practice, as different kinds of unguents were used, the cohesion arising from the impurity and clamminess of these lubricating substances, must be considered and allowed for.

Major-General Pasley said that when he was quartered at Malta, he tried some experiments on friction, by having a slab of Maltese stone, which resembled the oolite of Bath, rubbed smooth and placed horizontally; other pieces of smooth-faced stone of the same quality, but of different areas, were then attached to a cord which was weighted and passed over a pulley; the weights, which were just sufficient to give motion to the several pieces of stone, were then noted, and it was found that the area of the surface was not important, the friction being directly in proportion to the insistent weight of the stone. He could therefore corroborate Mr. Pole's propositions.

Mr. Farey considered that Mr. Pole had treated the subject of friction so well, and had selected his authorities in such a manner, as to establish his position incontrovertibly; he would therefore only remark, that in collating the friction experiments for his work from Dr. Gregory and others, he had in a measure rejected those of Vince, as being on too small a scale, and not of sufficient importance to rely upon as authority.

It must be admitted, that viewing the question practically, there were circumstances which would influence the proposition. If the surface of a journal was so small as to drive out the unguent, or to cut into the lower bearing, the friction would be unduly increased, and the theoretical position would no longer hold good. The use of unguents would not interfere with the general proposition, although in practice, any substance used for lucubration, which, when cold, solidified and became adhesive, might, for a time, produce an increase of friction; this of course would be avoided, but it would not bear upon the general question.

Mr. Rennie corroborated the position assumed by Mr. Pole, "that friction was independent of the extent of the rubbing surface:" his experiments, which had been tried on a large scale, and with various substances, gave uniformly this result, within the limits of abrasion: when that commenced, the bearings heated and there was an end of the theoretical position. The texture also of the rubbing surfaces altered the condition; for instance, any light body covered with cloth opposed a considerable resistance by the friction of the raised nap; but if the body was weighted, it again came within the limits of the law, because it more nearly resembled hard substances, which alone were considered in theory. Hard and soft woods varied, of course, in the same manner. The friction upon each other of metals of different degrees of hardness, caused in practice some little variation, but it was so slight, that the rule quoted, might be safely received as correct.

[*To be continued.*

POPULAR CYCLOPÆDIA OF NATURAL SCIENCE.*

Part IV.

In the present age, whilst works on all subjects are teeming from the press, and elaborate essays upon all branches of science are reduced to the consistence suited for feeding the minds of children, yet a gap in this kind of literature has been left, greatly to the detriment of those who have passed through the primitive "conversation books" on science, but are not sufficiently advanced to attack the, to them, formidable philosophical treatises which are held in the highest estimation. It was with no little pleasure that, on examining the present work, we found the author's intention was, as he stated in his prefatory notice, "to occupy a place somewhat intermediate between the simple elementary treatises on Physical Science and the more elaborate works of a professedly philosophical character."

The present Part contains an account of the gradual improvements in Horology, or the construction of instruments for the measurement of time, and also a display of the Science of Astronomy. Of the treatment of the former subject, which has principally engaged our attention, (the latter having met with less neglect at the hands of authors than most of the sciences,) we give our unqualified praise, both for the completeness of the

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* Published by W. S. Orr, & Co., Paternoster Row.

information communicated, as well as the lucid manner in which it is exposed. The author, in commenting on the necessity the early inhabitants of the world would naturally feel for dividing the day into regular portions of time, says, "various instruments were contrived for this purpose, and some of them shewed great ingenuity. The common hour-glass, in which the interval is measured by the passage of fine sand through a small hole, seems to have been one of the earliest of these."

"The most satisfactory of the ancient instruments for the measurement of time, was the *Clepsydra*, or water-clock, in which the hours were indicated by marks upon the side of a vessel, filled with water, from whose bottom a small stream was allowed to flow out. As the water in the vessel ran off, its surface sank, and its height, as shewn by the marks, indicated the time that had elapsed." After pointing out the defects of this construction of time-keeper, and the rude attempts made to correct them, the author proceeds to explain, by the aid of diagrams, the general principles on which clocks and watches are constructed. The important improvements are also clearly traced; the going-fusee, the improved as well as the simple escapement, the compensation balance and pendulum, and the complicated apparatus necessary for striking, are brought within the comprehension of the merest tyro in the mechanical art.

In concluding this notice of the *Popular Cyclopædia of Natural Science*, we cannot but congratulate the Publishers on their fortunate selection of the gentleman who has so well carried out the views they entertained, when commencing the publication of these treatises.

List of Disclaimers
OF PARTS OF INVENTIONS AND
Amendments
MADE UNDER LORD BROUGHAM'S ACT.

William Palmer,—disclaimer and memorandum of alteration to patent dated 9th November, 1841,* for "improvements in the manufacture of candles." Filed 16th March, 1843.

* In the specification of this patent, which will be found at page 358, of the present Vol., four improvements are described; the patentee now disclaims all but the first.

William Lomas and Isaac Shimwell,—ditto to patent dated December 8th, 1842, for "certain improvements in the manufacture of fringes, cords, and other similar small wares, and also in the machinery or apparatus for producing the same." Filed 12th June, 1843.

Alphonse Réné Le Mire De Normandy, M.D.,—ditto to patent dated 8th September, 1841, for "certain improvements in the manufacture of soap." Filed 13th June, 1843.

List of Patents

Granted for SCOTLAND, subsequent to May 22nd, 1843

To Charles Maurice Elizee Sautter, of Austin Friars, London, for improvements in the manufacture of borax,—being a foreign communication.—Sealed 23rd May.

John Laing, of Dundee, linen manufacturer, for improvements in apparatus for rubbing linen cloth, when making in power-looms.—Sealed 23rd May.

John Nisbett, of Elm-street, Long-lane, Bermondsey, London, engineer, for improvements in preparing hides and skins in the manufacture of certain descriptions of leather.—Sealed 23rd May.

Joseph Burch, of the City-road, London, engineer and machinist, for certain improvements in machinery for printing on cotton, silk, woollen, paper, oil-cloth, and other fabrics and materials, and certain apparatus to be used in preparing the moulds and casting surfaces for printing, and for certain modes of preparing surfaces previously to the design being delineated upon them. —Sealed 23rd May.

Angier March Perkins, of Great Coram-street, London, engineer, for improvements in the manufacture and melting of iron, which improvements are applicable to evaporating fluids.—Sealed 25th May.

William Brown, of the city of Glasgow, for improvements in the manufacture of porcelain, china, pottery, and earthenware; and which improvements are also, in part, applicable to the manufacture of paper, and to the preparation of certain pigments or painters' colors.—Sealed 26th May.

Percival Moses Parsons, of Stamford-street, London, civil engineer, for certain improvements in steam-engines and boilers, and in motive machinery connected therewith.—Sealed 31st May.

Alfred Brewer, of Surrey-place, Old Kent-road, London, wire-worker and felt manufacturer, for improvements in machinery for manufacturing paper,—being a foreign communication.—Sealed 1st June.

Charles Clark, of No. 1, Great Winchester-street, London, merchant, for an improved pyro-hydro-pneumatic apparatus, or means of generating, purifying, and condensing steam and other vapours, and of extracting from vegetable substances the soluble portions thereof; as also the application of parts of the said apparatus to other heating, evaporating, and distilling purposes.—Sealed 3rd June.

John Tappan, of Fitzroy-square, London, for certain improvements in machinery for preparing and spinning hemp and such other fibrous materials as the same is applicable to,—being a foreign communication.—Sealed 5th June.

Joseph Beaman, of Smethwick, iron-master, for improvements in the manufacture of malleable iron.—Sealed 7th June.

James Boydell, Jun., of Oak Farm Iron Works, near Dudley, iron-master, for improvements in manufacturing bars of iron with other metals.—Sealed 7th June.

Robert Alexander Kennedy, of Manchester, cotton-spinner, for for certain improvements in machinery for grinding or sharpening cards used in carding cotton or other fibrous material.—Sealed 7th June.

John Martyn Roberts, of Bryny Caeran, Carmarthenshire, for certain improvements in machinery for preparing, spinning, and winding wool, cotton, flax, silk, or any other fibrous bodies.—Sealed 8th June.

Charles Hancock, of Grosvenor-place, London, artist, for certain improvements in printing cotton, silk, woollen, and other fabrics.—Sealed 13th June.

George Robins Booth, of Hanley, mauufacturer and chemist, for a certain improved mode of applying heat, from various combustibles, to manufacturing and other useful purposes.—Sealed 15th June.

New Patents

SEALED IN ENGLAND.

1843.

To William Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improvements in obtaining copper from copper ores, some part or parts of which improvements are applicable to obtaining certain other metals contained in some copper ores,—being a communication.—Sealed 30th May—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for improvements in the method or system of constructing boats and other vessels, which the inventor intends to denominate the "Mondotian system,"—being a communication.—Sealed 30th May—6 months for inrolment.

John Tappan, of Fitzroy-square, Middlesex, Gent., for certain improvements in apparatus applicable to flues or chimnies, for the purpose of increasing the draft therein, and promoting the combustion of fuel,—being a communication.—Sealed 30th May—6 months for inrolment.

Thomas Forsyth, of Salford, Lancaster, engineer, for certain improvements in machinery for making bricks and tiles.—Sealed 1st June—6 months for inrolment.

Pierre Frederick Ingold, of Buckingham-place, Hanover-square, watch-maker, for improvements in machinery for making parts of watches, and other time-keepers.—Sealed 1st June—6 months for inrolment.

William Henry Fox Talbot, of Lacock Abbey, Wilts, Esq., for improvements in photography.—Sealed 1st June—6 months for inrolment.

Martyn John Roberts, of Carmarthen, Esq., for certain improvements in machinery for preparing, spinning, and winding wool, cotton, flax, silk, or any other fibrous bodies,—Sealed 1st June—6 months for inrolment.

Fennell Allman, of Salisbury-street, Strand, surveyor, for certain improvements in apparatus for the production and diffusion of light.—Sealed 3rd June—6 months for inrolment.

Junius Smith, of Fen-court, Fenchurch-street, Gent., for improvements in machinery for sawing wood.—Sealed 3rd June —6 months for inrolment.

William Brown, of Glasgow, merchant, for improvements in the manufacture of porcelain, china, pottery, and earthenware, and which improvements are also, in part, applicable to the manufacture of paper, and to the preparation of certain pigments or painters' colors.—Sealed 3rd June—6 months for inrolment.

Richard Farmer, upholder and cabinet-maker, and Joseph Pitt, plumbers' brass-founder, both of Birmingham, for certain improvements applicable to fixed and portable water-closets, and beds or bedsteads, a part or parts of which improvements are also applicable to raising and forcing water.—Sealed 6th June —6 months for inrolment.

Robert Smart, of the Commercial-road, Bristol, ship-owner, for improvements in paddle-wheels.—Sealed 8th June—6 months for inrolment.

John Burns Smith, of Salford, cotton spinner, for certain improvements in machinery for preparing, carding, roving, and spinning cotton and other fibrous substances.—Sealed 8th June—6 months for inrolment.

Carteret Priaulx Dobree, of Putney, Surrey, civil engineer, for certain improvements in the manufacture of fuel.—Sealed 10th June—6 months for inrolment.

Henry Page, of Cambridge, painter, for certain improvements in the mode of painting, graining, or decorating with oil and other colors.—Sealed 10th June—6 months for inrolment.

Henry Austin, of Hatton Garden, civil engineer, for a new method of glueing or cementing certain materials for building, and other purposes.—Sealed 10th June—6 months for inrolment.

Edward Joseph François Duclos de Boussois, of Clyne Wood Works, near Swansea, engineer, for improvements in the manufacture of lead, tin, tungsten, copper, and zinc, from ores and slags, and other products, and in the manufacture of their alloys with other metals.—Sealed 10th June—6 months for inrolment.

Ernest Lentz, of Eastcheap, Gent., for improvements in machinery for raising and forcing water, and other fluids, which machinery, when worked by steam or water, may be employed for driving machinery,—being a communication.—Sealed 10th June—6 months for inrolment.

Alfred Francis, of Vauxhall, Roman cement manufacturer, and Isaac Funge, workman, in the employ of the said Alfred Francis, for improvements in the manufacture of ornamental tiles.—Sealed 10th June—6 months for inrolment.

Samuel John Knight, of Water-side Iron-works, Maidstone, founder, for improvements in kilns or apparatus for drying hops, malt, and other substances.—Sealed 10th June—6 months for inrolment.

Thomas Wells Ingram, of Birmingham, Warwick, engineer, for improvements in pressing and embossing wood, and other materials, in order to apply the same to various useful purposes.—Sealed 10th June—6 months for inrolment.

Samuel Sparkes, of Wellington, Somerset, foreman and superintendent of a woollen manufactory, for certain improvements in machinery for carding wool, cotton, and other fibrous materials.—Sealed 10th June—6 months for inrolment.

John Tappan, of Fitzroy-square, Gent., for certain improvements in apparatus for grinding and polishing cutlery, and other articles, whereby the deleterious effects on the lungs and health of the workmen, produced by the dust and metallic particles arising from the said operations, are entirely, or to a great extent, obviated,—being a communication.—Sealed 10th June—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improvements in the preparation of paper, designed for bank notes, government documents, bills, cheques, deeds, and other purposes, wherein protection and safety from forgeries or counterfeits are required,—being a communication.—Sealed 10th June—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for the novel application of certain volatile liquids, for the production of light, and improvements in the lamps and burners to be employed for the combustion of such or other volatile liquids,—being a communication.—Sealed 10th June—6 months for inrolment.

John Galley Hartley, of Narrow-street, Limehouse, Middlesex, mast and block maker, for certain improvements in paving and covering streets, roads, or other ways.—Sealed 13th June—6 months for inrolment.

Frederick William Eggleston, of Derby, confectioner, for certain improvements in the combustion of fuel and consumption of smoke.—Sealed 15th June—6 months for inrolment.

Henry Bessemer, of Baxter House, St. Pancras, engineer, for certain improvements in the manufacture of bronze and other metallic powders.—Sealed 15th June—6 months for inrolment.

Prosper Antoine Payerne, of Paris, now residing in Tredeager-square, Middlesex, Doctor of Medicine, for certain improvements in keeping the air in mines and other confined places, in a pure and respirable state.—Sealed 15th June—6 months for inrolment.

Thomas Johnson Irvine, of Peckham, Lieutenant in Her Majesty's Navy, for certain improvements in packing cases, boxes, trunks, portmanteaus, and other articles for containing goods, which improvements may, under certain circumstances, be applicable to the preservation of life.—Sealed 15th June—6 months for inrolment.

Thomas Mitchell, of Dalton, York, dyer, for a certain machine and apparatus for increasing and permanently fastening the face or gloss of all kinds of woollen, worsted, and fancy cloths, by the application of steam alone, without immersing the goods in water.—Sealed 15th June—2 months for inrolment.

Thomas Richard Guppy, of the Great Western Iron Ship Building and Steam Engine Works, Bristol, civil engineer, for certain improvements in the building of metal ships and other vessels.—Sealed 15th June—6 months for inrolment.

George Edmund Donisthorpe, of Bradford, York, top manufacturer, for improvements in combing wool and other fibrous substances.—Sealed 15th June—6 months for inrolment.

John Oliver York, of Upper Coleshill-street, Westminster, engineer, and William Johnson, of Horseley Iron Works, Staffordshire, iron-master, for improvements in paving or covering roads, streets, and other ways or surfaces.—Sealed 15th June—6 months for inrolment.

Samuel Mason, of Northampton, merchant, and Caleb Bedells, of Leicester, manufacturer, for improvements in the manufacture of boots, shoes, slippers, overalls, and clogs, and in improvements in machinery or apparatus used in such manufacture, and in the preparation of materials for the said manufacture.—Sealed 15th June—6 months for inrolment.

George Lister, of Dursley, Gloucestershire, card manufacturer, and Edwin Budding, of the same place, machinist, for certain improvements in the means of covering the cylinders of carding and scribbling engines with wire cards, and in condensing the rovings delivered from such engines, and also in apparatus for sharpening or grinding the points of the cards, which latter apparatus may also be employed for grinding other articles.—Sealed 15th June—6 months for inrolment.

Edward Hammond Bentall, of Heybridge, Essex, iron founder, for certain improvements in ploughs, and in apparatus which may be attached thereto, for ascertaining the draft of instruments employed in tilling land.—Sealed 15th June—6 months for inrolment.

George Bate, of Bloomsbury, Wolverhampton, Staffordshire, carpenter, for improvements in apparatus for raising and lowering window blinds and maps.—Sealed 15th June—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improvements in apparatus for propelling vessels,—being a communication.—Sealed 15th June—6 months for inrolment.

George Robins Booth, of Hanley, Staffordshire, manufacturer and chemist, for a certain improved mode of applying heat from various combustibles, to manufacturing and other useful purposes.—Sealed 15th June—6 months for inrolment.

Thomas Oldham, of Manchester, manufacturer, for a certain improved mode of manufacturing bonnets and hats.—Sealed 15th June—6 months for inrolment.

Oglethorpe Wakelin Barratt, of Birmingham, experimental chemist, for certain improvements in gilding, plating, and coating, various metallic surfaces.—Sealed 15th June—6 months for inrolment.

Lemuel Wellman Wright, of Gresford Cottage, North Wales, engineer, for certain improvements in machinery or apparatus for bleaching various fibrous substances, and is also in possession of an invention of improvements in machinery or apparatus for converting or manufacturing the same into paper,—being a communication.—Sealed 15th June—6 months for inrolment.

James Gardner, of Banbury, Oxfordshire, ironmonger, for improvements in cutting hay, straw, and other vegetable matters, for the food of animals.—Sealed 17th June—6 months for inrolment.

Samuel Brown, of Gravel-lane, Southwark, engineer, for improvements in the manufacture of casks and other vessels.—Sealed 17th June—6 months for inrolment.

James Mackenzie Bloxam, of Hampstead, Esq., for improvements on meridian instruments.—Sealed 20th June—6 months for inrolment

John Read, of Regent-street, machinist, for certain improvements in ploughs for draining, subsoiling, and cultivating land.—Sealed 21st June—6 months for inrolment.

Louis le Paige, of Lombard-street, patent agent, for certain improved method or methods for preventing accidents on railways,—being a communication.—Sealed 22nd June—6 months for inrolment.

William Wylam, of Newcastle-upon-Tyne, merchant, for certain improvements in the manufacture or preparation of fuel.—Sealed 22nd June—6 months for inrolment.

Samuel Ellis, of Salford, Lancashire, engineer, for certain improvements in weighing-machines, and in turn-tables, to be used on or in connexion with railways; and in weighing-machines to be used in other situations.—Sealed 22nd June—6 months for inrolment.

Samuel Eccles, of Hulme, Lancashire, machinist, and Matthew Curtis, of Chorlton-upon-Medlock, machinist, for certain improvements in looms for weaving.—Sealed 22nd June—6 months for inrolment.

Moses Poole, of Lincoln's-inn, Gent., for improvements in collars for horses and other animals,—being a communication.—Sealed 23rd June—6 months for inrolment.

Nicholas Troughton, of Swansea, Glamorgan, Gent., for improvements in dressing ores requiring washing.—Sealed 23rd, June—6 months for inrolment.

William Needham, of Birmingham, gun-smith, for improvements in fire-arms.—Sealed 24th June—6 months for inrolment.

CELESTIAL PHENOMENA FOR JULY, 1843.

D.	H.	M.	
1			Clock before the sun, 3m. 22s.
—			☽ rises 8h. 15m. M.
—			☽ passes mer. 3h. 16m. A.
—			☽ sets 10h. 1m. A.
	7	12	☉ in Apogee
3	14	55	♃'s first satt. will im.
4	7	3	☽ in □ or first quarter.
4	15	9	☿ greatest Hel. Lat. S.
5			Clock before the sun, 4m. 7s.
—			☽ rises 1h. 40m. A.
—			☽ passes mer. 6h. 37m. A.
—			☽ sets 11h. 23m. A.
	2		☽ in Perigee
7			Occul κ Librae, im. 8h. 44m. em. 9h. 58m.
7	18	43	♄ in the descending node
8	4	11	♂ in conj. with the ☽ diff of dec. 1. 33. S.
10			Occul υ^1 Sagittarii, im. 14h. 41m. em. 15h. 38m.
—			Occul υ^2 Sagittarii, im. 15h. 10m. em. 16h. 4m.
10			Clock before the sun, 4m. 55s.
—			☽ rises 7h. 28m. A.
—			☽ passes mer. 11h. 25m. A.
—			☽ sets 2h. 17m. M.
11	5	6	Ecliptic oppo. or ○ full moon
11	13	4	♄ in conj. with the ☽ diff. of dec. 1. 54. S.
	16	2	☿ greatest elong. 20. 39. W.
12	11	18	♃'s first satt. will im.
12	19	15	♂ stationary
14	6	34	♃ in conj. with the ☽ diff. of dec. 5. 44. S.
	9	34	♃'s third satt. will im.
	10	51	♃'s fourth satt. will em.
15			Clock before the sun, 5m. 32s.
—			☽ rises 9h. 29m. A.
—			☽ passes mer. 2h. 42m. M.
—			☽ sets 8h. 23m. M.
	5	16	♄ in oppo. to the ☉
16			Mercury R. A. 6h. 14m. dec. 21. 43. S.
—			Venus R.A. 6h. 10m. dec. 23.5.N.
—			Mars R. A. 16h. 18m. dec. 25. 19. S.
—			Vesta R. A. 11h. 9m. dec. 11. 44. N.

D.	H.	M.	
	—		Juno R. A. 21h. 46m. dec. 1. 2. S.
	—		Pallas R. A. 9h. 47m. dec. 7. 12. N.
	—		Ceres R. A. 10h. 28m. dec. 18. 28. N.
	—		Jupiter R. A. 21h. 54m. dec. 13. 48. S.
	—		Saturn R. A. 19h. 36m. dec. 21. 36. S.
	—		Georg. R. A. 0h. 9m. dec. 0. 12. N.
	—		Mercury passes mer. 22h. 41m.
	—		Venus passes mer. 22h. 36m.
	—		Mars passes mer. 8h. 42m.
	—		Jupiter passes mer. 14h. 17m.
	—		Saturn passes mer. 12h. 0m.
16			Occul *m* Piscium, im. 12h. 28m. em. 13h. 27m.
17			Occul 45 Piscium, im. 9h. 42m. em. 10h. 23m.
17	6	42	♅ in conj. with the ☽ diff. of dec. 6. 32. S.
18	10	0	☽ in Apogee
18	10	42	♃'s second satt. will im.
19	1	40	☽ in □ or last quarter
	13	12	♃'s first satt. will im.
20			Clock before the sun, 5m. 58s.
	—		☽ rises 11h. 1m. M.
	—		☽ passes mer. 6h. 13m. M.
	—		☽ sets 2h. 2m. A.
21	13	34	♃'s third satt. will im.
23	14	45	☿ in the ascending node
24	3		♀ in the ascending node
25			Clock before the sun, 6m. 10s.
	—		☽ rises 2h. 4m. M.
	—		☽ passes mer. 10h. 29m. M.
	—		☽ sets 6h. 46m. A.
	7	1	♀ in conj. with the ☽ diff. of dec. 1. 7. N.
	13	6	♃'s second satt. will im.
	16	57	☿ in conj. with the ☽ diff. of dec. 1. 58. N.
26	15	7	♃'s first satt. will im.
27	5	42	Ecliptic conj. or ● new moon
28	4	12	☿ in Perihelion
	9	35	♃'s first satt. will im.
30	11		☽ in Pergee

J. LEWTHWAITE, Rotherhithe.

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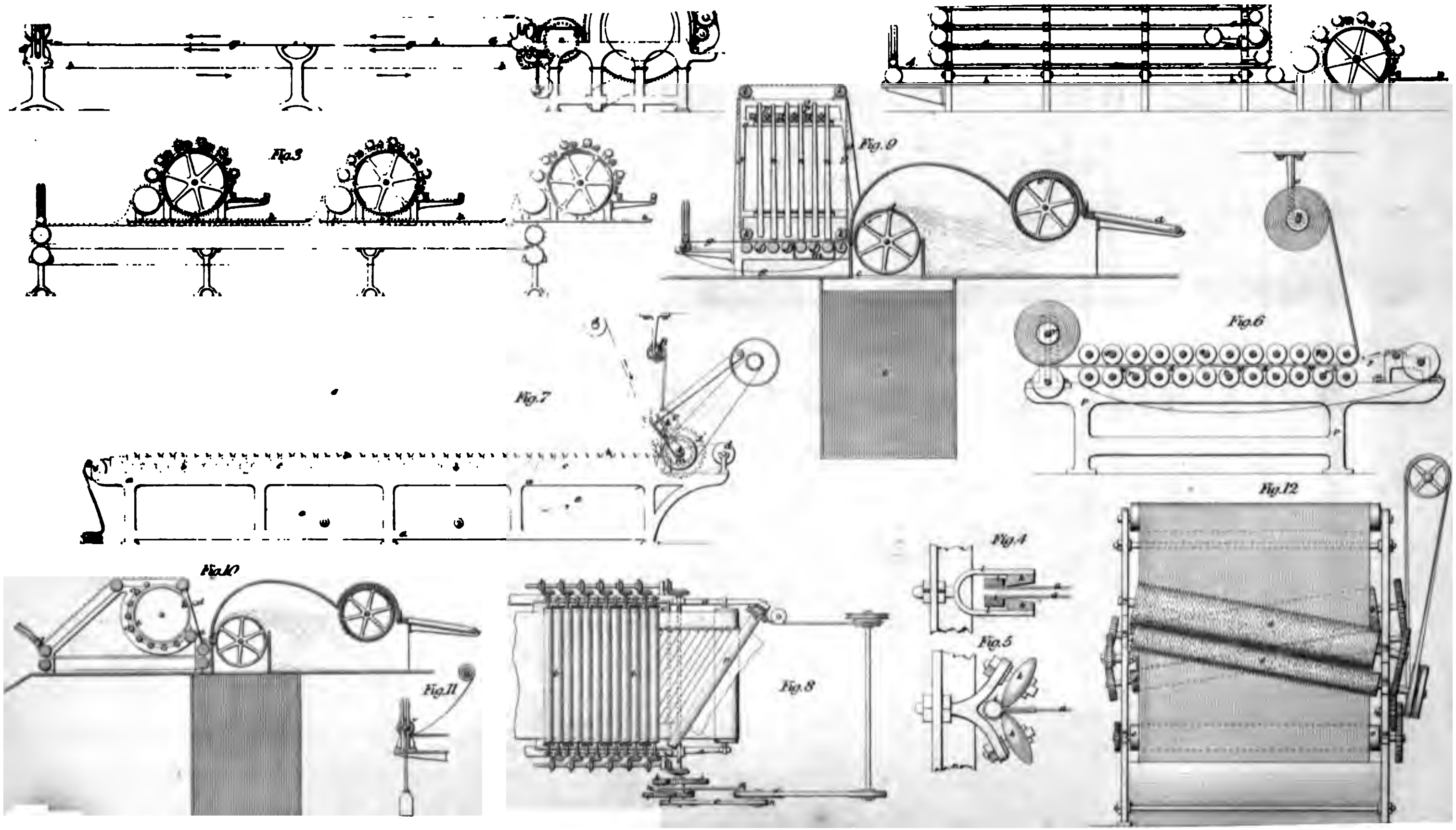
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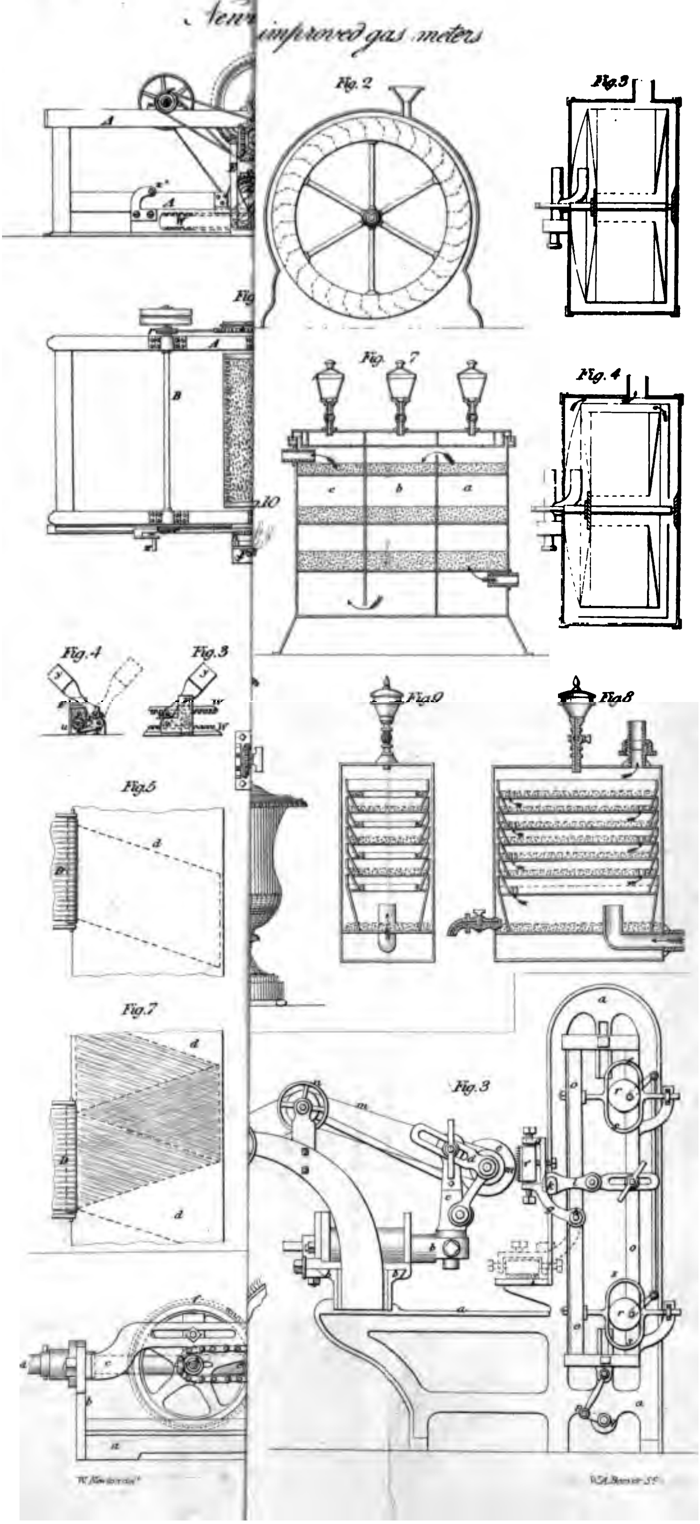
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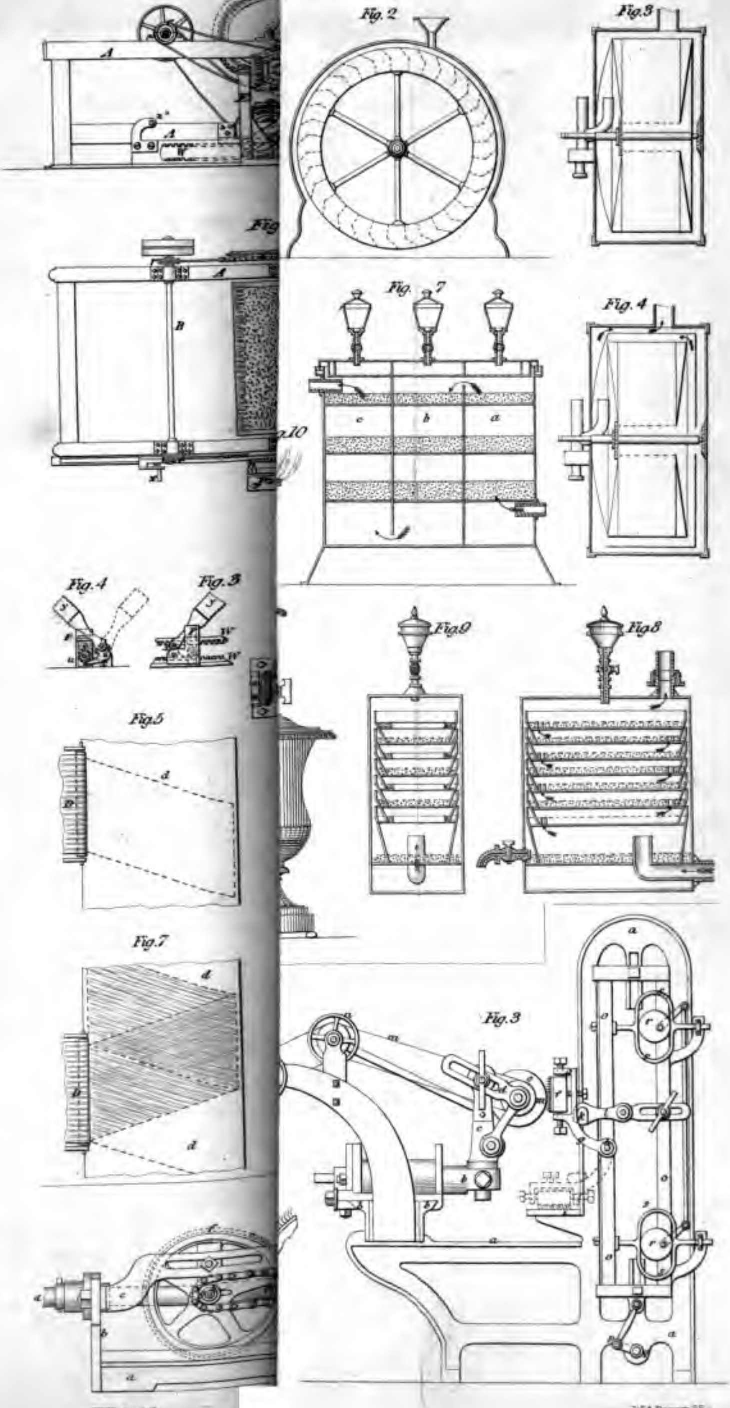
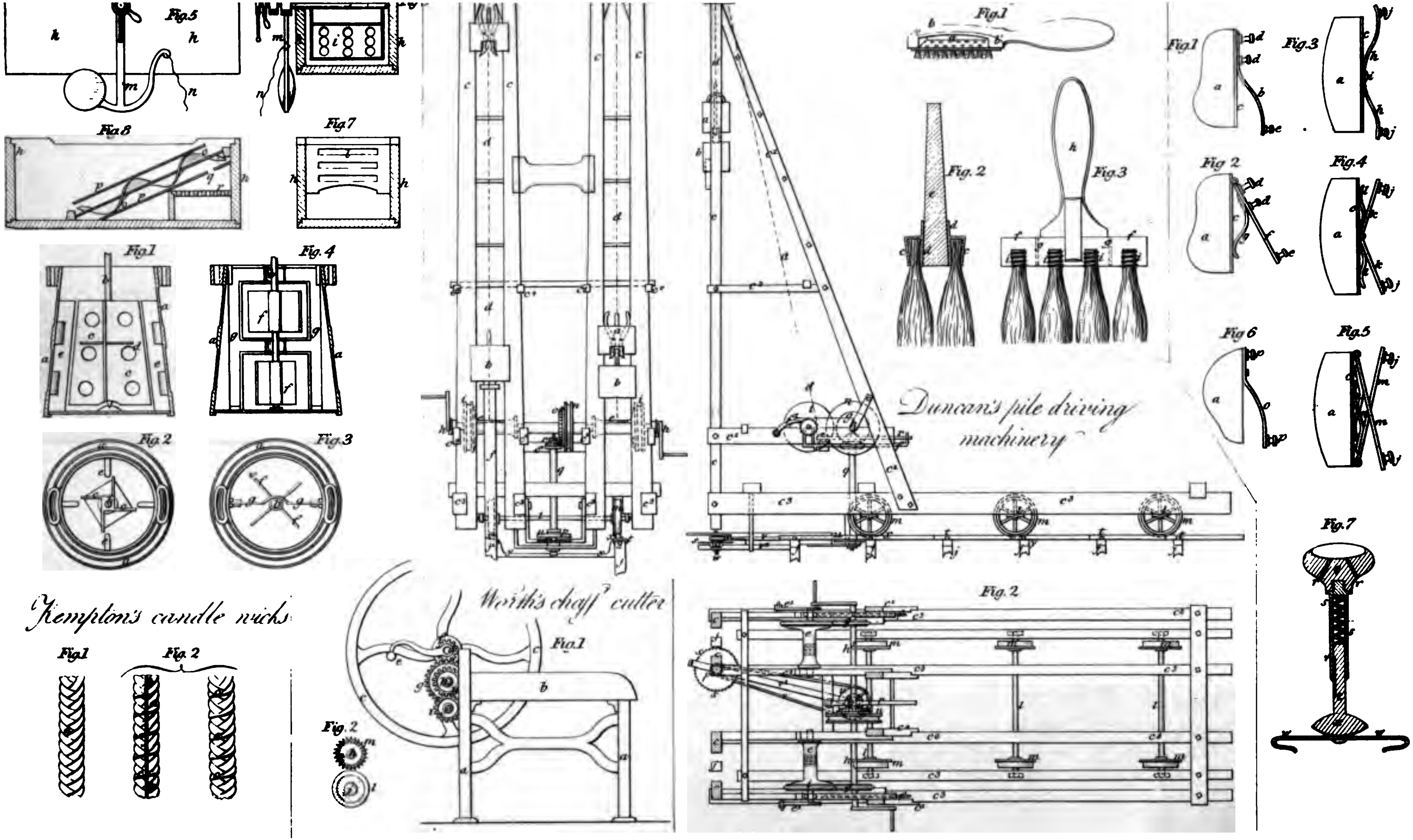
improved gas meters

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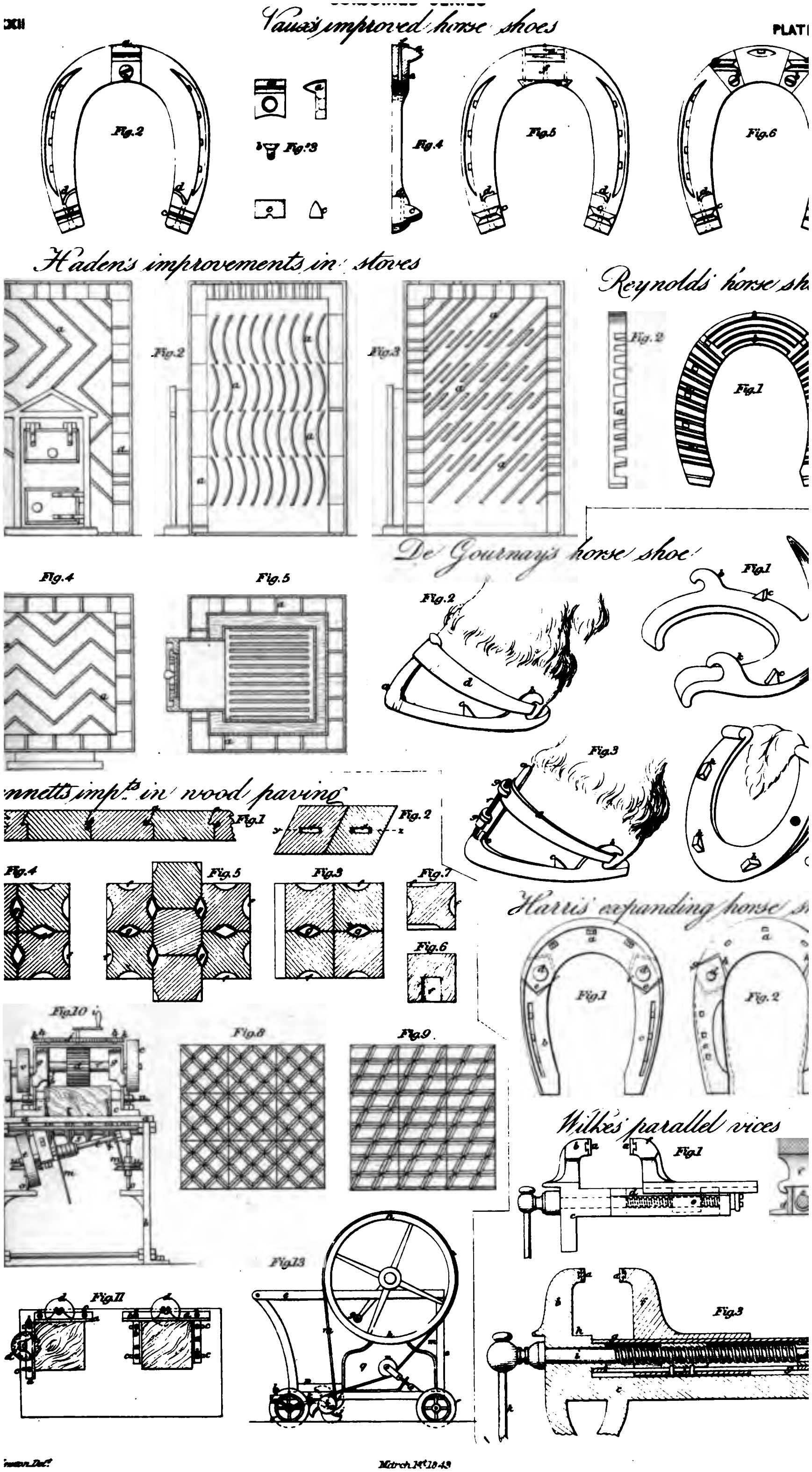
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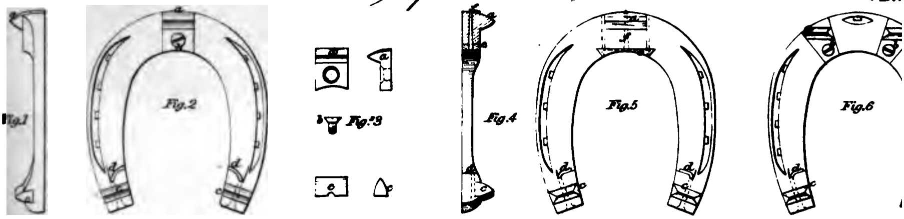
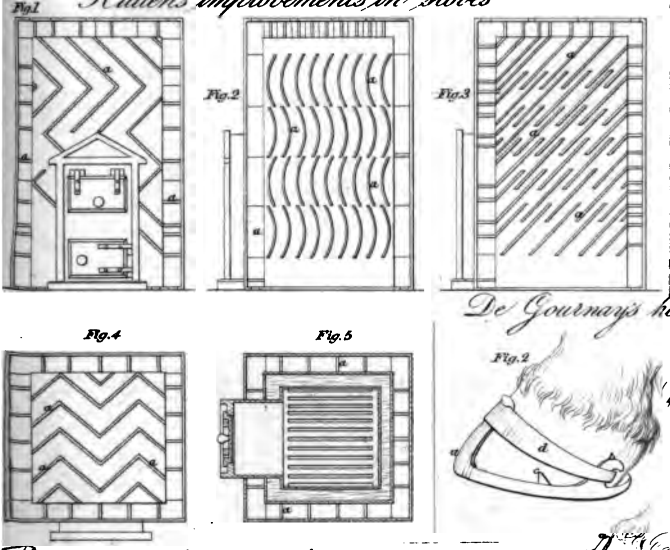
Vaux's improved horse shoes



Haden's improvements in stoves



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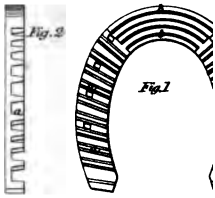
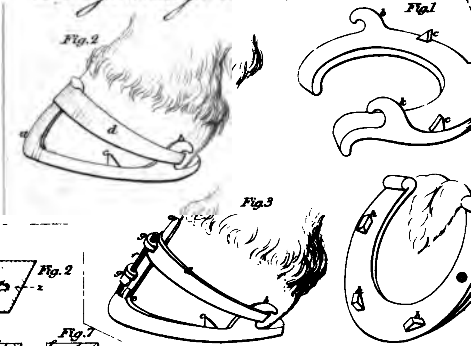
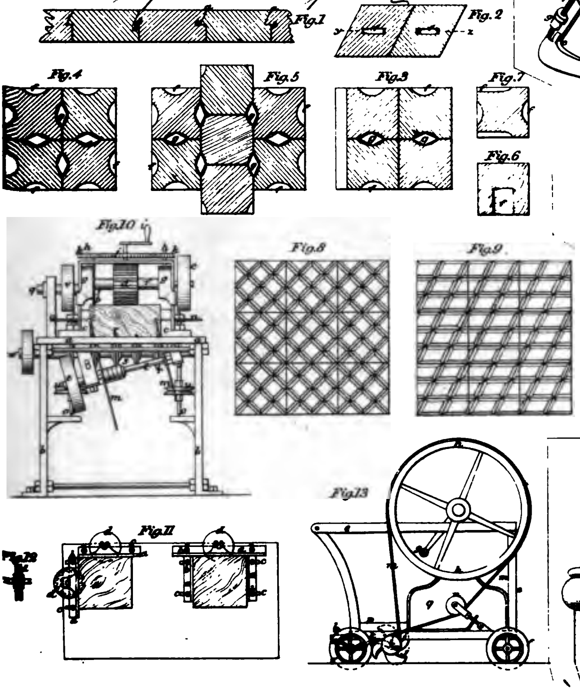


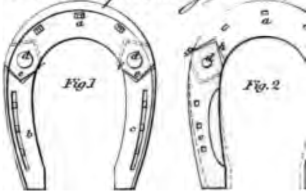
De Gournay's horse shoe



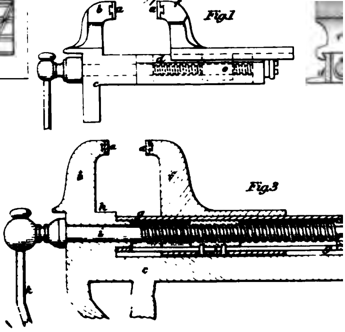
Bunnett's imp^ts in wood paving



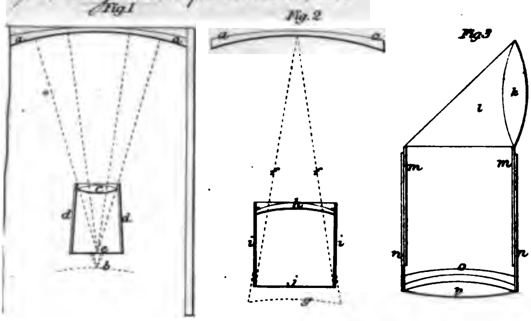
Harris' expanding horse s



Wilkes' parallel vices



Hodgson's imp^d camera box



Noel's improved boot

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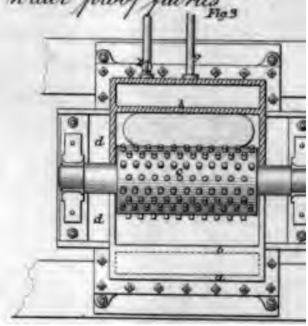

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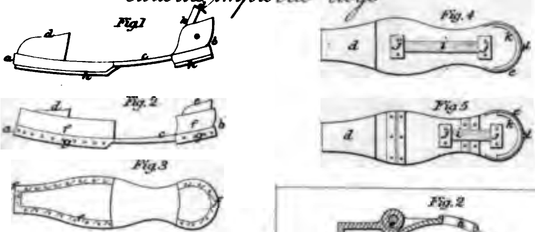

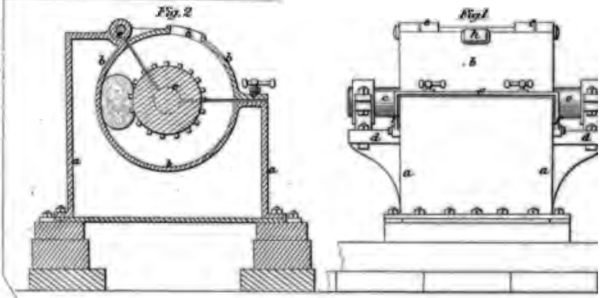

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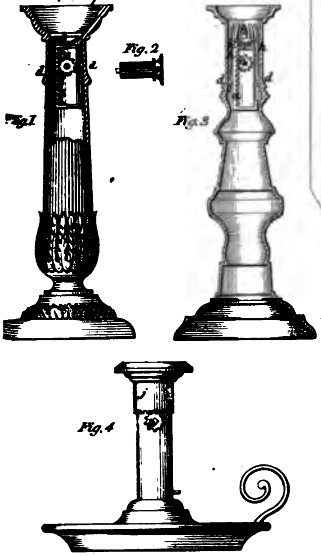

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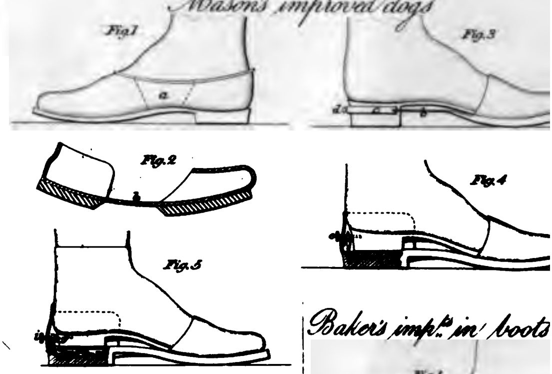
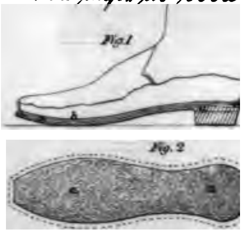
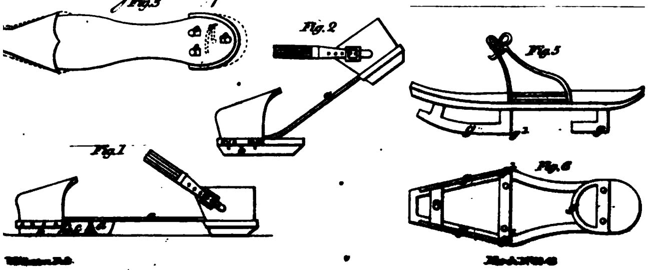


Baker's imp^ts in boots



Carron's dogs and pattens



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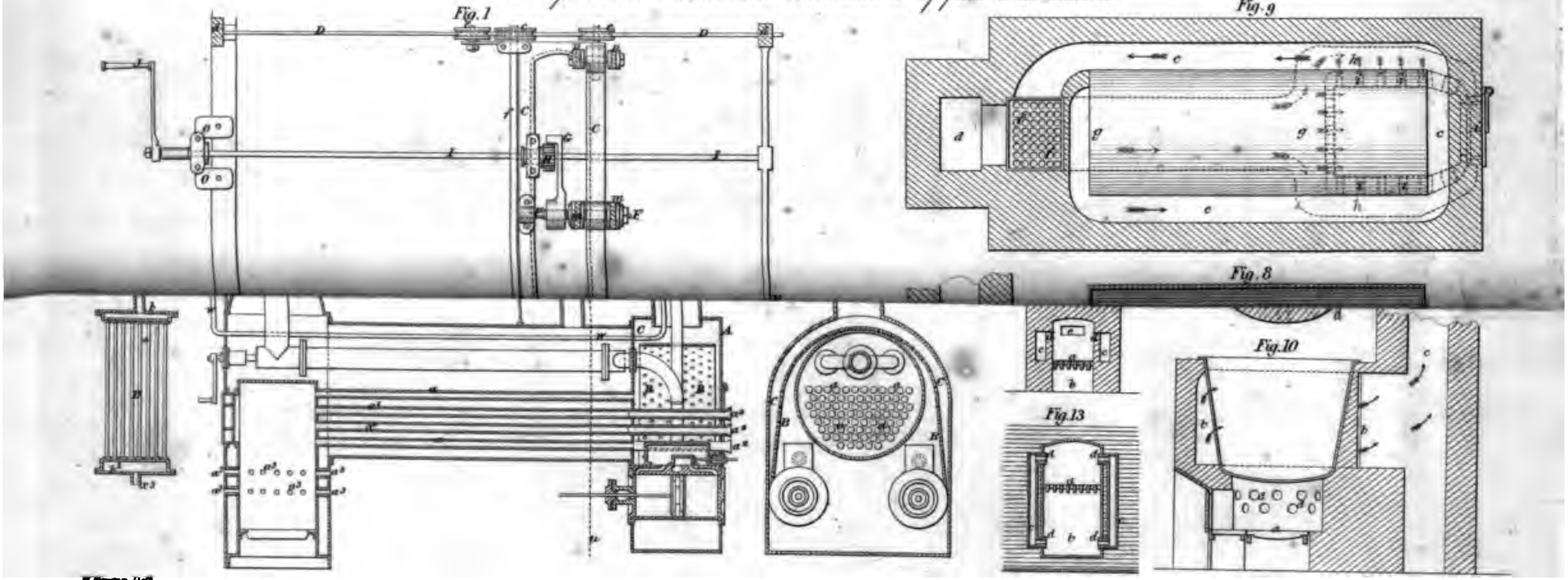
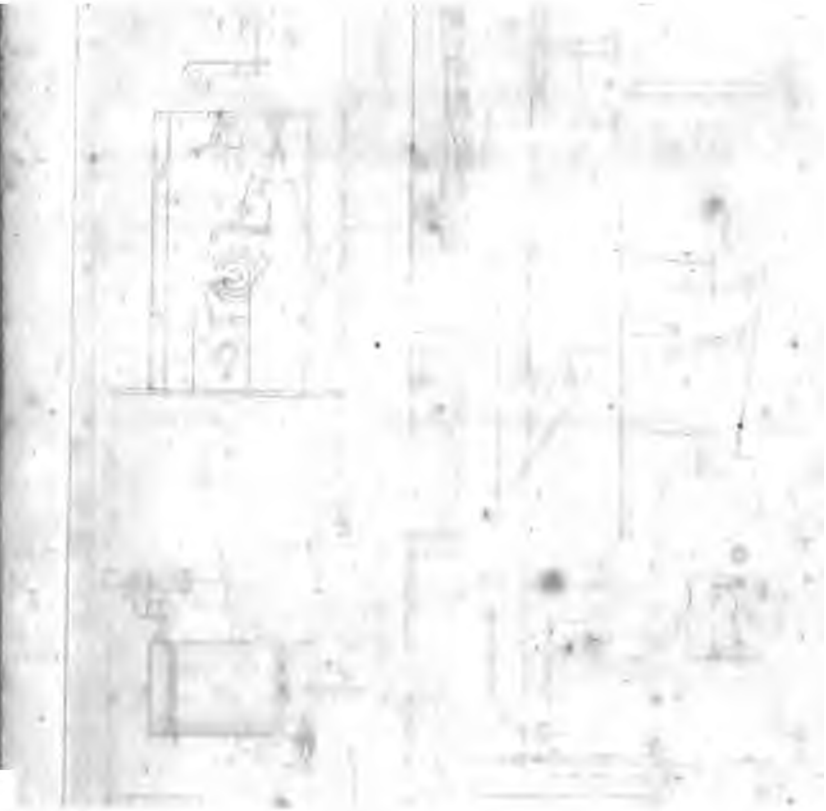


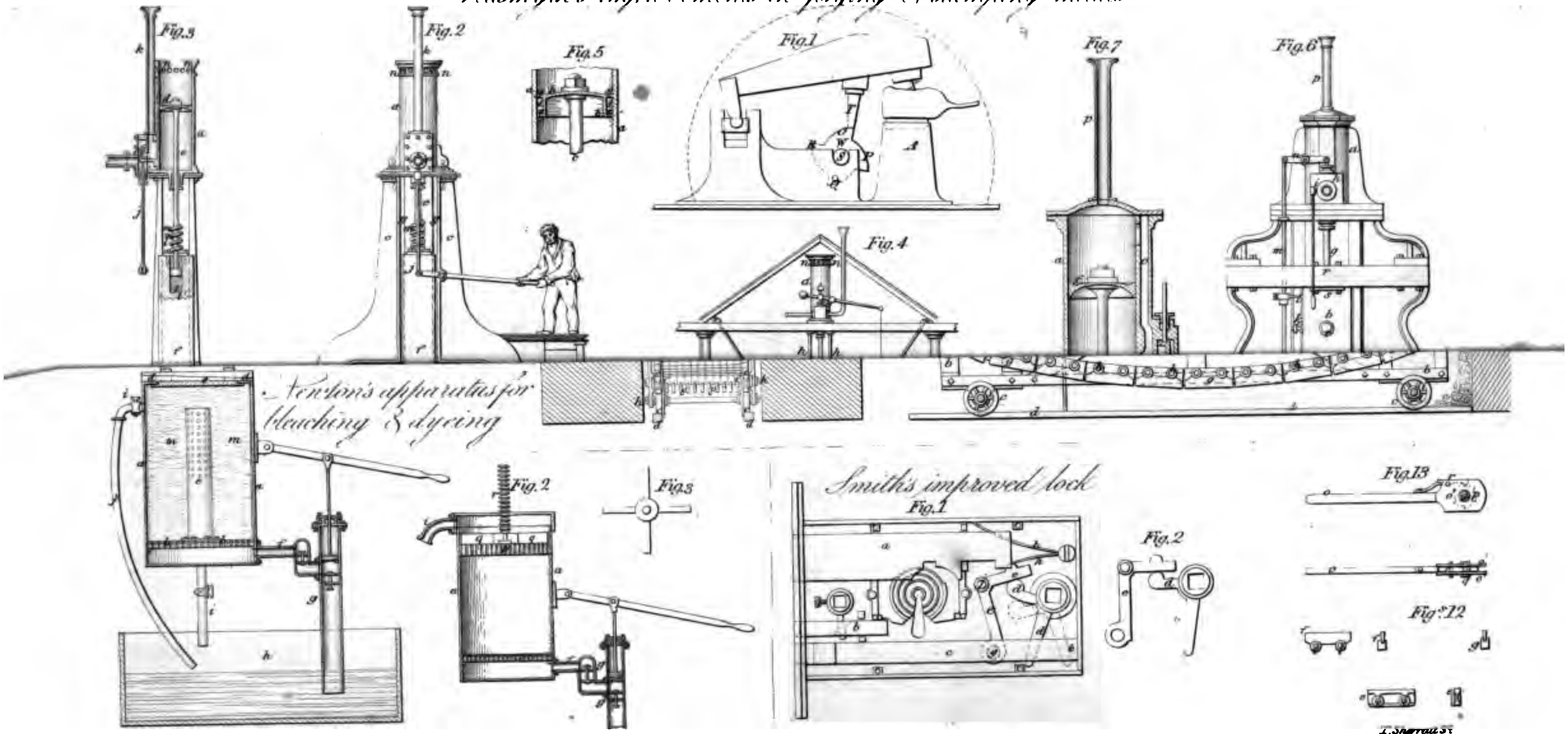
W. Newton Del.

April 1st 1843

W. A. Beever Sculp.



Nasmyth's improvements in forging & stamping metals



W. Newton Delt.

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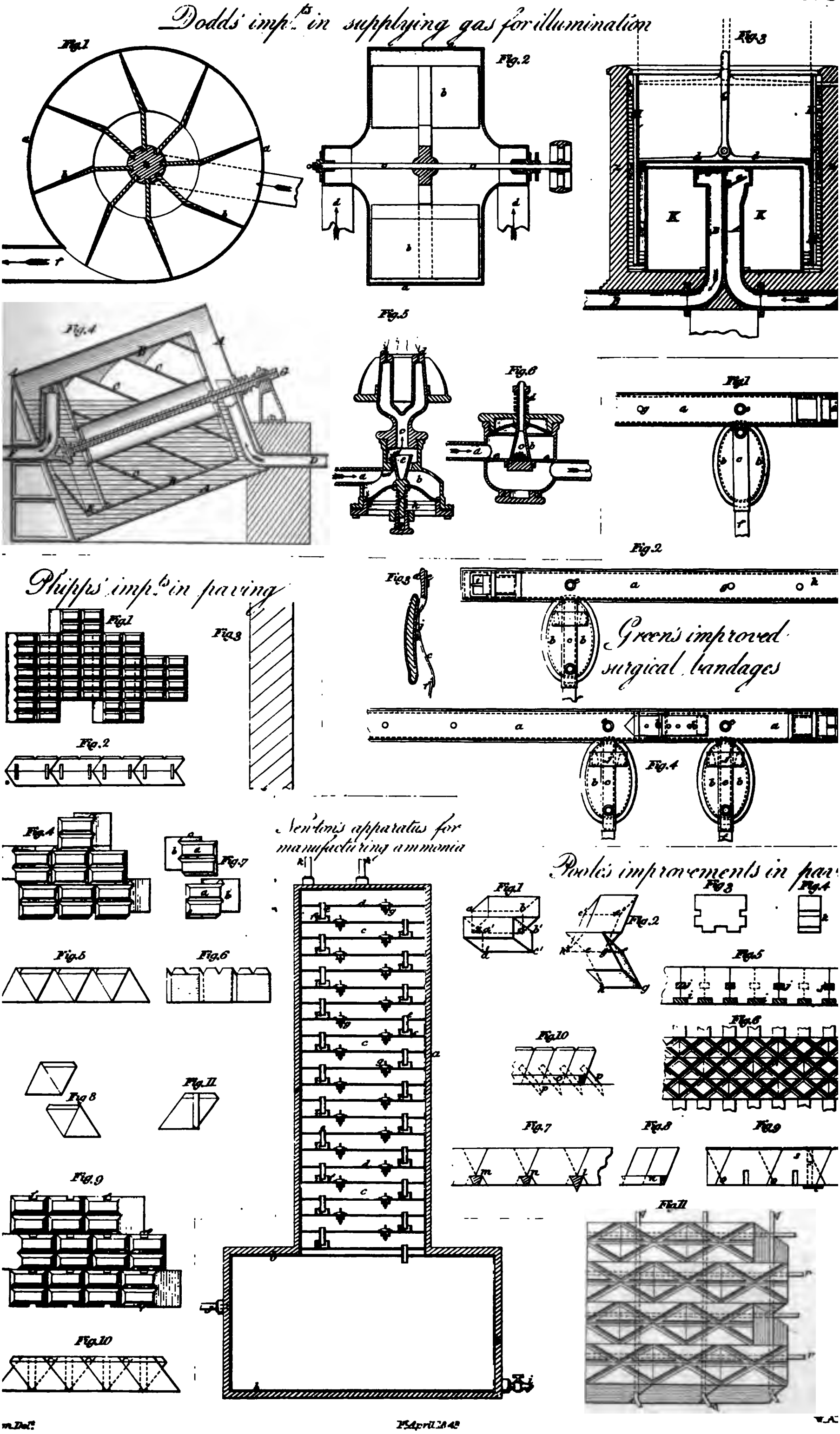
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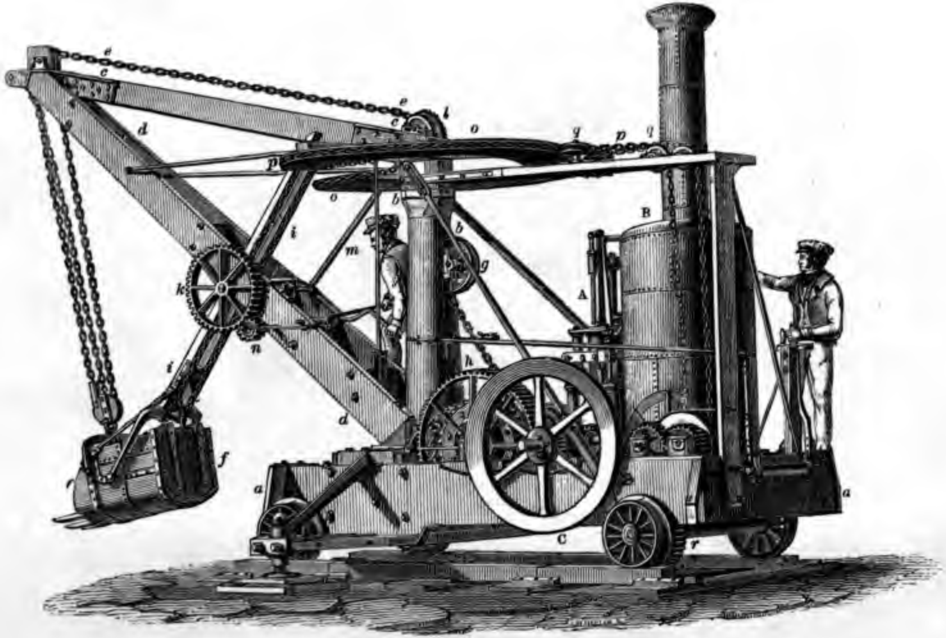
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Whitworth's street sweeping apparatus

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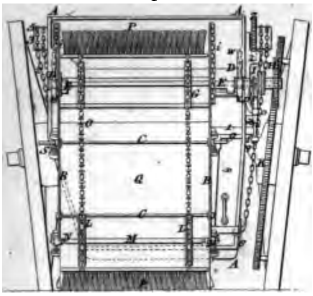

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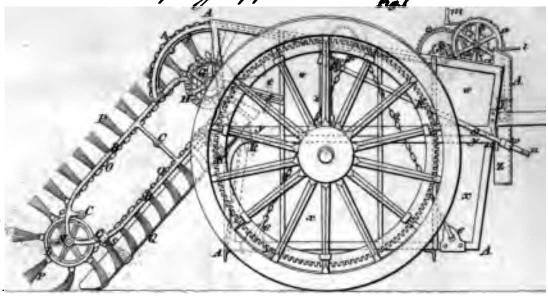

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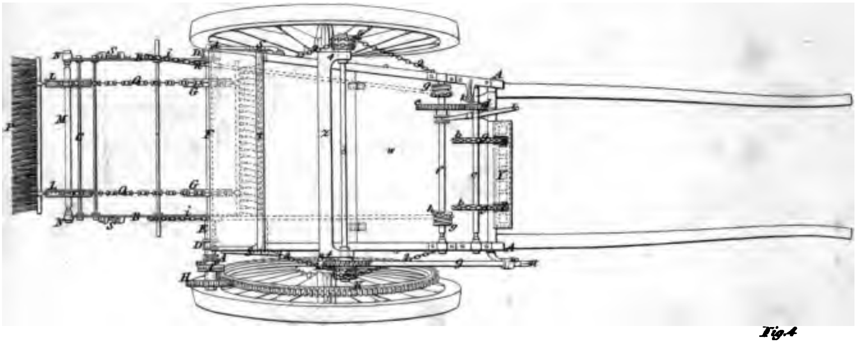


Fig. 4

Fig. 6

Fig. 7

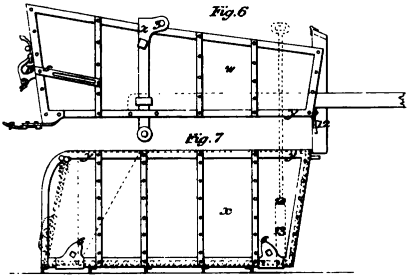


Fig. 8

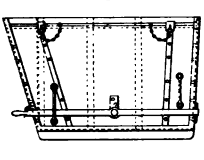
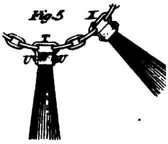


Fig. 5



Chesterman & Bottom's imp.d measuring

Fig. 1

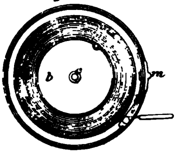
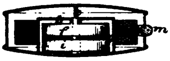


Fig. 2



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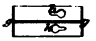


Fig. 3

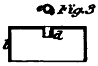
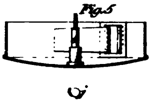


Fig. 5



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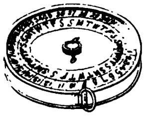

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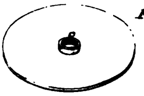

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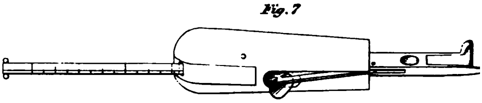
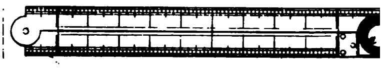


Fig. 6



Baggaly's improved comb

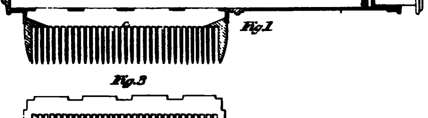


Fig. 1

Fig. 2

Fig. 3

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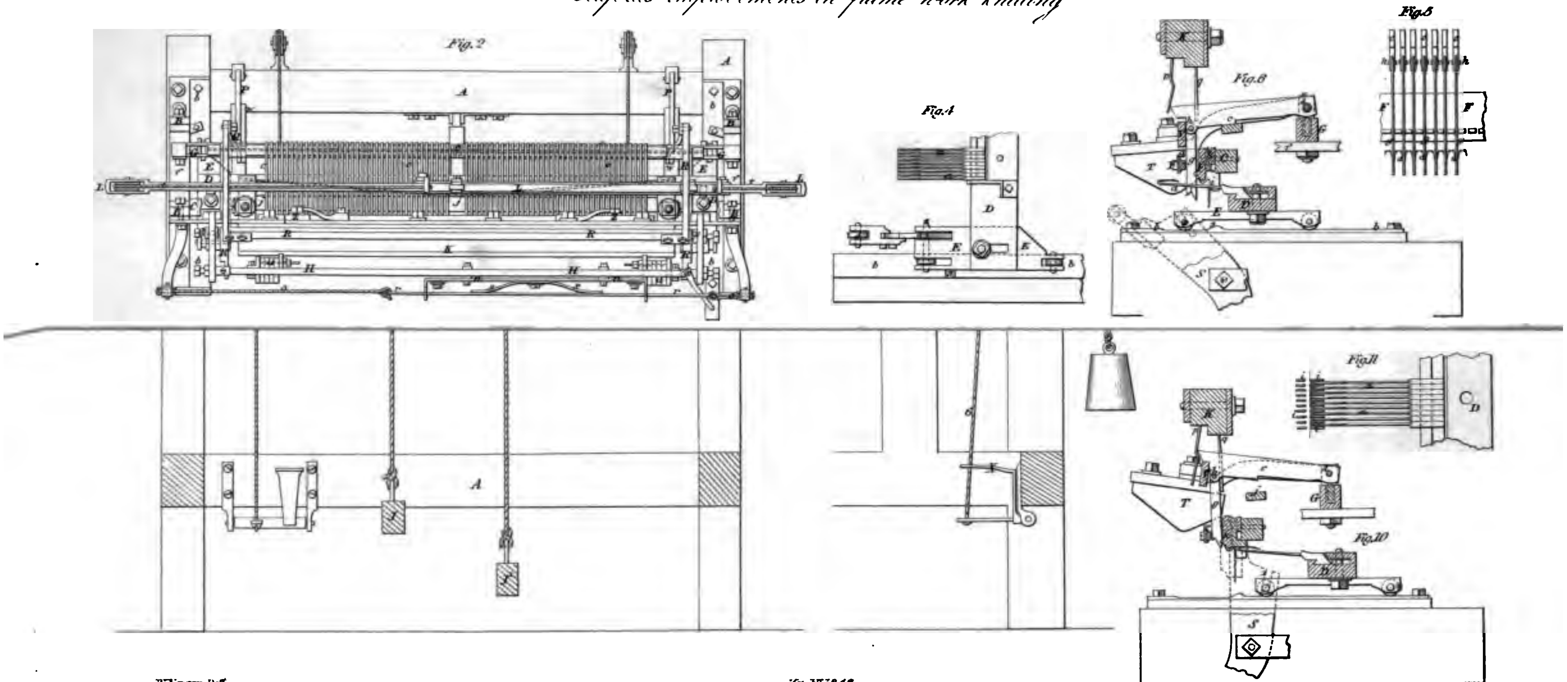
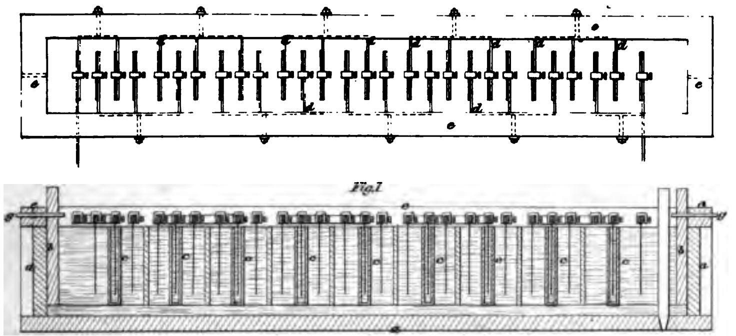
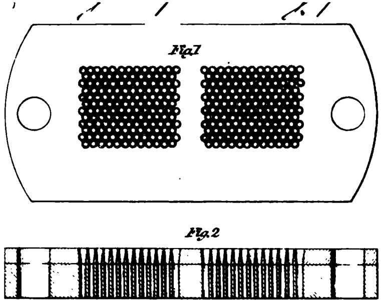
PLATE XII

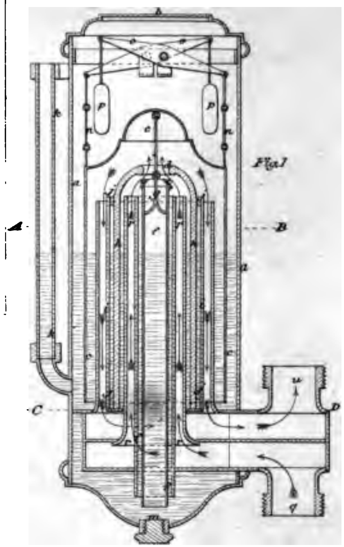
Bedford's improvements in frame work knitting



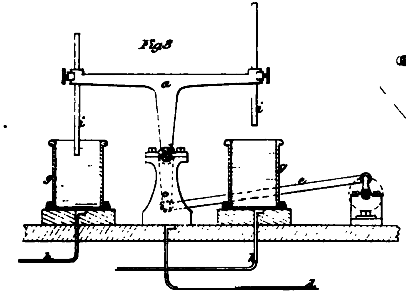
W. Newton Delt. May 1st 1848 W. A. Beever Sc.

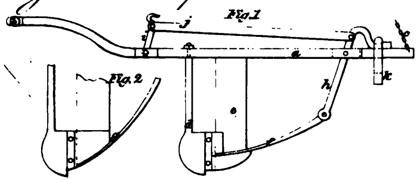


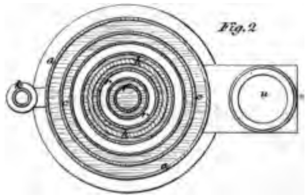


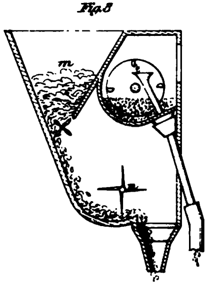


Grounsell's improved drill

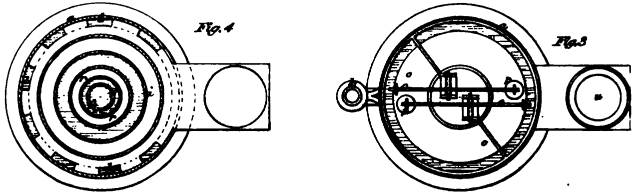




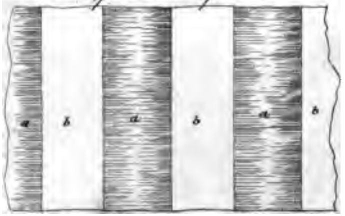




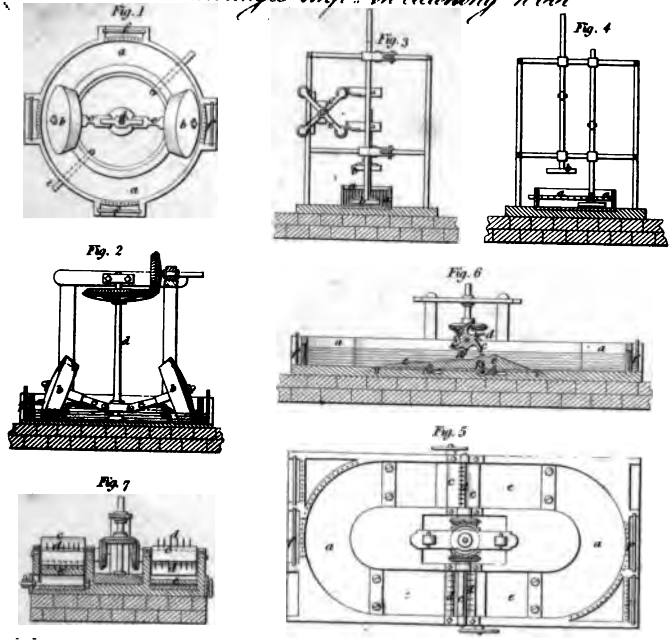
Newton's gas regulator



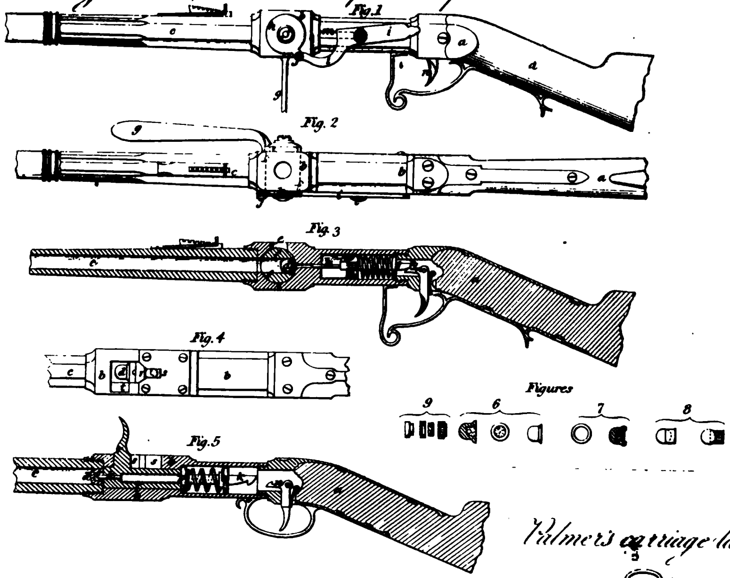
Nickels' plaited fabric



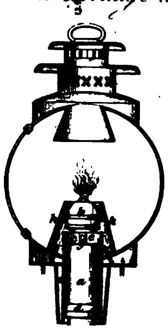
Partridge's imp.ts in cleaning wool



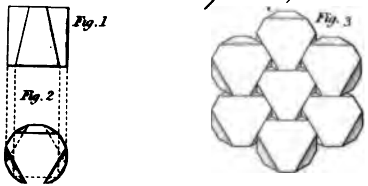
Golden & Hanson's improved fire arms



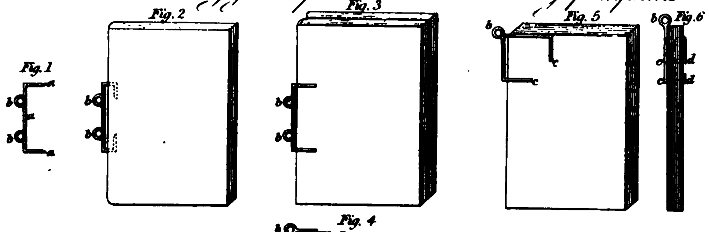
Palmer's carriage lamp



Dotchin's wood paving



Gye's improvements in binding pamphlets



Hempesch's improvements in obtaining and purifying oil

Fig. 2

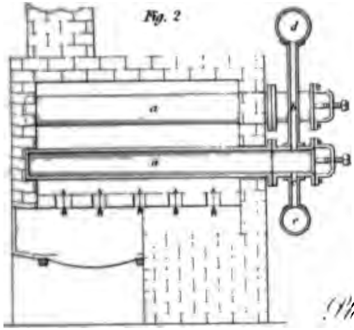


Fig. 1

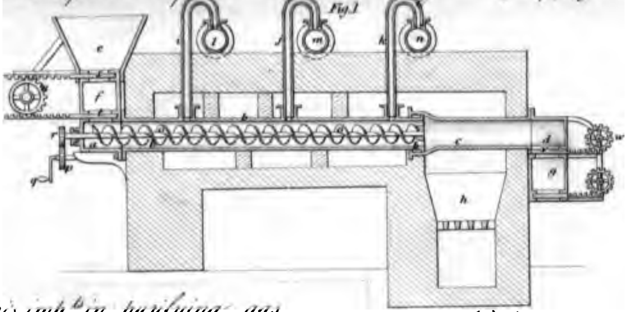
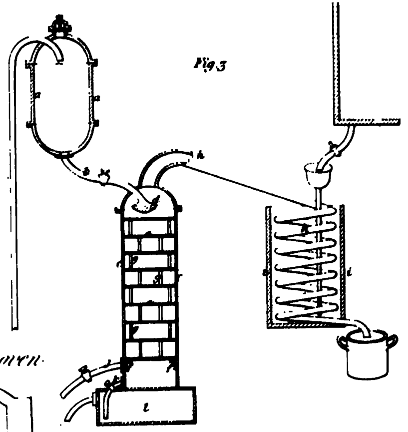


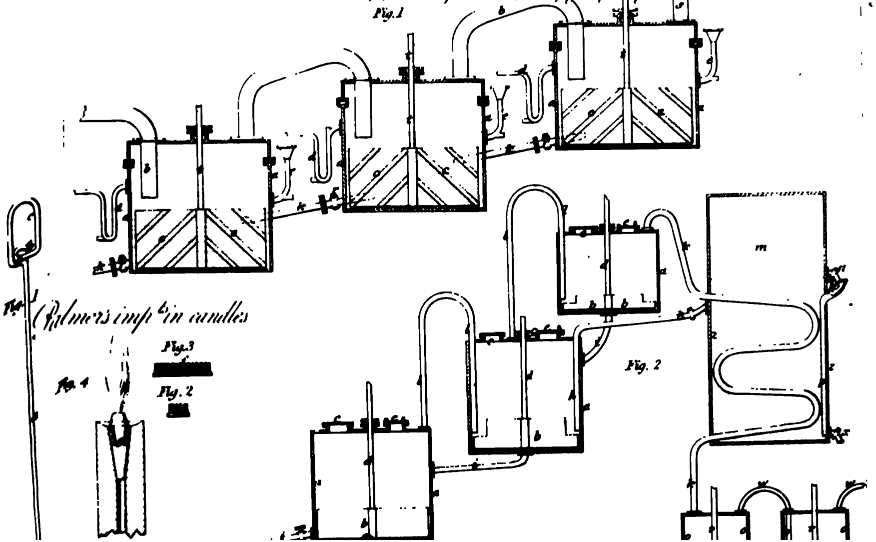
Fig. 3



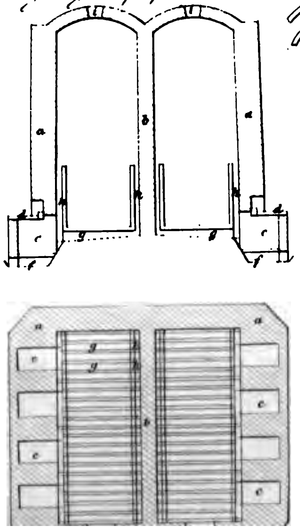
Philipps's imp.ts in purifying gas

Fig. 1

Fig. 2



Ridgway's imp.d potters oven



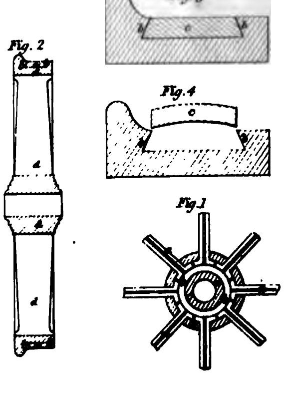
Banks's imp.ts in railway wheels

Fig. 3

Fig. 4

Fig. 2

Fig. 1



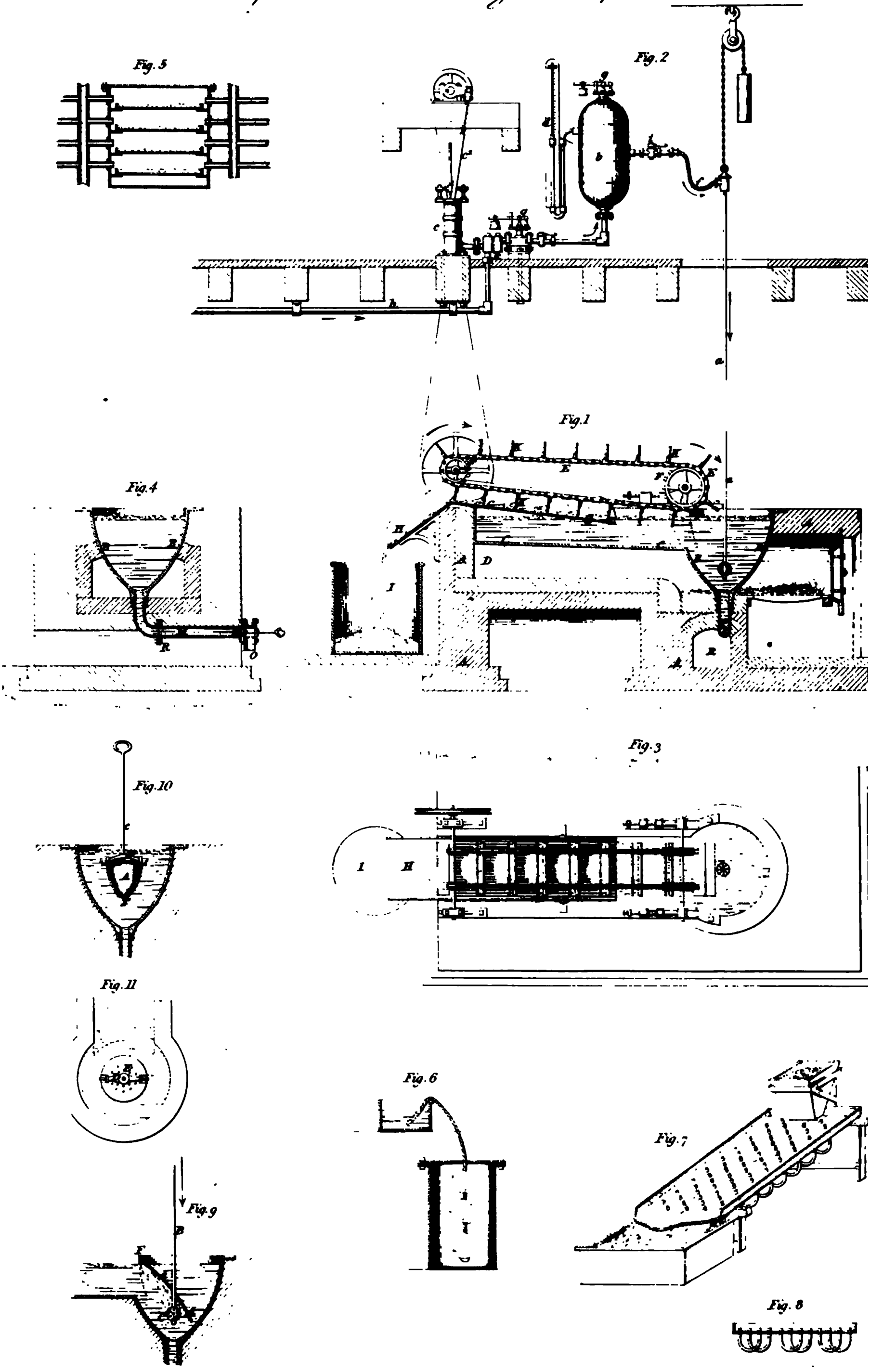
Palmer's imp.ts in candles

Fig. 4

Fig. 3

Fig. 2

Mullin's improvements in obtaining oxides of metals &c.



m Delt June 1st 1843 G. Gla

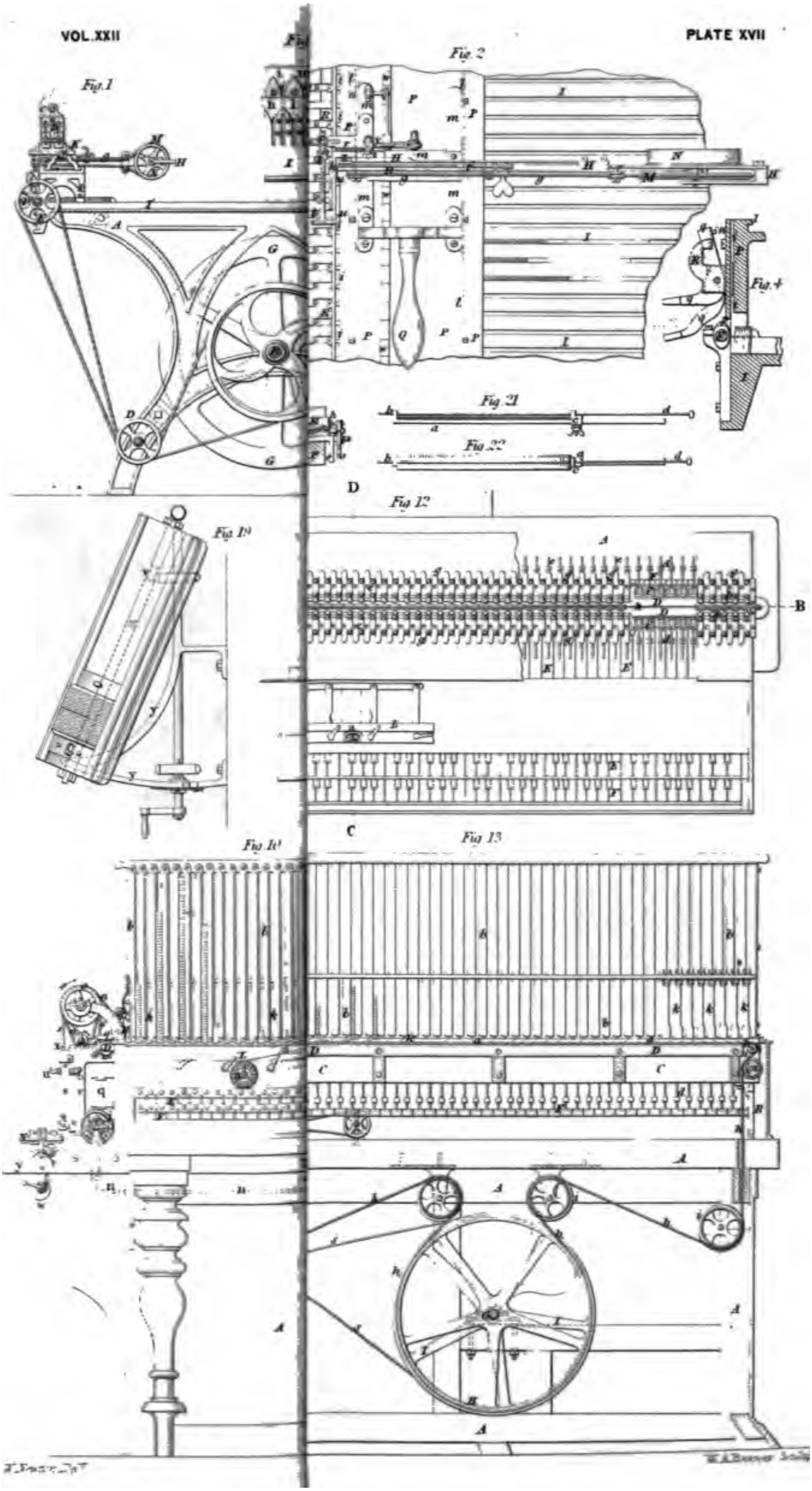
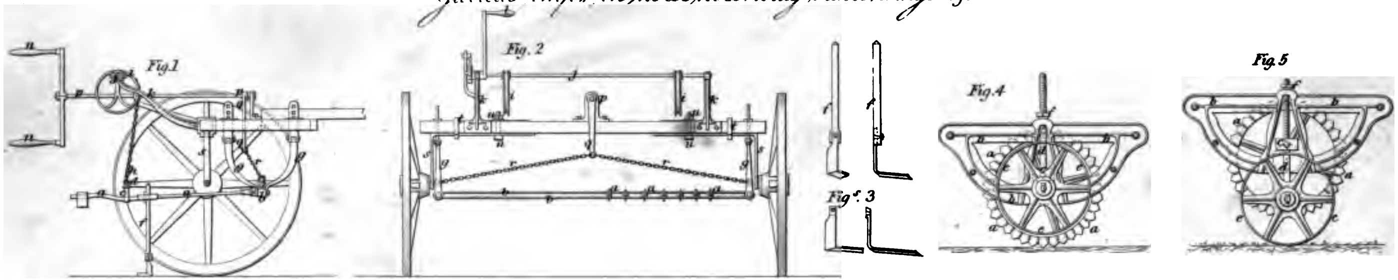
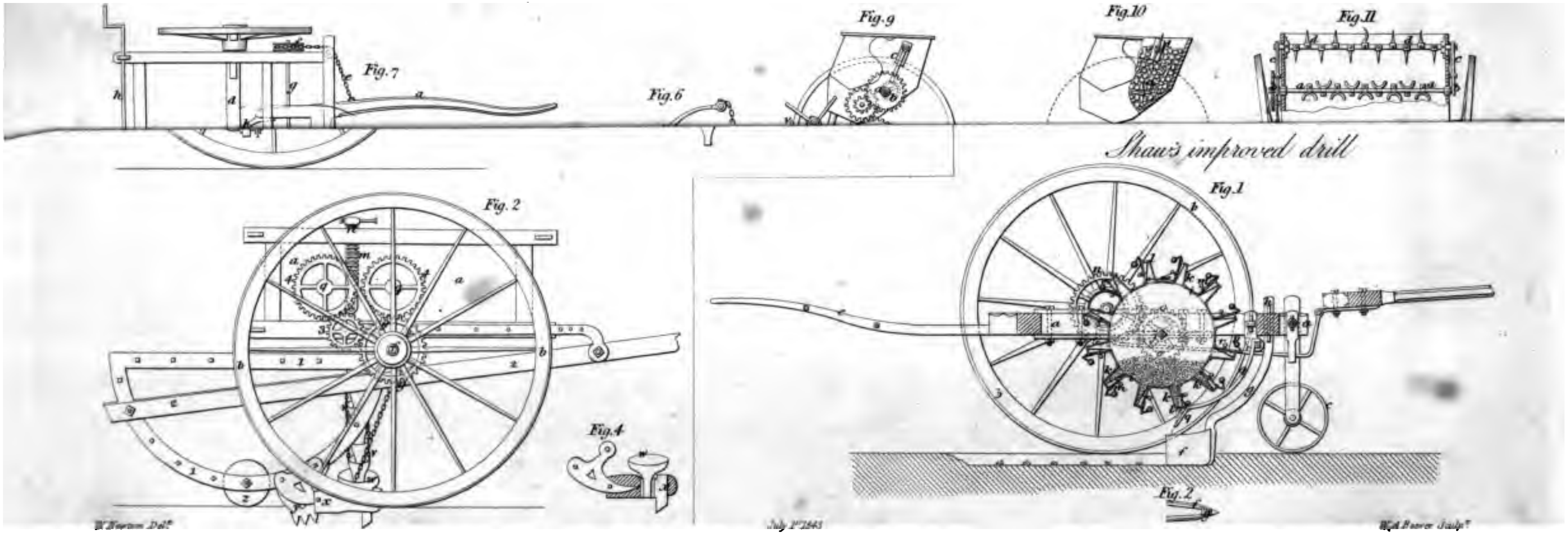


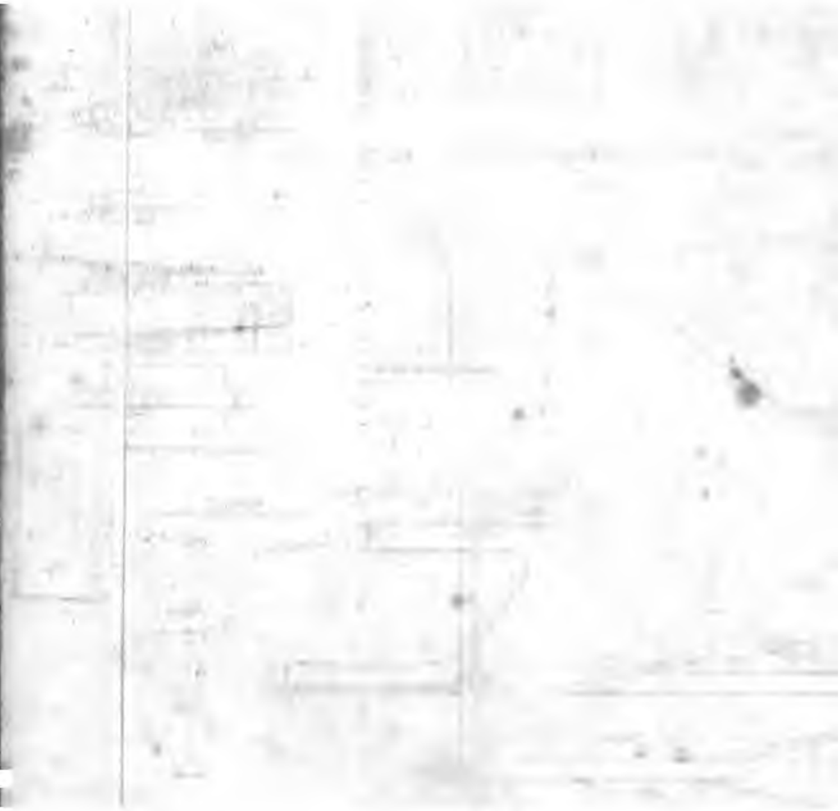
Fig. 1
Fig. 2
Fig. 4
Fig. 21
Fig. 22
D
Fig. 12
B
Fig. 19
C
Fig. 10
Fig. 13

Garrett's imp.ts in horse-hoes, drag-rakes, drags &c.

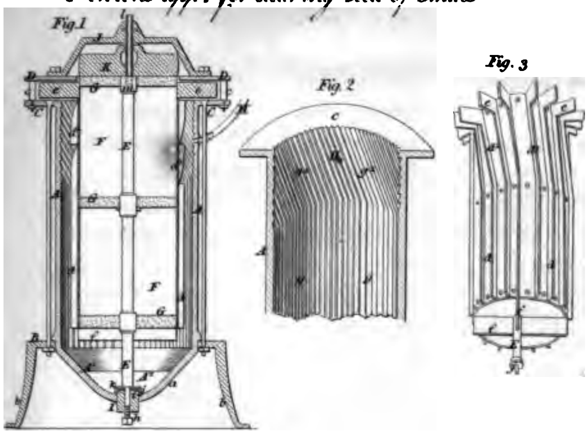


Shaw's improved drill

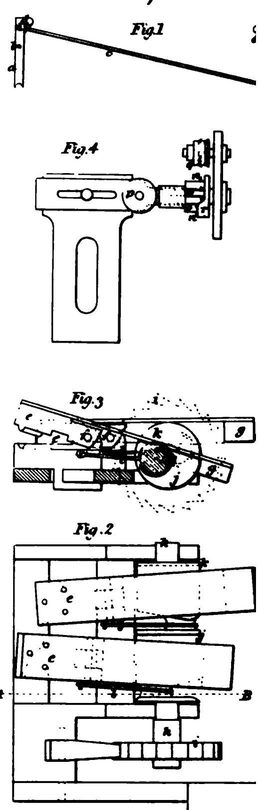




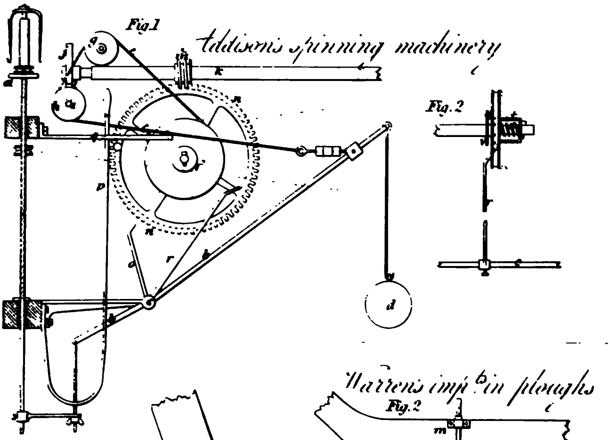
Newton's app.s for clearing seed of smuts



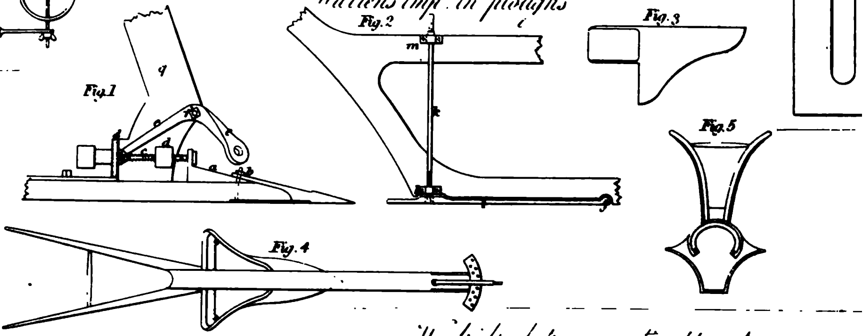
Osbaldeston's imp.ts in ...

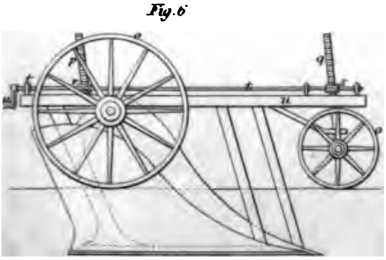


Addison's spinning machinery



Warren's imp.ts in ploughs





Woolrich's electro magnetic apparatus