## CHAPTER XI.

PATENTS OF THE NINETEENTH CENTURY, FOR IMPROVEMENTS IN OBTAINING MOTIVE POWER: ENGLISH, FRENCH, AND AMERICAN.

UNDER the Patent Laws previous to October, 1852, at which period the present amended law came into operation, the cost of a patent for the United Kingdom was little short of £300. The new law provides for obtaining patents progressively both in respect to time and payment; that is, protection for six months, on depositing a provisional brief outline specification, extensible, at the option of the patentee, to three, four, and seven years, making a total of fourteen years, as heretofore, and the fees at each stage being very moderate. The facilities thus offered by the present system occasion the patenting of a large amount of frivolous and crude schemes, entered on without investigation as to former claimants or the merits of the supposed novel inventions. This accounts for the immense number of subjects patented of late years, which never proceed beyond six months' protection.

A few early patents were granted on the mere title, unaccompanied by any description, as noticed in Chapter III. In later patents it was only required, and so continued to be to the end of September, 1852, to file a specification of the invention sought to be protected, before the six months expire, until which was done, the invention was only known by its title; and if not filed, as required, the patent in consequence lapsed. But under the existing law, a brief or provisional specification, ascertaining the nature of the invention,

must be put in on making the first application, otherwise no protection is granted; and before six months expire, a complete specification has to be lodged, fully detailing the invention. Instances of all these cases (except void patents) will occur in the following Catalogue Raisonné, that is—1. Patents granted on the mere title. 2. Others not specified, and therefore void. 3. Such as have not gone beyond provisional or six months' protection. And 4. Those fully specified.*

Patents of the seventeenth and eighteenth centuries have been given in Chapter III., to which one patent for 1801 was transferred from the present period, to be there associated with critical notices from contemporary scientific journals. The patents here enumerated may be said to have fallen dead born, having excited no notice or attention in scientific circles. All interest in them has been confined (with one exception) to the inventors themselves, who, though they have laboured seriously and sedulously, have elicited no new fact. The display their efforts make in the following pages is anything but flattering to their knowledge, ingenuity, or practical skill. Nothing can be more disheartening than such a scene of wreck and blighted hopes; and the sad picture should prove a salutary warning to all adventurers setting out on this shoreless ocean of enterprise.

1809.—WILLIAM PLEASANTS [No. 3226], of Abbey Street, Dublin, Bachelor of Arts. "A self-mover, or machine which can keep itself in motion." He says:—"My invention consists in causing water to ascend through inclined pipes in consequence of the centrifugal force communicated to it by the whirling of the vessel (partly filled with water) whereinto these pipes are inserted, which whirling motion is occasioned by the same fluid in its descent turning a wheel on the axle

* It may be useful to mention here that printed copies of all specifications can be obtained at exceedingly moderate charges, at the Great Seal Patent Office; all that is required being to name the *date* and accompanying *number*, each of which is given throughout this and the former list.

which passes up through and is fixed to that vessel." This is the old story, and as there is nothing remarkable in the apparatus it need not be farther described.

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1814.—HENRY JULIUS WINTER [No. 3861], of Dover, Kent, Confectioner. "A method of giving effect to various operative processes."

I construct a set of water-wheels, overshot, breast wheels, or other wheels, of such construction as that the whole or nearly the whole of the charge of water suitable for giving motion shall be employed in so doing. And I place the wheels of the set or series in such positions with respect to each other as that one of the wheels shall be worked by water, conveyed thereon; and that the second wheel of the series, shall be worked by the very same water, which I do for that purpose immediately convey from the tail of the first wheel unto the head or upper working part of the second wheel; and moreover, that another, or the third wheel of the series (if consisting of more than two wheels), shall be worked by the very same water, which I do for that purpose immediately convey from the tail of the second wheel unto the upper working part of the third wheel; and I do in this manner proceed by conveying the very same water from wheel to wheel, however numerous the set may be. And I cause the water to be received into a cistern. And I do infer, that the force of rotation by the said means produced in all the said wheels, or that the sum total of the rotatory force in all the said wheels, will be more than sufficient to raise to the first level the whole or as much as the whole of the water so employed in working the said wheels; and that I do accordingly, by the connexion and adaptation of a pump or pumps, or other fit hydraulic engine, with or unto the said wheels, raise again the said water, or an equal quantity, and do employ the water so raised in communicating and maintaining the rotatory force of the said set or series of wheels, as before shewn; and that I do, by other communications from the said wheels, give effect to such various operative processes as require machinery to be moved by employing the excess of the rotatory force for this last purpose, which shall be over and above

what would be adequate to raise and return the water as aforesaid. And lastly, I do declare that the power or force so to be generated will not cease to be augmented unless employed, count poised, or stopped, by some force extrinsic, and proceeding from some other source or cause (except the wear and decay of materials) than any which would exist in the set or series of water-wheels combined together and worked as aforesaid.

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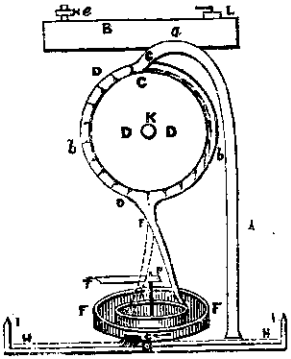
1819.—Robert Copland [No. 4364], of Liverpool, Merchant. "A new or improved method or methods of gaining power by new or improved combinations of apparatus, applicable to various purposes."

Figure 1 is a view of a machine by which I purpose to derive a disposable force or power from the action, weight, or pressure of the atmosphere, through the medium of the column of water or other heavy liquid descending on one side of the enclosed vertical wheel, and from thence through the centrifugal wheel, being returned into the same reservoir, from which the pressure of the atmosphere raises it to be again delivered on the top of the vertical wheel to supply the discharge on the descending side, arising from the centrifugal force communicated to it by the rotatory velocity of the centrifugal wheel, and the pressure of the descending column overbalancing the re-action or resistance of the atmosphere at the discharging apertures of the centrifugal wheel. Thus a small quantity of water or other liquid (according to the size of the machine required) being continually returned on to the top of the vertical wheel by the pressure or action of the atmosphere, and acting by its unbalanced gravity or impetus in its descent, will produce a disposable force or power of any required magnitude, by increasing the size or number of the



machines, provided the height the fluid is required to be raised is not quite so high as the column which the atmosphere when lightest will raise of that fluid, and allowing for the requisite velocity on to the vertical wheel. In Figure 1, A is the feeding pipe through which the fluid is raised by the pressure or action of the atmosphere on the fluid in the lowest reservoir, in which the lower end of the pipe is immersed, closed by a cock, sliding plate, valve, or shutter, to allow the machine to be filled at the commencement, and which may be under the surface of the fluid, also to keep it air-tight. The other end is inserted air-tight into the top reservoir, or by a curve, as shewn by the dotted line *a*, joined to pipe C, and delivering upon the vertical wheel, without any top reservoir. In this case, if water is used, the highest part of the bend or curve inside should not exceed thirty feet above the level of the water in lowest reservoir. B is the top reservoir, the lowest internal part of which should never exceed twenty-nine or thirty feet above the water in lowest reservoir, but it will admit the top of the reservoir, if wished, to be rather higher than when the curved tube *a* only is used. It must be quite air-tight, and supported as convenient. C is a pipe, joined air-tight to top reservoir, or forming part of A, *a*, C. C is a moveable flap of strong leather, or other substance, which may be joined to the lowest part of C, where the water is delivered so high on the wheel, and where floats with hinges are used on the wheel to prevent its going down on the ascending side; but not necessary when water is delivered lower on the wheel. D, D, D, D, is the fixed and immoveable waterway, and the fixed case or cover (of the vertical wheel), of which it is a part, joining also the stuffing boxes, through which the axle of the vertical wheel moves air-tight, thus entirely enclosing and surrounding every part of the wheel but the projections of the axle, and allowing the float boards and wheel just to turn freely in it without touching in any part except the axle in turning in the packing of the stuffing boxes; the float boards are fastened on to the rim or sole of the vertical wheel by very strong hinges or moveable joints just within the fixed waterway D. E is a pipe or pipes joined air-tight to the fixed cover or case enclosing the vertical wheel where the water is to be taken off it, having their lower ends inserted air-tight also into the bottom of the fixed and

immoveable top of the centrifugal wheel in such a direction that they may deliver the water into the moveable waterway of the centrifugal wheel as near as possible in the same direction as the water circulates in the wheel. F, F, is the centrifugal wheel, of any diameter convenient, according to the size of the machine, placed horizontally above the fluid in the lowest reservoir, so as to move on its axis as near as possible to the surface of the fluid without touching it, having an immoveable cover or top, leaving a hollow waterway round the rim, into which the fluid is discharged from E in the direction of the wheels' motion. G, G, are the discharging apertures of the centrifugal wheel. H, H, is the surface of the fluid in I, I, the lowest reservoir, containing a sufficient quantity of water, when the machine is put to work, to allow the bottom of feeding pipe A to be immersed in it at least two feet below the surface, or a greater depth may be given to that part of the reservoir under the mouth of pipe A, forming a sort of well in which A may be inserted any required depth, better to exclude any particles of air or bubbles mixed with the water nearer its surface from ascending in pipe A. This reservoir should be large enough to contain the whole of the water used before the machine is filled. K, K, are the ends of the axle of vertical wheel outside of the stuffing boxes of the fixed case, and are the only parts of the vertical wheel seen, and turning air-tight through the packing or stuffing boxes, or in any other manner the external air is entirely excluded from the vertical wheel when at work; *e* is an air-tight cock to discharge the air out of the machine when filling. L is an aperture into top reservoir, or into highest part of pipe A, *a*, when no top reservoir, closed air-tight by a screw cap; by this the whole machine is filled in every part with the fluid used before it can be set to work, the bottom of pipe A and apertures G (as well as cock to bottom of pipe E when required) being previously closed. P is part of the axle on which the centrifugal wheel revolves. Before the machine can be put to work, everything being previously arranged as directed, the apertures at G and bottom of A (and at E if required also), must be closed by sliding plates, valves, cocks, or other methods, as most convenient, and every part of the machine must be filled with the water or fluid used by the aperture L, or any other convenient method by which the

highest parts may be filled, the air allowed to discharge by opening E and O, the latter to be shut as soon as the centrifugal wheel is filled, and the cock at E closed where required, when the water is above it a little, *e* continuing open, so as to allow the air to be entirely discharged from every part, which being done, and the machine entirely filled with water, this cock and aperture L must be carefully closed; having then fixed upon the most convenient method for giving the required assistance to set the machine to work, by giving the centrifugal wheel motion, and assisting it till arrived at the velocity fixed, it must be put in motion, and the apertures G opened; after it has got a little into motion, and as soon as the velocity of the wheel has given a centrifugal force to the water sufficient to overbalance the slight difference in the height of the feeding and descending columns, the pipe A must be opened; a discharge from the apertures G will now take place, which is supplied from top reservoir B over the loaded side of vertical wheel, where, by its gravity and impetus acting on the float boards, it causes the wheel to turn till it descends, so as to be discharged through E, on to the rim or waterway W, of the centrifugal wheel, which it strikes with the velocity of its descent in nearly the direction of the wheel's motion, and is discharged through aperture G into the water contained at commencement in lower reservoir I, from whence this discharge is again supplied by the pressure of the atmosphere, returning it through pipe A into top reservoir, or through *a*, C, and the part intended of the vertical wheel. As the velocity of the centrifugal wheel is accelerated, the velocity of the descending column over the vertical wheel will also be accelerated, and, consequently, the vertical wheels, when having arrived at their respective fixed velocities, the assisting force being no longer necessary, may be withdrawn, and the centrifugal wheel may now receive what assistance is required to support its velocity from the vertical wheel through the connecting shafts and wheelwork, or in any other manner.

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1823.—Robert Copland [No. 4749], of Wilmington Square, Middlesex, Gentleman. "Combinations of apparatus for gaining power, part of which are improvements on a

patent already obtained by him for a new or improved method or methods of gaining power by new or improved combinations of apparatus applicable to various purposes."

He says:—"Figures 1 and 2 represent a double machine with the connecting pipes or hollow tubes, in the parts of which most convenient for opening and shutting occasionally are placed cocks, valves, or slides, No. 1 to 8, and lower valves 11 and 12, or other substitutes for these, which may be shut or opened when required by any of the well-known methods, from the motion of the beams, or by the hand, or any other method. C 1 and C 2 are hollow iron cylinders of equal contents, connecting together at bottom, where valve 11 opens or closes the communication; they have close air-tight covers or tops, with stuffing boxes for the rods to pass through, and the pipes being connected by air-tight joints." We then have "hollow cylinders, having pistons working in them; pipes inserted through these bottoms; an open trough or waterway joined on the top of these cylinders; four vessels or weights moving freely in the four cylinders, suspended by rods passing through stuffing boxes in the close tops;" and so on throughout seven printed folio pages. We have here a large amount of complication and friction.

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1836.—ROBERT COPLAND [No. 7216], of Wandsworth Road, Surrey, Esquire. "Improvements upon patents already obtained by me for combinations of apparatus for gaining power." The engine has a working beam and cylinders, like the preceding, but differently worked, without any appearance of being self-movng.

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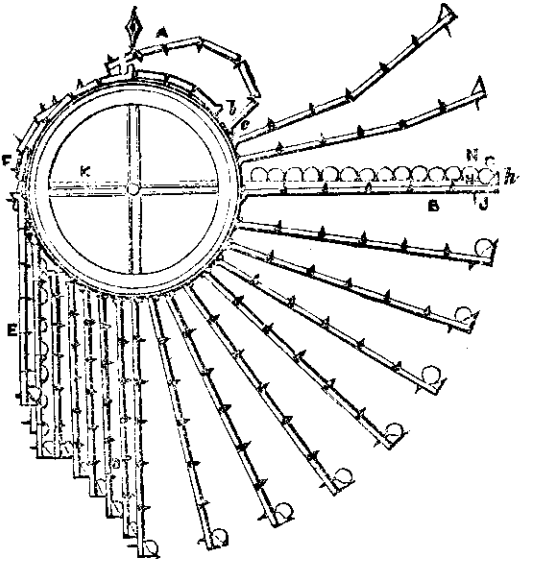
1821.—GEORGE LINTON [No. 4632], of Gloucester Street, Middlesex, Mechanist. "A new method of impelling machinery without the aid of steam, wind, air, or fire."

My invention consists in a vertical wheel moving by gravity alone, such wheel being fixed on an axis, which is made to turn easily in gudgeons, and the periphery of which wheel is provided with levers so constructed that by the mere revolution of the wheel they extend themselves to their

greatest length, and obtain their greatest acting power successively as they arrive by the rotative motion of the wheel at that position where they become situated at the upper part of the lower quadrant of the descending side of the wheel, and in which last-mentioned position they charge themselves with a weight at that extremity farthest from the axis; and which levers also cease to act as levers the moment they have passed the lower part of the said quadrant, and being carried up in an inactive state with the ascending side of the wheel, discharge the weight when the said weight arrives at some point above the level of the axis; and in causing the said weight, and others so discharged, to return, by gravity alone, to the situation whence they were taken by the levers before-mentioned.




I will here observe generally, that the principle of my invention being applicable to a series of vertical wheels on one axis, as well as to a single vertical wheel, and a series of vertical wheels being in my opinion preferable for the purpose

of practically applying my invention, I have described the principles of my invention, as applying to such a series. Fig. 1 is an end view of a series of vertical wheels, one only being seen, while the levers attached to the whole are visible. In Fig. 1, the lever A is represented in the act of falling from the periphery of the wheel into a right line. The lever is composed of a series of flat rods connected by ruler joints, which said ruler joints are provided with a stop or joggle to prevent their collapsing at any time more than will bring any one of the rods which compose the levers at a right angle with the rod next to it. This lever is attached to the periphery of the wheel by the hinge joint *b*, being provided with the shoulder *c*, to prevent its falling into any other than a right line from the centre of the circumference of the wheel. The levers are furnished at their outer extremity with a bucket or receiver, the bottom of which is sufficiently broad to retain the ball G; at *h* is a small roller to facilitate the delivery of the ball. The ball remains in the bucket till the lever comes into the position of the lever F, when is will roll out of the bucket on to the inclined plane, and by its own gravity roll to the balls at the other end of the inclined plane, ready to be again taken into a bucket. The stage which supports the inclined plane should not have any connection with the axis.

[The intended operation of this wheel is too obvious to require further description.]

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1825.—Edward Jordan [No. 5191], of Norwich, Engineer. "A new mode of obtaining power, applicable to machinery of different descriptions."

This is a singularly impracticable invention, yet the patentee claims that it "consists in sinking or forcing down to any convenient depth under water, buoyant vessels, by or with a lever, and also in directing and conducting them when so immersed, so that they are alternately placed in a position to act upon parts, forming in effect a lengthened portion of the lever that depressed them, thereby obtaining by a new mode a power applicable to machinery." Two large drawings and seven printed folio pages complete the specification.

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1827.—Sir William Congreve [No. 5461], of Cecil

Street, London, Baronet. "A new motive power." Enough has already been stated in respect to the inventions herein protected. (See Chapter IX.)

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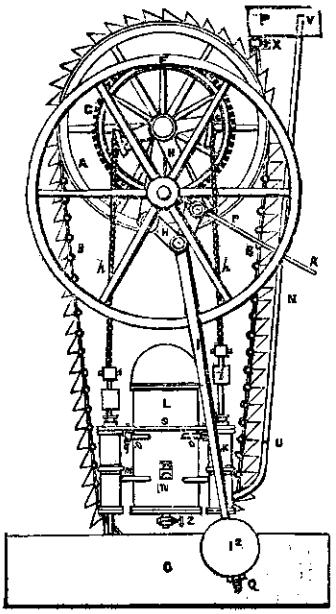
1832.—PIERRE NICOLAS HAINSSELIN [No. 6290], of Duke Street. St. James's, Middlesex, Architect and Engineer. "A machine or motive power for giving motion to machinery of different descriptions, to be called 'Hainsselin's Motive Power.'"



I do declare the nature of my said invention to consist in a machine, the nature of which depends on the descent of an endless series of reservoirs filled with water, which water is raised to a suitable elevation for the purpose, principally by the action of the machine itself.

No. 1 represents a front view of the machine, and No. 2 a side view; similar letters of reference being used to denote similar parts. A is a large drum; B, B, an endless series of reservoirs, or (as they would be called on a water wheel) buckets, each fastened by a hinge joint to the other, so as to form an endless chain, passing over the drum; C is a cogged wheel, working into the pinion D; and E is an eccentric, more particularly explained hereafter; F is a fly wheel; G, G, is a balance beam, carrying the segment of a circle at each end; H is what I call an escapement for I, which is a pendulum; and I 2 is the weight of the pendulum; K, K, are two pumps; L is the main cylinder of the machine; M, an air pump; N, a pipe, through which the water which works the engine is raised; O is a reservoir to receive the water from the descending buckets; and P is a reservoir to receive the water from the pipe N: and when it is required to make one of the said machines, the following details must be observed:— Suppose, for instance, it is required to make a machine on my plan, equal in power to a steam engine of which the expansive is equal to a resistance of 1,000 lbs. in a second. It will be seen that air and water are the two principal agents in me machine; water, it is known, weighs from 60 to 62 lbs. thy cubic foot, and it requires 32 cubic feet of air to balance one cubic foot of water; and I have found, by various experiments, that my machine employs about three-fourths of its power to produce it own action. From these premises it results that in order to have a machine on my plan equal to 1,000 lbs. per second, there must be 4,000 lbs. of water in the descending buckets, and two hundred cubic feet of air condensed in the cylinder L, by means of the air pump M, which is worked by hand by the lever handle *a*. The drawing represents sixty-four buckets fastened together by hinge joints in such manner as to form an endless chain of buckets, their motion being so contrived that they descend full at one side of the drum, and rise empty at the otherside, the drum being about three feet six inches in diameter; twenty-five of these buckets can retain water in the same time; and in order that the united weights of their contents may be 4,000 lbs., it is necessary that each of the sixty-four buckets shall be of a size (whatever be their form) conveniently to hold 160 lbs. of water. In order to supply twenty-five descending buckets with the required quantity of

water, the two pumps K, K, are placed a little above the lower reservoir O; the rods of these pumps plumb with the extremities of the balance beam G, G, by which they are worked; the capacity of each of these pumps should be such that each stroke of the piston should raise a column of water to the upper reservoir P, sufficient for the supply of one bucket (that is to say, 160 lbs.); these pumps, which may be called hydro-pneumatic, are nearly like ordinary lift pumps, the only difference being that the pump chamber is divided into two parts by the division *f*, the upper part being furnished with the piston of a force pump; the same rod *e* works both the piston *d* of the upper part of the pump chamber *c* and the valve *f* of the lower part of the chamber *g*. The pump rods *e*, *e*, are fixed to a chain *h*, *h*, which is attached to the segments on the ends of the balance beam G, G, and thereby made to work the pump rods, while the balance weights *i*, *i*, below the extremities of these chains, keep them at a proper degree of tension, and keep the beam on a just balance. The strong cast-iron cylinder L must be capable of resisting the force of the condensed air which it is intended to contain, say, at least 240 lbs. The interior of this cylinder is furnished with a division *f*, by which an upper and lower chamber are formed, marked *k* and *l*. The lower chamber *k* is intended to receive the water which the pumps K, K, feed it with by means of the pipes *m*, *m*, at every stroke of their pistons, and in this chamber the water frees itself from the air which may have been pumped in with it, and which is suffered from time to time to escape at the cock *n*, when a quantity has collected sufficient in any way to retard the action of the machine. It is from this lower chamber that the water is supplied to the upper reservoir P. The upper chamber *l* of the cylinder L is destined to receive the air, which is to be forced into and thus condensed in it by means of the small air pump M. It will be seen that the two small pipes *o*, *o*, communicate with the upper chamber *l* of the cylinder L, and the upper chamber *c*, *c*, of the two pumps K, K; these pipes are to let in the condensed air upon the tops of the piston *d*, *d*, to cause the downward movement of their alternate action. *q*, *q*, are two valves, each furnished with a lever *t*, *t*, which levers are connected by a jointed cross bar S, as shown in plan in the margin of the drawing No. 1. As the two arms or levers *t*, *t*, of this contrivance project beyond the vertical line of the

pendulum I, they are acted upon alternately by the vibration of the pendulum, thus alternately opening and shutting the valves *q*, *q*. The lower reservoir O may be of any convenient capacity, but the upper reservoir P should, at least, be able to contain as much water as twenty-five of the buckets can hold; and the ascending pipe N, through which the water is raised from the lower chamber *h* of the cylinder L to the upper reservoir P, should be of such a diameter as to contain exactly the quantity of water required to fill three of the buckets in the space between the point *u* (which should always be in a line with the division *f*) and the point *v*. The cock X is to regulate the descent of the water from the reservoir P into the buckets, which should be just equal to what is pumped up by each pump at each stroke of the piston. *y* is an air cock communicating with the upper chamber *l* of the cylinder L, and is to let a portion of the condensed air escape when its too great density causes the engine to work at too rapid a rate. Z is a cock for emptying the lower chamber of the cylinder L when necessary for repairs or otherwise, and a similar cock or valve should be made to the lower reservoir O, in case at any time it should be required to empty it. As it is necessary that each bucket as it empties itself should be replaced by a full one, the pinion D should be so regulated with reference to the toothed wheel *c* (which is fixed on the same axis as the drum A), that at every half revolution of the fly wheel F (which gears in with the pinion D, and is on the same axis with the eccentric E), one of the buckets shall present itself in turn under the cock X to be filled. The pendulum I is fixed on the same axis as the balance beam G, G, and the object of the eccentric fixed on the axis of the fly wheel is to act upon that part of the pendulum which I call the escapement at *r*, thus propelling the pendulum to one side, while as soon as the eccentric turns away from *r*, and it thus escapes from the action of the eccentric for a time, its own weight brings it back to be acted upon by the eccentric again, thus keeping up the vibration of the pendulum. The jointed bars at H, H, H, H, which I have called the escapement, form a part of the rod I. This rod is furnished with the weight 1 2, which may be raised or lowered on the rod I, by turning it to the right or left on the thread of the screw Q, to regulate the motion of the pendulum; and this motion may be further regulated by the segment bar and adjusting screw, which

expands or contracts the jointed bars H, H, H, H, of the escapement, at pleasure, and thus allows an increased or diminished action of the eccentric on the part *r* of the escapement; R is a lever to throw the pinion D in and out of gear with this fly wheel F, in order to stop the machine or put it in action when required; and it may be well here to describe that the is effected by means of the small arm, which, when in gear, protrudes through a hole in the flange of the pinion; but when the pinion is drawn away from this arm, the fly wheel and all upon its axis stops, and the pinion turns harmlessly with the toothed wheel.

This verbose description is followed by describing how the invention is to be worked, which it is needless to inquire into.

[In the "Description des Machines et procédés pour lesquels des Brevets d'Invention ont été pris;" Paris, vol. 33, p. 239, is an account of a "Machine hydropneumatique, dite Machine Hainsseline," Laporte, October, 1836.]

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1833.—Barthelemy Richard Comte de Predaval [No. 6510], of Leicester Place, London, Engineer. "An engine for producing motive power, applicable to various purposes." It comprises an outer circular case, supported on a stand, having a corresponding hollow water and air-tight cylinder turning on an axis, working in a stuffing box; this axis is fixed to a drum, and passes through the case at each side, which supports it. This frame contains pistons or friction plates occupying the space between the inner drum and outer case on all four sides. There is an air cock, mercurial guage, springs, leather packing, metal plates, &c., &c. Yet in spite of all this complication, we are informed the engine acts "by a joint power derived from the buoyancy of a body in fluids, and the weight of a body in vacuo."

Note.—This patent was made the subject of a joint-stock company. (See conclusion of Chapter X.)

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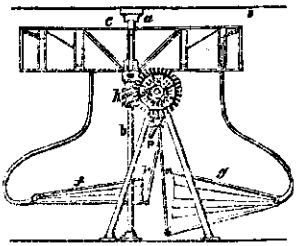
1839.- Jacob Brazill [No. 8312], of Deptford, Kent, Governor of Trinity Ground. "Improvements in obtaining motive power."

My invention consists in a certain arrangement or combination of mechanism wherein the atmospheric air is employed

as the impelling agent, being brought to bear in such a manner as by exerting a constant urging pressure, to produce a continuous rotary motion, and applies to all the purposes where a prime mover is required.

Fig. 1 is an end view of the apparatus. *a*, *a*, are the bearings, top and bottom, for the vertical shaft *b*, which bearings are to be so constructed as to produce the least possible amount of friction. *c* is a large drum furnished with radial plates or fans, some of the plates being so arranged as to slope down towards the bottom plate, thus forming, as it were, a series of boxes decreasing in their transverse dimensions as they approach the boss. This drum is to be put in motion by means of a current of air directed through the pipes *d* and *e*, from the two pairs of double bellows *f* and *g*. *h* is a worm fixed on the vertical shaft by means of a tightening screw, or in any other convenient way, taking into the worm wheel *i* on the horizontal crank-shaft *j*, supported in bearings *k*, *k*. The cranks *l*, *l*, work the bellows, by connecting rods *m*, *m*; *n* is a spur wheel taking into a pinion *o*, on the axle of which is a winch handle *p*, for starting the apparatus.



What I claim as my peculiar right is, the impulsion of a current of air against the fans of a drum (as that at *c*) through pipes, as at *d* and *e*) for the purposes of a motive power, together with a certain arrangement of mechanism, by means of which the action first induced shall be kept up.

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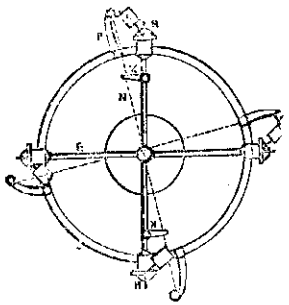
1842.—William Henry Stuckey [No. 9419], of St. Petersburg, Esquire. "A pneumatic engine for producing motive power."

Fig. 1 is a front view of my said pneumatic engine, partly in section. $A^1$ and $B^1$ two horizontal cylinders, united at their inner extremities *a*, *a*, which rotate on gudgeons that have their bearings C, C, in the upright standards D, D; $A^2$ and $B^2$ two pistons which work to and fro in these cylinders;

$E^1$ and $E^3$ two hollow arms or tubes which radiate from the cylinder $A^1$, and $E^2$, $E^4$, two similar arms or tubes which radiate in opposite directions from the cylinder $B^1$, each cylinder having an open communication with the arms or tubes attached to it. $F^1$, $F^2$, $F^3$, and $F^4$, four other cylinders, affixed to a circular ring R, R, open at top to the atmosphere, and open at bottom to the radial tubes $E^1$, $E^2$, $E^3$, $E^4$, connected with them at their outer extremities. $G^1$, $G^2$, $G^3$, $G^4$, pistons working in the cylinders $F^1$, $F^2$, $F^3$, and $F^4$, and $H^1$, $H^2$, $H^3$, and $H^4$, caps screwed on to the flanges of the cylinders. The different parts described form a wheel, which, on being set in motion, rotates on the gudgeons in the bearings C, C. The motion is produced as follows:—I adjust the wheel so that the tubes $E^1$ and $E^3$ shall be in a vertical position; and pour into the tube $E^1$, through the cylinder $F^1$, withdrawing the piston $G^1$, as much mercury or other suitable fluid body (previously determined by calculation) as will fill the tube from the point of its connection with the inner cylinder $A^1$ up to the bottom $(a, a,)$ of the outer cylinder $F^1$. The mercury thus introduced flows into the cylinder $A^1$ at the back of the piston $A^2$, and presses that piston forward to the extremity of its range, the piston $G^1$ being then restored to its place in the cylinder $F^1$, and pressed close down on the mercury in the tube $E^1$. I next turn the wheel till the tubes $E^2$ and $E^4$ are in a vertical position, by which turning the mercury therein is forced into the tube $E^3$, flowing down which it drives the piston $G^3$ of the cylinder $F^3$ forward to the extremity of its range, leaving a vacuum in the cylinder $A^1$ at O, equal to the difference between the heights from which the mercury descends in the tubes $E^1$ and $E^3$. I then fill the tube $E^2$ and cylinder $B^2$ with mercury, to the same extent and in the same way as I previously filled the tube $E^1$ and cylinder $A^1$, after which I turn the wheel till the tubes $E^1$ and $E^3$ are once more in a vertical position, whereby I produce a vacuum in each pair of tubes, and their intermediate cylinder, to the degree of the difference



before explained. To the four tubes there are attached four cocks $K^1$, $K^2$, $K^3$, $K^4$, which, after the vacua have been obtained, are closed; and to the four rods of the pistons of the outer cylinders $F^1$, $F^2$, $F^3$, $F^4$, there are attached four hanging or balance weights $L^1$, $L^2$, $L^3$, $L^4$, in such manner that they shall co-operate with the atmospheric pressure on the said vacua in giving rotation to the wheel. $M^1$, $M^2$, $M^3$, $M^4$, are jointed levers, by which these weights are connected at one end with the pistons $G^1$, $G^2$, $G^3$, $G^4$; and $N^1$, $N^2$, are cords or bands, by which they are suspended at the other end from standards P, P, projecting from the ring R, and bearing pulleys, over which the cords or bands pass, each cord or band serving to suspend the two weights which are opposite to each other, for which purpose it is passed internally across the wheel and over the exterior of one of the cylinders $A^1$ or $B^1$. The cords or bands are attached to the weights at the lower ends thereof, and pass over small pulleys close to the points of connexion, so that the cords or bands, when pulled, may act the more effectually on the weights. It will be readily understood that when any two of the tubes are in a vertical position, and the mercury or other suitable fluid has descended to the bottom of the lower tube, its pressure on the piston of the outer cylinder $G^1$ or $G^2$, or $G^3$ or $G^4$, will cause the weight connected with that piston to turn inwards towards the centre of the wheel, by which movement a strain is exerted on the connecting cord or band $N^1$ or $N^2$, which throws up the opposite weight at top, and causes it to force down the piston of the top cylinder, or the surface of the mercury in the upper tube, whereby any excess of pressure at the bottom of the lower tube is transferred to the top piston, where it acts in aid of the atmospheric pressure on the vacua obtained in manner aforesaid. The four cocks K, have regulating rods connected to them in the way common in steam and other engines, so that as each tube comes into a vertical position the cock attached to it is opened, and as it passes from that position towards the horizontal, is shut, so that the mercury always retains its proper position in the tubes or cylinders, and is acted on by the pressure of the atmosphere at those points only where such pressure can be of service. The power of this wheel will be, of course, in proportion to the vacua produced in manner aforesaid, and to the altitude of the columns of mercury employed. The inner cylinders might be dispensed

with, and the tubes be made to communicate directly with each other, but I prefer, for most purposes, the arrangement which I have before described, with the two intermediate cylinders $A^1$, $B^1$; where the inner cylinders are dispensed with, I make use of eccentrics instead of the joined levers before described, to enable the weights to turn to the extent of about half a circle. The number of tubes also need not be limited to four, but increased to any convenient extent.

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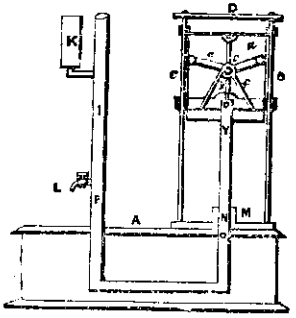
1845.—William Willcocks Sleigh [No. 10,711], of Chiswick, Middlesex, Doctor of Medicine and Surgeon. "A hydro-mechanic apparatus for producing motive power."

The nature of my invention consists in the application of hydrostatic pressure in a chamber by means of apparatus, and in such manner as to reduce the effect of the hydrostatic pressure in the said chamber, in whatever direction is opposite to that in which it is intended that the said pressure shall propel the said chamber, and thereby produce motive power, without depending upon any escape of water from the said chamber for that purpose.

Fig. 1 represents a vertical sectional elevation of the apparatus. The framework A A A A. B B, a foundation plate into which the two vertical pillars or guide rods C C C C are firmly screwed and held in position at their upper extremities by the cross bar D. In the framework A A A A lies the horizontal pipe E, from the ends of which rise two vertical pipes F and G. The pipe F has a stuffing box H H, and a solid cylindrical piston I I; a supply pipe and tap J leads from a small funnel K; and lower down, projecting from the same pipe, is a discharge cock L. At the upper end of the pipe G is a stuffing box M M, through which works up and down in the pipe G the smaller pipe N N, open at both its extremities O O. On the upper end of this pipe N N is fixed and supported, by means of two vertical



rods *k k*, the chamber *a a a a*, which has a free communication with the water in the pipe N N, through the opening O; this chamber consists of two hollow cylinders *a a a a*, united at a right angle. The horizontal cylinder has an opening or communication *d d* with the perpendicular one, and is furnished at each end with a piston *b b*. The perpendicular cylinder is furnished with the piston *h h*, which answers as a moveable bottom to the whole chamber; these three pistons, *b b* and *h h*, are connected together. The piston *h h* has an opening and stuffing box at *i i*, for the pipe N N. *r r*, various stuffing boxes for the pistons *b b* and *h h*. S, a rod for communicating the power gained to machinery. T, an air cock for the admission of air during the filling and emptying of the pipes and chamber. All these pistons must move water-tight and with as little friction as possible.

I will now proceed to describe the modus operandi and the effect to be produced thereby. Water must be introduced into the pipes E F G, through the small funnel K, and through the supply cock J, until these pipes, together with the pipe N N and the chamber *a a a a*, are all completely full, the air cock T being open during the flow of water. When all are full, the supply cock J and the air cock T must be closed, and the piston I I pushed down into the pipe E; this will cause the water in the chamber *a a a a* to press upon every portion of its interior surface with a power greater than that given to the piston I I, proportionate to the difference between the area of the piston I I and the area of the chamber. Now, the moveable bottom or piston *h h* being supported by the lateral pressure on the pistons *b b*, the upper part or roof of the chamber *a a a a* is freed from a great part of the counteracting effect of the downward pressure on the moveable bottom *h h*, and, therefore, the upward pressure necessarily carries the chamber and all fixed to it upwards with a proportioned effective power, the said chamber of course descending on the upstroke of the piston I I. A power being thus obtained in the chamber *a a a a*, greater than that given to the piston I I, it is evident that if the rod S be connected by any ordinary means to a crank shaft or other suitable machinery, and the piston rod of the piston I I be moved by a suitable power, an increased production of motive power must be the result, which may be applied by any of the ordinary well-known means to machinery.

"The machine imparts a power of upward motion to the chamber *a a a a*, greater than the power applied to the prime mover or piston I I, without depending upon any escape of water from the said chamber for such effect."

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1853.—William Willcocks Sleigh [No. 809], of London, Physician and Surgeon. "The production of motive power, which he entitles 'The counteracting re-acting motive power engine.'" He says:—

"The nature of my said invention consists in producing motive power by means of water, or of any suitable fluid or liquid, acting by a forcing pump, or other well-known means, in certain chambers fixed to an axletree, the said chambers being so constructed that that portion or aspect of the pressure, force, or power, which is in the direction opposite to that in which it is intended motion should take place, is neutralized, resisted, or counteracted in such a way, and by such contrivance or apparatus, that the said re-action shall not counteract that portion or direction of the said pressure, force, or power of said fluid or liquid which is in the direction of the intended motion. The said motion not depending upon nor being produced by the exit or escape of any of said fluid or liquid from said chambers."

After describing his complex machinery, he says:—"From all which, it must be evident that when the chambers are filled with water by the pump, and force applied to its handle, the said pressure or force must produce a rotatory motion of said chambers, axletree, apparatus attached thereto, and any machinery connected by any ordinary means to said axletree." But, unfortunately for the scientific world and the public at large, said "counteracting re-action motive-power machine" has not yet been able to counteract the common inertia of matter.

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1856.—William Willcocks Sleigh [No. 404], for producing motive power, which I entitle "The hydrostatic motive-power engine."

It consists "in producing power by the action of a forcing-pump, or water contained in certain chambers fixed to an axletree, counteracting by mechanical apparatus that portion of the force or pressure which is in the direction opposite to

that in which it is intended motion should take place, said motion and counteraction not being produced by, nor depending upon, the exit or escape of any of said water from said chambers." Two folio printed pages, and a large drawing of five figures, complete the specification of this most impracticable machine.

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1860.—WILLIAM WILLCOCKS SLEIGH, of 49, Middleton Square, London, M.D. "The neutralific motive-power engine."

Without any preliminary remark, the patentee commences with a description of the drawings given in four figures on two large sheets. The first contains a side view, with the frame for supporting the axle, and an immoveable ring; the second shows the axle with a longitudinal canal in its centre, forming a communication between a forcing-pump and cylinders or chambers, firmly fixed to the axle, to which guide-rods, or arms, are fixed; piston-rods support plungers in the cylinders; a forcing-pump communicates with the canal on the axle; a flat ring is fixed to and supported by the frame by brackets, to which four toothed pinions are fixed. A ring has teeth in its convex and concave surfaces, and also steps on each side of a former row of teeth. This ring is supported by and acts on a pinion. A lesser ring, with teeth on its periphery, is firmly fixed to the guide-rods or arms. Horizontal levers are attached to the piston-rods. A horizontal arm supports a cam. Legs act on the steps of a wheel (that with teeth on its convex and concave surfaces). A "circular wheel" has teeth co-operating with the teeth of the foregoing wheel, and has cams on each side to act on levers. Other levers are jointed on legs, acted on by the preceding levers, and on guide-rods or arms. There are horizontal levers to adapt the piston-rods to the bent end of the guide-rods, so bent to enable the guide-rods to pass clear in front of the before-named flat ring and the pinions.

The forces produced by water, in this instance, may be produced by a liquid or solid substance, capable of exciting two forces in opposite directions. To put the engine in action, the cylinders being full of water, force is to be applied, strong enough to sustain, and continue so to do, by repeated strokes of the pumps, till the piston of the chambers

be resisted and supported. Then motion commences! The cams before-named acting on levers, produce an action similar to that of a person on a treadmill. The pistons and their rods being thus supported and resisted, the force acting on the surface of the chambers opposite to said pistons, rotate the guide-rods, the axle, and the chambers. To stop the engine, open the tap, and let the water escape from the chambers!

The claim is for—"the principle by which the said neutralific motive-power engine acts, and which principle consists in counteracting or neutralizing one of two forces acting in opposite directions, produced by either a liquid, fluid, or solid, the force so counteracted or neutralized being in the direction opposite to that on which it is intended motion should take place; said motion not depending upon nor being produced by the exit or escape of any liquid or fluid from said chambers."

We have been thus particular in describing this "neutralific engine," because it is impossible to accompany it with an engraving, the printing of the present work being in progress during the lodging of the final specification. But what engineer, or engineer's apprentice, can require any further illustration by which to enable him to discover, whether a fluid thus bottled up in a chamber can, by means of pumps, levers, cams, and toothed pinions, be made to move machinery at all, much less so as to require to "open the tap and let the water escape" to stop it?

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1846.—WILLIAM EATON [No. 11,452], of Newington, Surrey, Engineer. "Certain improvements in obtaining motive power," which consist, "in the first place, in a novel arrangement of machinery or known mechanical agents by which fluids, being subjected to pressure or force from an hydraulic press or other power applied in a suitable manner, are caused to work or operate perpetually, or so long as the parts of the said mechanical agents are in a working condition, for the purpose of actuating other machinery, as a substitute for a steam engine, water-wheel, windmill, or other first mover."

The fourteenth year for which this patent was granted having this year expired, the public should not only be in-

formed "that a principle heretofore not used in any engine or machinery is brought into action,' and that the acting "pressure, weight, or force" is not "required to pass through space," but also that this elaborately described and illustrated invention is now public property. Let the use hereafter made of it be the test of its merit.

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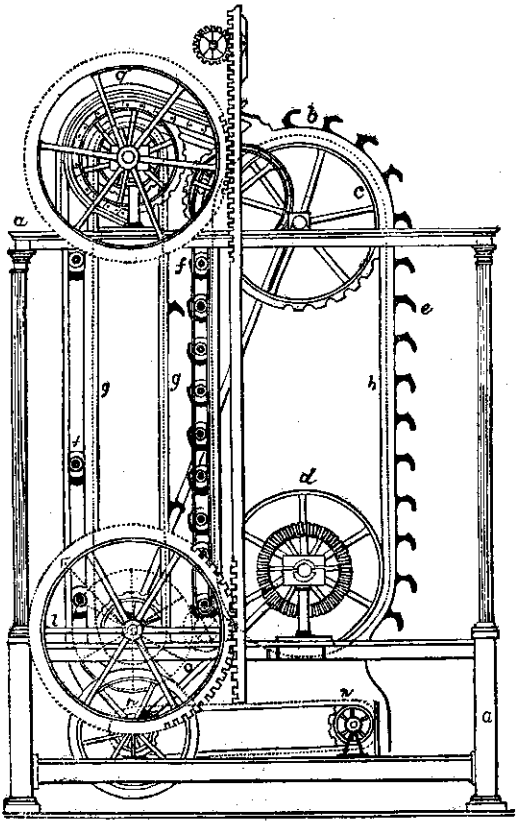
1848.—JOSEPH EUGENE ASAERT [No. 12,293], of Lille, France, Machinist. "Improved means of obtaining motive power."

I combine two endless chains or bands in such manner that one is caused to be moved by a series of descending weights, and thus to obtain motive power to axes, from which motion is communicated to the second endless chain or band, which is so arranged as to convey the several weights back to the higher position, and owing to there being at all times a large number of weights descending and acting at a greater leverage than there are weights ascending, and which act at a lesser leverage, there will result a considerable motive power for giving motion to other machinery.

Fig. 1, a side elevation of the machine. *a a*, the framing; *b b*, an endless chain carried by the two chain wheels *c d*. On the endless chain *b b* are fixed brackets *e e e*, which receive the weights *f f f*, as the brackets come successively over the chain wheel *c*, thus causing the chain to descend on that side of the wheel, and thus is motion obtained continuously to the wheels *c d*, according to the number and amount of weight used, and if a constant succession of these weights be delivered to the carrying brackets *e e*, on the chain *b b*, the power obtained would be the value of the several weights *f f*, which are constantly descending with the chain *b b*, but from this amount of pressure will have to be deducted the loss by reason of the friction of the various parts, and also the requisite force for causing the weights *f f* to be returned into a position for keeping up a constant supply to the chain *b b*. *g g*, a second endless chain, carried by the chain wheels *h i*, on the axes $h^1$ $i^1$, which turn in suitable bearings at $h^2$ $i^2$, and it is by means of this chain *g g* that the weights *f f* return to the upper part of the machine so as to keep up a supply to the chain *b b*, and so that that chain in descending will have all the descending brackets filled, and the leverage

by which these weights will be raised will be the radius of the wheels *h i*, which, being compared with, will be seen to be much less than the radius of the wheels *c d*, and therefore the leverage with which the weights *f f* act when descending, will be greater than that of the ascending weights. Motion is communicated to the chain *g g* in the following




manner:—On the axis $c^1$ is affixed a bevilled toothed wheel $c^3$, which takes into and drives the bevilled toothed wheel *k*

on the axis $k^1$, which turns in suitable bearings carried by the framing of the machine. At the lower end of the axis $k^1$ is affixed a bevilled toothed wheel $k^2$, which takes into and drives the toothed wheel $l$ affixed to the axis $i^1$ of the chain wheel $i$. $r$ $r^1$ are two toothed bars, which are so arranged as to work alternately in connection with the cog wheels on the axes $h$ $i$; that is to say, when the bar $r$ is descending, and by its weight gives motion to the axes $h$ $i$, and thus aid in raising the ascending weights carried up by the chain $g$, the the bar $r^1$ being raised during the time the bar $r$ is descending, for which purpose the bar $r^1$ is moved out of gear, with its cog wheels on the axes $h$ $i$, then the bar $r$ will be put out of gear with its cog wheels on the axes $h$ $i$, and the bar $r^1$ will be brought into gear with its cog wheels and will become the descending bar, and act to give motion to the axes $h$ $i$, and thus aid in raising the ascending weights, and thus will they alternately be the means of aiding in giving motion to the axes $h$ $i$. The manner in which the bars $r$ $r^1$ are caused to rise is as follows:—The bars are connected together in such manner, that by moving one out of gear with its cog wheels on the axes $h$ $i$, will put the other bar into gear with its wheels on the axes $h$ $i$, so that the bars $r$ $r^1$ may alternately become descending bars, whilst the other is being raised into a position to become an acting descending bar. In raising the bars $r$ $r^1$, there is a corresponding train of wheels to each bar, which receive their motion from the axis $i$, and the act of moving either bar $r$ or $r^1$ out of action in respect to its cog wheels on the axes $h$ $i$, will bring that bar into a position to be acted on by its train of wheels for raising it. $s$, a cog wheel on the axis $i^1$, which gives motion to the cog wheel $s^1$, which has on its axis the cog wheel $s^2$, which, when the bar is brought into position, raises it; and a like arrangement of wheels is used to each bar $r$ $r^1$. At each end of the axis $i^1$ is an eccentric $t$, which gives motion to the lever $u$, and to the two bars $r$ $r^1$, so that the one which has completed its descent is put in communication with its train of cog wheels, whilst the other bar $r$ or $r^1$, which has completed its ascent, will be put in communication with its cog wheels on the axes $h$ $i$, in order again to descend, and thus will there be a bar $r$ or $r^1$ to descend, and thus aid in causing the ascending weights to be moved upwards to their highest position. By these arrangements, the supply

of weights *f f* will be kept up in direct ratio with the descent by the chain *b b*. And in order to ensure that the weights as they go out of use in respect to the chain *b b* may come into a correct position for the chain *g g* to take them up, the following arrangement of parts is employed:—*n n n n* are four chain wheels on the two axes $n^1$ $n^2$, and these two pair of wheels carry the two endless chains $n^3$ $n^3$, which have horns or projections $n^4$ at suitable intervals, so that when the weights are left successively by the brackets on the chain *b*, they will be received between these horns or projections, and moved thereby till they come into a position for the carrying brackets on the endless chain *g g*, by which the weights will be successively raised to the highest position in the machine, the ascending weights moving with greater velocity than the descending weights, and thus is the constant supply kept up to the chain *b b*. Motion is communicated to the endless chains $n^3$ $n^3$ by the axis *o*, which turns in suitable bearings carried by the framing of the machine. On the axis *o* is affixed the bevilled toothed wheel $o^1$, which is driven by the bevilled toothed wheel $d^3$ on the axis of the chain wheel *d*; and on the other end of the axis *o* is affixed the bevilled toothed wheel $o^2$, which takes into and drives the toothed wheel $n^5$ on one of the axes $n^1$, so that the two endless chains $n^3$ will be moved at such a speed as to receive and carry forward the successive weights *f f* to the chain *g g*; and in order that the weights *f* may be correctly taken forward from the chain *g*, there are two endless chains *p p* carried by four chain wheels *q q* on axes, two of which turn freely on the axis *h* of the endless chain *g g*, the other two wheels *q q* being fixed on the axes $q^1$, and there are horns or projections which receive the successive weights, and cause them to be moved into a correct position for the endless chain *b*, there being springs between the guides near where the weights pass into the brackets on the chain *b b*, such springs simply acting to prevent the weights passing without some force, by which they are insured being correctly delivered to the brackets of the chain *b* by the movement caused by the chains *p p*, all which will readily be understood on examining the drawings. The weights are guided in their descent, and also in their ascent, by means of the guides *x x*. In order to retard and stop the machine, a strap break is used, with other apparatus.

Having thus described my invention, what I claim is, the mode herein explained of combining mechanical parts into a machine, whereby two endless chains or bands are caused to be put in motion by a series of weights, the descending weights being at all times more numerous, and acting with greater leverage than the ascending weights, whereby an improved means of obtaining motive power is produced.

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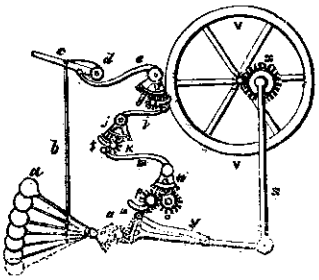
1850.—ARNAUD NICOLAS FRECHE [No. 13,220], of Paris, Merchant. "Improvements in obtaining power."

The specification occupies seven folio printed pages, and, from its peculiar language, is possibly a translation made abroad. The plan of leverage and the description are so peculiar that they are given entire:—

This invention consists in the creation of a principle of action of several levers producing by one another such a progression of power that the inventor thinks it susceptible of being applied to all the necessities which are supplied by steam. The inventor explains that the weight placed on the lever *a* will be trebled at the point which unites this lever to that marked *c*, and that this last will increase it sixfold, because it will double the power given to it by lever *a*, which will cause on the first of the multiplying levers *e* a weighing equal to six times the weight with which the lever *a* is loaded. This first multiplying lever having for point of support an axis bearing a sector, which will thus be directed by it, and the radius of this sector only being the fifth part of the length of this lever, the power given by this sector to the first multiplying lever will be five times greater, which will make it represent thirty times the weight which will load the lever *a*; but, as the cam that this sector causes to work to give a weighing on the second multiplying lever *i*, cannot be conveniently worked unless it be at some distance from the centre of the pinion which make it move, the thirty power above cited will be reduced to twelve and a half, causing the



weight which will be operated on the second multiplying lever. Now, proceeding to this second multiplying lever, and stating that by the reason that the length of its arm will contain three times the radius of the sector which it will impel, the twelve and a half power which will belong to this one will be trebled on this sector, and the power of this last will be equal to thirty-seven and a half times the weight which will load lever *a*; but as the cam which this sector will impel to make this third multiplying lever yield (marked *m*) its power as the preceding one will take place at some distance from the centre of the pinion which makes it work, these thirty-seven and a half power will be reduced to fifteen and a half, making the weight which will rest on the third multiplying lever. And, lastly, as the length of this third multiplying lever will also contain three times the radius of the sector which it will govern, and that so the fifteen and a half power which will weigh on it will be trebled on this sector, the power that the latter will have will be equal to forty-six and a half times the weight which will load the lever *a*, power which will yet be reduced by the effect of the distance from the point where the cam will work, reduction which will be, however, less than the preceding ones, because the pinion directing this cam being larger will be more powerful than the other two, from which the result will be that the forty-six and a half power will only be reduced to twenty-three and a quarter. It will thus be seen what is the progression of powers which will be given at the beginning of the operation by the simultaneous action of all these levers. That which must be next explained is the means that the inventor of this principle has imagined to overcome the obstacle which has always given to believe that it never could be attained to make a lever raise by the action of another. It is true that at the first aspect this obstacle seemed to defy all that could be tried to overcome it, since nature itself seemed to oppose it being vanquished. However, the perseverance with which the inventor sought the means of prevailing has made him find it, and this is in what these means consist:—Since, has he said, the power which a lever gives to an eccentric with the appropriation of raising another lever, cannot give fully to this eccentric the force necessary to it, so that it may operate this raising, as this power is more than absorbed by the resistance when the pressure of the eccentric takes place at a

wheel, whose use is to move the third cam in the proper direction; *p*, pinion which engages with this wheel to move the third cam; *q*, third cam; *r*, lever to which this cam will give the power which the preceding levers will have given. This last lever will have, similar to all the others, a roller, which will aleviate the hardness of the tail-piece and cams; *s*, crank, which will give to the driving shaft the power which will be transmitted to it by lever *r*; *t*, wimble, which will have two uses,—first. that of joining the crank to the driving shaft; second, that of acting by return to raise lever *a*; *u*, wheelwork, which will facilitate this raising by regulating it according to the course of the crank *s*; *v*, fly-wheel, which will maintain the progression of the pieces producing the power; *x*, gears directing this fly-wheel, which, like the said gears, will be placed in the empty space which will separate the two sides of this mechanism; *y*, driving shaft, which will be common to all the cranks, and from whence will be taken, whether on itself, or on other points by means of transmission, the power disposable; *z*, point of support of the levers and gear trees, the whole bearing on two frames, which will make for each row of levers a separate casing. Note, a hanging rod beneath the weights, which will load the levers *a*, and which will traverse two plates sliding between two grooves, will stop the working of this mechanism at will, by means of a screw threaded for the purpose, which will by these plates strongly press the hanging rod working, which will be carried out by means of a (screw threaded for the purpose, which will, by these plates, strongly press the hanging rod working, which will be carried out by means of a screw) turning handle, helped by gears if necessary, and which at the same time will disengage the fly-wheel. The upper lever, designated by the letter C, will also be loaded with a weight if thought fit, so as to have to place on the lever *a* a heavy load. In order that the cogs of the gears may constantly adhere, so that the coming and going that the levers operate may not cause any loss of time, springs or balance weights will be used, which, being fixed to the axes of these gears, will oblige their cogs to remain always applied to each other. The inventor thinks that this addition of levers would deliver this mechanism from the inconvenience of the dead points which the wimbles cause by the position they take in their revolutions. He, moreover, thinks that by these levers

more power still would be gained; but this advantage would be at the expense of the velocity. As to the first motion which the cams would prevent being regular, it would be remedied by arranging the arm of the levers joined to the cranks, so as to give to the driving shaft an invariable motion, whatever be the action of these cams on the levers which impel the driving shaft.

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1851.—GUSTAV ADOLPH BUCHHOLZ [No. 13,515], of Norfolk Street, London, Civil Engineer. "Improvements in motive power, and in propulsion." This is a specification in eleven printed folio pages, with seventeen sheets of drawings, containing thirty-nine figures. The third part of his invention consists "in a machine constructed of such mechanical parts, that, constant pressure being applied at two or more points, and so that the lines of pressure shall give rotary motion to one or more axes, the pressure shall remain stationary in position." At page 6 of this singular document, he says:—"I will now proceed to describe certain modes of applying constant force of pressure to the eccentrics, to produce the desired motion." He thus begins:—"A is the framework of the machine, which is securely bolted and fixed together. B*, a 'bush,' through which the screw C* works for compressing the spring D*, pressing upon the rods E*, E*," and so forth. And we are assured—"this machine will be found to work more advantageously when the forces are applied to the eccentrics in a direction as nearly as possible at right angles to a line passing through the centres of the two systems of eccentrics." Again,—"Drawing 8 shews another simple machine," in which "pressure upon the eccentrics will produce a continuous rotary motion of the shaft A." He then gives his views on obtaining compound motion.

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1852.—THOMAS GREAVES [No. 283], of Manchester, Veterinary Surgeon. "Improvements in the method or means of obtaining or employing motive power." "This machine consists of a beam about six feet long, affixed upon a frame; at one end of the beam are two connecting rods, one attached to a crank, the other to a rod over a hopper."

A flat chain, large pulley, buckets, &c., follow; yet, in spite of all, "this machine will dispense entirely and altogether with either steam power or manual labour!" Believe it who can.

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1855.—THOMAS GREAVES [No. 2205]. In October, 1855, he commenced, but did not complete, a patent for improvements on above. I now propose (he says) to have only one shaft to run through the beam, and also through two large bevil wheels, the beam being placed between the said wheels, one end forming a shaft for two pinions of different sizes rivetted together, which gear into the bevil wheels, each having two half rims, one forming an inner or lesser circle, having teeth of the same pitch, gearing into one of the pinions, *et cætera*, and *et cætera!*

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1852.—LOT FAULKNER [No. 410], of Cheadle, Chester, Machinist. "Certain improvements in the method of obtaining motive power."

"I employ a beam capable of vibrating upon a fixed centre; to one end I attach the machinery to be moved; to the other, two levers mounted upon studs, and so connected by spur gearing that they shall revolve in opposite directions, and always counterbalance each other; and upon these levers I place suitable weights." And so on. In conclusion, "As the power required to put the weighted levers in motion is so small in comparison with the force exerted at the other end of the vibrating beam, it will be evident that a great increasing motive power is obtained." This being only a provisional specification, so far makes the supposed invention public and free.

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1852.—ERNST LUEDEKE [No. 706], of Bedford Street, London. "Improvements in obtaining and applying motive power." "I intend, by the use of a pendulum, double wheel, and springs, to produce vibration, kept up by the concurrent action of the pendulum," &c. Only provisional, and therefore now public property.

1852.—THOMAS WOOD [No. 887], of the Glue Works, Hunslet, Leeds, Millwright. "Improvements in the mode of obtaining motive power." "My invention consists (he says) in obtaining motive power by means of a wheel, the periphery of which presses on water, or any other fluid, confined within a box or case, or larger wheel, to which, backward and forward, or rotatory, motion is communicated by mechanical means." He adds:—"In combination with this wheel and water chamber, I employ weights, which are made alternately to rise and fall, and by means of levers and suitable gearing to act upon the wheel." A good drawing of this notable machine accompanies the specification.

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1852.—GEORGE FITT [No. 921], of Parsonage House, Chalk, near Gravesend. "Obtaining mechanical motive power and speed." This is a singular specification, although only provisional, and has a large drawing attached. Its author has now lost all title to the invention. He says:—"From the mechanical principle of the inclined plane, and a certain law of the lever, I have produced, by an arrangement of machinery, a multiplied mechanical force without an ultimate loss of speed." He adds:—"The method of working the machine is, by causing the power to revert to the first wedge from any part where it is greater and the velocity is the same as in the first wedge, by the bands and riggers, *i. e.*, by rods, or any other method, by the hand or by a spring, or anything else capable of giving it motion and force." Again:—"Suffice it to say, that by increasing the diameter of the wedges, and the velocity with which they revolve, and the number acting on each other, a power can be obtained more than sufficient for any purpose yet known, or that ever will be known, where power is required."

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1852.—A. V. NEWTON [No. 1163], of Chancery Lane, London, Patent Agent. "Improvements in obtaining and applying motive power." This invention consists in "employing the pressure of a weight or of a lever, to act upon one or more wheels, rollers, or pulleys, and thereby cause them, by their rotation, to actuate the axle or shaft intended

to communicate motion to a carriage or machine." Eight and a half folio pages of description follow, with two large sheets of drawings, as given by this agent's "foreign correspondent," who states that—"The principle upon which is based the present invention is, that the force of gravity properly applied will produce the effect of a horizontal or tractive force. This being the case, it will be understood that, by properly applying and adapting this force of gravity, a carriage, even when loaded with a heavy weight, may, or to a certain extent, be made to propel itself."

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1852.—Benjamin Glorney [No. 1189], of Mardlyke Mills, near Dublin, Manufacturer. "Improvements in obtaining and applying motive power." He has only filed a provisional specification, which, if it has no other merit, has that of brevity. He says:—"This invention consists in obtaining motive power by the weight of a moving waggon or carriage, which is made to traverse backwards and forwards along a railway, and thereby communicate thereto an oscillating or vibrating motion, or a rectilinear motion, the said railway being either mounted on a centre or pivot for this purpose, or otherwise constructed and arranged so that the weight of the loaded waggon or carriage may be made to act thereon. The power and motion thus obtained may be communicated by any convenient gearing to the machinery intended to be driven; but the peculiar arrangement of such gearing must depend upon circumstances, and should, in a great measure, be left to the discrimination of a competent engineer."

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1853.—Auguste E. L. Bellford [No. 118], of Castle Street, London, Patent Agent. "An improved machine for obtaining motive power." It is "composed of pumps of small diameter, a water reservoir into which air is pumped, causing the water to escape by a tube, thence into a smaller cylinder," &c., &c. Suffice it to say, that this complication of pumps, pipes, and cisterns, is so efficient, "that once in movement, the machine will feel it, and will not require any auxillary motive power." As the plan (communicated by a

foreigner) is fully described by drawings, although the patent is not completed, it is open to public use—if wanted.

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1854.—ADDERLEY WILLCOCKS SLEIGH [No. 174], Knight of the Most Noble and Ancient Order of the Tower and Sword, M.R.H.S., Captain Royal Services of Portugal and Spain, late R.N., of No. 1, Weymouth Street, Portland Place, London, Middlesex, for his invention of "creating a continual self-acting, self-sustaining, new motive power, applicable to every purpose requiring speed, motion, and power, together or separately."

He states as his invention,—"Firstly, The application, by the mechanical agency hereinafter described, of the principle of the imponderosity or identification of lesser quantities or bodies of fluids, or liquids in fluids, or liquids of their own nature, or otherwise, and of the same or different temperatures. Secondly, Of the principle of the ponderosity, attraction, or specific gravity and momentum of fluids or liquids in the atmosphere, or in any less dense medium, or in a vacuum." And so through four other heads of like jargon. He concludes:—"I do not confine my discovery and invention, the principles being natural laws; and being the first and only person to shew and ascertain and prove (?) how those natural laws could be applied to power and speed by an engine invented by me, and these principles thus applied being correct."

In the printed specification, six folio pages are occupied with description, and two large but extraordinarily-executed drawings given, they being mere rough pen-and-ink hand sketches, executed without rule or compasses. A more stubbornly solid piece of mechanical invention it is next to impossible to imagine; and only that, according to his own statements, the patentee himself appears so satisfied with its versatile mobility, we might good-naturedly enough suppose his sole object was to solicit information on the merits of this oddly conceived and constructed monster perpetual motion engine.

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1854.—JOHN AITKEN [No. 557], of Longsight, Manchester,

Gentleman. "Improvements in obtaining motive power." His short provisional specification, all he published, makes the following a public gift!—"This invention consists in an arrangement of apparatus for obtaining power by lifting and lowering weights, and this is done by means of two pulleys between which are guides for the weights used. The lowest of the two pulleys is so formed as to push the weights in succession up the guide to the upper pulley, over which it passes, and descends by the guide on the opposite side. The machine is set in motion by any external power, and then the principles of inertia, gravity, and momentum are brought into action, and the result is, the weight of the balls falling, and their momentum is on one side of the working wheel, the cog wheel, and on the other side the weight of the ascending balls lessened by their momentum; the momentum in both being in proportion to their velocity, and the difference between the two is the working power." Possibly he has often since wished that facts had favoured him as much as a fervid fancy in making such a declaration of his supposed invention.

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1854.—James W. Shaw [No. 1360], of Birmingham, Merchant. A communication from Don Manuel Maria José Trinidad Miciano y Contillo, residing at Cadiz, Spain "Improvements in apparatus or machinery for producing motive power." This ingenious Spaniard saith:—"The invention consists in a certain arrangement and combination of an axle with a system of shifting radial arms or levers, furnished with weights, and maintaining a motive power by the force of gravity alone, without any other agent than mechanism."

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1854.—Plato Oulton [No. 1744], of Dublin. Gentleman. "Improvements in obtaining motive power." "My invention consists in the construction of a machine or apparatus in which a stream of leaden or other suitable balls are made to supply the place of water in actuating two or more main wheels, and in which provision is made for keeping up a constant supply or stream of balls to these wheels by means of a peculiar arrangement of worm shafts." The machine consists of "two main wheels, above which is an inclined

plane, by way of head race, down which the balls roll on to the wheels, each ball entering one of the buckets of the wheels. When the balls have carried the wheels round, they fall on to and roll down another short inclined plane, by way of tail race, and are carried on to the screws or worm shafts." This "head race" and "tail race" must, long ere this, have turned out a goose chase. The whole specification reads as if rather coming from the good old times of the last century than with the freshness of only the last six years. Three and a half folio pages of print, and a large drawing, complete this sapient specification.

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1854.—FREDERICK SAMSON THOMAS [No. 2129], of 17, Cornhill, London. "An improved mode of obtaining motive power." Provisional protection alone having been obtained, expired within six months, and the following statement is now given to the public for whatever it is worth:—"My invention (he says) consists in certain mechanical contrivances for the construction of a wheel having, by its own mechanical construction, the power to commence and sustain a rotative movement, and applicable to convey such movement to other machinery requiring motive power. The construction of the wheel consists in forming therein certain arms or chambers, upon or within which I place weighty balls, or rollers, or fluids, which approach the periphery of the wheel upon the descending side, and the centre or nave of the wheel upon the ascending side; and by the greater leverage on the descending side, I provide the power by which the wheel obtains and sustains its own rotative movement."

The early pages of the present volume sufficiently expose the fallacy of this oft-repeated scheme.

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1854.—GEORGE HALE [No. 2589], of Tavistock Street, London, Boot and Shoe Maker. "Certain improvements in obtaining and applying motive power." Although only provisionally specified, and therefore lost to the patentee, the public will be no gainers, the invention being a very old one. "My improvements (?) consist in taking advantage of the

power of gravity, and applying the same by means of a suitable arrangement of mechanical parts to drive machinery of various kinds. Power is obtained (?) by causing certain weights applied to or connected with rotating arms or levers to act upon and drive a central shaft with which the said arms are connected. The weighted levers are jointed, and so arranged, that when they are intended to act by their gravity on the shaft to be driven, they will be extended outwards to their greatest extent, so that their weights may be made to act with the greatest leverage and effect on the central shaft, and cause the same to rotate; and when the weighted arms or levers have so acted, and are required to be brought up again into their elevated position, the weights are brought nearer to the centre of the shaft, or of the circle of rotation, so as to diminish the leverage and allow the falling weights, whose leverage is much greater, to overcome the gravity of the ascending ones. The motive power thus obtained may be applied by causing the motion of the centre shaft to be communicated to the main driving shaft of any machine or apparatus required to be driven." Alas! who, reading the above, would suppose he was perusing a document from the archives of the Patent Office?

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1855.—Jacques Roux Delguey Malavas [No. 238], of Montbrison, France, Gentleman. "Improved machinery for obtaining and applying motive power." It consists of "an arrangement of apparatus which I term (he says) gravitation machinery." Its principle "is founded upon the laws of gravity, and the power depends upon the difference which exists with the same weight, according to whether it is brought nearer to or further from its point of gravitation."

"The apparatus consists of a number of circular plates accurately fixed on a long horizontal shaft mounted in suitable bearings. Between these plates are placed long levers, their centres of motion at one end, their opposite ends resting in guides, &c."

He concludes:—"When the main shaft has been made to rotate once, the weight of the levers, by bearing on the discs, will keep it continuously in motion." A large drawing, and four and a half folio printed pages, complete the specification of this not very obvious scheme.

1855.—GEORGE AUGUSTUS HUDDART [No. 942], of Brynkir, Caernarvon. "Improved machinery for obtaining and applying motive power." A water-wheel with buckets, and a chain of buckets; the first to raise the water to an elevated cistern, being rotated by the chain, operated by the discharge of the water raised. Why disturb such novelties from their original dust? But, above all, why attempt patenting such rubbish?

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1860.—GEORGE AUGUSTUS HUDDART and JOSEPH DURHAM ERSKINE HUDDART [No. 263], both of Brynkir, Caernarvon, Gentlemen. "Improvements in obtaining motive power."

The object of this invention is to obtain motive power by loading a wheel in such a manner that the specific gravity of the load on one side shall always exceed that of the other, and thereby ensure its continuous rotation so long as the mechanism is desired to operate. The load proposed to be applied to the wheel may consist, for example, of a series of cylinders open at one end, and fitted each with a weighted piston, which closes them air-tight. The cylinders are placed around the wheel, and the whole of the apparatus is to be immersed in water or other liquid. The cylinders are to be filled with air or other aeriform body, and the weighted pistons, as they come round to the position for pressing upon the air or gas contained in their respective cylinders, will compress that fluid, and thus the buoyancy of the cylinder will be proportionately reduced. When, however, the weighted piston becomes pendent, it will act in the opposite direction, and expand the confined air or gas, and thereby increase the buoyancy of its cylinder; thus each cylinder will be constantly presenting to the central wheel a varying specific gravity. And it is this increase or decrease in the specific gravity of the parts forming the load which is made available for driving the wheel, and thereby producing motive power.

Instead of employing a dead weight for compressing and expanding the confined air, a cam or other equivalent mechanical means may be adopted. The load may also, if preferred, be carried by an endless chain passing over a pair of chain wheels.

1855.—Robert Benton [No. 2304], of Birmingham, Engineer, Surveyor, and Land Agent. "Improvements in obtaining motive power by leverage."

This invention has for its object the means of keeping a barrel or wheel in continuous motion by the successive application of any even number of levers, acting entirely independent of each other, and in eccentric instead of the customary circular orbits; for which purpose, eccentric planes are employed, and each lever, on successively coming in contact with such eccentric plane or planes, is for the time being elongated, and rendered a long lever with a short shank; and having passed through or over such plane or planes, it immediately becomes neutralized on the rising side of the barrel or wheel to which it is attached, by being so fixed as to form one side of a cube figure, either square or octagonal, and in that position it is carried round the moving barrel or wheel until its pivot returns to the point from whence it was first placed against the face of the eccentric plane.

The patentee had arrived at an advanced age at the above date, which, coupled with his experience and earnest belief in the truthfulness of his scheme, might well plead an ample apology for the wilder non-perpetualities of mere tyros in mechanical science.

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1855.—Henry Weber [No. 2373], of Zurich, Switzerland, Mechanician. "Certain improvements in apparatus for motive power."

"My apparatus (he says) consists of a half cylinder (which may be made to rotate on a centre), placed in an inclined position, and supported on drums or friction rollers, on which it travels in circular guides. To the upper part of the half cylinder is attached a weight in such a manner as to press by means of a lever on its upper edge. The weight pressing on the half cylinder imparts to it a continued revolving motion in the guide circles."

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1855.—Michel Pierre Gilardeau [No. 2607], of Paris, and 4, South Street, Finsbury, London. "A new motive power." "The invention consists, first, in using a certain quantity of liquid equal to a weight of at least three atmo-

spheres, to compress the air alternately into two parallel pumps, thereby obtaining a power equal to the weight employed. Secondly, to make use of the compressed air for propelling a horizontal cylinder in which a vacuum is produced. And, lastly, to compel the weight employed for compressing the air to pass from one side of the apparatus to the other."

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1856.—DAVID JONES [No. 463], of Ragland, Monmouth, Civil Engineer. "Certain improvements in obtaining and applying motive power." This invention consists in obtaining power by the combined action of air, water, or other fluids on each other, by vacuum or pressure. An important feature consists in so constructing and operating with the apparatus that there is no appreciable friction of the principal parts thereof, and consequently no wear of the material, thereby effecting economy; the power generated and maintained in the apparatus for an indefinite period is also attended with no expense.

I take (he adds) an open vessel, of any convenient shape or size, into which I place water; also a cylindrical vessel, the air discharged therefrom, is to be filled with water, and placed upright with the open end downwards, immersed in the first vessel; a hollow collapsible sphere has affixed to one end a flexible tube, formed with two outlets or branches, each fitted with a cock, one opening to the atmosphere, the other to a hollow vessel.

A "vibrating lever" is described; and after a printed page of description, we are at last assured that—"The alternate opening and closing of the cocks of the apparatus is rendered self-acting by the vibrating movement of the lever or other suitable means."

Most likely the "other suitable means" was found, in the end, to be just the one thing wanting, for this patent, like many of its class, never went beyond the first six months' protection.

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1856.—WILLIAM SMITH [No. 1158], Adelphi, London. A communication from Alexandre Herault, of Angers, France. "A new application of the syphon as an irrigator and a motive power machine."

The invention consists in the peculiar arrangement of an apparatus fitted to the upper part of a syphon, which is provided with receptacles, which permit the withdrawal of a certain quantity of water from it without disturbing it or its action, and employing this water at the same time as a motive power, by the means and through the instrumentality of the apparatus itself, and also by its fall working an hydraulic power of any description, or feeding a system of irrigation. Finally, by means of this apparatus, water can be thrown to a height of from three to seven or eight yards, without cessation, by making the exit vent of the trough in a proportion agreeing to the quantity or volume of water that it receives.

Two folio pages of print and a full drawing complete the specification of this topsy-turvy syphon; but as the invention did not proceed to the Great Seal, all right in it has lapsed in consequence. The idea is by no means new, and its cause of failure is due to an imperative law of hydrostatics.

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1856.—DUNCAN LANG [No. 1345], of Greenock, Scotland, Engineer. "Improvements in obtaining and applying motive power."

Air (he says), when accumulated in any vessel, and compressed or urged into motion, acts as a very powerful motive agent.

Having described an engine, but one that is capable of great modification, he concludes:—"The motion is perpetual in its action, in as far as matter or material is susceptible of the time (query, "term") being applied to mechanical invention, and capable of being modified and adjusted, stopped and resumed. Its advantages are—its enormous power and economical use; the pressure from the compressed air of the common atmosphere dispensing with coal, coke, fire, and the tear and wear of their action, and expense, as attendant on the engines of the present day in their practical working."

That word "practical" is a decidedly saving clause in this instance. But who would not rather bear with the wear and tear of expensive machinery steam-propelled, than rest satisfied with the much-extolled machinery here and elsewhere described as that of which "the motion is perpetual?"

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1856.—GENERAL HENRI DEMBINSKI [No. 1611], of Paris.

"An apparatus giving a self-acting motive power, produced by water, elasticity, compressed water, or any gas whatever."

My invention (he says) consists of an apparatus to produce a continual motion reproductive of itself, by two wheels being connected by means of gearing or endless chains or ropes, the motion being produced either by weight or elasticity, the latter obtained by air, gas, compressed water, or any compressible fluid.

This hopeless scheme is accompanied by a drawing described in a full folio page of letter-press, presenting no extractable point of interest. It never had more than six months' patent protection.

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1856.—ROBERT and EDWARD LAVENDER [No. 2164], of London. "Improvements in raising water and other fluids, and in obtaining power thereby." Their apparatus consists of two upright cylinders, between and over which a wheel or pulley is mounted, and over this wheel an articulated piston is hung, its ends passing into the two cylinders; one end of the piston descending into one of the cylinders, displaces the fluid therein, which flows up to suitable troughs, and the other end of the piston descends into the other cylinder. Hydraulic bellows are recommended for giving motive power! "In this way (we are assured) any amount of motive power will be obtained, and the only cost thereof will be that of keeping the machinery in repair." Which "cost," we can promise, shall be as nothing per annum, for how can that wear out that remains so imperturbably quiet?

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1856.—ANTIONE JEAN BAPTISTE LESPINASSE [No. 2234], of Toulouse, France, Engineer. "Improvements in the means of obtaining motive power." All we can learn of this precious scheme is derived from one of the shortest possible provisional specifications, thus:—"This invention relates to an improved hydraulic apparatus for obtaining motive power. This apparatus consists of a reservoir of water, or other fluid, fitted with a syphon, the larger limb of which passes down to a water wheel, and is so constructed as to be capable of directing a stream of water on to either side of the wheel,

according to the direction of rotation required. The axis of this wheel works a set of pumps for raising the water which has acted upon the wheel, and returning it to the reservoir to be again supplied to the wheel through the syphon. The power may be transmitted from the axis of the water-wheel to a driving shaft in any convenient manner."

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1856.—Robert George Barrow [No. 2455], of Poplar, London, Engineer. "A self-maintaining motive power obtained from water, air, or any other fluid or liquid." He says:—"The method of obtaining motive power, self-sustaining, is as follows: I make a double-acting force-pump of one half the diameter of the cylinder, and attach to it a receiver with an hemispherical top (air-tight), and I force water or air into this receiver with the pump until I attain the pressure on the square inch required. I then attach or connect the pump to the engine, and it will maintain the supply in the receiver for any definite period required, so long as all the joints are tight and in working order." A complete specification and drawings were filed by the inventor's executors, but the character of the invention, as a "self-sustaining" power, is by no means clear.

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1856.—Aime Lecocq [No. 2873], of France, Contractor. "Improvements in hydraulic engines." These improvements consist in an arrangement by which the pressure of the water flowing from a basin or reservoir, and falling down in the buckets of a wheel enclosed on both sides, causes this wheel to turn and carry the water up through a syphon-like canal to another basin or reservoir, from whence part of the water may flow and impart motion to another wheel, which latter, as well as the first one, may serve then as a prime mover for any machinery.

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1857.—Bartholomew Predavalle [No. 958], of Bloomsbury, London, Civil Engineer. "A new motive engine." "The said invention (he says) consists in the action, alternately intercepted and restored, of the vertical pressure

of liquids on a base, and the ascent of liquids by capillary attraction. For this purpose, twice the liquid, for instance, water, wanted to rise a piston in a cylinder is put in a vessel, large in size and small in depth, communicating with the said cylinder. A reservoir above the vessel, and of the same size, is put in communicatlon with the cover of the vessel by a pipe, and both the reservoir and pipe are filled with water. In the cover of the vessel there are fixed some capillary tubes in glass, communicating with the water inside the vessel, and such in number as to contain about the quantity of water required to raise the piston, these capillary tubes passing throughout the bottom of the reservoir into the water; they are vertical for about one inch, then horizontal for about half an inch, then vertical to the top. This particular construction of the capillary tubes is indispensable to the purpose for which they are intended. A valve in the cover of the vessel when cut off the communication of the pipe with the water in the vessel, opens the communication between the water in the vessel and the capillary tubes." He also vaguely describes another similar machine, being only a provisional specification.

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1858.—Bartolommeo Predavalle [No. 2563], of Hart Street, Middlesex, Civil Engineer. "Improvements in producing or obtaining motive power."

"My invention relates to the combination of certain mechanical means in connection with a peculiar property of fluids observable in the 'hydrostatic paradox' for the purpose of producing or obtaining motive power. According to this invention, motive power is produced by the vertical pressure of a column of fluid alternately cut off and restored. For this purpose, a column of fluid is caused to exert vertical pressure on a body of fluid contained in a vessel of larger base than the diameter of the column, means being provided for alternately and instantaneously cutting off and restoring such pressure for neutralizing the pressure on the side opposite to that on which motion is to be primarily produced, and for returning the vessel after having been acted on to its original position to receive a fresh impulse. I include in the term 'fluid,' and propose to use as the fluid agent, water or other liquid, mercury or other substance kept naturally or

artificially in a state of sufficient fluidity, vapours, gaseous or aeriform fluids. In one arrangement, I employ a vessel consisting of two separate parts (kept in contact), and fix vertically thereto a pipe or tube which communicates with the interior of the vessel, and which I fill with fluid so as to obtain a pressure in the vessel equal to the weight of a column having the diameter of the vessel's interior and the height of the pipe. The bottom of the vessel is connected by a shaft, or otherwise, to one end of a beam or lever, to the other end of which, and at an equal distance from the centre, is connected another apparatus (or pipe and vessel) in every respect similar to the preceding. To each pipe, near its junction with its respective vessel, is fitted a cock or valve, which cocks or valves may be acted on by the motion of the machine itself, and are so arranged as to open and shut alternately, so that when one is open, the column of fluid will instantly act on the vessel in connection with it, and by its pressure force it down, and with it the end of the beam; while the other vessel, having its cock or valve shut, has no other pressure than its own absolute weight, and is consequently raised by the leverage of the balance, *i. e.*, the depression of the descending vessel. The action is then reversed, and thus a reciprocating motion is produced by the vertical pressure of the column of fluid alternately cut off and restored. Motion thus obtained may be applied directly or transmitted vertically, horizontally, or obliquely, or converted into rotary or other motion by suitable appliances. The power so obtained may also be caused to compress liquids or steam, or other aeriform or gaseous fluid, in a separate vessel, in order to drive pistons or communicate motion to an Archimedean screw, wheels, or other contrivances, and may be adopted in substitution of steam, water power, or other agent, for working any known arrangement of engine."

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1859.—Bartolommeo Predavalle [No. 2851], of Bloomsbury Street, London, Civil Engineer. "According to this invention, motive power is produced by the vertical pressure of a column of fluid alternately changing its action on the beam of a balance." Only provisional protection was obtained.

1860.—Bartolommeo Predavalle [No. 1458], of Bloomsbury, London, Civil Engineer. "A new mode of, and apparatus for producing and obtaining, motive power."

The provisional specification (all published) states:—"My invention consists in a constant atmospheric pressure imparting its downward gravitation on a vertical column of liquid, communicating with a hollow piston suspended in a cylinder and surrounded by a vacuum. At one extremity of an india-rubber tube is fixed a circular frame containing a valve opening outside, and at about an inch from this a plate of the same diameter as the valve is secured, in order to form a kind of a hollow air-tight piston sack or bag."

More surely need not be quoted to convince any one of the impossibility of effecting a moving power by such an arrangement. However, one more quotation will suffice:—"When the vacuum is made in the cylinder, and the vertical pipe filled with liquid, the pressure of the atmosphere through the thin or small pipe will impart a constant impulsive force to the valve and to the rod touching it, in proportion to the height of the column of liquid and the vacuum produced; and the apparatus will move according to the adopted contrivance, and may be applied as the piston of a steam-engine."

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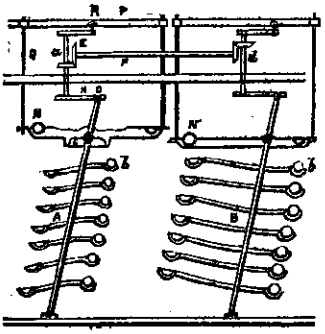
1857.—Charles Barlow [No. 1108], of Chancery Lane, London, Patent Agent. A communication by Joseph Commandeur, of Lyons, France, Gentleman. "A mechanical apparatus for regenerating the impulsive force of any motive power." He says:—

The effects of this machine are due to the force created by the travelling of heavy iron balls or weights in and around helical spirals, which are wound round cylinders of different diameters. These cylinders are set in motion by the impulse given to them by the gravitation of the heavy weights or balls when set in motion, which motion is of an oscillating rotatory kind, on account of the shafts being inclined.

The drawing represents a vertical section across the axle of the upright cylinders A and B. The helical spirals are of a hollow or trough form, so that the iron balls or weights placed at the upper end will easily and instantly run down them. The spirals of the cylinders A and B have a reverse

action—the former acts as the motive power, the latter as a resistance; that is to say, its only purpose is to carry up again the balls or weights running out from the lower spirals of the cylinder A into a lower horizontal trough C, which conveys them into a lower spire of the cylinder B, the iron balls running up the said cylinder through the spiral windings until they reach the top part, where they fall into the horizontal path D, which conveys them back to the upper spirals of the cylinder B by means of the four bevilled wheels E E E E, two of which are keyed to the horizontal shaft F,



and the two others on short vertical shafts A and D. The number of spirals being the same in each cylinder, and their rotative motion being at the same speed, it follows that at each revolution of the cylinder A a ball will run out of the lower spiral, and will be conveyed back to the cylinder B through the straight trough, and similarly at each revolution of the cylinder B a ball will run out of its upper spiral and be conveyed back into the cylinder A through the gutter or trough D. This new combination will constantly regenerate and maintain the first impulsive force applied to the apparatus. From the disposition of the helical spirals and cylinders, it is evident that the surfaces of revolution generated by the axes or shafts T T, of the cylinders A and B, are conical surfaces, the generating lines of which are the axes I I of the cylinders, which revolve around their summit,

which moving freely in suitable bearings, the axles or shafts I I can revolve very freely. The top part of the shafts I I is also of a spheroidal shape, as seen at G G, and, working in brass seats, moves freely at top and bottom in its bearings, so that the motion of the shafts is easy, the first driving around with it the crank H, whilst the shaft I is driven by the crank H. At the lower part of the cylinders, discs J J are keyed, which discs are provided with wedge pieces K K, the lower corners of which bear on the chairs L L for the purpose of lessening the strain at the end of the cranks, producing a kind of re-action which acts as an addition to the motive force. Above the cylinders A and B, circular plates or troughs are placed, working on brass bearings around the rounded edges of the shafts I I. In these troughs, heavy iron balls travel, serving as a fly-wheel to the rest of the machine, and balancing the balls in the spirals. These plates have an oscillating motion on the rounded edges O O, and are connected to the upper cross arm plates P P by rods Q Q Q Q. They have also an oscillatory motion given to them by the crank knobs R R. The troughed plates M M ought to have an inverted inclination to that of the helical spires of the cylinder, which inclination may be suitably regulated by the screw nuts on the connecting rods Q Q Q Q, as shown on the drawing. The under sides of the troughed plate are provided with a circular rib S S, projecting downwards, and rounded off at its edge, and which constantly bears on the plates T T as they revolve. By means of the adjustable connecting rods Q Q Q Q, the heavy balls N N are started, running to the required number in advance of the cylinders, so as to overcome the dead points. By means of the apparatus hereinbefore described, and shown by the annexed drawing, impulsive force may be increased by increasing the number of spirals so as to admit of the use of more weights, or by enlarging the pitch of the helical so as to admit of the use of larger balls; and some of these balls might be hollow, so as to increase power in the less ratio. Instead of the helical cylinder A, a bucket-wheel might be used, into which the balls carried up by the spirals of the cylinder B would enter at its top part. The contrary principle might be applied, videlicet, the helical cylinder A might be preserved as the motive agent, and the wheel to carry the balls. Lastly, both helical cylinders might be applied to

convey the iron balls to the wheel, which latter should then be the motive agent. The force and efficacy of the apparatus will increase or decrease according to the size and weight of the balls, to the diameter of the motive helical spiral, and to the weight of the balls in the troughed plate.

I claim the construction of a machine for imparting motive power actuated by rotating balls in helical spirals, or any mere equivalents therefor.

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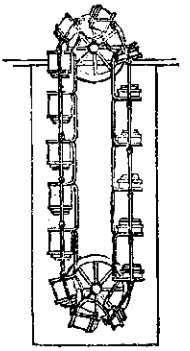
1857.—PETER ARMAND LE COMTE DE FONTAINEMOREAU [No. 1330], of London, Agent. "An improved hydraulic motor." A communication.

The apparatus is composed of a number of hollow elastic buckets or bellows, partly immersed in water, made to pass over two pulleys. Each bellows is furnished with a leaden weight at the bottom, which forces the air contained in the bellows on one side, to pass by means of connecting tubes into those buckets or bellows which are on the opposite side. The bellows are fitted to slotted links, and connected together so as to form an endless chain, which passes over the two pulleys.



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1857.—WILLIAM GILMOUR [No. 2125], of Dalbeth, Scotland. "Improvements in obtaining motive power."

This invention (he says) relates to the obtainment of a continuously-acting motive power, by means of weights operating upon combinations of levers or parts acting on the lever principle. It may be carried out under various practical forms, but under one of its simplest modifications the apparatus mainly consists of a pair of long parallel horizontal levers of the first order, each set upon a fulcrum near one end, whilst to the other and longer end there is hung a weight of a certain predetermined size. The descent of this weight,

when the apparatus is in motion, obviously elevates the opposite shorter arm of the lever, and this end is connected to a short crank upon a small horizontal shaft, which shaft has upon its opposite end a longer crank.

The pin of this longer crank is jointed by a suitable link to the longer arm of another lever of half the length of the main lever. This lever is also of the first order, and its shorter arm is linked to one end of an equal-armed lever, the opposite end of which lever is connected by a rod to a crank upon a long horizontal transverse shaft. This long shaft has upon it three other cranks; the second of these cranks is linked to the longer arm of another lever, to which is hung a weighted lever one half that of the weight on the main lever. The other shorter end of this lever is linked to one end of an equal-armed lever, the opposite end of which is linked to a crank on a secondary horizontal transverse shaft. This shaft has also four cranks upon it, and the external one next to that last referred to is linked to the weighted end of the main horizontal lever.

The remaining two cranks on the main horizontal four-cranked shaft operate in a precisely similar manner upon an exactly corresponding series of parts in connection with the other main horizontal lever; in other words, the arrangement comprehends two main horizontal weighted levers, working in combination through the intervention of precisely similar parts, the entire apparatus comprising four acting weights, the two on the main levers being twice the weight of the other two.

The result of this combination is, that as the two main weighted levers descend, they alternately elevate the other lighter weights, which lighter weights in turn descending, operate by means of their lever connections so as to again raise the main weighted levers, and thus cause the main horizontal crank shaft continuously to revolve.

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1857.—WILLIAM MIDDLESHIP [No. 3199], of South Grove, Mile End, London, of H. M. Customs. "Improved machinery or apparatus for obtaining motive power."

My invention of improved machinery or apparatus for obtaining motive power consists principally of a wheel of any

suitable diameter, and mounted on a spindle which turns in bearings; the rotation of this wheel is to be effected and kept up by maintaining a weight of water always on one side of the wheel, or if the wheel should be immersed in water, the same object may be effected by the inflation of chambers with air, the ascending power of the air chambers being sufficient to communicate rotating power to the wheel, as the air chambers will be inflated on one side only of the wheel. Whether water or air be employed as the motive agent, the chambers, which must be arranged round the periphery of the wheel, must be collapsible, so as to admit of their alternately receiving the air or water, and allowing the same to be expelled when required. I prefer to make the chambers in the form of a wedge, but other forms may be employed if preferred.

As respects working the wheel by water power, on the right hand of the wheel the collapsible chambers are filled with water, and as they communicate by means of tubes with similar chambers on the opposite side of the wheel, it will be understood that when the wheel begins to rotate, in consequence of the weight of water on one side of it, the collapsible vessels which are capable of compression are brought into contact with a pressing wheel mounted in bearings below the water wheel. The pressing wheel is moved by the friction of contact only, and the collapsible chambers being pressed between the two wheels, the water is forced out of the lower ends up into the opposite chamber above, thus rendering the weight on the opposite side of the wheel the same as before the movement took place; the emptied chamber is prevented from filling again until it arrives at the top, and is ready to pass to the right side of the axis. The motion is continued by each chamber being successively brought down and compressed, and the water therefrom forced into the opposite chamber above in regular succession. The reflow of water from the upper into the lower chamber, after passing the point of compression, is to be prevented by a button turned by a pin, or any other suitable contrivance, which must be brought into operation just as the chamber is emptied. The button or other contrivance which closes the ccllapsible chambers may be removed by a similar pin when the chamber reaches the upper part of the wheel to be refilled. Assuming that the

weight of ten pounds of water on the right side of the wheel would be sufficient to force up one pound to the required opposite point, any additional number of chambers for which there might be space left would give an increased motive power.

The principle, when applied to air working a wheel under water, is to be effected simply by reversing the position of the wheels and substituting air as the motive power for compression downwards to the chamber at the bottom of the wheel, so that by its buoyancy it may, in its tendency to ascend to the surface of the water, pull round the wheel.

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1858.—Marc Antoine François Mennons [No. 566], of Paris, and Finsbury, London. "Certain improvements in the production of motive power." This invention consists in constructing machinery for utilising gravity and centrifugal force for obtaining motive power. The machinery is composed—first, of a peculiar pendulum or swinging lever, which, after receiving an oscillating motion by the hand acting on a cord, comes in contact with springs which cause the pendulum to rebound and continue oscillating. This motion is further assisted by means of the gravity of water, or other liquid, placed in tubes or receivers at the bottom of the pendulum, &c. This invention had only six months' protection.

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1858.—George Hale [No. 1374]. Levers on a shaft—as before. (See 1854, No. 2589.)

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1858.—George Singleton Hill [No. 1743], of Ryde, Isle of Wight, Miller. "Improvements in hydro-pneumatic machinery." The invention, completely patented by this patentee, "is based on the principle that atmospheric air will sustain a column of water varying from twenty-eight to thirty-two feet in height, according to its pressure indicated by the barometer." He says his machinery "consists of a water-wheel of about twenty-eight feet in diameter, a cistern or well underneath it, and a tank about three or four feet deep fixed above the wheel; there are to be fitted to it as

many pumps as required for pumping the water into the tank above, to be driven by the water-wheel." A large drawing is given, in describing which the patentee complacently informs us—"The suction pipes I descend into the cistern K, formed beneath the wheel, where the water employed in turning the wheel collects, and is elevated by the pumps G to the top of the wheel again." This is remarkable under any circumstances, but more so as thus recorded in the Patent Office by a practical man, and a miller too.

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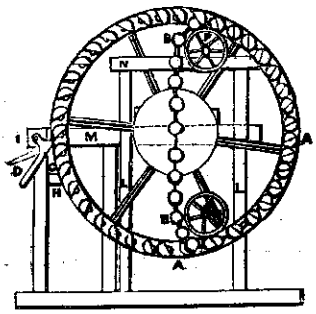
1858.—Pierre Richard [No. 1870], of Rue St. Jean, Paris, Engineer. "Improvements in apparatus for obtaining motive power."

The invention consists in communicating a rotary motion to a fly-wheel or drum by means of a set of falling weights tied together by means of chains, ropes, or straps. This set of weights, forming an endless chain, runs over two pulleys, or rollers, suitably disposed up and down near the fly wheel, which is provided with a set of cups suitably shaped, and fixed around near its periphery, so as to receive the weights as they are delivered up by the upper pulley, and to carry them down to the lower pulley, whence the same weights re-ascend in a straight direction to the upper pulley. The weights of the endless chain running or falling down in the curvilinear direction of the periphery of the drum are more numerous than those that are raised up in a straight line, because the curvilinear line is longer than the straight one, and the difference of heaviness due to the number of weights is the force which, by its action at the end of the levers or radii of the drum, causes that drum to rotate.




The drawing shows an endless chain composed of twenty-five rounded weights or balls, fifteen of which are carried by

the cups or bowls mentioned, whilst the ten other weights are ascending freely in a straight line, being carried upwards by the excess of weight of the former. L L L, feet of the frame bearing the whole apparatus; A A, fly wheel or drum; P P, pulleys or rollers, over which runs the endless chain, composed of rounded weights B B B, which are tied together by strings or straps as aforesaid. The shafts of the pulleys P P run on bearings fixed upon the cross pieces N N of the frame; the shaft of the drum runs upon bearings fixed upon the cross piece M of the said frame; C C C, cups or bowls fixed around the drum A A. The machine being set in motion, will keep on running to perform any work which may be applied to it. It can be stopped by means of a brake G, acted upon by a lever D worked by hand. When the lever is brought at D, the brake is tight, and the drum A stops.

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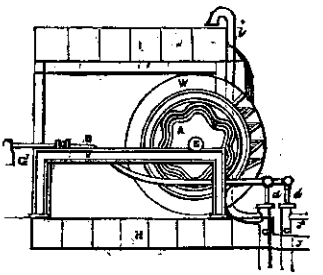
1858.—James Black [No. 1933], of Edinburgh, Machine Maker. "An improved mode or means of obtaining, applying, and transmitting motive power."

A face plate or disc is fixed on an axis, and has formed in it a number of wipers, eccentrics, or curved paths, which receive (in the space taken out) a pulley or roller, free to revolve on its own axis, and attached to an adjustable lever in equal balance with the desired lift or pressure. On rotary motion being communicated to the plate (by a band or otherwise), the pulley or roller moves round the eccentrics or paths, imparting a rocking motion to the lever (similar to the action of a beam), wherefrom motion may be transmitted or applied, as desired, or converted by suitable appliances into any description of motion.



In connection herewith, a pump may be set in a tank of water, and a tank added above; on the same shaft with the face plate is a water-wheel driven by the water from above; when it

passes the centre, the water falls into the lower tank and is pumped up again; whatever weight of water is in each stroke is equalized by a balance weight on the lever; the number of eccentrics and size of water-wheel may be increased to correspond with the quantity of water required to secure a desired power.

One means of imparting rotary motion from my arrangement is by attaching at the end of the lever a crank and connecting rod of same radius as the lift of the lever, carried over the centre by a fly wheel.

The invention is applicable to the actuating of pumps, mincing machines, and other machinery, instruments, and apparatus, and to parts thereof; to propelling on land and water, and to various motive purposes.

Fig. 1 is an elevation, showing an arrangement for obtaining power according to my invention. X is the general framework of the apparatus; A, a disc or plate, mounted on a shaft E, and formed with curved paths B; the same shaft E also carries a water-wheel W, provided with vanes or blades *w w*, as is usual; C is a roller, working in the paths B, and connected to a lever D, attached to rods *d d* of pumps G G. $G^1$ is a balance weight at the further end of the lever, which is supported in the bearing *f*; H H are tanks fixed below the water-wheel, and I is a tank set above it; *i i* are supply pipes, for conveying the water from tanks H H to the tank I; *j j*, escape water pipes. The water falling from the tank I on to the wheel W, drives that wheel in the usual manner; and when it passes the centre, the water falls into the lower tanks H, from which it is pumped up again into the upper tank I by the pumps G, actuated by the levers E, driven by the rollers C, in the pathways B of the face plate A, as the latter is caused to revolve by the revolution of the water-wheel W on the same shaft with it, thus producing a continuous motive power.

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1858.—JOHN COATES [No. 1934], of Lower Shadwell, London, Engineer. "Improvements in apparatus or machinery for obtaining and applying motive power."

A complicated machine is described, of which he says:—"The cylinder, the tubular portions, and the trough are filled with water, and the working of the piston causes the alter-

nate admission and expulsion of the water, thereby putting the engine into motion." He adds:—"The water that supplies the engine cylinder ascends the (hollow) column supporting the beam." The patent has no drawing; but though completed, the construction of the engine and its precise intended mode of working are not very obvious.

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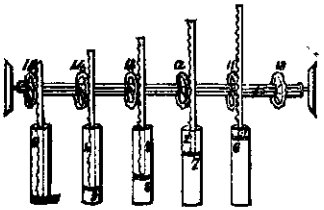
1858.—PETER PICKERING [No. 2142], of Danzig, Prussia, Landed Proprietor. "An atmospheric engine." 1, 2, 3, 4, 5, cylinders 18 feet long or high and 3 feet diameter, so that the surface of each piston has 1,296 square inches acting with an atmospheric pressure of 15 lbs. to the square inch, causes a pressure of 19,440 lbs. to each cylinder (saying nothing of friction, which will be accounted for later); 6, 7, 8, 9, 10, pistons of each cylinder, as they must be placed when the engine begins to work; 6, 7, 8, 9, causing a vacuum under each piston (as they have for the first time been brought into their present situation by main force), afterwards, when the engine is permitted to start, they will regulate themselves; No. 10 lies flat on the bottom of the cylinder; 11, 12, 13, 14, 15, piston rods acting on shaft No. 16; 17, wheel to communicate the engine's power to the machinery of the engine itself; 18, wheel to communicate the engine's power to the wheel or propelling screw of a ship, manufactory, locomotive, &c.



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1858.—ROBERT WRIGHT [No. 2530], of Manchester, Jeweller; and T. J. MERCER, of Coventry, Watch Manufacturer. "A new or improved motive power engine." "Our invention consists of an engine by which motive power is obtained by the use of compressed air, which said engine also effects the compression of the air, by the expansive

power of which the motive power is obtained." This looks very like an intended perpetual motion, but in this provisional specification is insufficiently described.

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1858.—Moses Starbuck No. [2708], of New York, America. "A static pressure engine." In his very brief provisional specification, all published, he says:—"My invention consists in the application of a static pressure to produce a continuous movement, which movement is effected in consonance with the settled laws of mechanical philosophy, by means of arrangements of devices heretofore undeveloped. By means of these devices, I am enabled to convert a static pressure into a continuous movement, from which the static pressure (minus the friction of the engine) can be continually given off for the purpose of moving any machinery to which the engine may be applied.

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1858.—Joseph Marie Roussel [No. 2853], of Paris, Mechanician. "A new system and new apparatus, using air as a motive power." A drawing accompanies the provisional specification; but the patent, not being completed, has, like many more, lapsed in consequence. Compressed air is used, and the patentee assures us that—"The motor once set in motion, the pumps supply air in a quantity sufficient to compensate in the great reservoir that already used."

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1859.—Hugh Rigby [No. 754], of Salford, Manchester, Engineer. "Improvements in machinery or apparatus for obtaining motive power, applicable to hoists, and all other purposes to which motive power can be applied."

He says:—"I employ an upper reservoir of water of any suitable capacity, and, by means of a regulating valve, allow the water to fall upon the buckets of a water-wheel or turbine, the water being delivered into a similar reservoir below. The water-wheel or turbine gives motion to a series of hydraulic pumps, for the purpose of forcing the water into one or more hydraulic rams, to each of which a larger pump-bucket is attached, working in a suitable barrel, the bottom

of which is placed in the lower reservoir. As the water-wheel or turbine turns from the supply of water, and gives motion to the series of pumps, the ram or rams rise, and raise the larger bucket or buckets, the effect of which is to raise the surplus water from the lower reservoir to the upper, which latter is thus continually supplied; which, acting on the wheel, obtains a motive power in proportion to the dimensions of the parts." Need more be said? We have quoted the patentee's own statement from a complete specification of three printed folio pages, accompanied by four large sheets of illustrative drawings! Yet Manchester is distinguished for its engineers and machinists.

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1859.—James Randal Smith [No. 1057], of Glasgow. Gentleman. "Improvements in obtaining motive power."

Under one modification, the apparatus or machinery consists of a wheel with a tubular or hollow rim capable of revolving in a vertical plane upon a horizontal axis or centre of motion. To the periphery of this wheel there are attached at equal distances asunder and all round it a series of open cages or chambers, each containing a flexible diaphragm of a tubular or bag form. The two ends of each chamber or flexible bag-holder are solid discs, to one of which one end of the flexible bag is attached so as to be fluid-tight, and a water thoroughfare or tube passes from this end disc to the wheel rim, so that there is a free passage from the hollow rim into the interior of each flexible bag. The opposite end disc has attached to it a spring of any convenient kind, and between this spring and the end of the flexible bag on that side there is interposed a heavy disc weight. This weight fits loosely to the interior of the bag chamber, and it is attached to the free end of the flexible bag so as to be fluid-tight. The tubular or chamber space in the main wheel is filled with water, mercury, oil, or other liquid, and its operation is this:—Supposing there are eight flexible bag chambers, and that the position of the wheel is such that there are two diametrically opposed chambers in an accurate vertical line or plane, whilst of course there are other two in an accurate horizontal line, the remaining four chambers holding relatively of course positions in lines of 45 degrees with the horizon, and supposing the wheel to be intended to revolve to

the right or in the same direction as the hands of timekeepers, then one of the flexible bags in the two chambers in the horizontal plane, the one to the left, or the ascending one, is empty of water, the disc weight being on the top of it so as entirely to collapse it, the opposite bag of this pair, or that on the descending side, is full of water, the disc weight having distended it by falling down upon the spring on the end of the chamber, so that water or other liquid matter in the wheel has flowed from the wheel into the interior of the bag. The next bag beneath the full one on the descending side, or following the direction of the revolution of the wheel, is also full of liquid, but its weight is of course acting upon the wheel with a reduced leverage as compared with the one above it. The bottom bag is also full of liquid, but of course inert as regards its operation upon the revolving action of the wheel. The next bag on the ascending side is half full of liquid, the weight and spring being above it. The next to this, as already described, is empty, as also is the following one, and the top one of all, whilst the first or uppermost one on the descending side is half full. This description shows that there is a preponderating weight upon the descending side of the wheel, causing the latter to revolve, and this preponderance is kept up throughout the whole revolution, as each bag comes into and goes out of action.

According to another arrangement, motive power is obtained by a peculiar system of toothed wheel gearing. The principle involved in this arrangement may be carried out in working practice in many ways. According to one arrangement, this combination involves twelve wheels; of these, eight are bevil wheels, disposed in four pairs, the individual wheels of each pair being set at an angle or inclination one with the other, each wheel being set loose upon the end of an inclined or angularly-disposed lateral stud, the whole being carried upon a pair of parallel horizontal shafts, so as to form a parallelogram in plan. When the set of weights on one side have descended to their lowest positions in virtue of the half revolution of two of the pairs of bevil wheels, their action upon the interposed wheel on that side has also caused the other half of the train of four bevil wheels to turn round or swing over upon the main centre, as before referred to, and thus their weights are brought at once to their highest positions, and just past the centre, for the purpose of again giving motion to the arrangement for the

succeeding half revolution, and in this way the revolution is kept up continuously as each set of two pairs of bevil wheels turns alternately upon the main centre. The essence of this portion of the invention being the obtainment of continuous revolution from weights disposed upon inclined wheels or discs, in combination with the reversing action of these wheels for again bringing the operating weights to their highest positions of work.

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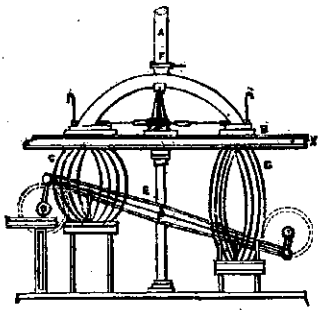
1859.—Moses Haym Picciotto [No. 1413], of Finsbury Circus, London, Merchant. "Improvements in apparatus for producing or obtaining motive power."

My invention consists in combining apparatus in which motive power is produced by the gravity or pressure of a permanent column of fluid in a stationary pipe, the base of which is connected to a fixed cistern or chamber, to the bottom whereof are attached a number of vertical flexible tubes terminating in and attached to a moveable plate, piston, or vessel, capable of travelling up and down (in guides or in a cylinder), the flexible tubes bending and unbending as the moveable plate, piston, or vessel rises and descends. This plate, piston, or moveable vessel is also connected to one end of a beam, the other end of which is connected to a precisely similar apparatus, also consisting of a like set of flexible tubes, attached in like manner to a fixed chamber (communicating with the column of fluid), and to a moveable plate, piston, or vessel, communication being opened between the main pipe and the flexible tubes at one end of the beam; the gravity or pressure of the column of fluid will act upon and force down the plate, piston, or moveable vessel at that end, unbending the tubes, and bringing down the corresponding extremity of the beam, whilst at the same time communication is closed between the main pipe and the flexible tubes at the other end of the beam, causing such end to rise, its tubes bending accordingly, to facilitate which operation a small quantity of the fluid contained therein may be let off to be pumped back into the main pipe. The action is then reversed, communication being opened on the up side, and closed on the down side, and so on, whereby reciprocating motion is produced and motive power obtained. The power may be increased by adapting

similar means to the under side of each of the plates, pistons, or moveable vessels, in such a manner as to cause the gravity or pressure of a column of fluid to act upward on the plate, piston, or moveable vessel when the downward pressure of the fluid contained in the first-mentioned main pipe is removed, by closing the communication thereof with the upper set of tubes, the pressure acting upward on the plate, piston, or vessel at one end of the beam, while acting downward on the plate, piston, or vessel at the opposite end, and *vice versa*. The flexible tubes may be so contrived as to bend into an arc, spiral, or other convenient form. The apparatus may be adapted to act horizontally instead of vertically. The term fluid, when employed in this specification is intended to comprise water and other liquids, gaseous and abriform fluids, and mercury and other substances in a fluid state.

I now proceed more particularly to explain my said invention.

Figure 1 is an elevation of an apparatus constructed according to these improvements. A is a pipe, which I call the main pipe, and which contains the column of water or other fluid, from the pressure or gravity whereof motive power is to be obtained. This pipe A is fixed to brickwork or in a general framework X, and terminates at the lower end in two branches $A^1$ $A^2$, whereof $A^1$ leads into a chamber $B^1$, also fixed to the framework X, and perforated on its under surface for the reception of a number of flexible tubes $C^1$ $C^1$ $C^1$, attached to it at their upper ends, and connected at their lower ends to a vessel $D^1$, as shown in the plan, Figure 2; such vessel travelling up and down in stationary guides $a^1$ $d^1$. $e^2$ is an arm or link by which the vessel $D^1$ is attached to a beam E. The branch pipe $A^2$ in like manner leads into a chamber $B^2$, with flexible tubes $C^2$ $C^2$ $C^2$, terminating in a vessel $D^2$, working in guides $d^2$ $d^2$, and connected by an arm or link $e^2$ to the beam E;



the arrangements of the parts $B^2$ $C^2$ $D^2$ $d^2$ $e^2$ are precisely similar to those of $B^1$ $C^1$ $D^1$ $d^1$ and $e^1$ respectively. The tubes of the set $C^1$ are equal in number to those of the set $C^2$, and the collective area or surface of the bores of the tubes in either set is nearly equal to the surface of the bore of the main pipe A. Thus, for example, suppose the diameter of the main pipe A were 12 inches, giving 108 square inches of surface, then the same amount of surface would be presented in either set of tubes collectively. $f^1$ $f^2$ are valves working to and fro in valve boxes $g^1$ $g^2$, and actuated from the fly wheel shafts, or other part of the machinery, in the manner hereinafter described for opening and closing communication between the main pipe A and the flexible tubes on each side of the beam; they are so arranged and operated that when the end $h^1$ reaches the bottom of its stroke, the valve $f^1$ closes, and cuts off communication between the fluid in A and that in the tubes $C^1$, and when that end $h^1$ has reached the top of its stroke, the valve $f^1$ opens and permits communication between the fluid in A and that in the tubes $C^1$; in a similar manner the valve $f^2$ closes when the end $h^2$ has reached the bottom of its stroke, and opens when it has arrived at the top of its stroke. The valves are so regulated that one valve must always be quite closed before the other valve begins to open. Instead of two valves $f^1$, $f^2$, a single pivot valve or a ball or circular valve may be used, being fitted at the bottom of the pipe A, and so actuated as to open and close communication on each side alternately, or a two-leaved or other convenient valve or valves may be employed for the purpose. F is a cut-off valve near the bottom of the pipe A, opened by means of a lever handle to start the engine, and left open while it is at work.

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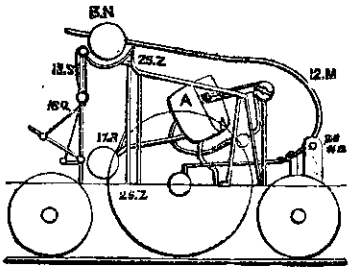
1859.—PRINCE GUSTAVE GENNERICH [No. 2815], of Poland. "A new system of motive power applicable for working cranes and wheels."

The present invention is a motive power applied to a crane for raising goods instead of multiplied hands or steam power. The principle consists of a heavy weight sliding on an iron rod which is attached to the axis of a wheel, and by means of a snap fastened to the rod causes the wheel to

revolve. By means of the heavy sliding weight the cylinder to which the chain is attached is made to act with great power. The same power may be applied in any case where a wheel or crank is required to be turned, as by the heavy weight sliding to and fro the iron rod acts as balance and creates a power, and by moving up and down turns a wheel or crank.

Figure 1, A, a heavy weight containing four wheels inside as is indicated 2, A, running on two rods, 3, B, C, the weight 4, D, the chain, 5, E, and connected with a communication rod; 6, F, another chain, 7, G, and 8, H, which are attached 9, I, and 10, K, which is just the position which drew down the driving lever for the wheel; 11, L, the other chain; 8,




H, is dropping into a wheel, 12, M, driving weight, 13, N, standing upright, being the time of change to draw up the sliding or the gennero-motive power weight for another revolution of the wheel 12, M, is inclosed in a little catch, 14, O; 15, P, a lever; also, 16, Q, is the start for the motion of the gennero-motive or the new system of motive power. The lever 15, P, drawn down, draws up by means of a chain 18, S, a weight 17, R, which has lost all its power and gives to Figure 13, N, the full power to draw down the lever 12, M, for another start for the gennero-motive weight, and so it goes constantly with the two levers 15, P, and 16, Q, the two weights, 13, N, and 17 R, being placed opposite each other and attached with a chain sliding on wheels between them 19, T, while drawing down the lever 12, M, Figure 17, R, is cased by the lever 15, P, and drawn up with the lever

and weight 13, N; 20, U, and 21, V, are levers for the driving lever of the eccentric wheel; 22, W, adopted for the perfect revolution of the driving wheel without fly-wheel or balance; 23, X, is a lever which is pressed down only by the weight 13, N, and doubles the power, acting together with the gennero-motive weight, only for the revolution of the 12, M, the lever; 10, K, exercises the same power, only in a different manner; 1, A, has only a bar of iron catching in the frame; 3, B, with Figure 24, Y, the frame of the entire engine is starting off; 3, B, C, in which the axle runs; 25, Z, Figure 26, A, A, is a very strong frame, in which a very great power is exercised, in which the axle of 10, K, and 12, M, runs through; 27, B, B, a frame in which the lever for the driving wheel is attached. For the conclusion 28, C, C, everywhere where a hole is running through to be fastened with screws and nuts.

This is the entire description of the gennero-motive or the new system of motive power exercised by means of weights, levers, and chains, to be used to any extent of power; even the engine does not require to be larger, only the weights must be increased.

[The engraving of this complicated machine in its reduced size is curtailed, and many references obliged to be omitted; its impossible nature, however, is evident.]

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1860.—GEORGE REDRUP [No. 272], of Loughborough, Leicester, Brewer. "Improvements in the means of and apparatus for obtaining and applying motive power whereby perpetual motion may be obtained." Here is no concealment of the real object, as in most titles. The entire provisional specification is as follows:—

My invention consists of cylinders with pistons working up and down, or to and fro as may be required, which are actuated by simple or compound levers. I use a small cylinder similar to that employed in ordinary steam engines. Instead of using steam power, I attach to each end of the cylinder which I here call the smaller cylinder, an elbow of cast iron or other metal with the top part large enough to screw or fix on a large cylinder in which I have a piston working as may be required. On the top of each of the

large cylinders and on the side nearest the small cylinder, I fix a piece of iron or other metal, or if preferred I cast the same with the cylinder for the purpose of fixing in the end of a lever near to this which I call the fulcrum, and upon the lever I attach the piston of the large cylinder in a similar manner to that which is applied to force and other pumps. At the end or long end of the levers, I propose to to attach either in a fixed or moveable position a weight which will impart considerable pressure to the piston of the large cylinders. Inside the small cylinder is a piston, with the piston rod working through a stuffing box, which stuffing box is fixed on the elbow at one end of the cylinder, the said piston rod being connected with machinery as in steam engines for turning a crank, the piston working to and fro communicating a rotative motion. Underneath, or in any required position relatively to each of the levers which act on the piston of the large cylinders, I employ simple or compound levers with the short end placed close to the end or weight of the lever attached to the cylinder, so that a small weight applied at the long end of the under lever will raise both the weight and lever which are attached to the cylinder, and which when raised takes off the pressure from the piston. These levers are acted upon by certain parts of the machinery when in motion, either by weights, springs, a wheel or wheels, or other apparatus having cord or other suitable material attached; I have also various other modes of acting upon them alternately, and they are moved when the piston arrives at or near either end of the small cylinder, or when required. Inside the cylinders, that is to say, on each side of the small piston and between that and the pistons of the large cylinders, I place a requisite quantity of water or other fluid to be acted upon on each side alternately by the pressure of the lever, piston, and weight of the larger cylinder as before mentioned.

In farther explaining my invention, I suppose a machine to be charged with a proper quantity of water, oil, or other fluid, the piston of the small cylinder being nearest the stuffing box, and the weight or pressure being removed from the large cylinder farthest from the stuffing box, by means of a lever or levers acting upon the upper lever, thereby lifting up the end of the long lever the height required, the pressure then being applied on the water by means of the

lever, piston, and weight, as before mentioned, on the large cylinder near the stuffing box; now suppose the large cylinder to be six times larger than the small one, while the piston descends one inch, the smaller piston would be forced six inches, causing the water to rise higher in the cylinder with the pressure relieved. When the piston and small cylinder have moved their proper distance from the stuffing box, the machinery will instantly take off the pressure by the levers from the end just forced down, that is to say, the piston of the cylinder nearest the stuffing box, and will put the whole pressure on the water in the other cylinder, which would force the small piston back again towards the stuffing box; the machinery before mentioned acting upon the levers reverses the pressure as before, so that a continual or perpetual motion is kept up. One particular arrangement of my engine is constructed with a small cylinder placed horizontally, and with a large cylinder placed perpendicularly, but I do not confine myself to the foregoing mode of working, fixing, or arrangement, as the same may be varied or modified as circumstances may require.

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1860.—THOMAS EDWARDS [No. 930], of Great Tindal Street Works, Birmingham, Engineer. "Improvements in obtaining motive power."

This invention relates to a peculiar system or mode of obtaining motive power, and consists in the employment for that purpose of a continuous pressure obtained from steam, air, gases, or fluids of any kind, such pressure acting upon a revolving piston inside a cylinder. This piston is provided with two metallic packing strips forming a line of contact with the opposite sides of the interior of the cylinder, one of such lines of contact being formed on the abutment side of the piston, and the other on the pressure or power-exerting side of the piston. The axis or shaft of the rotatory piston is placed eccentrically within the cylinder, and the cylinder accommodates itself to the changing positions of the piston in its revolving or circular motion. The medium or agent employed for obtaining the requisite pressure is admitted by a suitable divided passage cast in the shaft, each compartment communicating by an opening or passage with either side of the revolving piston, so that the engine may be

reversed at pleasure, by simply directing the agent used through one or the other of the passages by any convenient valvular arrangement.

The essential feature of novelty in this engine is the total absence of all exhaust when in motion, the motive power being produced by the constant pressure of the medium or agent inside one half of the cylinder exerted against the revolving piston; any suitable packing may be used on the ends of the piston next the cylinder covers.

This patent did not proceed beyond provisional protection; and, though not expressly so stated, yet must be for a perpetual motion, if the inventor has discovered a mode of obtaining "continuous pressure" through pneumatic or hydraulic agency acting on "a revolving piston inside a cylinder," under "the total absence of all exhaust when in motion."

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In the foregoing statements of English patents, we have (including those in Chapter III.)—that is, to June, 1860—seventy-four patentees, who obtained eighty-four patents. It is curious to observe their several stations in life. We find a Prince, a Baronet, two Counts, a Knight of the Tower and Sword, a General, a Groom of the Privy Chamber, the Governor of Trinity Ground, a Doctor of Divinity, two Doctors of Medicine, two Surgeons, a Bachelor of Arts, ten Gentlemen, four Merchants, ten Engineers, three Civil Engineers, an Architect, a Surveyor, a Contractor, a Manufacturer, a Brewer, a Millwright, a Miller, five Machinists, a Carpenter, a Draftsman, a Jeweller, a Watchmaker, a Confectioner, a Shoemaker, a Custom-house Officer, with nine persons and seven foreigners undescribed. The major portion of these must have been persons above mediocrity in position and education, so that the pursuit of Perpetual Motion has been far from being limited to an unintelligent class, as boldly assumed by many insufficiently-informed writers. Their patents cannot have cost much, if any, less than £4,000—a large amount to pay for the empty privilege of possessing letters patent to so much moonshine!

## French Patents.

The following particulars of Patents for Perpetual Motion are translated from "Description des Machines et Procédés pour les-quels des Brevets d'Invention ont été pris. Paris." Quarto. They are arranged under the head of "Moteurs," and, though extracted entire, afford but little information:—

1. M. J. B. Fauche; for a machine called "Motasipse," intended to realise perpetual motion.—August, 1845. (Vol. 1, p. 127, 1850.)

2. M. Guenee. The inventor tries to utilise the movement of a case of mercury placed on a moveable tressel, by which the centre of gravity is displaced.—December, 1844. (Vol. 1, p. 289.)

3. M. Peydiere. He has constructed a system of rails forming three railways, and says that after the first impulse given to a waggon of his construction for this railway, its movement would be perpetual, or at least greatly augmented. —December, 1844. (Vol. 1, p. 305.)

4. M. Durand. He raises water from a well, which water he proposes using to operate the pump employed. (Vol. 4, p. 193.)

5. M. Grellet; for a perpetual movement.—August, 1845. (Vol. 5, p. 97.)

6. M. Lemoigne. The inventor raises water by means of a pump, and causes the same water to work the pump. (Vol. 5, p. 187.)

7. M. Chalette-Thevard; for mechanism having a perpetual movement, described in his patent and certificate. —October 22, 1846. (Vol. 5, p. 190.)

8. M. Moinau. In his patent and certificate, dated September, 1846, the inventor describes a machine in which a pump raises a certain quantity of water, and is kept in movement by the same. (Vol. 6, p. 6.)

9. M. Georges. The inventor claims a mode of turning a windmill by means of bellows; and considers that the mill ought to cause the bellows to work.—April, 1846. (Vol. 6, p. 208.)

10. M. Fouillet has a perpetual movement. (Vol. 8, p. 23.)

11. M. LEGENTIL. He has a combination by which he forms a break wheel, which after a first impulse is intended to move the machine he has invented, leaving a disposable extra power. (Vol. 9, p. 149.)

12. M. ROLLET. The inventor desires to make and maintain a power by his arrangement of certain levers and weights.—May, 1847. (Vol. 10, p. 265.)

13. M. PEYDIERE; for a perpetual movement.—January, 1851. (Vol. 18, p. 348.)

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## AMERICAN PATENTS

For Perpetual Motion are generally considered to be rather numerous, but no adequate opinion can be formed by consulting mere Patent Lists, which give only the Titles. However, as Patent Specifications and Models previous to 1837 were destroyed in the fire which occurred at Washington, the following List of Patents, previous to that period, may be offered as referring, most likely, to intended self-motive machines:—

PETER OVERT, New York. Power and motion by weights.—Dec. 18, 1813.

JAMES WIDDIFIELD, Philadelphia. Perpetual water-wheel.—April 21, 1817.

CHARLES REDHEFFER, Philadelphia. Gaining power.—July 11, 1820.

CAM BROYLES, Tellico. Power for propelling machinery by weights.—Oct. 19, 1827.

JOEL ESTES, Brownsville Power for propelling mills by rolling and balance wheel.—August 15, 1831.

WILLIAM RHODES, Trenton. Power for propelling mills by lever.—April 27, 1832.

L. H. EMMONS and G. UPHAM, Masillon. Power for propelling mills by balance lever.—May 16, 1833.

OBED R. MARSTON, Java, U. S. Power by weights.—Jan. 9, 1835.

LUKE M. EDWARDS, Trenton. Power for propelling machinery, called lever and dead weights.—March 2, 1835.

ELISHA TURNER, North Pownel. Power by weights.—June 12, 1835.

J. J. GIRAUD, Baltimore. Self-motive power.—March 31, 1836.

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On this peculiar class of patents, here concluded, we have but little further to remark.

Whether the matter thus brought under notice amounts to any proof of scientific progress or not; whether it claims our congratulation or not, who can doubt? Much assuredly has been attempted, much done, yet what remains is, after all, but a baseless fabric. The grand problem itself remains as great a mystery as when it was first propounded. It has, therefore, been customary to associate the pursuit with Alchemy, Judicial Astrology, and similar chimeras. But as a mechanical effort, it compares and ranks rather with such schemes as the many ingenious attempts at Flying, Submarine Navigation, and Electro-motive Engines, all of which have, in turn, led to elaborate, expensive, and futile experiments. If common sense be appealed to in the matter, it readily suggests itself to us to exclaim with Cowper:—

> "Defend me, therefore, common sense, I say,
> From all idle enterprises, light or vain;
> From dropping buckets into empty wells,
> And growing old in drawing nothing up."

But scientific inquiries are governed by no such standard; their results are generally in advance of the age, and in every sense uncommon. Something might be hoped from Mathematics; but Mathematical Science is the follower or servant of arts, and not their precursor or master; much as it owes to the results of invention in affording it matter for its valuable demonstrations, no invention whatever owes its

origin to mathematical science—in short, it can only operate on fixed or assumed data; and it is evident that that which is assumed correct in Figures may fail on the test of Facts. On the question, Whether Perpetual Motion is possible or impossible, therefore, on all the evidence we have been able to adduce, the only verdict we can conscientiously give is that of *Non proven*.