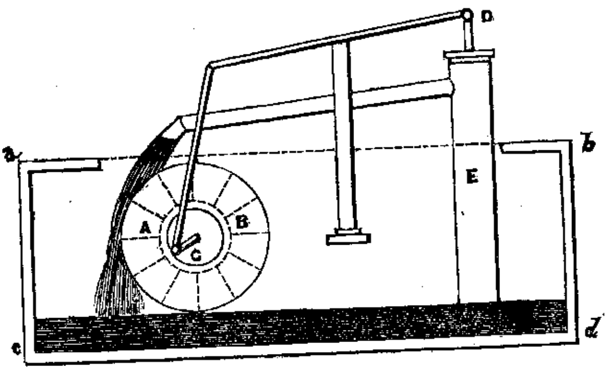
SECTION III.—*Plans for Effecting Perpetual Motion.*

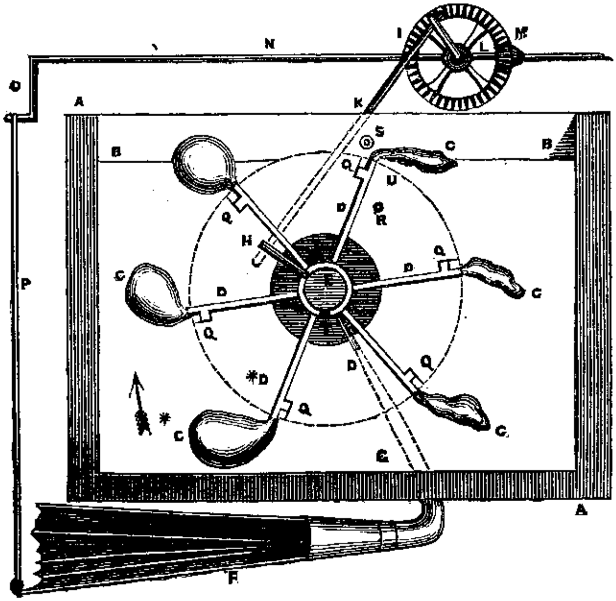
1. A PERPETUAL PUMP.—A correspondent (vol. 1, 1823) sends the following account of the proposed machine :—

I know only of one at present which in theory appeared to the inventor "just the thing;" of course he must have been totally ignorant of the laws of friction.



The above sketch will show his idea. *a b c d* is the section of the reservoir, &c., showing the wheel, the pump, &c. A B is an overshot water-wheel ; C D the working beam ; E the pump ; F a pipe from the top of the pump, through which the water was to fall upon the wheel ; C G an arm, communicating, by means of a crank attached to an horizontal shaft through the centre of the wheel, motion to the lever or working beam, and so raising water from the reservoir by means of the pump ; H I the water. It was supposed that the water which had fallen upon the wheel into the reservoir would be raised by means of the pump, fall through the horizontal pipe, and so produce a continued rotatory motion.

2. A Hydro-pneumatic Apparatus.—A correspondent (vol. 1, 1823) gives an account of a plan which, though failing from the friction—an insurmountable obstacle—is presumed to have some claim to ingenuity.



A A A A is a cistern of water, filled as high as B B. C C C C C C are six bladders, communicating by the tubes D D D D D D with the hollow axle E, which axle is connected with the bellows F by the pipe G. H is a crank, connected with the crank I by the rod K. L is a saucer-wheel, M a pinion, N its shaft. O is a crank, attached to the bellows F by the rod P. Q Q Q Q Q Q are valves, with a projecting lever. R and S are two projecting knobs. T is a hole in the axle E, forming a communication with it and the lowermost bladder. The axle B being put in motion, carried round the bladders and tables, and by the cranks H and I, and the connecting-rod K, caused the wheel L to revolve, which, communicating a similar but accelerated motion to the pinion M, shaft N, and crank O, worked or blew the bellows F by the rod P; the air entered the axle E by the tube G, and passing through the hole in it at T, entered the lower bladder C* by the tube D*; this bladder being thus rendered lighter than the space it occupied, ascended, bringing the bladder behind it over the hole in the axle T in like manner, and which thereby gained an ascending power, producing a similar effect on the one behind it. When one of the bladders arrived at the knob S, the lever of the valve Q struck against it, and opened the valve; when the bladder arrived at U and began to descend, its pressure on the water drove out the air, and gave it a descending power; the knob R then closed the valve Q, and prevented the entrance of any water into the bladder; by this contrivance, three of the bladders were full and empty, according as they passed over the hole T or the knob S.

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3. De Luc's Column.—A correspondent (vol. 1, 1823) says:—

Some of your correspondents treat that redoubtable subject, perpetual motion, as a chimera; and others, on the contrary, say that they have discovered the long-sought object, and prove thereby that it is no chimera. A correspondent (F. J.) in No. 11* is one of the latter, but his scheme is only in perspective.

[After a few observations on other communications in the Magazine, he proceeds:—]

There is now existing a perpetual motion, made by Mr.

* Among the Notes to Correspondents, p. 176, the Editor says:—"F. J. asserts that, so far from 'the idea of a self-moving machine' being a mere chimera (as our correspondent Mr. Bevan seems to think), 'had he capital sufficient, he could erect a machine that would do the work of ten thousand horses without any expense but the wear of the machinery.'"

Wansborough, of Fulham, in June, 1818. It was the invention of Professor De Luc, and the mobile is electricity. A gold ball, suspended by a silken thread, vibrates against two gold pillars, and vibrates perpetually. Its principle I do not know, but the Professor explained it satisfactorily to his brethren in science. This is but a pretty plaything, and does not come within the laws of the desired problem, but it still is sufficient to overturn the foundation of Mr. Mactaggart's sermon.*

* * When young, I devoted much of my time to this subject, and devised at least a dozen schemes, rotatory, pendulous, &c., and actually constructed several models; but far from being shaken by such repeated failures, though I have attained a tolerably sober age, my faith is still firm, and so will remain until I have proof of my tenets being wrong. I shall esteem it a great favour if any one would oblige me with this proof, as it might serve to divert my thoughts from a future attempt, which I contemplate.

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4. ANOTHER PERPETUAL PUMP.—A correspondent (vol. 1, 1823) observes:—

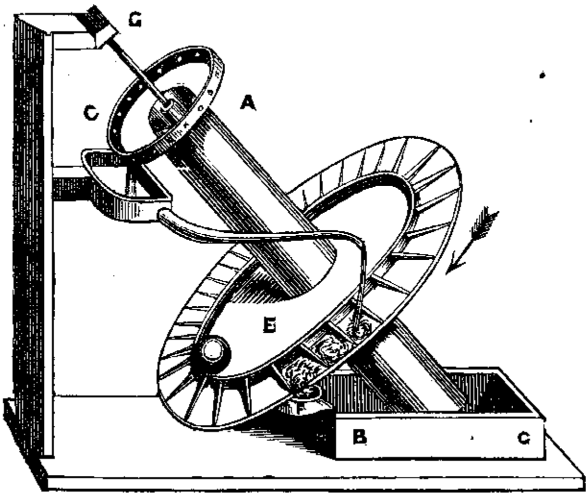
* * I hope soon, however, to produce something that will convince even the scepticism of great minds that a self-acting machine is not impossible; but that I may not lie under the charge of giving my ideas only in perspective, I will say this much, that the moving power I contemplate is to be produced by a pump, so constructed that the same power that will raise water ten feet high will raise it to any height required, even though it were ten thousand feet.

[Farther on, the Editor remarks on the above:—]

It seems rather obvious that "F. J." meant to say "the same self-acting principle," not precisely "the same power."

* Mec. Mag., vol. 1, p. 253.

5. Archimedean Screw and Mercury.—A correspondent (vol. 1, 1823) thus describes his plan:—



A is the screw turning on its two pivots G G; B is a cistern to be filled above the level of the lower aperture of the screw with mercury (which I conceive to be preferable to water on many accounts, and principally because it does not adhere or evaporate like water); C is a reservoir, which, when the screw is turned round, receives the mercury which falls from the top; D is a pipe, which by the force of gravity conveys the mercury from the reservoir C on to (what, for want of a better term, may be called) the float-board E, fixed at right angles to the centre of the screw, and furnished at its circumference with ridges or floats to intercept the mercury, the moment and weight of which will cause the float-board and screw to revolve, until, by the proper inclination of the floats, the mercury falls into the receiver F, from whence it again falls by its spout into the cistern G, where the constant revolution of the screw takes it up again as before.

[After noticing the friction, &c., he adds :—]

To overcome this (the power of the fluid in the screw to turn it backwards), I thought of placing a metallic ball, or some mercury, on the ledge above the floats (as at H in the drawing), of just so much weight, and no more, as would exactly neutralize this backward endeavour; whether or no this would increase the difficulty of raising the mercury in the screw I cannot say, having never tried the experiment. * * * We all know the late Mr. Merlin's machine, consisting of two magnets poised upon their respective centres, and placed within the sphere of each other's influence, by which they were said to vibrate *in perpetuum;* but the general opinion at the time was, that some concealed mechanism was placed underneath, which, indeed, he himself never denied.

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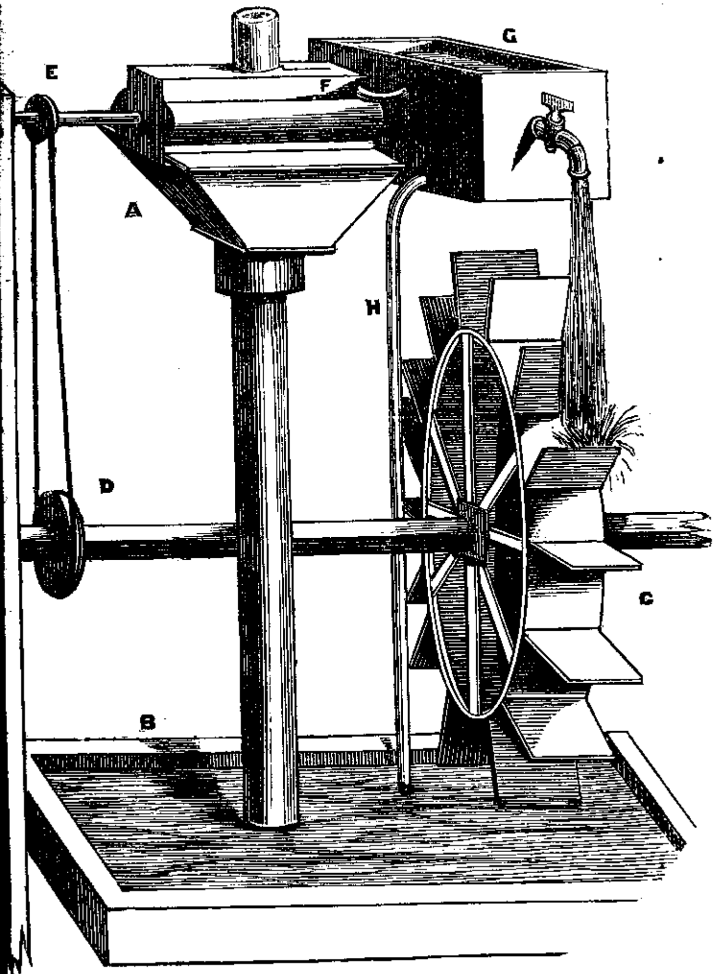
6. Plan of a Self-moving Machine (vol. 1, 1823):—

[A description of Rangely's Patent Roller Pump having appeared in the first volume, the writer proposes employing this pump, "which is represented as working with no more friction than what is occasioned by its revolution on its axis, viz., the revolution of a cylinder on its axis delivering water with a continual stream, &c., &c."]

I think it possible to produce a self-moving power by such a machine as that, a drawing of which is now prefixed. From its very simple construction, a very brief description is necessary. A represents a pump immersed in a reservoir B; the pump is worked by the rotatory motion of the water-wheel C, which is four feet in diameter. On the shaft of the water-wheel is the drum-wheel D, working by a small cord the wheel E, on the axis of the pump discharging the water by the pipe F into a reservoir G over the water-wheel. In this reservoir is a cock to regulate the quantity of water to be discharged on the wheel. The wheel on the shaft of the water-wheel being nine inches diameter, and the wheel on the axis of the pump three in diameter, the latter will consequently make three revolutions for one of the water-wheel. As the pump is not required to turn with great velocity, the speed might be regulated by the quantity of


G
E
F
A
H
D
C
B

water thrown on the water-wheel, the latter being four feet in diameter, and the wheel on its shaft nine inches; consequently the radius or arm of the wheel has near 4½ powers to counteract the friction of the axis of the pump and water-wheel, and of a fine cord passed over the wheels D and E. If necessary, the friction of the machine might be still farther reduced by the axes of the pump and water-wheel being made to run in gudgeons with friction rollers.

The pipe H is intended to convey the surplus water from the reservoir over the wheel to the reservoir below.

The pump might easily be turned by a cog-wheel; but this is unnecessary, as the cord passing over the drum-wheels will do equally well, and is, besides, a more simple method.

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7. PLAN BY MAGNETISM (vol. 4, 1825).—Its inventor writes:—

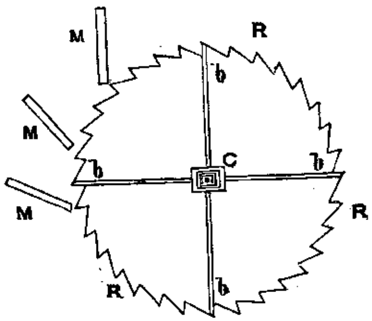
> Let those laugh now who never laugh'd before;
> Let those who ever laugh'd, now laugh the more.

* * * *

You will agree with me that the universe is a display of perpetual motion, and that such a thing does, beyond all doubt, exist. The co-operation and nice combination of what or how many various causes (each perhaps governed by different laws, and opposite in their effects) which produce this perpetual motion, it might be presumptuous to endeavour to ascertain; suffice it to know, that all concur in a most wonderful manner to exhibit what man is striving to discover, and hitherto in vain.

I coincide in opinion with those who consider there are insurmountable difficulties to the discovery of perpetual motion by any machinery wholly subservient to the laws of gravity and the mechanical powers; and as the perpetual motion of the universe is not effected under the laws of gravity only, there appears but little probability of man's discovering it by such machinery.

By consulting nature's laws generally, success is more likely to follow; and, indeed, an invisible (but well-known) agency is available for the purpose. I have, therefore, resorted to an auxiliary that operates wholly independent of, and in opposition to gravity, to effect perpetual motion; with what success you will see.



DESCRIPTION.—The above drawing represents a wheel of one foot in diameter, revolving on its centre C. Its circumference R R R is a thin steel hoop, or rim, three quarters of an inch broad, formed in the indented manner delineated, and connected to the centre by two bars *b b b b*. (The thin edge of the rim presents itself to view.)

M M M are three magnets fixed totally unconnected with the wheel. Their poles are placed as close as possible to its rim, but not to touch it, to impede its going round. These three magnets are so disposed as alternately to exert their full attractive powers, at right angles, on the flat indented surface of the steel rim of the wheel; and as it moves round, the attraction of one magnet does not cease its operation until another magnet exerts its full power.

The weight of the wheel on the side next the magnets being thus continually lifted, or rendered lighter, by the attraction of the magnets, causes the weight of the opposite side of the wheel to preponderate on its centre, and the wheel to revolve, and to continue a perpetual rotatory motion, at least as long as the magnets retain their attracting power.

8. Account of several Schemes (vol. 4, 1825). By F. Bell, who states that—

About five or six years ago, a young man, a Scotchman, of considerable ability, stumbled upon this attractive plan of producing a perpetual motion. Confident of the truth of his principle, and giddy with the dreams of riches which he had been told would await the happy inventor of this long-sought desideratum in mechanics, he gave up all his emoluments in Scotland, and hastened to London, for the purpose of getting his machine constructed in a superior manner. The workman he employed was a Mr. Allen, then resident in the neighbourhood of Fetter-lane. The principle he employed was exactly similar to that of your correspondent, but more complex in its application. After a lapse of some months, the machine was finished; and, with beating heart, the magnet was applied to produce effects which should astonish the world; but, alas! how shall I describe it? It was at that moment discovered that the magnetic influence was exerted equally to the right and left; and that, instead of the pieces of soft iron, disposed at equal distances round the circumference, being only pulled or attracted in one direction, they were equally acted upon in the opposite, and consequently no motion ensued.

It is about three years since that another person, also a native of North Britain, proposed a new power to propel carriages on the road and ships at sea, and exhibited a model of his engine in Burlington Arcade, Piccadilly. It consisted of a wheel moved (as he pretended) by this self-same principle of magnetism. The magnet, of a spherical form, was placed on a plate of metal, or, rather, mixture of metals (as he said), which had the rare power of intercepting the magnetic attraction, and consequently preventing the re-action which was fatal in the other case. I believe Mr. Gill took the trouble to expose this pretender in his "Technical Repository."*

I had an opportunity, some time ago, of reading a letter from a person who had witnessed a similar invention, made by a Mr. John Spence, shoemaker, at Linlithgow, also in "Scotland's Isle." It consisted of a needle nicely balanced

* See Chapter VI., p. 184.

on a pivot, which was kept in continual motion by its poles being alternately attracted by two magnets, properly placed, and whose attraction was regularly cut off through the intervention of intercepting substances, which Mr. Spence was represented as having spent twenty or thirty years in finding out.*

It was also stated that he was at that time constructing an apparatus applicable to time-keepers, which he was going to present to the Royal Society, but, not having since heard of him or his intended communication to that learned body, I am afraid that Death has stepped in, and *intercepted* him in his laudable pursuits.

* * * * *

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9. SPENCE'S PERPETUAL MOTION (vol. 4, 1825):—

* * About two years since, a person named Haigh (a native, I believe, of Yorkshire) called on me with what he called a "perpetual motion." I inquired why he did not present it to some learned body in London, instead of travelling with it as an exhibition. He replied that, as he was not himself the inventor, he was afraid he should not be attended to. He said it was invented by the late Mr. John Spence, of Linlithgow, near Edinburgh, who, being on his journey to London to present it to the Royal Society, was taken ill in some part of Yorkshire, where, after a lingering illness, he died; and that he bequeathed the machine to him in gratitude for the assistance he had received from him during his illness. The construction of the machine was as pointed out by Mr. Bell, with this difference:—the needle was attached to a brass balance, about the size and weight of the balance of a watch, beyond the edge of which it projected. He suffered me, after having witnessed its swift rotatory motion for about half an hour, to remove the balance, &c., from the frame in which it acted, when I found the pivot and holes very much worn, which convinced me it must have been in action a considerable time (he said it had, nearly six years). On replacing it, and blowing slightly against the edge of the balance, it instantly commenced its action as before, *i.e.*, with the same steady velocity, making about one hundred and

* See pp. 182, 226.

sixty revolutions in a minute, which I again witnessed a considerable time; nor did Haigh appear the least impatient to put an end to the gratification I was experiencing.

The following extract of a letter from Capt. Bagnold, R.M., Member of the Society of Arts, Haigh left with me:—

"Liverpool, May 2, 1820.

"Having inspected Mr. S. Haigh's exhibition of a magnetic perpetual motion, I prevailed upon him to permit the approach of a powerful horse-shoe magnet, the property of Mr. Byewater, of this town. When in contact with the glass on one side, it produced no very striking alteration; when held perpendicularly over the case, it appeared rather to accelerate the revolution of the needle; but when removed to the opposite side, its effect was instantly visible,—the needle was suddenly checked, and seemed to recover its motion by successive impulses. From the foregoing circumstances, I am clearly of opinion Mr. Haigh's exhibition is a fair specimen of perpetual motion by magnetic influence, and the experiment has totally banished from my mind all suspicion of deception; and I strongly recommend Mr. Haigh by no means to repeat the experiment, lest injury should accrue to so ingenious an invention."

Sir, yours, &c.,

RICHARD PRICE, Watchmaker and Silversmith.

Wiveliscombe, Somerset, June 13, 1825.

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10. PERPETUAL MOTION ON PHILOSOPHICAL PRINCIPLES (vol. 4, 1825):—

The following is copied from a foreign work: should you consider it worthy publication, it is much at your service.

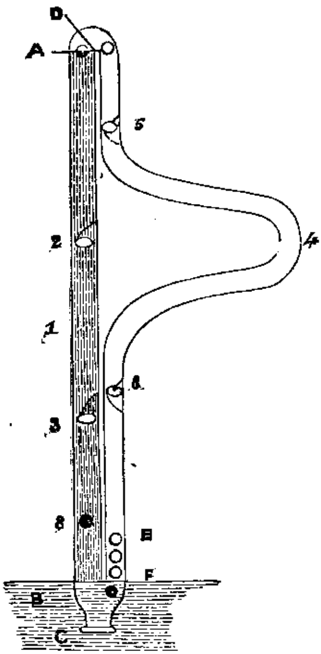
R. W. DICKINSON.

"The power is at present applied to the machinery of a clock; this clock, unconnected with the power, is calculated to go for two years without winding up, by the weight of a single pound, that gives motion to a pendulum of twenty pounds, which moves through a space of 518·400 inches in twenty-four hours, while the small maintaining weight (a single pound) descends only 1-10th of an inch. The internal work of the clock consists of three wheels. In order that the superiority of this movement may be obvious to every understanding, as well as to those more conversant with the more difficult parts of mechanics, it is necessary to mention that the common eight-day clock requires a weight of fourteen pounds, where this only requires the weight of one, is wound up once in eight days, and moves a pendulum of three pounds and a half, where this moves one of twenty, and is wound up only once in two years. In twenty-four hours, the maintaining weight of the common clock descends six inches, in this it descends only 1-10th of an inch. The least weight which we at present recollect to have heard of being used by the first artist in London is five or six pounds, where this requires only one, in consequence of the diminution of friction. So far it has been thought necessary to describe this clock in comparison with the common one.

"We now come to that part to which extraordinary merit is to be ascribed—the faculty of winding itself up without the intervention of human power. This faculty is derived from the weight of the atmosphere, and can never cease (under the conditions after mentioned) while the machine lasts, and while a column of air either loses or gains 1-150th part of its common weight five times in the space of two years, the time which the clock goes without requiring any assistance; or, in other words, as long as the change of the weight of the air, five times in the space of two years, shall be such as to cause the mercury either to ascend or fall 2-10ths of an inch in the barometer above or below its mean height. The wearing out of wheels, or of any kind of machinery, by friction, never can be avoided; accordingly, it has never been required in the discovery of a perpetual motion. It is therefore sufficient, on that subject, to say that the present machine, upon a fair comparison of its friction with that of the common clock, would probably move five centuries, a period sufficient for any purpose that can be required."

11. A Hydro-pneumatic Plan.—A correspondent (vol. 4, 1825) says:—

The unsuccessful (but far from fruitless) search made to discover the "philosopher's stone," and the "elixir vitæ," were productive of most important and beneficial results in the kingdom of chemistry; so, by a parity of consequence, I am disposed to believe that, from enquiry after the "perpetual motion" (though equally unsuccessful), a similar good will result to the mechanical world. * * I beg leave to offer the prefixed device. The point at which, like all the rest, it fails, I confess I did not (as I do now) plainly perceive at once, although it is certainly very obvious. The original idea was this—to enable a body which would float in a heavy medium and sink in a lighter one, to pass successively through the one to the other, the continuation of which would be the end in view. To say that valves cannot be made to act as proposed will not be to show the *rationale* (if I may so say) upon which the idea is fallacious.



The figure is supposed to be tubular, and made of glass, for the purpose of seeing the action of the balls inside, which float or fall as they travel from air through water and from water through air. The foot is supposed to be placed in water, but it would answer the same purpose if the bottom were closed.

DESCRIPTION OF THE ENGRAVING.—No. 1, the left leg, filled with water from B to A. 2 and 3, valves, having in their centres very small projecting valves: they all open upwards. 4, the right leg, containing air from A to F. 5 and 6, valves, having very small ones in their centres: they all open downwards. The whole apparatus supposed to be air and water-tight. The round figures represent hollow balls, which will sink one-fourth of their bulk in water (of course will fall in air); the weight, therefore, of three balls resting upon one ball in water, as at E, will just bring its top even with the water's edge; the weight of four balls will sink it under the surface until the ball immediately over it is one-fourth its bulk in water, when the under ball will escape round the corner at C, and begin to ascend.

The machine is supposed (in the figure) to be in action, and No. 8 (one of the balls) to have just escaped round the corner at C, and to be, by its buoyancy, rising up to valve No. 3, striking first the small projecting valve in the centre, which, when opened, the large one will be raised by the buoyancy of the ball; because, the moment the small valve in the centre is opened (although only the size of a pin's head), No. 2 valve will have taken upon itself to sustain the whole column of water from A to B. The said ball (No. 8) having passed through the valve No. 3, will, by appropriate weights or springs, close; the ball will proceed upwards to the next valve (No. 2), and perform the same operation there. Having arrived at A, it will float upon the surface three-fourths of its bulk out of water. Upon another ball in due course arriving under it, it will be lifted quite out of the water, and fall over the point D, pass into the right leg (containing air), and fall to valve No. 5, strike and open the small valve in its centre, then open the large one, and pass through; this valve will then, by appropriate weights or springs, close, the ball will roll on through the bent tube (which is made in that form to gain time as well as to exhibit motion) to the next valve (No. 6), where it will perform the same operation, and then, falling upon the four balls at E, force the bottom one round the corner at C. This ball will proceed as did No. 8, and the rest in the same manner successively.

12. F. BELL'S ENDLESS BAND WITH CORK FLOATS (vol. 4, 1825).—After commenting on perpetual motion schemes, he says:—

I certainly consider the idea of gaining a perpetual motion by the passing of bodies through mediums of different densities is a very ingenious one, as it is the same in effect as if the specific gravity of the moving bodies was a variable quantity, which agrees very well with the definition of De la Hire—viz., to find a body heavier and lighter than itself.

[He then gives the following as a better plan:—]

Let an endless chain or rope be passed over a pulley, and through a hole of similar diameter made in the bottom of a vessel filled with water, so that one half of the rope will always be in the water, and the other half in air. Now, let this chain or rope be divided into equal links or divisions, and constructed in the following manner:—Let pieces of cork, or any other light substance, be attached to the rope exactly in the same manner as the whalebones are fastened to the stick of an umbrella, so that they may form a complete cylinder, when passing through the hole in the bottom of the vessel, and prevent the water from rushing out; but the moment one of these links gets through the hole (which will be immediately filled by another) these pieces of cork will radiate, or fly out, like the spokes of a wheel, and exert a force proportionate to their lightness, to ascend to the top of the vessel, and thus give motion to the machine.

* * * * *

Although it is my opinion that the "Century of Inventions" has been the means of forming many a mechanical mind, by creating a spirit of enquiry after those subjects, yet I also believe it has fallen into the hands of few persons who have not from that time become determined perpetual-motionists; for, if we can place any reliance upon the invention No. 56, which seems so well attested, the Marquis was undoubtedly in the secret. The plan which most people adopt, who would accomplish the point by means of weights, is, I dare say, familiar to most of your readers—viz., by means of falling levers, a description of which may be seen in the "Mathematical Recreations," translated by the late Dr. Hutton; but, as the Doctor observes, "it may be easily shown that there is one position of the wheel in which the system is in equilibrium, and consequently will stop:" the plan may therefore be given up as untangible. I have seen and read of many attempts to overcome this obstacle by means of springs, &c., but they have been attended with no better success. I am, however, in possession of a method of constructing the machine so that "all the weights on the descending side of the wheel shall be perpetually further from the centre than those of the mounting side," by which arrangements there seems to be an equilibrium in every position of the wheel.

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13. Another Band with Cork Floats.—A correspondent (vol. 4, 1825) states that he attempted a continued motion precisely on the foregoing plan. He says:—

The experiment I made was with a number of corks, strung at intervals for the purpose, and passed through an aperture in the bottom of a glass vessel, to which they were fitted. As might be expected, the weight of the column of water over the aperture was superior to the buoyancy of the corks, and upon their being pressed upwards they were forced back again to the aperture. This to me was sufficient, for the expansion of these corks in the manner described by Mr. Bell would, it appeared to me, not in the least increase their buoyancy, unless their bulk could also be increased at the same time.

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14. Perpetual Motion Discovered; or, a Plan by which a Vessel may be made to continue in powerful motion, without any assistance, as long as her materials endure (vol. 5, 1825). —The inventor states:—

The principle on which I depend is the well-known law in hydrostatics, that the pressure of water is the same at the same depth, whatever may be the diameter of the vessel that contains it.

Let a boat be constructed, having a bottom as flat as possible. Let two parallel boards (each of equal dimensions with the bottom of the boat) be strongly connected together, having an interval between them of about an inch. By a contrivance similar to that which unites the upper with the lower board of a common bellows, affix these boards, thus connected, to the bottom of the boat, in such a manner that they may be readily susceptible of an alternate ascending and descending motion, in a space of about two or three feet in height, to which water must have no access. In the centre of these boards, or of this moveable frame, fix a strong iron rod, extending upwards through the boat, and attached to the machinery for working the paddles. In the upper part of the moveable frame make a small aperture, to which firmly secure a narrow tube, extending upwards through a hole in the bottom of the boat. At the bottom of this tube let there be a sliding valve, which by a very simple contrivance can be closed the very moment that the frame reaches its greatest distance from the bottom of the boat, and as speedily re-opened when the frame comes in contact with the boat. Through this narrow tube pour water into the moveable frame, until both it and the tube are full. The space between the frame and the bottom of the boat must be always free from water. The vessel now is ready for action. Let us suppose that, owing to the upward pressure of the sea, the frame is now in contact with the bottom of the vessel; to remove it to its greatest distance from the vessel, nothing more is required (according to the above principle in hydrostatics) than an altitude of water within the narrow tube a little greater than the level of the sea; or, if the tube be not sufficiently long, a weight pressing on the water within the tube equal to the weight of a column of water of the required altitude, will be equally efficient, and far more convenient. If the valve be opened, this altitude of water will be applied, and the frame will then be forced to its greatest distance from the bottom of the vessel, and will then, consequently, have closed the valve. The valve being closed, the pressure of the water in the tube is no longer continued on the sheet of water within the moveable frame, so that the sea will then, with a power nearly equal to the weight of the vessel, force the frame upwards with the iron rod affixed to it, and thereby set the machinery and paddles in vigorous motion, and impel the vessel either against the tide or in any other direction which may be required. When the frame comes again into contact with the bottom of the vessel, the valve is again opened—the water in the tube again presses on that within the frame—

the frame again descends; and thus it will continue *ad infinitum*, without any assistance whatever.

[He proposes placing it in a "circular channel."]

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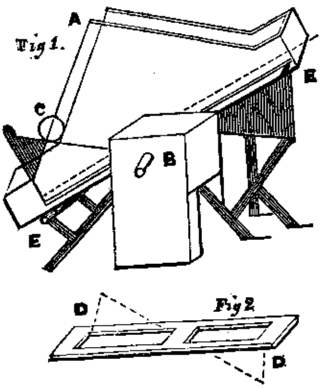
15. Perpetual Pump (vol. 5, 1825).—Its inventor says:—

The description of the perpetual pump has suggested to me whether the long-sought "perpetual motion" may not be found by a simple mechanical alteration of that machine, and substituting a cannon-ball as a *primum mobile*, in lieu of the water, not always obtainable. I would recommend that in the bottom of the trough be inserted, at each end, two dropping-boards, of a triangular form, moving on an axis at one corner, one of which falling below the level of the trough at the elevated end, the other shall be raised by the stop affixed to the standard-post, which, throwing the ball again back to the former end, shall depress that, until the same process is repeated in perpetual activity.



Description.—Fig. 1. A, the trough, swinging on an axis at B. C, the cannon-ball, raised by one of the dropping-boards, D, whilst the other falls through the opening at E, into the trough. F, the support or stop, raising the dropping-board D. The centre of the trough ought to be pierced, leaving the sides as a support to the ball, which ought not to be wider than the ball may travel freely through.

Fig. 2. DD, the dropping-boards, which pass through the centre, so as to leave a sufficiency of the trough as a resting-place for the ball to give a momentum, and depress the trough, previously to its being again raised by the dropping-board.

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16. Perpetual Clock (vol. 5, 1826).—A correspondent says:—

Allow me to state that six or seven years ago I saw part of an apparatus which I was informed had been at work two years, and then taken to pieces. It was a pendulum clock, the spring of which was wound up by the rising and falling of the mercury, acted on in two tubes by the atmosphere, every variation of which, whether it tended to rise or depress the mercury, still acted the same way on the spring.—T. N.

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17. Ancient Attempt at Perpetual Motion (vol. 5, 1825):—

The underwritten is translated from an ancient Latin book * * * (entitled "De Simia Naturæ," Autore Roberto Fludd),* which treats of every science known at the time it was published, and largely of the science of mechanics. What follows I have extracted merely to show that the discovery of the perpetual motion was as nearly attained then, perhaps, as it is now.—I am, &c., P.

Of another useful invention for raising water easily, by the which a certain Italian ventured to boast that he had discovered the Perpetual Motion.

Description of the Instrument.—A is an exhauster, or pump.

B, a little wheel placed at the bottom of the exhauster, about which pestils, or circular flaps of prepared leather, revolve lightly, so that they rise easily: they are connected by crooked iron.†

* See Chapter I., p. 28.

† Bent iron wire, I imagine, by the plate.

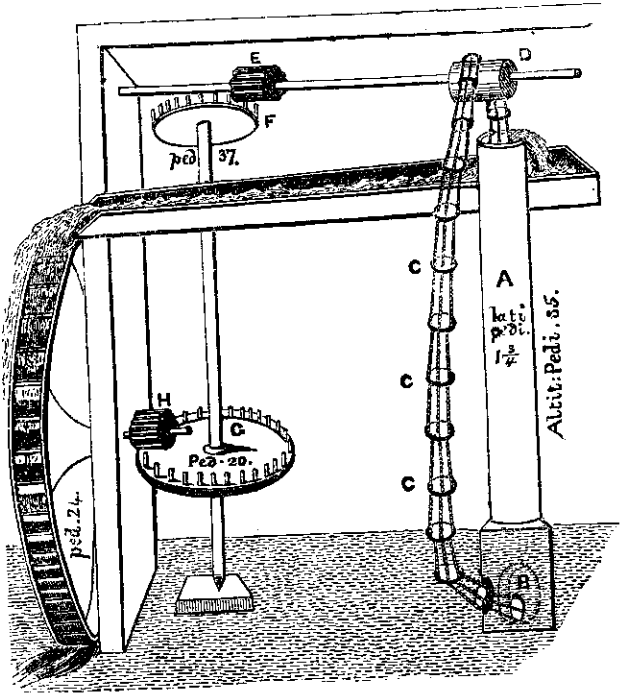
C C C, pestils, or circular leathers, by means of which the water is raised in the pump.

D, a wheel, by which the said circular leathers are raised up.

E, a pinion, moving the wheels D and B.

F is a wheel, continued from the wheel G, whose teeth the pinion E propels circularly.

H, a pinion moving the wheel G.



USE OF THE INSTRUMENT.—This instrument is classed with those of the first sort,* on which account it is absolutely necessary for a multitude of purposes, because it bears

* In reference to previous rules.

upward a large quantity of water with the least labour; for the number of wheels is not variable; but the length of the receiver A is about the proportion of 35 feet, and its breadth one foot and one-third. The concavities of it should be made exactly round, that they* may not lose any water by contracting in their ascension; the concavity of the pump, therefore, should be perfectly round. The great water-wheel should be 24 feet diameter, and the wheel G 20 feet.

The Italian, deceived by his own thoughts, conceived that as much water would be raised by this pump as would keep the wheel perpetually in motion; because he said that more force was required at the extremity of this machine than at the centre;† but because he calculated the proportions of power wrong, he was deceived (undeceived) in practice.

This last remark is a dose for many perpetual motion seekers.

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18. Orchard's Vacuum Engine (vol. 6, 1826).—He considers the following a great improvement on a plan he had formerly suggested. It is meant to be a self-supplying engine:—

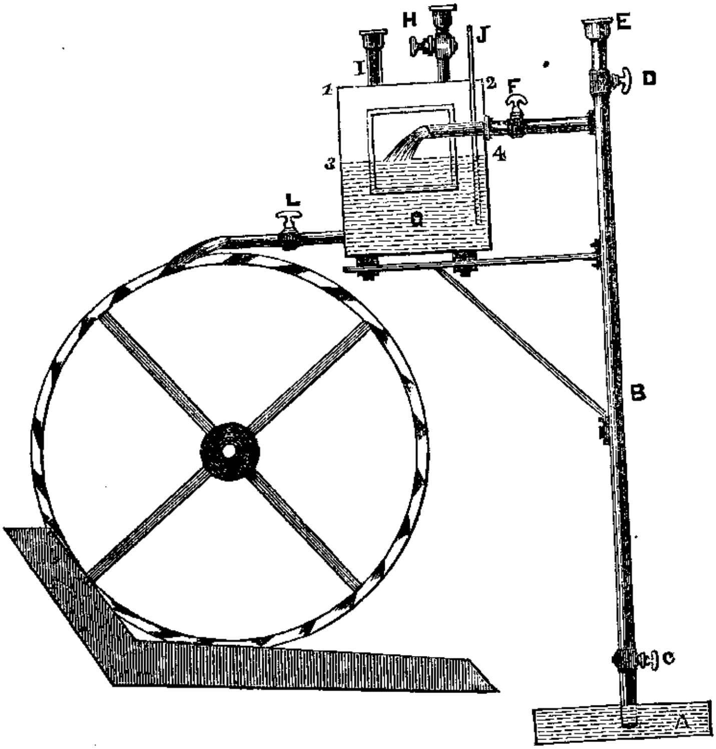
A is an iron reservoir nearly filled with mercury; B, a tube twenty-four inches long, having its lower end inserted in that reservoir; and C and D two cocks for the convenience of filling the tube B. From this tube another tube M proceeds at right angles, to the vessel G. In this latter tube is the cock F, to admit of, or shut off, a communication between the tube and the vessel G. This communication being closed, the tube B is carefully filled with mercury; after which, the cock D is closed, and the cap E screwed on.

The vessel G is to be filled with mercury through the cock H, the pipe I being open to allow of the escape of air. When this vessel has been filled, the cock H should be closed, and its cap screwed on; and the pipe I be also closed by a valve, which is to be pressed tight by the cap on the head of the pipe. I is a vent-pipe, open at the top. The space represented by the double lines is a panel of thick plate glass,

* The circular leathers.

† The pump?

having two horizontal lines described on its surface, whereby the attendant may observe the quantity of mercury within the vessel.



The cock F being closed, a quantity of mercury must be allowed to run out of the vessel G, equal to the space 1, 2, 3, 4, which space will become a vacuum. If, therefore, the cock L be then opened, to allow of the discharge of a certain quantity of mercury on the wheel, and the cocks C and L also opened, the mercury will continually rise from the reservoir A into the vessel G, and thence be discharged on the wheel, whence it will again fall into the vessel A. to keep up the supply. The cock F must be so adjusted as to admit into the vessel G a quantity of mercury equal to that which is discharged by the cock L. This can be ascertained and regulated by means of the panel of glass above described.

The specific gravity of mercury being $7\frac{1}{2}$ ounces, it is evident that but a small quantity of it is required to turn the wheel, which has no friction but that of the axis on which it turns.

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19. A PERPETUAL MOTION AT STUTGARTT (vol. 6, 1826). —A correspondent writes:—

I beg to take this opportunity of stating my knowledge of the truth of perpetual motion having been accomplished by magnets placed round a circular box, enclosing a steel-vaned wheel, and also that there is now a machine incessantly at work, without assistance, in the famous library at Stutgard, by which a bar (hung by a pivot through the middle) in an upright position, between two pillars, with a ball at each end, the top one being a little heavier than the one below, continues to vibrate by the top ball alternately falling upon and rebounding from each pillar. How this is performed I am ignorant, as the person who saw it and described it to me did not examine it with the eye of a machinist, but was merely eye-witness to the effects.

[He begs the favour of a description and drawing.]

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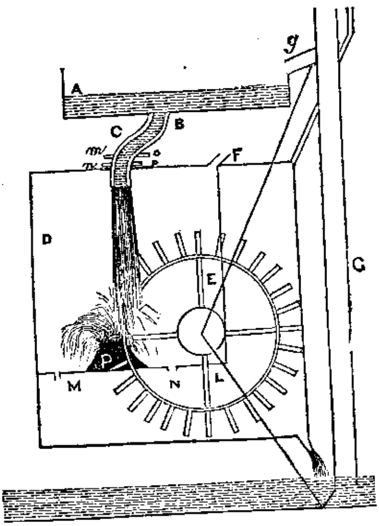
20. WATER BLOWING MACHINE APPLIED TO THE PRODUCTION OF PERPETUAL MOTION (vol. 7, 1827).—The inventor writes:—

I am encouraged to send you the following attempt at perpetual motion, because I think it is upon a principle that has not yet been examined in your pages.

In Dr. Brewster's appendix to Ferguson's Lectures, the following description is given of what is called a "Water Blowing Machine:"—"Let A B (see Fig.) be a cistern of water, with the bottom of which is connected the bended leaden pipe B C H. The lower extremity, H, of the pipe is inserted into the top of a cask or vessel, D E, called the condensing vessel, having the pedestal P fixed to its bottom, which is perforated with two openings, M N. When the water which comes from the cistern A is falling through the part, C H. of the pipe, it is supplied by the openings or tubes, *m n o p*, with a quantity of air which it carries along with it.



This mixture of air and water, issuing from the aperture H, and impinging upon the surface of the stone pedestal P, is driven back and dispersed in various directions. The air being thus separated from the water, ascends into the upper part of the vessel, and rushes through the opening, F, whence it is conveyed to the fire, while the water falls to the lower part of the vessel, and runs out by the openings M N." The author then goes on to describe the construction of the pipe B C H, in the curve of which some nicety is required, and to explain some atmospherical phenomena upon the principle of this machine, adding that "Franciscus Tertius de Lanis observes that he has seen a greater wind generated by a blowing machine of this kind than could be produced by bellows ten or twelve feet long."

Now, if, instead of the pedestal P, a wheel were placed in the condensing vessel, as in the figure, would not the water, in falling upon the wheel, be sufficiently dispersed to disengage the air at the same time that it drove the wheel, and would not the motion of the wheel be retarded by the density of the internal air?

I do not apprehend that any considerable resistance would be offered by the internal air, and the motion of the wheel can be regulated by its load, so as to offer a sufficient resistance to the descending stream of water; and I therefore assume that the water, in its descent, would produce, by means of the wheel, a power capable of raising a part of the water expended back again to the cistern; and this is the extent of the power of most of those machines which have been mistaken for perpetual motions by their projectors. But I have a blast of wind which is described as being of great force. Can this blast be in any way applied to raise the surplus water? I think I see the smile which the proposal will produce in those who deny the possibility of a perpetual motion. "A mere puff of wind!" is, doubtless, ejaculated from all sides. But, let me tell these gentlemen that, though I may not know any method by which such blast can produce that effect, it does not by any means follow that the impossibility of the thing is thence to be presumed. Far from it; for such a conclusion rests upon the supposition that the powers and application of a blast of wind are fully known, and that no research or experience can add to our knowledge on that subject—assumptions which appear to me somewhat ridiculous. Allow me, for the sake of argument, to suppose that this blast, instead of wind, had been a blast of steam. Time was, when wise men would have smiled, and said, "A puff of steam—a mere puff of steam!"—and had some one, more sanguine than the rest, attempted, by its application, to produce a motion, he would have applied it to the float-boards of a wheel, as in Branca's engine, and have been disappointed. It is not given to man to know when the powers of any great agent have been fully developed; and those who act upon such presumptions throw the greatest obstacles in the way of enquiry. But, to shew the anti-perpetualists that within their own time, since the commencement of the "Mechanics' Magazine," an addition has been made to our knowledge of the powers of a blast of wind, I have added a tube, G, to my figure, the proposed use of which I shall now describe.

In a part of the "Mechanics' Magazine," published some time ago, there was described a novel mode of raising water in a tube,* by directing a stream of air over its mouth, thereby destroying the pressure of the atmosphere.

[He asks the author of this experiment "to what height he has raised water by this means."]

I do not suppose it will rise to the height of the cistern as I have figured it; but it may still be a question whether it may not be accomplished by a series of short tubes, the bottom of the one being placed in the cistern into which the next below discharges its water, each being constructed with a blast and two valves, in the same manner as the single tube—namely, the valves x (under water) and y, worked in such a manner, by the arms K L, that the one may shut when the other opens. Presuming that the water will rise to the top of the tube, when the blast is in action (x open and y shut), the water in the part of the tube between the blast and y will be discharged into the cistern at the next motion of the valves—namely, when x is shut and y opened, the blast, at the same time, being discontinued.

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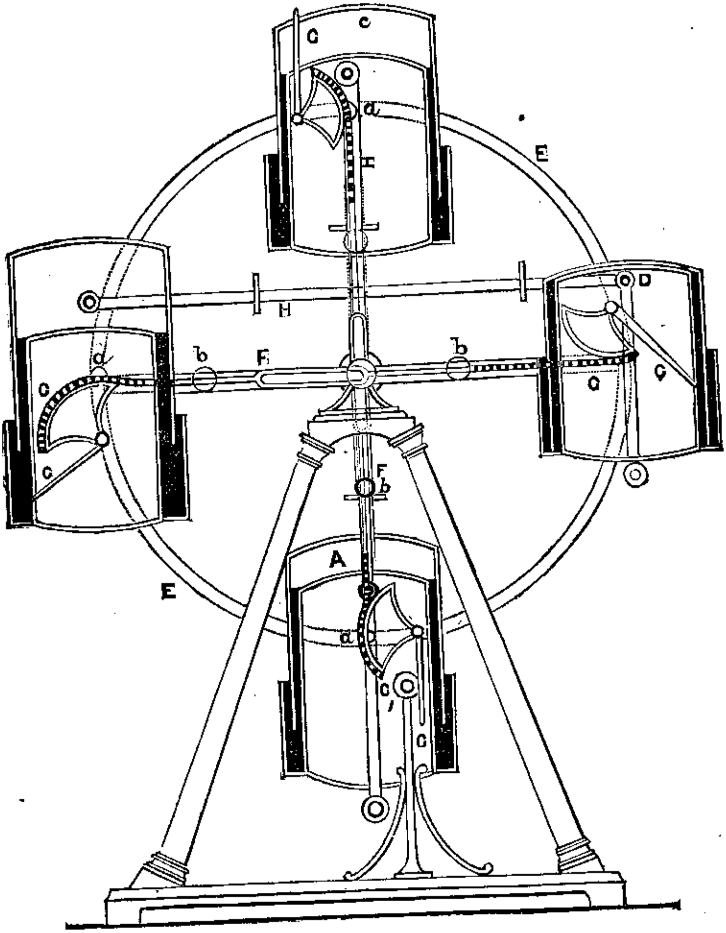
21. Editorial Note, and Letter on Perpetual Motion (vol. 7, 1827):—

[The subject of perpetual motion having been recently again brought under discussion in our pages, our impartiality and candour have been appealed to for the insertion of the following plan. * * There is always one advantage attending the publication of even the most absurd schemes of this kind, that they produce refutations which serve to make the true principles of mechanics better and better understood among ingenious men, and to induce numbers silently to abandon the prosecution of plans equally absurd, and equally cherished with the fondest regard.—Ed.]

* * * * * *

Amid all the fruitless attempts which have appeared, there

* Rather, the short leg of a syphon, by blowing with a pair of bellows.



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was still one avenue to the object of pursuit overlooked, to which the common and well-known principles of hydrostatics seemed to direct the way: this was the principle that any body specifically, or bulk for bulk, lighter than common air, will rise and swim in it. Consequently, if I attach a certain quantity of vessels, at equal distances, round the circumference or rim of a wheel, so contrived as that one half of the vessels shall be exhausted on one side of the wheel, and the other half filled with air on the opposite side, in this case the exhausted vessels will attain the highest part of the wheel, and the full ones the lowest. But to render the matter more explicit, I must refer to the prefixed drawing.

A B C D are four vessels, connected to the wheels E E (though only one is shewn, to prevent confusion) by round pins, *a a a a*, which project from the vessels on each side, and enter into corresponding holes in the wheels E E. The wheels E E are caused to revolve by the space under the vessel B being a vacuum, and therefore lighter than the same portion of air: a little before the vessel B reaches the highest point of the wheels, it begins to close, and opens the opposite vessel D, in the same manner as the vessel C opens A, because the pressure of the atmosphere on the vessel C is equal to the pressure on A. Instead of common packing to make the vessels air-tight, mercury is substituted, which has infinitely less friction, and is never out of order: it is represented by the black marks in the drawing. The particles of mercury not being entirely free from friction, a little power is requisite to open and shut the vessels; this is effected by the rods F F, connected to the levers G G G G by chains. The rods F F give motion to other rods, H H, by the rollers *b b b b* acting against the collars on the rods H H. Again, the levers G G G G are successively worked by sliding over the roller P. The connecting-rods H H are so adjusted as not to draw the vessels out of their upright position, which would let the mercury escape; also, the lower vessels A and D are made rather larger in diameter than B C, so as the pressure of the atmosphere may counterpoise the weight of the vessels A C and B D, with their connecting-rods, &c.

I doubt not in the least, that if a pneumatic machine like this were accurately executed, it would continue in perpetual motion; yet I still think the power might be greatly increased by placing the whole engine under a receiver of condensed air, say from ten to twelve atmospheres, which would weigh, if it were ten atmospheres, about twelve ounces per cubic foot.

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22. SCHEME OF PERPETUAL MOTION (vol. 7, 1827). By Sir W. Congreve, Bart.—The following article is from the "Atlas:"—

The celebrated Boyle entertained an idea that perpetual motion might be obtained by means of capillary attraction; and, indeed, there seems but little doubt that nature has employed this force in many instances to produce this effect.

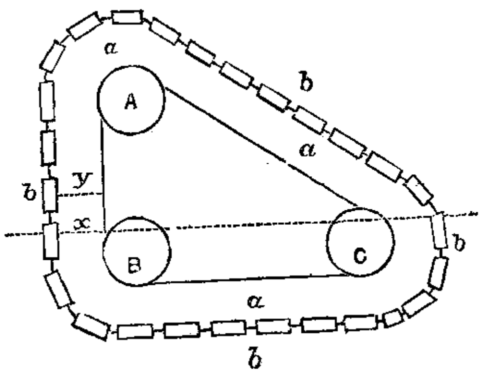
There are many situations in which there is every reason to believe that the sources of springs on the tops and sides of mountains depend on the accumulation of water created at certain elevations by the operation of capillary attraction, acting in large masses of porous material, or through laminated substances. These masses being saturated, in process of time become the sources of springs and the heads of rivers; and thus, by an endless round of ascending and descending waters, form, on the great scale of nature, an incessant cause of perpetual motion, in the purest acceptance of the term, and precisely on the principle that was contemplated by Boyle. It is probable, however, that any imitation of this process on the limited scale practicable by human art would not be of sufficient magnitude to be effective. Nature, by the immensity of her operations, is able to allow for a slowness of process which would baffle the attempts of man in any direct and simple imitation of her works. Working, therefore, upon the same causes, he finds himself obliged to take a more complicated mode to produce the same effect.*

To amuse the hours of a long confinement from illness, Sir William Congreve has recently contrived a scheme of perpetual motion, founded on this principle of capillary

* A familiar instance of a continuous round of interchanging cause and effect, produced by this capillary process, and limited only by the duration of the materials, is furnished by a common candle. The flame melts the wax or tallow, which, ascending the fibres of the wick, keeps that flame alive; so that, literally speaking, the flame is the active cause of its own existence,—a sort of paradox, precisely similar to that which our perpetual motion seekers have so long been vainly endeavouring to realize.—ED. "Mec. Mag."

attraction, which, it is apprehended, will not be subject to the general refutation applicable to those plans in which the power is supposed to be derived from gravity only. Sir William's perpetual motion is as follows :—

(*Fig.* 1.)



Let A B C be three horizontal rollers fixed in a frame; *a a a*, &c., is an endless band of sponge, running round these rollers; and *b b b*, &c., is an endless chain of weights, surrounding the band of sponge, and attached to it, so that they must move together; every part of this band and chain being so accurately uniform in weight that the perpendicular side A B will, in all positions of the band and chain, be in equilibrium with the hypothenuse A C, on the principle of the inclined plane. Now, if the frame in which these rollers are fixed be placed in a cistern of water, having its lower part immersed therein, so that the water's edge cuts the upper part of the rollers B C, then, if the weight and quantity of the endless chain be duly proportioned to the thickness and breadth of the band of sponge, the band and chain will, on the water in the cistern being brought to the proper level, begin to move round the rollers in the direction A B, by the force of capillary attraction, and will continue so to move. The process is as follows :—

On the side A B of the triangle, the weights *b b b*, &c., hanging perpendicularly alongside the band of sponge, the band is not compressed by them, and its pores being left open, the water at the point *x*, at which the band meets its surface, will rise to a certain height, *y*, above its level, and thereby create a load, which load will not exist on the ascending side C A, because on this side the chain of weights compresses the band at the water's edge, and squeezes out any water that may have previously accumulated in it; so that the band rises in a dry state, the weight of the chain having been so proportioned to the breadth and thickness of the band as to be sufficient to produce this effect. The load, therefore, on the descending side A B, not being opposed by any similar load on the ascending side, and the equilibrium of the other parts not being disturbed by the alternate expansion and compression of the sponge, the band will begin to move in the direction A B; and as it moves downwards, the accumulation of water will continue to rise, and thereby carry on a constant motion, provided the load at *x y* be sufficient to overcome the friction on the rollers A B C.

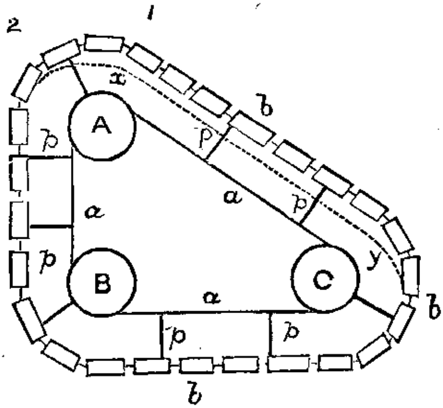
Now, to ascertain the quantity of this load in any particular machine, it must be stated that it is found by experiment that the water will rise in a fine sponge about an inch above its level; if, therefore, the band and sponge be one foot thick and six feet broad, the area of its horizontal section in contact with the water would be 864 square inches, and the weight of the accumulation of water raised by the capillary attraction being one inch rise upon 864 square inches, would be 30 lbs., which, it is conceived, would be much more than equivalent to the friction of the rollers.

The deniers of this proposition, on the first view of the subject, will say, it is true the accumulation of the weight on the descending side thus occasioned by the capillary attraction, would produce a perpetual motion, if there were not as much power lost on the ascending side by the change of position of the weights, in pressing the water out of the sponge.

The point now to be established is, that the change in the position of the weights will not cause any loss of power. For this purpose, we must refer to the following diagram.

With reference to this diagram, suppose *a a a*, &c., an endless strap, and *b b b*, &c., an endless chain running round the rollers; A B C not having any sponge between them, but kept at a certain distance from each other by small and inflexible props, *p p p*, &c., then the sides A B and C A would, in all positions of this system, be precisely an equilibrium, so as to require only a small increment of weight on either side to produce motion. Now, we contend that this equilibrium would still remain unaffected, if small springs were introduced in lieu of the inflexible props *p p p*, so that

(*Fig.* 2.)



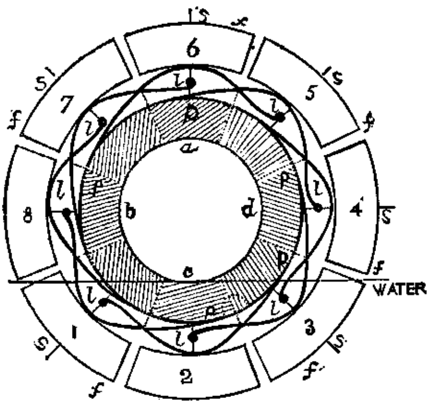
the chain *b b b* might approach the lower strap *a a a*, by compressing these small springs with its weight on the ascending side; for although the centre of gravity of any portion of chain would move in a different line in the latter case—for instance, in the dotted line—still the quantity of the actual weight of every inch of the strap and chain would remain precisely the same in the former case, where they are kept at the same distance in all positions, as in the latter case, where they approach on the ascending side; and so, also, these equal portions of weights, notwithstanding any change of distance between their several parts which may take place in one case and not in the other, would in both cases rise and fall, though the same perpendicular space, and consequently the equilibrium, would be equally preserved in both cases, though in the first case they may rise and fall through rather more than in the second. The application of this demonstration to the machine described in Fig. 1, is obvious; for the compression of the sponge by the sinking of the weights on the ascending side, in pressing out the water, produces precisely the same effect as to the position and ascent of the weights, as the approach of the chain to the lower strap on the ascending side, in Fig. 2, by the compression of the springs; and consequently, if the equilibrium is not affected in one case—that is, in Fig. 2, as above demonstrated—it will not be affected in the other case, Fig. 1; and, therefore, the water would be squeezed out by the pressure of the chain without any loss of power. The quantity of weight necessary for squeezing dry any given quantity of sponge must be ascertained and duly apportioned by experiment. It is obvious, however, that whether one cubic inch of sponge required one, two, or four ounces for this purpose, it would not affect the equilibrium, since, whatever were the proportion on the ascending side, precisely the same would the proportion be on the descending side.

This principle is capable of application in various ways, and with a variety of materials. It may be produced by a single roller or wheel. Mercury may also be substituted for water, by using a series of metallic plates instead of sponges; and, as the mercury will be found to rise to a much greater height between these plates, than water will do in a sponge, it will be found that the power to be obtained by the latter materials will be from 70 to 80 times as great as by the use of water. Thus, a machine, of the same dimensions as given above, would have a constant power of 2000 lbs. acting upon it.

We now proceed to shew how the principle of perpetual motion proposed by Sir Wm. Congreve may be applied upon one centre instead of three.

In the following figure, *a b c d* represents a drum-wheel or cylinder, moving on a horizontal axis surrounded with a band of sponge 1 2 3 4 5 6 7 8, and immersed in water, so that the surface of the water touches the lower end of the cylinder. Now then, if, as in Fig. 2, the water on the descending side *b* be allowed to accumulate in the sponge at *x*, while, on the ascending side D, the sponge at the water's edge shall, by any means not deranging the equilibrium, be so compressed that it shall quit the water in a dry state, the accumulation of water above its level at *x*, by the capillary attraction, will be a source of constant rotatory motion; and, in the present case, it will be found that the means of compressing the sponge may be best obtained by buoyancy, instead of weight.

For this purpose, therefore, the band of sponge is supposed to be divided into eight or more equal parts, 1 2 3 4, &c., each part being furnished with a float or buoyant vessel, *f* 1, *f* 2, &c., rising and falling upon spindles, *s*, *s* *s*, &c., fixed in the periphery of the drum; these floats being of such dimensions that, when immersed in water, the buoyancy or pressure upwards of each shall be sufficient to compress that portion of the sponge connected with it, so as to squeeze out any water it may have absorbed. These floats are further arranged by means of levers *l l l*, &c., and plates *p p p*, &c., so that, when the float *f* No. 1 becomes immersed in the water, its buoyant pressure upwards acts not against the portion of the sponge No. 1, immediately above it, but against No. 2, next in front of it; and so, in like manner, the buoyancy of *f* No. 2 float acts on the portion of the sponge No. 3, and *f* No. 3 float upon No. 4 sponge.



Now, from this arrangement it follows, that the portion of sponge No. 4, which is about to quit the water, is pressed upon by that float, which, from acting vertically, is most efficient in squeezing the sponge dry; while that portion of the sponge No. 1, on the point of entering the water, is not compressed at all from its corresponding float No. 8, not having yet reached the edge of the water. By these means, therefore, it will be seen that the sponge always rises in a dry state from the water on the ascending side, while it approaches the water on the descending side in an uncompressed state, and open to the full action of absorption by the capillary attraction.

The great advantage of effecting this by the buoyancy of light vessels instead of a burthen of weights, as in Fig. 2, is that, by a due arrangement of the dimensions and buoyancy of the floats immersed, the whole machine may be made to float on the surface of the water, so as to take off all friction whatever from the centre of suspension. Thus, therefore, we have a cylindrical machine revolving on a single centre without friction, and having a collection of water in the sponge on the descending side, while the sponge on the ascending side is continually dry; and if this cylinder be six feet wide, and the sponge that surrounds it one foot thick, there will be a constant moving power of thirty pounds on the descending side, without any friction to counteract it.

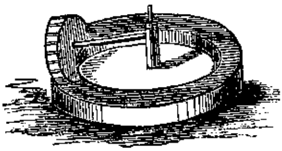
It has been already stated, that to perpetuate the motion of this machine, the means used to leave the sponge open on the descending side, and press it dry on the ascending side, must be such as will not derange the equilibrium of the machine when floating in water. As, therefore, in this case the effect is produced by the ascent of the buoyant floats *b*, to demonstrate the perpetuity of the motion, we must show that the ascent of the floats *f* No. 1 and *f* No. 3 will be equal in all corresponding situations on each side of the perpendicular; for the only circumstance that could derange the equilibrium on this system, would be that *f* No. 1 and *f* No. 3 should not in all such corresponding situations approach the centre of motion equally; for it is evident that in the position of the floats described in the above figure, if *f* No. 1 float did not approach the centre as much as *f* No. 3, the equilibrium would be destroyed, and the greater distance of *f* No. 1 from the centre than that of *f* No. 3 would create a resistance to the moving force caused by the accumulation of the water at *x*.

It will be found, however, that the floats *f* No. 1 and *f* No. 3 do retain equal distances from the centre in all corresponding situations, for the resistance to their approach to the centre by buoyancy is the elasticity of the sponge at the extremity of the respective levers; and as this elasticity is the same in all situations, while this centripetal force of the float f No. 1 is equal to that of the float f No. 3, at equal distances from the perpendicular, the floats f No. 1 and f No. 3 will, in all corresponding situations on either side of the perpendicular, be at equal distances from the centre. It is true, that the force by which these floats approach the centre of motion varies according to the obliquity of the spindles on which they work, it being greatest in the perpendicular position; but, as the obliquity of these spindles is the same at all equal distances from the perpendicular, and as the resistance of the ascent of the floats is equal in all cases, the centre of buoyancy will evidently describe a similar curve on each side of the perpendicular; and consequently the equilibrium will be preserved, so as to leave a constant moving force at x, equal to the whole accumulation of water in the sponge. Nor will this equilibrium be disturbed by any change of position in the floats not immersed in the water, since, being duly connected with the sponge by the levers and plates, they will evidently arrange themselves at equal distances from the centre, in all corresponding situations on either side.

It may be said that the equilibrium of the band of sponge may be destroyed by its partial compression; and it must be admitted that the centre of gravity of the part compressed, according to the construction above described, does approach the centre of motion nearer than the centre of gravity of the part not compressed. The whole weight of the sponge is, however, so inconsiderable, that this difference would scarcely produce any sensible effect; and if it did, a very slight alteration in the construction, by which the sponge should be compressed as much outwards as inwards, would retain the centre of gravity of the compressed part at the same distance from the centre of motion as the centre of gravity of the part not compressed.

Sir W. Congreve's Plan of Perpetual Motion (vol. 7, 1827).—The following is taken by the Editor from a small pamphlet on the subject, by the ingenious Baronet himself:—

The power of a wheel thus set in motion may either be applied in the common mode, by machinery at the end of the axis, or the wheel itself, as in the following figure, may be



made to revolve in a circular cistern of water, of any convenient diameter, being connected by an arm from the centre of the wheel to an upright revolving shaft in the centre of the cistern, so as to be connected with machinery.

[He proceeds to enlarge on the merits of the invention, gives a scheme for propelling boats, and descants on capillary attraction when glass plates are used, and proposes the use of them with water, and of copper or platina plates with mercury, concluding:—]

My principal object in publishing this little tract is, if possible, to call the attention of men of mathematical attainments to a subject which, from the general disbelief of the possibility of the thing, such men will scarcely condescend to look at. Feeling, however, that the application of a new principle is here involved, which is not liable to the general objections urged against perpetual motion, I have bestowed the most patient attention to the subject, and must confess I cannot myself discover any fallacy in the proposition here stated.

WILLIAM CONGREVE.

March 10, 1827.

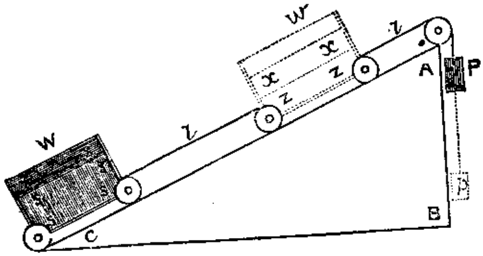
P.S.—Since writing the above, I have had a conversation with one of our most celebrated mathematicians on this subject. He contends that the weights ascending on the sloping side of an inclined plane can exert no pressure so as to produce any effect on that plane, without a corresponding loss of power and destruction of the equilibrium. He seems to forget that the very principle of this equilibrium is, that the inclined plane itself, at — degrees above the horizon, supports one half the weight, and is, of course, reacted upon to an equal extent by that weight; so that if the weight were 100 lbs., 50 lbs. of this would be absolutely disposable to the compression of any substance between itself and the plane, such as the sponge above-mentioned, the other 50 lbs. being the only part supported by the counterpoise on the perpendicular side.

Now, will he contend that if a carpet or sponge were stretched round this inclined plane, and fixed to it so as to be allowed to absorb water on both sides by the capillary attraction, will he, I say, contend that there would not, in this case, be 50 lbs. disposable on the side A C for squeezing the water out of this sponge or carpet, by its pressure on the slope, without affecting the equilibrium, while there would be no weight pressing upon it to operate with this effect on the perpendicular side?

Sir Wm. Congreve's Perpetual Motion (vol. 7, 1827):—

[The editor, alluding to Sir William's "Plan of Perpetual Motion from Capillary Attraction," states that the Baronet has since published a revised and enlarged edition of that pamphlet (Knight and Lacey, pp. 24, price 1s.), in which he endeavours to refute the principal objection which he has heard made to his plan by a celebrated mathematician, who opposed to Sir William Congreve's proposition a general maxim, said to exist in all mechanical operations, viz., "that no duty (to use his own terms) can be performed without a corresponding loss of efficiency." He concluded that "the weight ascending on an inclined plane can produce no positive effect, such as the compression of a spring or sponge, by which the centre of gravity of the weight shall describe a curve instead of a straight line, without an equivalent loss of efficiency." The propounder of this objection defied Sir William to produce an instance to the contrary, and agreed to leave the decision of the main question to this issue. Sir William therefore offers the following as a proof that power may be gained by his plan without any corresponding loss in point of efficiency:—]

Let A C be an inclined plane. Now, suppose a small carriage W on four wheels, at the bottom of this inclined plane, be connected by a line *l l* over a roller, with a counterpoise P hanging perpendicularly, so that P would have just power enough to move the carriage W slowly up the plane A C;



suppose, also, that this carriage be loaded with a yielding substance, such as sponge, filling the space *s s s s*, and having a layer of some heavy substance, such as lead *x x*, laid upon the top of it, so as to be capable of gradually compressing the sponge; and, lastly, let us suppose that, things being thus arranged, the carriage moves slowly up the plane W to *w* by the action of the counterpoise; and that while this is taking place, the leaden weight *x x* has gradually compressed the sponge in the carriage into a smaller compass *z z*; in doing which, it is evident that the centre of gravity will describe a curve instead of a straight line. Now then, I will ask whether, under these circumstances, this change of position in the load of the little waggon will make the waggon and its contents weigh more at *w* than at W, so as to render the counterpoise P, in this last situation, less efficient in drawing the carriage up the plane?

To say there would be any increase of weight thus created in the carriage W, and any consequent loss of efficiency in the counterpoise, would indeed be most absurd; for, on the contrary, it is evident that if the sponge were wet, this sinking of the lead would produce a decrease of weight in the waggon, and, consequently, an increase of power in the counterpoise equivalent to the weight of water squeezed out.

My friend, therefore, must admit that I have fairly met his issue, and have shown that the sponge may actually be compressed by the sinking of the lead on the ascending side without any increase of weight or loss of power, as he contends; and, consequently, that the load constantly accumulated by the capillary attraction on the descending side, must be a clear gain of power adequate to produce a perpetual motion, whether the application of this principle be by a series of small detached parcels, as in Fig. 3, or by a continued band of sponge and endless chain of weights, as in Fig. 1, which is, in effect, the same thing.

I do not mean to say that my friend's general objection does not hold good where only one power, such as gravity, is employed; for certainly, in that case, if the sponge were alternately to act as weight and power, the loss of any weight of water squeezed out on the ascending side would be felt on the descending side when the gravity of the sponge was called upon to act as a counterpoise. But the objection will not apply when two distinct powers, gravity and capillary attraction, are combined, as in the problem before us; for in this case, at the moment when the inefficiency of the mere gravity of the sponge is felt, its capillary attraction acts spontaneously, and restores the load of water on the descending side, which is necessary to give it due efficiency, as counterpoise, to sustain the motion.

It is evident, therefore, that in applying his general maxim to my proposition, he extends it beyond the just sphere of its applicability; and it is thus that we frequently deceive ourselves by the too great extension of general and metaphysical dogmas. It is thus, I am convinced, that the discovery of the very important problem now before us has been so long retarded, by the general persuasion of its impracticability, which has, during a period of unexampled progress in mechanical science, absolutely deterred men of mathematical acquirements from bestowing a moment's consideration upon this now dishonoured problem.

[This concludes the chief extracts. The editor goes on to say:—]

Sir William gives a more detailed representation on the same principle as the figure just inserted, for which the reader is referred to the pamphlet itself. He concludes with expressing his perfect conviction that he has proved " the existence of a very considerable moving force, being the 150th part of the whole weight to be set in motion." " A power, the sufficiency of which to keep water in motion in a variety of ways, with a considerable excess to spare, will not (he says) be doubted, when it is remembered that many of the largest scale beams, with a ton in each scale, may be moved by much less than an ounce weight." "For my own part (he says), not being able to see any reason why the machine should not act, I confess that my faith is sufficiently strong to have induced me to take out a patent, and I am determined to use my best exertions to give mankind the benefit of this discovery, should it turn out, as I sincerely believe it will, a source of perpetual power without expense."

AMERICAN REVIEW of an Account of a New Scheme of Perpetual Motion, invented by Sir William Congreve, Bart. From the "Franklin Journal." Philadelphia, vol. 4, 1827.—In noticing this work, the reviewer makes the following introductory observations:—

Sir William Congreve is a member of the British Parliament, and claims to be a man of science, and an engineer. He is the inventor of the rockets which bear his name. He was also the contriver of a clock, which was intended to look like a perpetual motion. It kept a ball in motion, which served only to injure the going of the clock.*

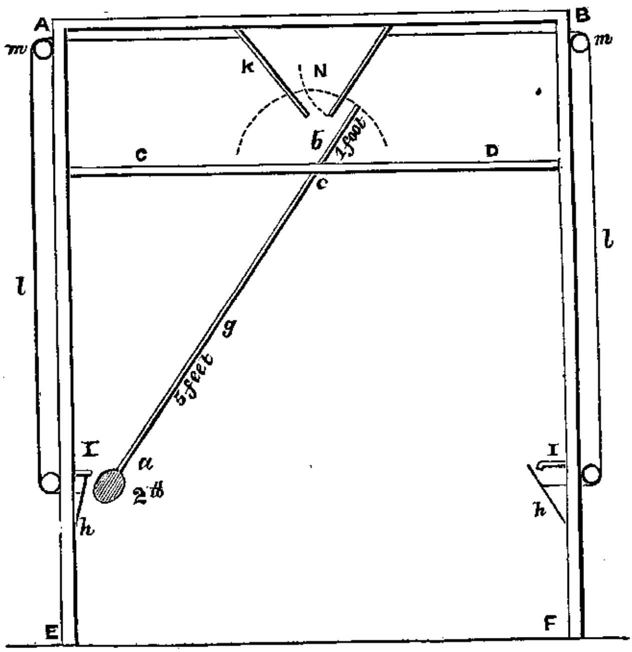
[After making extracts, which the foregoing articles anticipate, together with remarks thereon, the writer concludes:—]

The proposition of the Baronet includes the idea of a perpetual motion, as this term is restricted by those who have written upon the subject. This has been defined to be —a motion which is supplied and renewed from itself, without the intervention of any external cause. The impossibility of constructing such a machine has been repeatedly demonstrated; as to effect it would require us to discover a body which, in one position, possesses less gravitating force than in another; or, in other words, which is both heavier and lighter than itself.†

* A clock of this description is exhibited at the Museum in the Rotunda of the Arsenal, Woolwich.

† This article does not appear in the "Mechanics' Magazine."

23. A Pendulum Motion.—A correspondent (vol. 7, 1827) describes the following arrangement:—



A B E F is a frame connected by C D—a cross bar, through which runs *g*, a pendulum hung on a pivot C. This pendulum has two arms, one *a* measuring five feet, and the other *b* one foot in length, connected so together to form a lever with a long and short arm, whose fulcrum is *c*. This pendulum has a weight of two pounds at its end. K K are two short levers, having a joint in them to allow the pendulum to pass them one way, but not the other, without moving them, whose fulcra are *d d*, by which they are connected with A B. From these run cords *l l* over *m m m m* pulleys, which cords are connected (for the purpose of drawing them up into catches) with *h h*, springs throwing with a power of three pounds. I I are catches for the springs when brought back after working their power, moving upwards. N is the point where the pendulum g will escape from the lever K.

There are various springs, stops, &c., necessary to keep the parts in their proper positions, which are not shown, not being essential to the consideration of the question. Now, assuming the pendulum to be brought into the position shown in the drawing, and the spring to be let loose against it, the pendulum would begin to move with a power equal to five pounds, which I assume would be sufficient to throw it up to a higher situation, on the opposite side, than that from which it set out; but in its progress its short arm comes in contact with K, to which is attached one spring h, which is drawn up into the catch by such motion of the pendulum. This resistance is equal to three pounds, and something more; but, because the arm of the lever to which the power is applied is five times longer than the short arm at which it meets with the resistance, it requires but at most one pound to overcome it; by which one pound of the five pounds being lost, there will remain four pounds, or two pounds above the weight at the end of the pendulum, to raise it to as high a situation as that from which it set out, and which I assume will be sufficient for such purpose. Being raised to such a situation, it will release the spring H on the opposite side, by striking up the catch; and will perform a similar motion, and be attended with similar results, as the first.

Another correspondent makes the following remarks on the proposed Pendulum Motion:—

The resistance opposed by the catch I C (on the right-hand side of the plate) to any impulse, is something more than 3 lbs., this resistance being occasioned by the force of the spring, equal to 3 lbs., the weight of the catch, and its friction on its fulcrum.

The impulse is here erroneously imagined to be 4 lbs.: on the contrary, it is not quite 3 lbs. Supposing the pendulum to fall from the situation represented in the figure, it would rise to an equal height on the opposite side if all obstacles were removed. But though it starts with a momentum equal to

2 lbs., yet that is continually diminishing in consequence of friction and the resistance of the air. The end b coming in contact with K, something more than 1 lb. is lost, and the pendulum continues its motion until, the momentum being destroyed, it is stationary for a moment of time, and then returns. Let the point where it is stationary be called n, and let the pendulum again start from the situation in the figure, with the additional momentum of 3 lbs. from the spring. This 3 lbs. is undiminished until the pendulum arrives at n; it is then called into action, and gradually diminishes from the obvious causes above stated—friction and the resistance of the air. Hence the momentum with which the pendulum strikes the catch is something less than 3 lbs., to overcome a resistance something more than 3 lbs.

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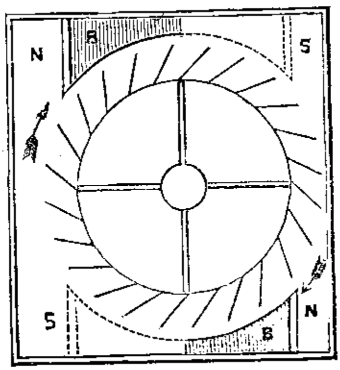
24. Perpetual Motion by Magnetism (vol. 9, 1828). —The inventor says:—

The object of the present communication is to lay before your readers an attempt at perpetual motion by means of magnetism, applied somewhat differently to any that has yet been published in your Magazine.



The above is a wheel of light construction, moving on friction wheels *in vacuo;* the rim is furnished with slips of steel,

—pieces of watch-spring will do. N N are two magnets, which, attracting the rim of the wheel, will render one side lighter and the other heavier, causing it to revolve *ad infinitum*: or, to render it more powerful, let the steel rims be magnetized, and fixed on the wheel with their north poles towards its centre. Let two more magnets be added, as shown by the dotted lines: let these two, S S, be placed with their south poles nearest the rim of the wheel; and the other two, N N, with their north poles in that position. Now, as similar poles repel and opposite poles attract, the wheel will be driven round by attraction and repulsion acting conjointly on four points of its circumference. B B are blocks of wood, to keep off the attraction of the magnets from that part of the wheel which has passed them.

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25. Cox's Perpetual Motion (vol. 10, 1828):—

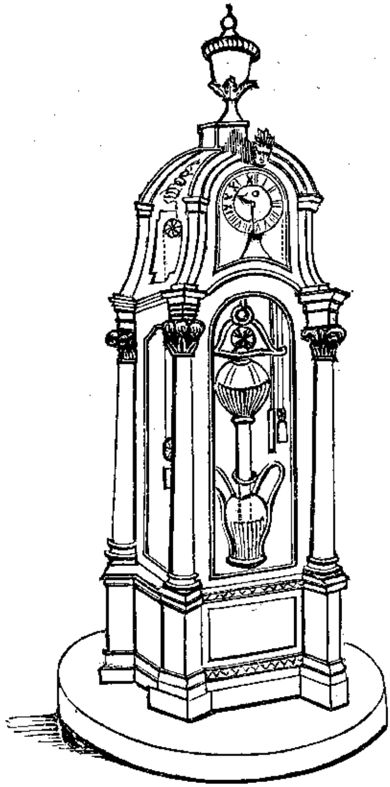
As one of your correspondents mentions my having in my possession an engraving and description of the perpetual motion clock which occupied a prominent place in Cox's Museum, some fifty or sixty years ago, I beg leave to enclose the same.—I am, Sir, yours, &c., W. P.

Chatteris, Cambridgeshire.

Description of the Engraving.—On the back of the engraving, we are first presented with what appears to have been an extract from a descriptive inventory of Cox's Museum, written in a very showman-like style, and conveying but little real information with respect to the construction of the piece of mechanism pretended to be described. It is in the following terms:—

"The Perpetual Motion is a mechanical and philosophical time-piece, which, after great labour, numberless trials, unwearied attention, and immense expense, is at length brought to perfection. From this piece, by an union of the mechanic and philosophic principles, a motion is obtained that will continue for ever; and although the metals of steel and brass, of which it is constructed, must in time decay (a fate to which even 'the great globe itself, yea, all that it inherit,' are exposed), still the primary cause of its motion being constant, and the friction upon every part extremely insignificant, it will continue its action for a longer duration than any mechanical performance has ever before done.

"This extraordinary piece is something above the height, and about the dimensions, of a common eight-day pendulum



clock; the case is of mahogany, in the architectural style, with columns and pilasters, cornices and mouldings, of brass, finely wrought, richly gilt, and improved with the most elegantly adapted ornaments. It is glazed on every side; whereby its construction, the mode of its performance, and the masterly execution of the workmanship, may be discovered by the intelligent spectator. The time-piece is affixed to the part from whence the power is derived; it goes upon diamonds; or, to speak more technically, is jewelled in every part where its friction could be lessened; nor will it require any other assistance than the common regulation necessary for any other time-keeper, to make it perform with the utmost exactness. Besides the hour and minute, there is a second hand, always in motion; and to prevent the least idea of deception, as well as to keep out the dust, the whole is enclosed within frames of glass.

"N.B.—The very existence of motion in the time-piece is originated, continued, and perfected, from the philosophical principle by which alone it acts."

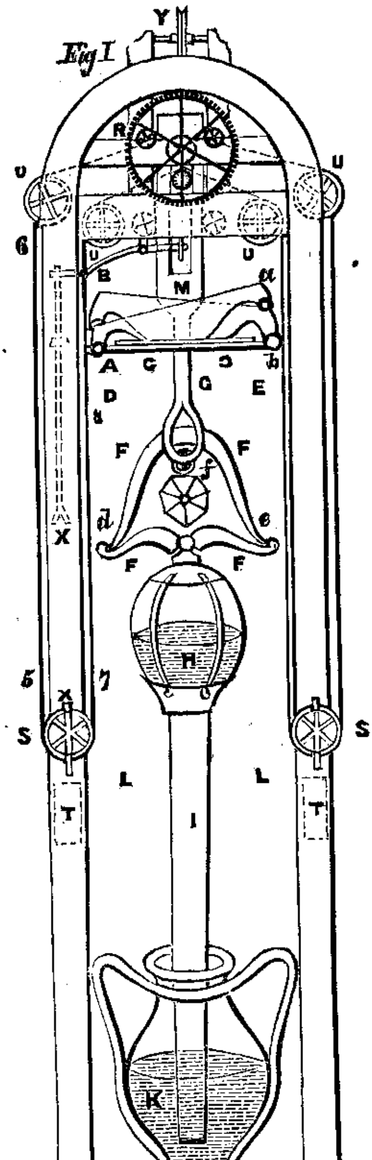
Following this, there is an address "To the Public," from another pen (apparently), which seems to have been intended to throw some light on "the philosophical principle" so mysteriously spoken of by Mr. Cox; but leaves it in as much obscurity as before. The following is the only part of it that need be quoted:—

"The constant revolution of wheels, moving in vertical, horizontal, and other directions, is not only physically produced, but the indication of time from an union of the philosophic with the mechanic principles is effected. Upon the dial, besides a minute and an hour hand, is another hand, dividing the minute into sixty equal parts. These hands are motionless till affixed to the primary motion; so that the motion of the time-piece (as Mr. Cox expresses it) is originated, continued, and perfected, by the philosophic principle through which it is solely actuated."

The secret is, however, at last divulged, in the subjoined certificate from the celebrated philosopher, James Ferguson:—

"I have seen and examined the above-described clock, which is kept constantly going by the rising and falling of the quicksilver in a most extraordinary barometer; and there is no danger of its ever failing to go; for there is always such a quantity of moving power accumulated, as would keep the clock going for a year, even if the barometer should be taken quite away from it. And indeed, on examining the whole contrivance and construction, I must with truth say that it is the most ingenious piece of mechanism I ever saw in my life.—JAMES FERGUSON, Bolt-court, Fleet-street, Jan. 28, 1774."

Fig I.

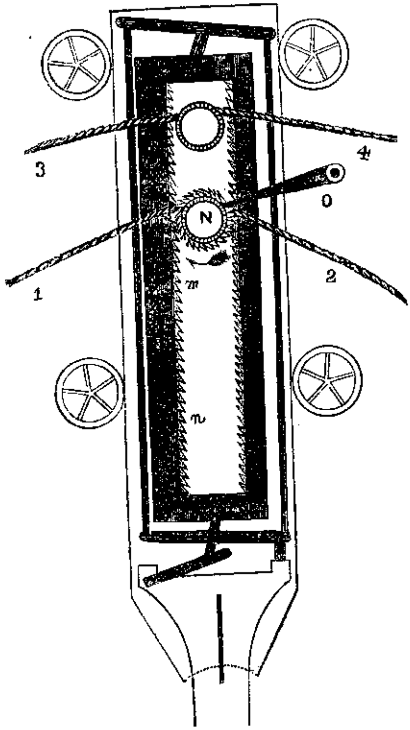


Cox's Perpetual Motion (vol. 11, 1829).—The following is given as a description of the internal mechanism of the perpetual motion clock; collected "from a very large engraving," inscribed "'to the King's most Excellent Majesty,' by Mr. James Cox; and a letter-press description written by the philosopher, James Ferguson, published some years since (but without a date):"—

This clock was kept in constant motion by the rise and fall of a considerable weight of quicksilver. The manner in which this motion was made subservient to the purpose of dividing time will, I hope, be rendered intelligible by reference to the accompanying drawings.

Fig. 1 is a front view of the machine. A *a* and B *b* are two strong pieces of metal, curved on the under side, like the foot of a rocking cradle, to which their motion on the supporting plate C C is similar; they are therefore distinguished by the name of cradles. To the end of the cradle A is hung a rod D *d*, and to the opposite end of the other cradle *b* is hung the other rod E *e*. By the lower end of these two rods (which are of equal length), at *d* and *e*, the frame F F F F hangs, with the gimbol *f* and its upright bar G. To the middle of the lower part of this frame is hung the large glass ball or bulb of a barometer H; the tube of which, I, goes down into the quicksilver in the glass cistern K. This cistern is supported by two rods L L, whose ends hang from the contrary ends of the cradles A *a* and B *b*; the right-hand rod from the end *a* of the cradle A *a*, and the left-hand rod from the end B of the cradle B *b*. A very small degree of attention to this connexion will show that if the bulb H be pulled down it must draw up the cistern K, and if the cistern be pulled down it will draw up the bulb; for, as either end of the cradle goes down, the other end must rise. The cistern being open at top, the atmosphere exerts a varying pressure on the surface of the quicksilver; and when heavy, forces the greater part of it up the tube I into the bulb H: this makes the bulb heavy and the cistern light; the bulb, therefore, descends, and draws up the cistern. On the contrary, when the air becomes light, its pressure is so much the less on the surface of the quicksilver in the cistern; and being then unable to support the lengthened column of quicksilver in the bulb, part of it descends into the cistern, which, becoming thus heavier than the bulb, descends and draws it up. And thus, when the air is heavy the bulb descends, and ascends when the air is light, through more than double the space that the mercury rises and falls in a common barometer. The frame F F F F and its upright G being con-

(*Fig.* 2.)

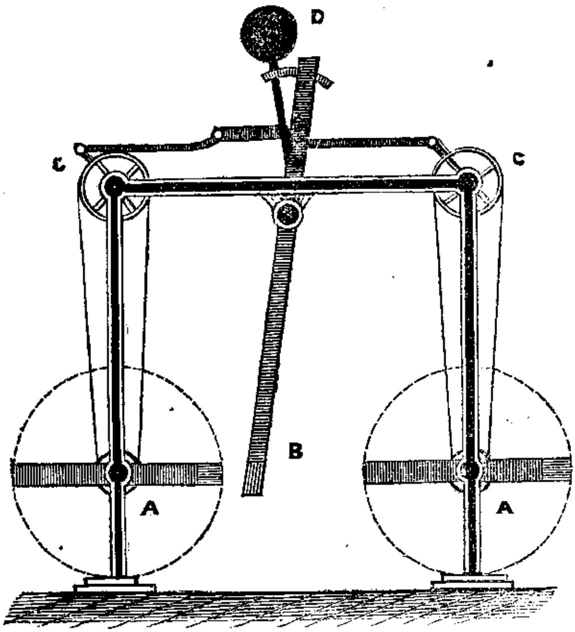


nected with the bulb, rise and fall with it. To this upright bar G is attached the wind-up frame M,—which is shown on a larger scale in Fig. 2. In this frame are two thin metal plates *m* and *n*, toothed like the blades of saws, one set of teeth *m* pointing downwards, and the other set *n* pointing upwards. When the frame falls, the teeth of the saw *m*, by means of a sliding movement, engage the teeth of the wheel N, and turn it round in the direction shown by the arrow; when the frame rises, the saw *m* is disengaged by the sliding movement, and the saw *n* is brought into connexion with the wheel N, which it turns round in the same direction as before; so that whether the frame ascends or descends, it is continually turning the wheel N in the same direction. This frame moves between four friction wheels, which retain it in an upright position. O is a catch which falls into the teeth of the wheel, to keep it from being turned in the contrary direction, by any accident, during the short intervals of time between one of the saws leaving the wheel and the other taking into it. On the back of the wheel N is a pulley, with sharp-pointed pins fixed in the bottom of its groove, for laying hold of the endless chain 1, 2. Above this is just such another pulley, over which the chain also goes, 3, 4. This last pulley is fixed on the axis to the great wheel (R, Fig. 1) of the clock movement, by which the whole of the clock-work is put in motion.

Returning to Fig. 1:—The endless chain just described passes over the four upper pulleys U U U U, which are fixed, and under the two lower ones S and S, which rise and fall with the heavy weight T on one side, and the lighter counterpoise *t* on the other side, which hang from the pulley frames. The weights consisted of two boxes made of thin brass plate; but T was filled with lead, while *t* was quite empty The weight T acts with half its force of gravity upon the part 5, 6, of the endless chain, and with the other half upon the part 7, 8. By pulling the former part, it turns round the great wheel R as fast as the motion of the balance of the clock will permit that wheel to move. It will be seen that if this motion continued for a short time, the weight T would go down to the bottom, and then the clock would stop. But the train of the movement is such, that the weight would keep the clock going a whole year, before it would descend quite to the bottom of the machine. By the above-mentioned contrivance of the wind-up frame M, which, as it moves up and down, turns the wheel N round (in a direction contrary to that in which the pulley and wheel R is moving), and draws up the chain in the direction 7, 8, while the weight T is pulling down the part 5, 6, the weight is prevented from ever going down to the bottom, and a perpetual motion is produced in the clock, by the alternating pressure of the atmosphere on the barometer H I K. The weight of quicksilver employed was about one hundred and fifty pounds.

The only inconvenience that Mr. Cox found in all this machinery was, that the changes of the air affected the barometer so much as to draw up the weight through more space than the clock movement would allow it to descend; which tended to overwind the clock and break the chain. To remedy this, Mr. Cox made the wind-up wheel to turn loose on the arbor, whenever a click was discharged from its ratchet wheel. And although the action of the wind-up frame, &c., would continue, they would have no effect upon the chain pulley and arbor, which would remain at rest till such time as the weight T had again descended, and permitted the click to regain its hold of the ratchet wheel. I may observe, that the discharge of the click, in the first place, was effected by the rising of the weight T; for when the top *x* of the pulley frame S reached the rod X, it raised it, and, by means of the levers, disengaged the click. To counterbalance the weight of the wind-up frame M, one end of a short chain is fixed to the back of it; and after the chain is put over the pulley Y, at the top of the machine, a weight is hung on the end of the chain. It may be observed that as the weight T has four feet to descend from the top to the bottom, its power upon the time-piece must be as much lighter when at top, or heavier when at bottom, as double the difference of the weight of so much chain; which would cause an irregularity in the going of the clock, as it has a balance and not a long pendulum. To avoid this inconvenience, the weight T was made to wind up a smaller weight every twelve hours, by means of a remontoir; and this smaller weight acting upon the time-piece, kept it in motion. As it is the perpetual motion part which I wished to explain, I have omitted the clock movements, which are of the common description—the balance spoken of consisting of a lever, supported by an axis in its centre, and loaded at each end with a weight. —W. B.

26. PERPETUAL MOTION BY MAGNETISM (vol. 10, 1828).—Alluding to a former scheme of his for applying magnetism, the inventor submits the following :—



Let A A, in the prefixed engraving, represent two magnets revolving on axes. Let B represent a larger magnet, hanging on an axis, pendulum fashion, between the two former. As the poles of the two smaller magnets lie in the same direction, the effect will be to draw the larger magnet towards that on the left hand, while it is at the same time repelled by that on the right; but while this is going on, the upper end of the large magnet raises, by means of a guide wire, the tumbler D, which, just before the magnets come in contact, passes the perpendicular, and falls over, carrying with it the lever connected with the two wheels C C, and causing them to perform a quarter revolution; these wheels are connected by lines with two small

wheels fixed on the axles of the two magnets A A. While **the former** make a quarter revolution, the latter turn half **round**; consequently, the position of the magnets is reversed, **and** the same motions are then performed by the pendulum **magnet** being attracted and repel ld in the opposite direction; **and** just before the magnets touch each other, the arrangement is again instantly reversed.

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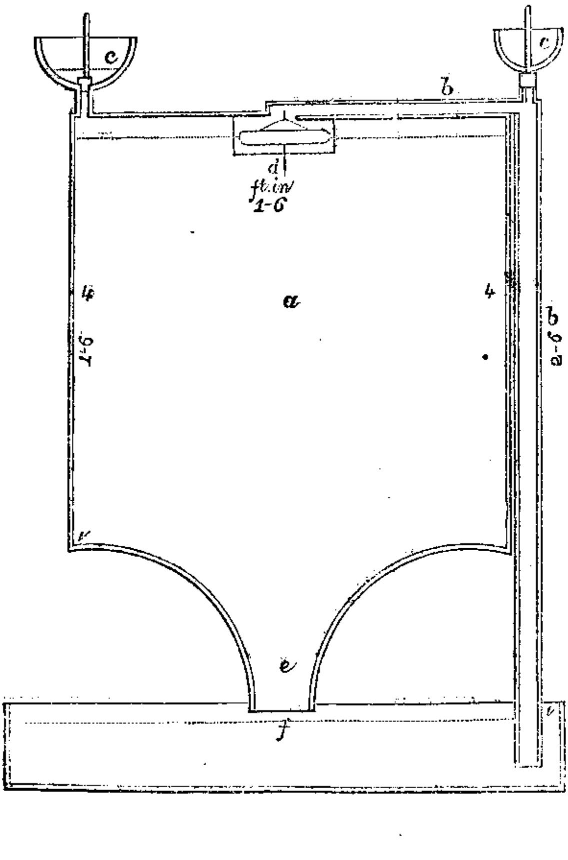
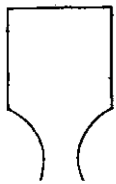
27. A PERPETUALLY-FLOWING SYPHON (vol. 10, 1828) is described by reference to the annexed sectional figure:—

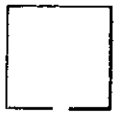


a is a circular glass vessel, 1 foot 6 inches diameter; *b b*, a tube fixed thereunto: *c c* are funnels containing valves; *d*, a float of hollow copper, or any light substance; *e*, an open mouth; *f*, an open vessel filled with mercury as high as the dotted line.

It is well known that several experiments were made by M. Venturi, Sir Isaac Newton, &c., demonstrating that a vessel shaped thus—



will emit water with a much greater rapidity than a vessel shaped thus—



say, with more than a third as much more speed. I propose, then, to have the mouth of the vessel *a* of the former shape, being the natural form of flowing water. The vessel *a*, and tube *b*, must be completely filled with mercury, by means of the funnels *c c*, which will also contain mercury. In order to set the fluid in motion, the valve in the large vessel *c* is to be raised; the mercury (which was hitherto held up by a greater weight of atmosphere) will instantly run out of the mouth *e*, and must be suffered to do so till the mercury in *c* is level with the dotted line: by this time the mercury in *a* will have obtained a momentum * which will be more than equivalent

* "Water not only gravitates with the vessel that contains it, but independently of it; and thus, if the containing vessel is supposed stationary, and a hole is bored in its bottom, the contained water will flow out and descend through the air for the purpose of obtaining a lower situation than it before occupied; and in so flowing out, those particles of fluid which were over, or in immediate contact with, the hole, will be discharged first," &c.—"Library of Useful Knowledge."

to the pressure of the atmosphere; consequently, the mercury will run out of the large vessel *a*, till it falls as low as the dotted line; the float *d*, resting on the mercury, of course falls with it, opens the valve, and admits a proportionable quantity of mercury through the tube *b*, driven by the pressure of the atmosphere (the height from the mercury in *f*, to the top of the tube *b*, being only 26 inches; which is 2 inches less than what the atmosphere will at all times raise mercury in a vacuum).

By this means will there not be a continual circulation of mercury?

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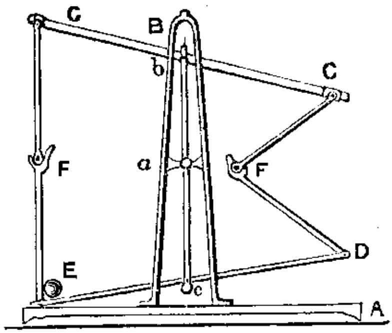
28. New Mechanical Motion (vol. 11, 1829).—A correspondent says:—

To the curious who delight in mechanical intricacies, to whom ingenuity of contrivance is the goal for which they run, nothing seems to afford and require such endless resources as that most puzzling thing—perpetual motion. The unfortunate name "perpetual motion," if changed for "mechanical experiment," would eventually, perhaps, remove the real cause of censuring it, by the different idea of the object aimed at.



I now beg leave to offer some account of a combination of movements, which, from its originality, and seeming to possess every requisite for retaining it in action, may possibly be acceptable.

This diagram shows a side view. On the stand A are raised two supports B, each having a centre hole at *a*, to receive the axle of the balanced apparatus, consisting of C, a glass tube containing a portion of mercury G; and D, a grooved scaleboard, in which a ball, E, can roll backwards and forwards. F F are two jointed levers, which are to serve, when struck by the ball, to reverse the position of the compound balance: the whole centred at *a*, the tube at *b*, and the grooved board at *c*. In its present position, the mercury (it is supposed), having flowed to the end C, will depress D, and cause the ball E to roll to D, and depress the end G F D; and so on continually.

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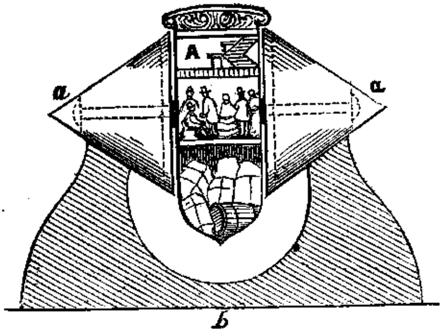
29. Self-moving Railway Carriage (vol. 12, 1829). —A correspondent writes:—

In treating of perpetual motion—"that grand secret for the discovery of which those dictators of philosophy, Democritus, Pythagoras, Plato, did travel unto the Gymnosophists and Indian priests"—it would add considerable interest to give some account of its early history. Regarding the fallibility of every contrivance hitherto planned or experimented upon, we may gather sufficient from the writings of Bishop Wilkins alone. The "little world" of Paracelsus and his followers—the planetarium invented by Cornelius Dreble, for King James—the "magnetical globe or Terella," suggested by Pet. Peregrinus, with the wheel that he, Taisner, and Cardan thought might be kept in motion by "pieces of steel and loadstones"—are, like the Bishop's own wheel and plummets, and his application of Archimedes' screw, inadequate to the grand end for which they were designed.

Without enlarging on this head, we shall proceed with the description of a machine which, were it possible to make its parts hold together unimpaired by rotation or the ravages of time, and to give it a path encircling the earth, would assuredly continue to roll along in one undeviating course till time shall be no more.

A series of inclined planes are to be erected in such a manner that a cone will ascend one (its sides forming an acute angle), and, being raised to the summit, descend on the next (having parallel sides), at the foot of which it must rise on a third and fall on a fourth, and so continue to do alternately throughout.



The diagram is the section of a carriage A, with broad conical wheels *a a*, resting on the inclined plane *b*. The entrance to the carriage is from above, and there are ample accommodations for goods and passengers. The most singular property of this contrivance is, that its speed increases the more it is laden; and when checked on any part of the road, it will, when the cause of stoppage is removed, proceed on its journey by mere power of gravity. Its path may be a circular road formed of the inclined planes. But to avoid a circuitous route, a double road ought to be made. The carriage not having a retrograde motion on the inclined planes, a road to set out upon, and another to return by, are indispensable.

I am indebted to a much-respected friend for the hint of this means of effecting a veritable perpetual motion.

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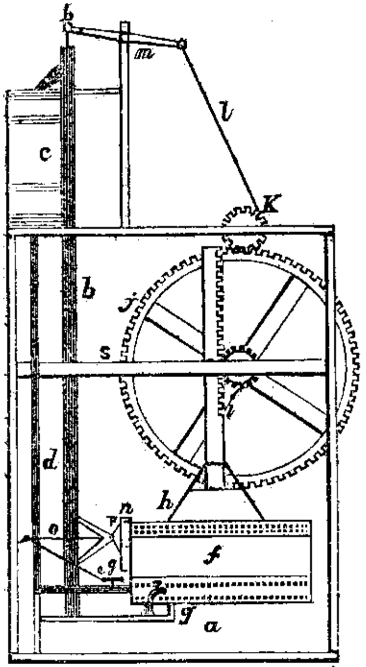
30. An Exercise for Perpetual Motion Seekers (vol. 13, 1830).—The inventor says:—

Let us suppose an apparatus to be constructed of the description represented in the annexed engraving: *a* is a water cistern, whence water is to be raised by the pump *b*, to supply the cistern; *c d* is a small pipe with a stop-cock at *e*, which lets the water from cistern *c* into a strong water-tight bellows *f*. The bellows have no valve, but a cock *g* to let out the water into cistern *a*; *h* is a weight, and *i* a rack on the top of the bellows which works in the cogs on the axle of the large cog-wheel *j*; *j* turns the little cog-wheel *k*, that gives motion to the arm *l*, and works the pump-handle *m*;



n is an upright rod on the end of the lever *o*, which rod has a turn at *p* and *q* for the top of the bellows to press against in ascending and descending. The water being let into the bellows from the pipe *d*, will cause the top of the bellows, with the weight and rack, to ascend till the former reaches and presses *p*, which will move the lever *o* and the arm or rod *r*; by which means the stop-cock *e* of the pipe will be shut, and the cock *g* opened, and the water let in from the bellows into the cistern *a*. The top of the bellows will now descend till it comes down and presses the turn *q*, which will again shut the cock *g* and open *e*, on which the water will again flow from the pipe into the bellows, and cause the top with the rack to ascend.

Now it is generally known that the power of an hydrostatic bellows is thus calculated:—

As the area of the orifice or section of the pipe,
To the area of the bellows:
The weight of water in the pipe is,
To the weight the bellows will sustain on the top-board.

We will suppose, therefore, the pipe *d* to be 10 feet high, with a bore equal to 1 square inch, which would give 120 cubic inches, and about 4¼ lbs. of water. Let us suppose, also, the boards of the bellows to be 20 inches square, which gives 400 square inches. When the water is let from the pipe into the bellows, there will be a pressure of 4¼ lbs. on every square inch, which on the whole will amount to 1700 lbs. Now take half of this force and place it on the top of the bellows; there will then be a working power of 850 lbs. up and down, and allowing the bellows to raise one foot, it will contain about 20 gallons of water. Now the question is, will not the machinery, with a moving power of 2 feet and 850 lbs., raise 20 gallons of water 10 feet, which would, of course, cause the motion to be perpetual?—JOHN SIMS.

Pwllheli, North Wales, Dec. 11, 1829.

REMARKS ON FOREGOING SCHEME (vol. 13, 1830).—A correspondent says:—

Had Mr. Sims gained the power exerted by the descending weight on his bellows, he would have been fortunate indeed; but it unfortunately happens that its returning power (or an equivalent) was expended in raising it.

With respect to his question, whether a circulation of water would be kept up by the arrangement, I answer, no;