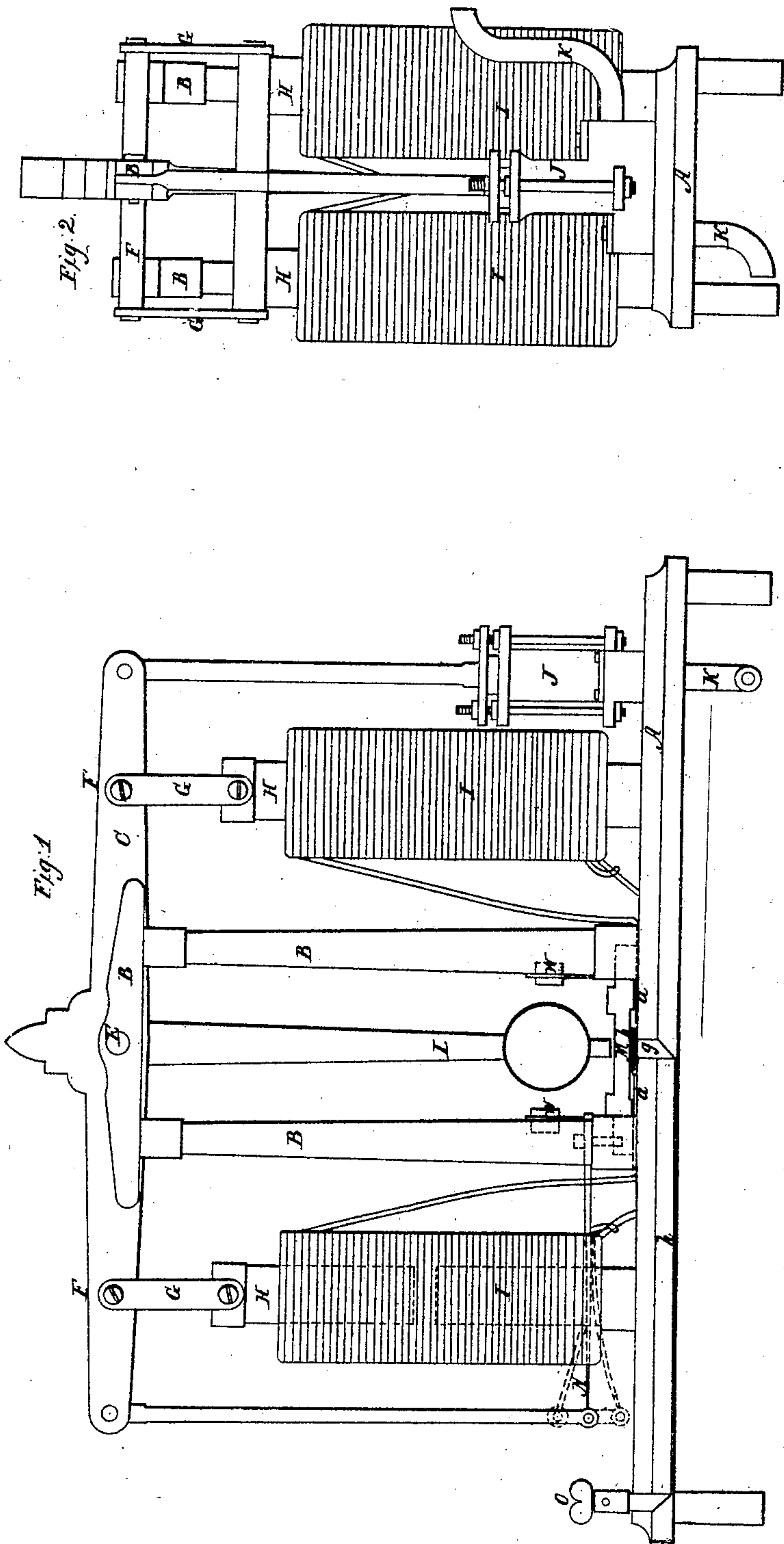


J. S. GUSTIN.
ELECTROMAGNETIC ENGINE.



is ~~not~~ in print.

UNITED STATES PATENT OFFICE.

JOHN S. GUSTIN, OF TRENTON, NEW JERSEY.

IMPROVEMENT IN ELECTRO-MAGNETIC ENGINES.

Specification forming part of Letters Patent No. 9,291, dated September 28, 1852.

To all whom it may concern:

Be it known that I, JOHN S. GUSTIN, of the city of Trenton, county of Mercer, and State of New Jersey, have invented a new and useful machine called the "Electro-Magnetic Pumping-Engine," of which the following is a full and exact description, reference being had to the annexed drawings, making part of this specification.

Figure 1 is a side elevation of the engine, and Fig. 2 is an end elevation of the same.

The same letters of reference apply to the same parts in the different drawings.

The nature of my invention consists in the arrangement of a pump and electro-magnets attached to a lever or working-beam, with the several parts so adjusted with spring and pendulum that by the application of a galvanic battery the pump is put in motion and continues its work steady without requiring the aid of personal attention, except that which is necessary to replenish the acids in the battery when exhausted:

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the bed-plate. B is the upright frame-work. C is the working-beam with its center shaft and bearings, E. F F are two arms passing through the working-beam, to the ends of each of which are straps G G or links, and by which are suspended the armatures H of the magnets and helices I. J is the pump, with its piston-rod connecting with the end of the working-beam. K are the pipes. L is the pendulum. M is the valve or break-piece that changes the battery-current from one to the other magnet. N is the regulating-spring, connected by a rod to the end of the working-beam. O are two connecting-screws, (only one can be shown in the drawings,) by which to connect the two poles of the battery. The dotted lines shown in the helices represent the iron forming the magnet and armature.

To further illustrate its construction and operation, I will suppose that I am to make an engine to raise one thousand gallons of water fifty feet high in twenty-four hours, to do which I should use a force-pump of one-inch bore and two-inch stroke. The electro-magnets should be of two-inch round iron, and each leg seven inches long and three inches space be-

tween them, the top part or armature of the same length, but one-eighth of an inch less in diameter to allow it to pass freely inside the helix, which should have a thin sheet-brass tube inserted in it to prevent the motion of the iron from disturbing the insulation of the wire forming the helix. The helices should have not less than twenty-five pounds of No. 16 wire to each, and so wound and connected as to produce the proper polarity. They should be thirteen inches long, and when placed on the leg of the magnet should have a thick india-rubber washer under the lower end, to protect their insulation from being broken and hold them in such a position that the armature will meet with the magnets at their middle, as shown by dotted lines.

A very thin piece of rubber-cloth on the end or pole of the magnet is necessary to prevent the adhesion of the armature when the battery-current is broken, and also prevents the violent concussion of the two metals meeting. The magnet is to be secured to the bed-plate A. The frame-work B should be raised so as to allow the straps or links G G to be five inches long, holding both armatures five-eighths of an inch from the magnets when the pendulum is central. This will give one-and-a-quarter-inch motion at the magnets. The working-beam, being extended out sufficiently long to reach a vertical line of the pump, will have about two inches motion.

The pendulum is an arm extending down from the working-beam, with a ball of about four inches diameter, with a projection on its under side that moves the valve, as shown at M, alternating the battery-current on the magnets by the vibrating motion of the pendulum. The pendulum vibrates between two cross-pieces (the ends shown at W) secured cross-wise between the upright posts. In each of those should be secured a short spiral spring or thick piece of spring india-rubber, forming a bumper to relieve the force of the blow of the pendulum, and also to assist in reversing its motion, the center piece of copper, *g*, being connected by the strips of copper *h* and the thumb-screw *o* with the battery. The two pieces of copper *a a* connect with the helices.

On the valve is a piece of hard-silver plate, *b*, its length so adjusted that it can form a connection with but one side at the same time.

The negative wires from the helices are both led to a like strip of copper and thumb-screw on the opposite side of the bed-plate and by the thumb-screw with the negative pole of the battery. The regulating-spring should be so adjusted in strength that it would require twenty pounds force to move it one inch to the point of extension (shown by dotted lines) with the rod from the working-beam, and so set as to be at rest when the pendulum is central, its object being to receive the excess of power of the electro-magnets when they are closing, and give it off when they are too far extended for the attractive force to be available. Thus, with the assistance of the pendulum and the springs, nearly an equal force is exerted through the stroke of the pump. The strength of this spring will vary with the power required in different engines. In all cases it should be fully equal to the power required to move the pump when the spring is at its extreme point of action. At that point the electro-magnet has so feeble a force that the spring has nearly the whole work to perform.

The upright frame-work and working-beam may be made of cast-iron. The bed-plate, however, should be of wood well saturated with shellac varnish. The several connections can then be secured to it. The proportion and strength of the frame-work and working-beam may be left to the judgment and taste of the builder. Keeping in view the several uses with a battery of twelve or fifteen of telegraph size arranged for intensity, it will be found to work vigorously, and if the water is to be raised to a greater elevation it can be done by adding more battery.

What I claim as my invention, and desire to secure by Letters Patent, is—

The application of a spring or springs or their mechanical equivalent used as recipients of the excess of power in the closing of the electro-magnets and armature, to be imparted again to the next, as described and set forth.

JOHN S. GUSTIN.

Witnesses:

JOHN WHITTAKER,

ALBERT J. WHITTAKER.