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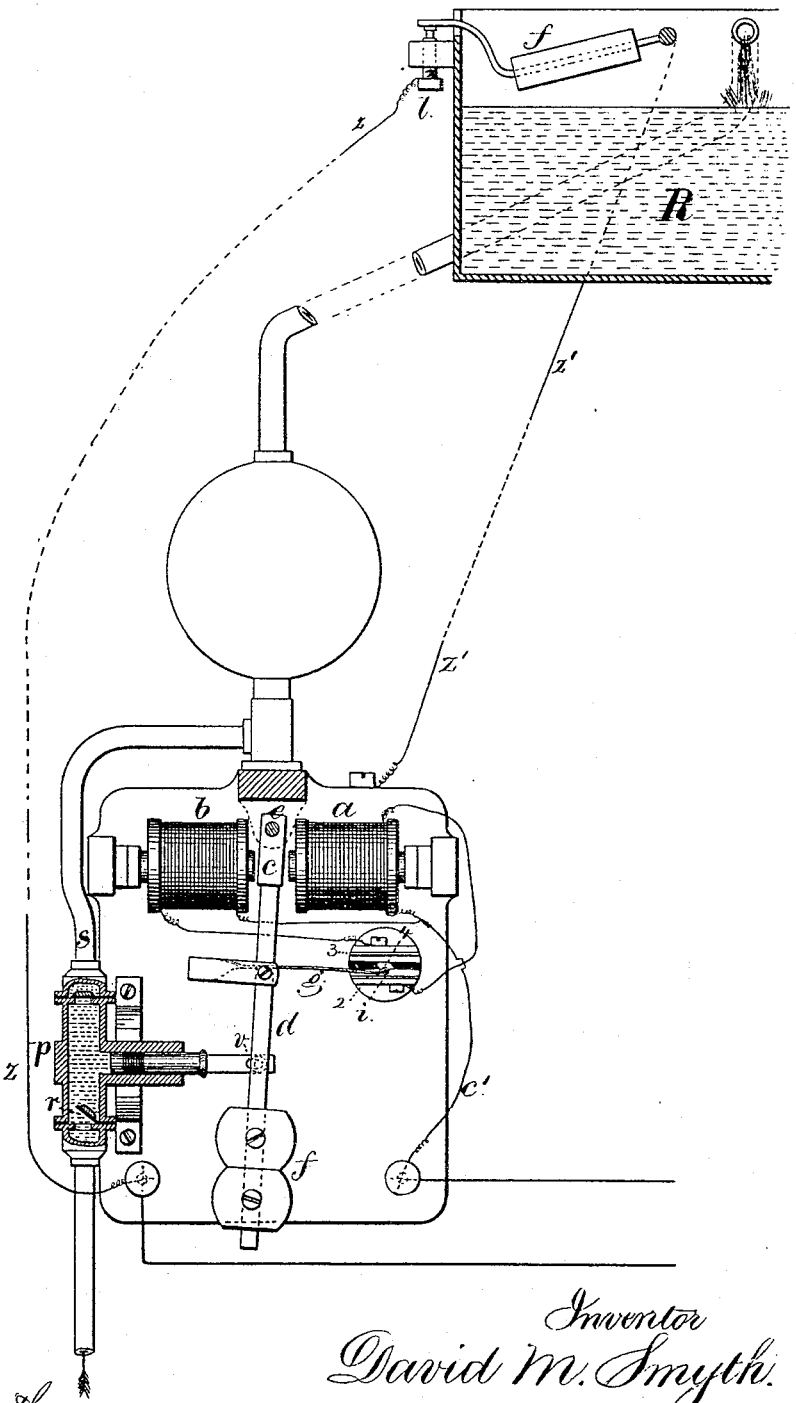
D. M. SMYTH.

Electro-Magnetic Water-Raising Apparatus.

No. 202,764. Patented April 23, 1878.



Witnesses
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UNITED STATES PATENT OFFI.

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DAVID M. SMYTH, OF EAST NORTHWOOD, NEW HAMPSHIRE.

IMPROVEMENT IN ELECTRO-MAGNETIC WATER-RAISING APPARATUS.

Specification forming part of Letters Patent No. **202,764**, dated April 23, 1878; application filed September 4, 1877.

To all whom it may concern:

Be it known that I, DAVID M. SMYTH, of East Northwood, in the county of Rockingham and State of New Hampshire, have invented an Improvement in Water-Raising Apparatus, of which the following is a specification:

I make use of electro-magnets facing each other, with an intermediate armature that is upon a swinging weighted pendulous lever operated by the magnets, and having a circuit-reversing switch that changes the direction of the current passing through the magnets to reverse the movement of the armature and keep the pendulous lever swinging rapidly and powerfully.

A pump with proper induction and eduction pipes is employed, and the connection between the pendulous lever and the pump is not a close one; but there is a looseness that allows the pendulous lever to swing and attain velocity before it gives motion to the pump. Thereby I am enabled to exert the electric force to the best advantage, and pump water much higher than could be done if the movements of the pump were as great as the pendulous lever. I also use a float and lever, through which the electric circuit passes, and when the water in the reservoir rises to the maximum height the circuit to the electro-magnets is broken, and the reverse, so that the apparatus becomes automatic.

In the drawings I have shown, by an elevation and partial section, the improvement and the connections of the circuits.

The electro-magnets *a b* are opposite to each other. The armature *c* is between them upon the pendulous lever *d*, that has its fulcrum at *e*, and it is weighted at *f*.

A spring-arm, *g*, extends from the lever *d*, and at its end is a pin, *i*, that rubs upon the insulated flanged plates 2 and 3, which are preferably of platina, and there is an intermediate insulated cam, 4.

As the pendulous lever swings, this pin *i* would describe an arc of a circle from the fulcrum *e*, but it cannot, because it passes under or over the cam 4. Hence, as it moves to the right, it cannot rise until it reaches the end of the cam, at which movement the spring, having been bent, causes the pin 4 to pass rapidly from the plate 2 to the plate 3, changing the circuit; and as the lever swings the other way, the pin runs over the cam 4, and the spring-arm is thereby bent, and when the pin reaches the end of the cam the spring carries the pin across rapidly to the plate 2, and again changes the circuit.

By reference to the drawings, it will be seen that the wire *c'* from the battery passes to the electro-magnets *a b*, and by a wire from *a* to the plate 2, and by a wire from *b* to the plate 3, and the other circuit-wire *z* is led to the contact-point *l* at the reservoir R, into which the water is pumped, the circuit being complete through the lever and float *f*, returning by the wire *z'* to the frame of the machine, and thence, by the pendulous arm *d* and spring *g*, to either the plate 2 or 3, so that the electro-magnets will be alternately energized to swing the pendulous lever first one way and then the other; and this continues until the accumulation of water in the reservoir causes the float *f* to rise and break the circuit at *l*.

The pump *p* is of any suitable character. It is provided with the inlet pipe and valve *r*, and the outlet valve and pipe *s* to the reservoir or other receptacle.

The slot at *v* in the piston-rod receives a pin upon the pendulous lever, and allows the said lever to commence to swing while the pin moves from one end of the slot to the other, without acting upon the pump, whereby a momentum is acquired, and the armature approaches the energized magnet, so as to act powerfully upon the pump.

By this arrangement a larger quantity of water can be raised to a greater height than would be practicable if the lever and pump moved together without any looseness of connection.

It will be apparent that the electric connections may be made so that the direction of the currents in the electro-magnets will be alternately reversed, and the armature be polarized, so as to act by repulsion as well as attraction.

I claim as my invention—

1. The combination, with a pump, of a pendulous lever, armature, and electro-magnets,

...ose connection between the pump and ...or, substantially as set forth.

In a water-raising apparatus, the combi...ion of the electro-magnets, armature, pen...ious lever, spring circuit-changer, circuit-connections, and pump, substantially as set forth.

Signed by me this 28th day of August, A. D. 1877.

DAVID M. SMYTH.

Witnesses:
IRA B. HOITT,
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