(No Model.)

R. H. TUCKER.

ELECTRO MAGNETIC REGULATOR.

No. 272,799. Patented Feb. 20, 1883.

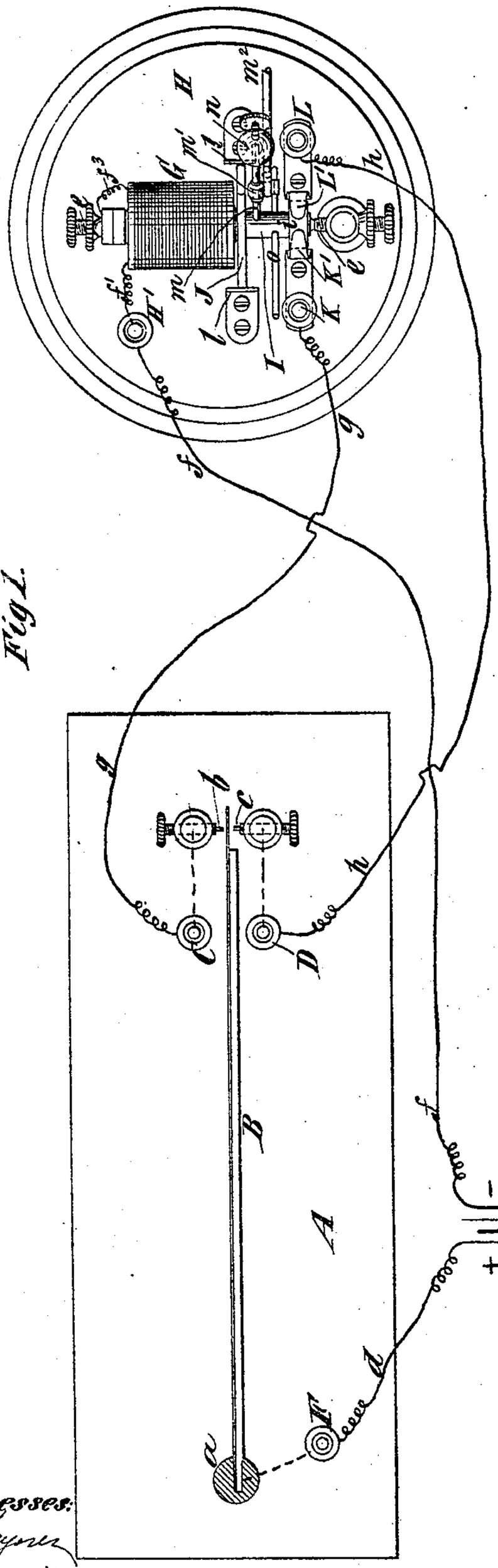

Fig 1.

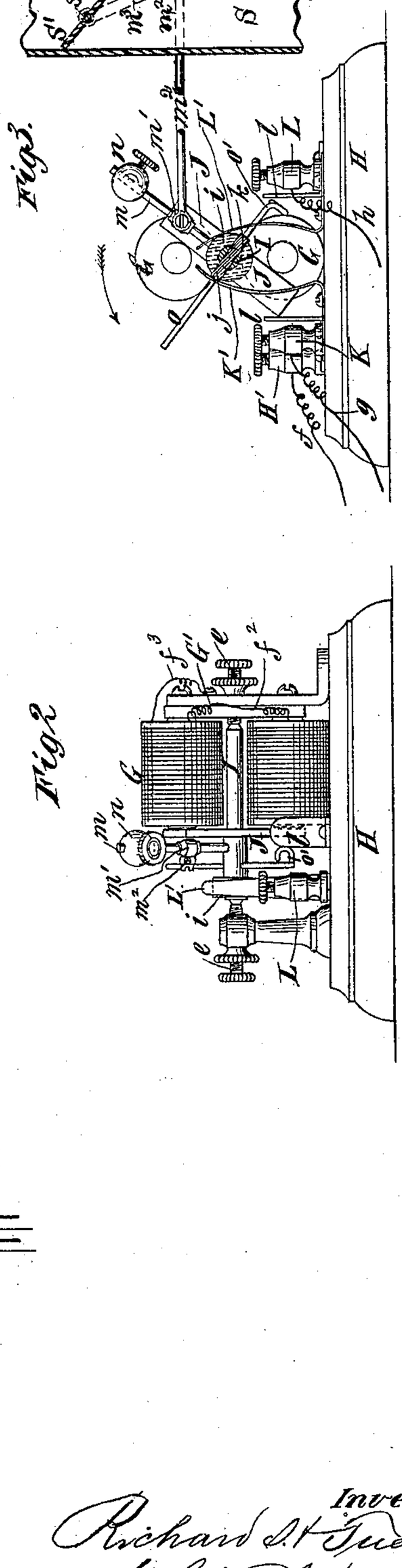

Fig 3.

Fig 2

Witnesses:
F. Haynes
Ed. Moran

Inventor:
Richard H. Tucker
by his Attorneys
Brown & Brown

UNITED STATES PATENT OFFICE.

RICHARD H. TUCKER, OF EAST ORANGE, NEW JERSEY.

ELECTRO-MAGNETIC REGULATOR.

SPECIFICATION forming part of Letters Patent No. 272,799, dated February 20, 1883.

Application filed September 18, 1882. (No model.)

To all whom it may concern:

Be it known that I, RICHARD H. TUCKER, of East Orange, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Electro-Magnetic Regulators, of which the following is a specification.

The principal object of my invention is to provide a simple and effective electro-magnetic regulator or electric motor for operating dampers or otherwise regulating the heat of furnaces of various kinds—such, for example, as furnaces for heating buildings, and for incubators or egg-hatching machines; but the invention may also be employed to regulate the flames of lamps, to open and close ventilators, to regulate or operate the valves or dampers of drying apparatus, and for other purposes.

In carrying out my invention I employ a thermostat, which acts to close one or the other of two electric circuits in which the motor is placed; and the invention consists in novel combinations of parts in the motor itself, which combinations are shown in the accompanying drawings.

In the drawings, Figure 1 represents a plan of my improved motor and a thermostat for use in connection therewith. Fig. 2 represents a side view of the motor alone; and Fig. 3 represents an end view of the motor, the shaft of the armature, and a circuit-changing device which is employed, being shown in section.

Similar letters of reference designate corresponding parts in all the figures.

A designates the base of the thermostat, and B the thermostat, which is secured in the post *a* at one end, and the other end of which is adapted to vibrate between contact-points *b c*, which are in electrical communication with the binding-posts C D. The thermostat is of course arranged in the place to be heated. E designates a small battery, the positive pole of which is connected by a conductor, *d*, with the binding-post F, and through said post with the thermostat B.

G designates an electro-magnet mounted upon the motor-stand H, and I designates a shaft, which is arranged in a position midway vertically between the coils of the magnet, and parallel therewith. This shaft has its bearings in screws *e*, and upon it is mounted an armature, J, which moves past the poles of the magnet, and so oscillates the shaft.

From the negative pole of the battery E a conductor, *f*, leads to a binding-post, H′, on the stand H, and from thence the current passes by a conductor, *f′*, to the lower coil of the magnet G, thence by a conductor, f^2, to the upper coil of the magnet, and thence by a conductor, f^3, to the post G′, which supports the magnet, and through it to the shaft I.

K L designate two binding-posts, which are connected by conductors *g h* with the binding-posts C D; and K′ L′ designate the two contact-springs which project from the binding-posts K L and bear upon a circuit-changing wheel, *i*, on the shaft I, which is provided with metallic contacts *j k*.

The oscillation of the shaft I and the movement of the armature J are limited by two stops, *l*, against one or the other of which the armature strikes, and when the armature is in either extreme position the circuit is closed from the spring K′ or L′, through the contact *j* or *k*, to the shaft I.

Upon the shaft I is mounted an arm, *m*, which is provided with a sliding collar, *m′*, adapted to be adjusted on said arm toward and from the shaft I, and to the collar *m′* is connected a rod, m^2, which extends to the damper, ventilator, or other article which it is the purpose of the motor to control.

In Fig. 3, I have shown a pipe or flue, S, which may be employed to conduct away the products of combustion from a furnace. In this pipe or flue is arranged a damper, S′, which is pivoted at *s*, and the rod m^2 is attached to an arm, m^3, fixed on said pivot. As the armature J moves, it operates the damper through the rod m^2 and arm m^3. Upon the arm *m* is also placed a weight, *n*, which is adapted to be adjusted on the arm toward and from the shaft I.

Through the shaft I is inserted a rod, *o*, and, if desired, the damper or other device to be controlled may be connected with the end *o′* of said rod, instead of being operated from the arm *m*.

The operation of my motor is as follows: Supposing that the armature is in the position shown in Figs. 1 and 3, the shaft I is in electrical communication with the spring K′ through the contact-piece *j*, as shown in Fig. 3. When the thermostat B comes in contact with the point *b*, it closes the circuit through the

conductor *g*, binding-post K, spring K′, contact *j*, shaft I, magnet G, and conductor *f*, to the battery. The armature J is then moved in the direction of the arrow, Fig. 3, until it is vertical and opposite the poles of the magnet, at which time the contact *j* leaves the spring K′ and the circuit is broken. The movement of the armature is then completed by the momentum, aided by the weight *n*, and the damper or the device which the motor controls is shifted. When the thermostat makes contact with the point *c*, it completes the circuit through the conductor *h*, binding-post L, spring L′, contact *k*, shaft I, magnets G, and conductor *f*, to the battery, and the armature and shaft are moved back to the position shown in Fig. 3.

The armature J and its stops *l* are so arranged that when the armature is at rest its opposite sides or edges barely touch the sides of the poles of the magnet, and thus a very long excursion of the armature is obtained. For example, if the armature is half an inch wide and the poles also half an inch in diameter, the movement of the armature would be about one and one-half inch.

By the use of two circuits—one to operate the armature in each direction—and the breaking of the circuits when the armature has made half its movement, the battery-power necessary is reduced to a minimum, and I am enabled to use the celebrated Leclanché battery, which is cleanly, requires no attention, and has every merit except constancy.

This motor is very desirable for the purpose intended, and as it is very simple and not liable to get out of order, it will operate for a great length of time without any attention.

An electro-magnet has been used in connection with a thermostat to release a clock-work apparatus from a detent, so that it will operate regulators or valves; but such an arrangement is objectionable because of the frequent winding of the clock-work required, and because of the liability of the apparatus to get out of order.

It may be remarked that in this regulator or motor the reciprocating motion is produced in both directions by a single magnet.

My improved motor may be used for operating the valves of any apparatus, the circuits being closed by a thermostat.

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

1. An electro-magnetic regulator comprising a magnet, an oscillating shaft arranged parallel with the coils of the magnet, an armature secured upon said shaft, and adapted to move past the poles of the magnet in both directions, and a circuit-breaking device upon said shaft, all combined so that the circuit through the magnet will be broken when the armature is in an approximately vertical position or opposite the poles, and the movement of the armature completed by gravity and momentum, and stops for limiting the movement of the armature in both directions, substantially as described.

2. The combination, with the thermostat and contact-points on opposite sides thereof, of a magnet, an oscillating shaft arranged parallel with the coils thereof, and carrying an armature adapted to move past the poles in both directions, the circuit-breaking device upon said shaft, and contact-springs connected with the contact-points of the thermostat, and adapted to break the circuit when the armature is in an approximately vertical position or opposite the poles of the magnet, a weight for completing the oscillating movement of the armature after the circuit is broken, and stops for limiting the movement of the armature in both directions, substantially as described.

3. The combination of the magnet G, the oscillating shaft I, the armature J, the contact-springs K′ L′, the contacts *j k* upon said shaft, a weight applied to said shaft for completing the oscillating movement of the armature in both directions, the stops *l l*, and the conductors, all arranged and adapted to operate substantially as described.

RICHARD H. TUCKER.

Witnesses:
HENRY T. BROWN,
FREDK. HAYNES.