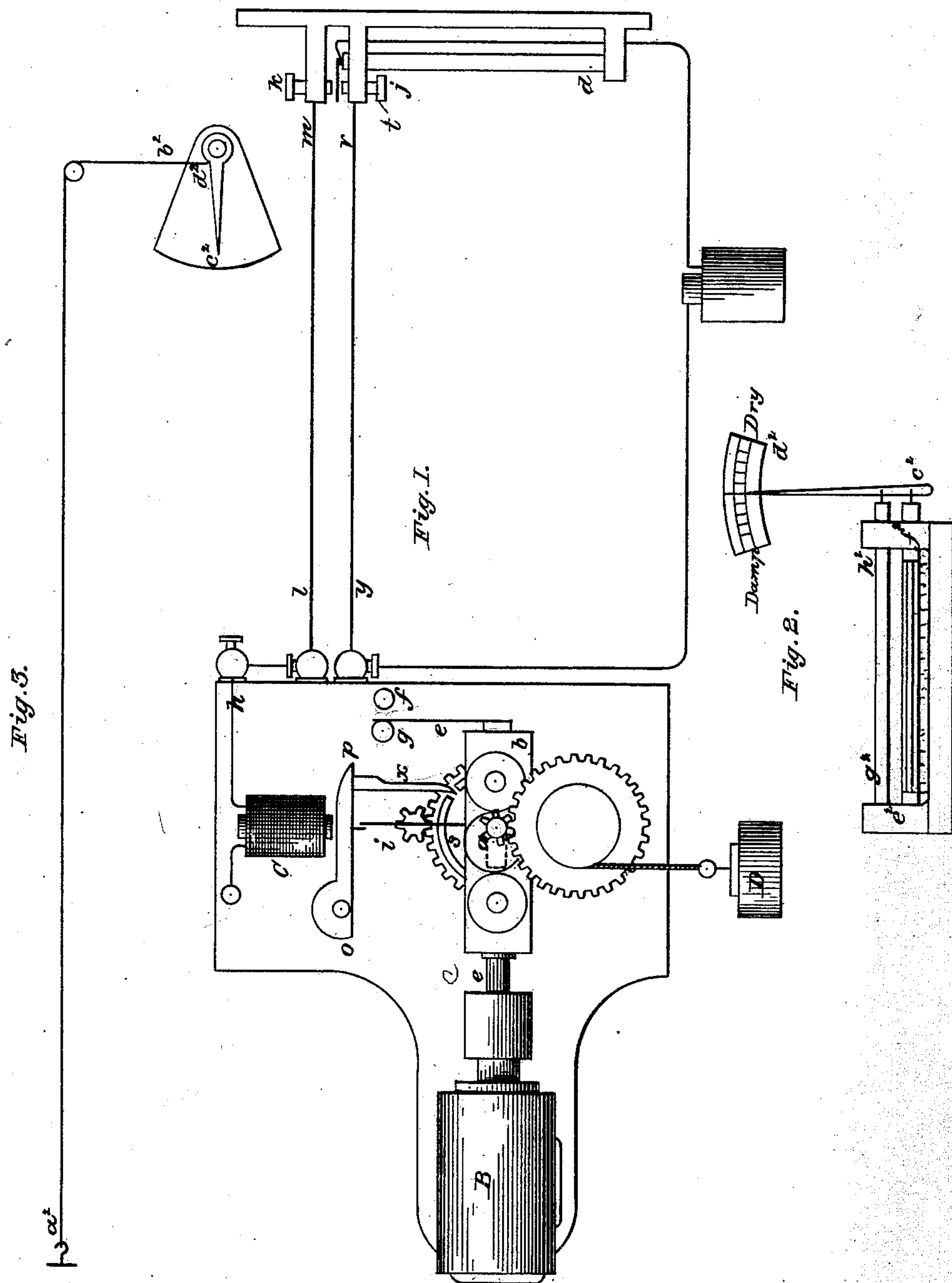


J. M. BRADFORD.
Electric Heat and Vapor Governor for Spinning and
Weaving Rooms.

No. 222,234.

Patented Dec. 2, 1879.



Attest:

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UNITED STATES PATENT OFFICE.

JULIEN M. BRADFORD, OF PORTLAND, MAINE, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO ZEBULON K. HARMON, OF SAME PLACE.

IMPROVEMENT IN ELECTRIC HEAT AND VAPOR GOVERNORS FOR SPINNING AND WEAVING ROOMS.

Specification forming part of Letters Patent No. **222,234**, dated December 2, 1879; application filed January 14, 1878.

To all whom it may concern:

Be it known that I, JULIEN M. BRADFORD, of Portland, county of Cumberland, and State of Maine, have invented an Electric Heat and Vapor Governor for Spinning and Weaving Rooms, of which the following is a specification.

The object of my invention is to control the temperature and moisture of the air of rooms.

The machine is designed particularly for spinning and weaving rooms, but may be used in many other rooms where the regulation of either temperature or moisture is necessary or desirable.

Figure 1 represents a side elevation of the governor. Fig. 2 represents a side elevation of a hygrometer. Fig. 3 represents another form of hygrometer in side elevation.

The valve situated at B, Fig. 1, controls the steam flowing from the boiler to the heating-coils; consequently when this valve is closed no steam enters the coils, and they do not heat the room. On the other hand, when this valve is open the steam enters the coils and heats the room. This valve is opened and closed by means of the eccentric *a*, to which the valve is connected by means of the rod *c b*. This eccentric, together with the rest of the train, derives its motive power from the weight D.

The rod *c b*, above mentioned, carries a metallic spring, *e*, which touches a metallic pin, *f*, when the valve is open, and a similar pin at *g* when the valve is closed. These two pins are insulated from the metallic plate to which they are attached and are joined to connecting-screws, which are also insulated from the plate. A third insulated connecting-screw is placed at *h*, and is connected to one wire of the temporary magnet C, the other wire of this magnet being connected to the metallic plate of the machine.

The thermometer is situated in the room to be heated, and consists of a rod of vulcanized rubber or metal, *d j*, one end of which is furnished with a metallic strip, which plays between the screws *t k*. These screws are adjusted according to the temperature wanted, and as long as this temperature is maintained the above-mentioned metallic strip will not touch either of the screws; but should the tem-

perature rise too high the expansion of the rod *d j* causes the screw *k* to be touched, which completes an electric circuit, and sends a current through the wire *l m*, thence through the spring *e*, thence to the magnet through the metallic plate of the machine, and back to the battery through the wire joined to the connecting-screw *h*. This current causes the magnet C to pull the armature *o p* toward it, and by this means the fly *i* is disengaged and the lever *r* is lifted from a slot in the wheel *s*. The train now moves until the wheel *s* has made half a revolution, at which time the lever *r* drops into a second slot in the wheel *s*, which causes the armature *o p* to catch the fly *i* and stop the train. The machine now remains at rest with the valve closed until the temperature of the room falls sufficiently to cause the thermometer to contract sufficiently to touch the screw *t*. As soon as this screw is touched a second current flows to the magnet through the wire *y v*. This causes the machine to start, open the valve, and stop again, as before.

By this arrangement the machine is always at rest, and the electric current always broken, excepting while the valve is being moved, thereby economizing the electrical and motive power to the greatest extent.

The electric circuit including the wire *l m*, I call the "closing-circuit," because its whole office is to cause the train to close the valve. The electric circuit including the wire *y v*, I call the "opening-circuit," because its whole office is to cause the train to open the valve.

When the apparatus is used to regulate the moisture of rooms, the valve B controls the steam supplying the vapor-jets, and a hygrometer controls the machine operating this valve.

An instrument operating in essentially the same manner as the wet-bulb hygrometer may be arranged to close the electric circuits which control the governor; but in this case it is absolutely necessary that the temperature of the room should remain uniform, because a rise of temperature is equivalent to a diminution of moisture, and a fall of temperature is equivalent to an increase of moisture.

The heat from the radiating-coils can be controlled by the governor, as shown at Fig. 1; but this does not wholly remove the difficulty,

because the steam injected into the room for the purpose of maintaining a proper degree of moisture sometimes diffuses its heat with greater facility than it does its moisture, and for this reason the temperature is unavoidably increased at the same time that the air is being moistened. For this reason the vapor-governor should work in accordance with some form of hygrometer which will give a direct indication as to the dryness or moisture of the air without special reference to the temperature of the room.

An instrument substantially fulfilling the above conditions is shown in Fig. 2. It comprises a thermometer and hygrometer united in such a manner that the disturbing influence of temperature may, in a great measure, be controlled.

$e^2 f^2$ represent a rod of hard rubber or metal, which is kept wet by a piece of cloth, by which it is enveloped. $g^2 h^2$ is a second rod of similar material. Both of these rods are joined to the lever $c^2 d^2$. If both of the rods $g^2 h^2$ and $e^2 f^2$ expand or contract in the same measure at the same time the end of the lever $c^2 d^2$ is not much moved; but if one of the rods move while the other remains stationary, or if one expand while the other contracts, the end of the lever $c^2 d^2$ makes a sensible movement to the right or left, according to the movement of the rods.

A simpler form of hygrometer which may be substituted for the one last described is represented at Fig. 3. It consists of a line of cat-gut or light cotton cord, $a^2 b^2$, which moves the lever $c^2 d^2$ when the dryness or humidity of the air causes the line $a^2 b^2$ to contract or expand.

The lever $c^2 d^2$, belonging to both forms of hygrometer above described, closes the circuits for the machine when it is used as a vapor-governor in the same manner as the thermometer closes the circuits when the apparatus is used as a heat-governor.

Having thus described my invention, I claim as new and desire to protect by Letters Patent—

1. The combination of a thermometer, closing-circuit, spring e , magnet C , armature $o p$, with a train for closing a valve, operating in the manner and for the purpose substantially as described.

2. The combination of a thermometer, opening-circuit, spring e , magnet O , armature $o p$, with a train for opening a valve, operating in the manner and for the purpose substantially as described.

JULIEN M. BRADFORD.

Witnesses:

H. A. HARMON,
Z. K. HARMON.