

W. H. GERRISH.
DRAFT-REGULATOR.

No. 178,138.

Patented May 30, 1876.

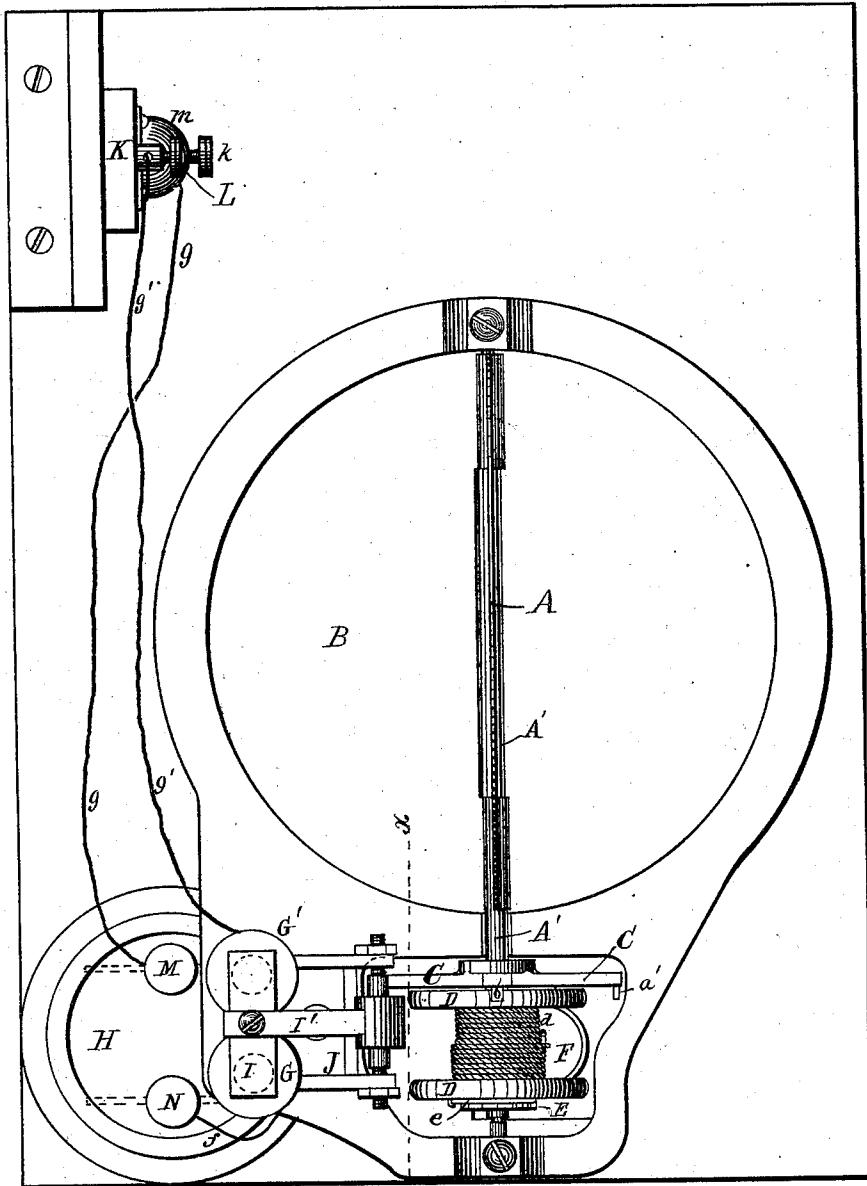


Fig. 1

Witnesses.

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E. A. Hemmenway

Inventor.

Wm H. Gerrish

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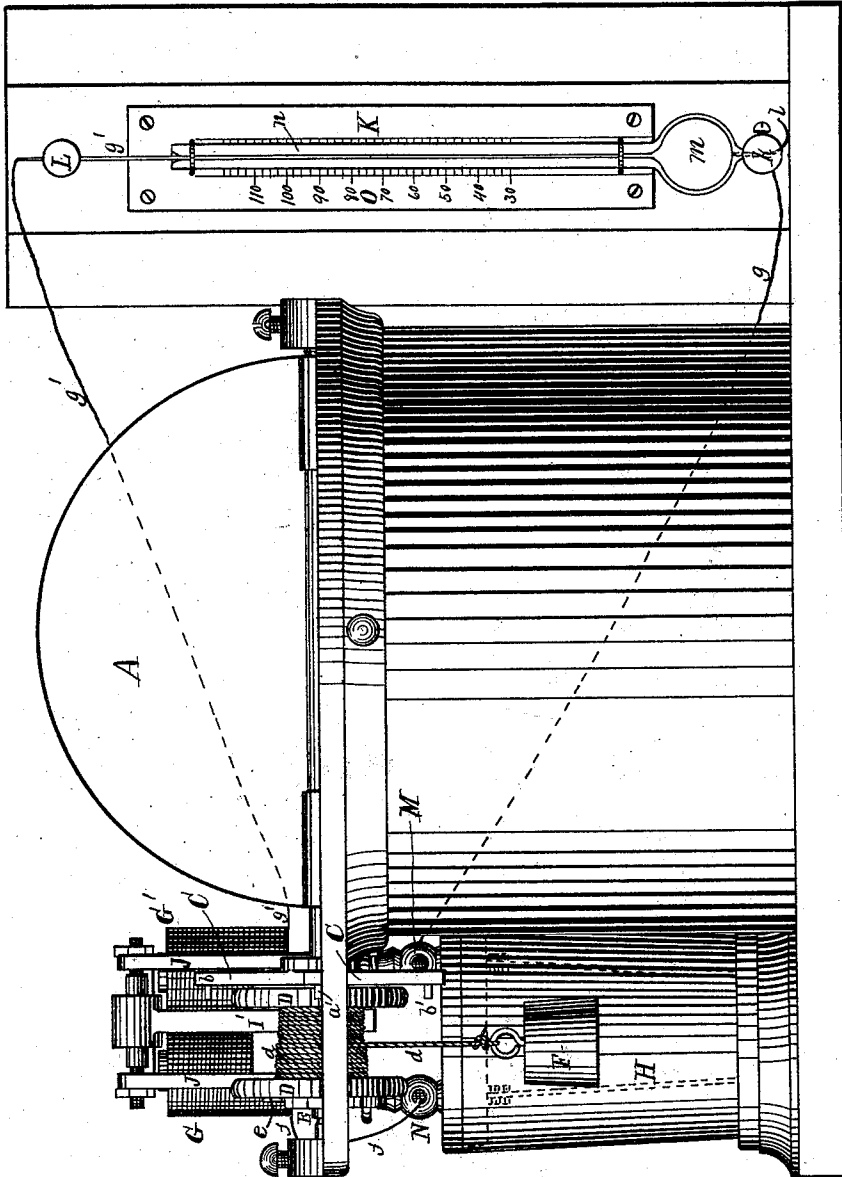


Fig. 2.

Witnesses

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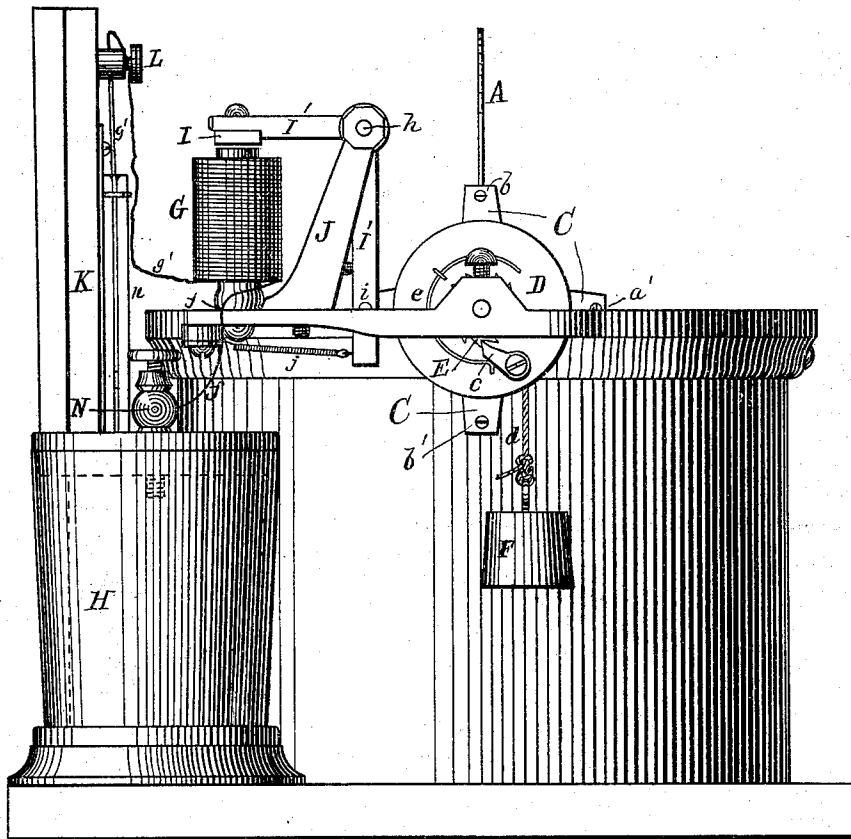


Fig. 3

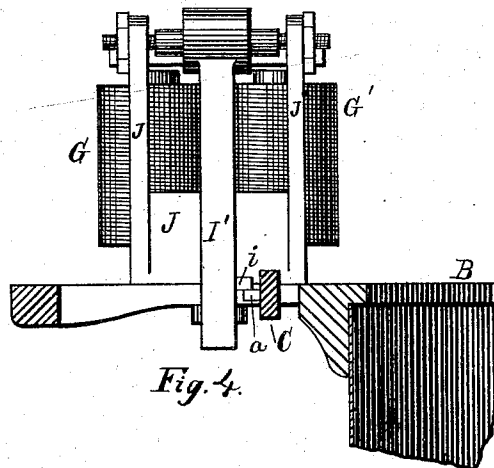


Fig. 4.

Witnesses.

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C. A. Kemmenway

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UNITED STATES PATENT OFFICE.

WILLIAM H. GERRISH, OF BOSTON, ASSIGNOR OF ONE-HALF HIS RIGHT TO
GEORGE F. FAY, OF FITCHBURG, MASSACHUSETTS.

IMPROVEMENT IN DRAFT-REGULATORS.

Specification forming part of Letters Patent No. 178,138, dated May 30, 1876; application filed
April 13, 1876.

To all whom it may concern:

Be it known that I, WILLIAM H. GERRISH, of Boston, in the county of Suffolk, and State of Massachusetts, have invented certain new and useful Improvements in Draft-Regulators for Hot-Air Furnaces and other Heating Apparatus, of which the following, taken in connection with the accompanying drawings, is a specification:

My invention relates to a device for automatically controlling the draft of a furnace or other heating apparatus; and it consists, first, in the use, in combination with a damper placed in the smoke-pipe, in an opening leading to the ash-pit, and adapted to supply air to increase the combustion, or in an opening leading to the combustion-chamber or the smoke-pipe, and adapted to admit cold air above the burning fuel to check the combustion, of an electro-magnet, a battery for charging said magnet, and a thermometer placed in the room the temperature of which it is desired to regulate, and adapted to close or break the electric circuit by the rise and fall of the mercury in its tube, all so arranged and connected to the damper that the closing or breaking of the circuit will cause the damper to be opened or closed, according as the temperature of the room falls below or rises to a given height.

My invention further consists in the use of an ordinary disk-damper mounted, by a central-axis, in a pipe or opening in such a manner that it may be revolved freely therein, and provided with a drum or pulley mounted on or connected with its axis, upon which is wound a cord or other flexible connection, to the outer end of which is suspended a weight of sufficient capacity to rotate said damper when released, and an automatically-operated stop, to hold said damper in its proper position either open or closed, and to release it to allow the weight to act, to close or open it when the temperature of the room rises too high or falls too low.

My invention further consists in the use of a stop-pin attached to or operated by the armature of the magnet, in combination with four similar pins set in the radial face of a wheel or spider mounted on the damper-shaft,

and so arranged relative to the axis around which they revolve, and the pin attached to or operated by the armature, that when the armature is attracted by the magnet its stop-pin will intercept one of said pins in its movement around its axis of motion, and retain the damper in a fixed position, either open or closed, according to the location and purpose of the damper, and when the circuit is broken and the armature recedes from the magnet its pin will release the weight, and allow it to act to rotate the damper, and be moved into a position to intercept the next pin when the damper has moved through an arc of ninety degrees, or from a closed to a wide-open position, or vice versa.

My invention further consists in the combination, with a damper adapted to be successively opened and closed by intermittent movements about its axis in the same direction, of a drum or pulley mounted loosely upon its shaft or on a shaft connected thereto by gears, or otherwise, and adapted to revolve freely thereon in one direction, and to be connected thereto, and cause said shaft to revolve with it when revolved in the reverse direction, and a weight connected to said drum by a cord or other flexible connection, and adapted to rotate said drum and the damper by its descent and to be wound up when run down by revolving said drum upon the shaft while the damper and its shaft remain in a state of rest.

My invention further consists in the use, in combination with a damper and suitable electro-magnetic apparatus for controlling the opening and closing of the same, of a thermometer, provided with an adjustable metallic wire or rod inserted in the upper end of its tube, all so arranged that the circuit may be closed at any desired temperature, as will be described.

Figure 1 of the drawings is a plan of an apparatus illustrating my invention. Fig. 2 is a side elevation; Fig. 3, an end elevation; Fig. 4, a section on line *xx* on Fig. 1.

A is a damper secured by its middle to the shaft A', and adapted to close the opening B, which may communicate with the ash-pit to supply air to feed the combustion, or with the space above the fire, or between it and the

chimney, to admit cold air to check the combustion, or it may represent a section of the smoke-pipe, in which case the draft is checked by shutting off communication between the chimney and the combustion-chamber, or obstructing the flue.

C is a four-armed spider, secured firmly to the shaft A' so as to revolve therewith, in the outer extremities of the arms of which are set the four pins *a a' b* and *b'* so as to project therefrom parallel to the axis of the damper, the pins *a* and *a'* being inserted in the outer end of opposite arms and equidistant from their axis of motion so that they revolve about the axis of the damper in the same path. The pins *b* and *b'* are similarly set in opposite arms, but somewhat nearer the axis of the damper than the pins *a* and *a'*, so that they revolve in a different path than that through which the pins *a* and *a'* move.

D is a drum or pulley fitted loosely to the shaft A' and provided with a pawl, *c*, pivoted to one of its heads or flanges, and adapted to engage with the teeth of the ratchet E, which is firmly secured to the shaft A' in such a manner that the drum D may revolve freely on the shaft A', but if revolved in the other direction the shaft A' and the damper A must revolve with it.

F is a weight suspended by the cord *d* from the drum D, upon which said cord is wound by revolving the drum D upon the shaft A' in the direction permitted by the pawl *c* when engaged with the ratchet-wheel E, with which it is kept in contact by the spring *e*.

G and G' are the two coils of an electro-magnet placed in convenient proximity to the spider C and connected by wires *f*, *g*, and *g'* to the opposite poles of a battery, H, which may be located in any convenient place in the cellar or up stairs.

I is the armature attached to the end of the lever I', which is pivoted at *h* to the stand J.

The lever I' in the case illustrated is an elbow-lever pivoted at the elbow, and has set in the lower end of its vertical arm the stop-pin *i* in such a position as to intercept and engage with the pins *a* and *a'* as they move about the axis of the damper when the armature is retracted from the magnet, or to engage in like manner with the pins *b* and *b'* when the armature is in contact with the cores of the magnet, the spring *j* serving to move the armature I away from the magnet when the circuit is broken.

It is obvious that the armature I and the stop-pin *i* might be attached to the same arm of the lever I', and by placing the magnet in a horizontal position, the pin *i* would bear the same relative position to the pins *a a' b* and *b'* as it does now.

The wire *g* leading from the screw-cup M of the battery connects, by means of the screw-cup *k*, with the wire *l* blown into the bulb *m* of the thermometer K in such a manner that its inner end is in contact with the mercury contained in the bulb.

L is a screw-cup placed above the tube *n* of the thermometer K, and having secured therein the wire *g'*, one end of which extends downward therefrom into the tube of the thermometer, and the other end is secured to the coil G' of the magnet.

The wire *f*, leading from the coil G of the magnet, connects with the screw-cup N of the battery. The wire *g'* is so connected to the screw-cup L that it may be adjusted therein to set its lower end at any desired degree on the graduated scale O, thereby determining the degree of temperature at which the electric circuit will be closed and the damper operated to check the draft.

The thermometer K is placed in the room to be heated, and the rising and falling of the mercury in its tube, caused by an increase or reduction of the temperature in the room, automatically causes the desired operation of the damper to increase or retard the draft without further attention from any person than to keep the furnace supplied with fuel.

I do not claim, broadly, a thermometer adapted to automatically break and close an electric circuit, as I am aware that such a device has been used before; but

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with a furnace or other heating apparatus, provided with a damper adapted to control or regulate the draft thereof, an electro-magnet, a battery, suitable connecting-wires, and a thermometer placed in the room to be heated, and within the electric circuit, and adapted to close and break said circuit by the rise and fall of the mercury in its tube, all arranged and connected with the damper, as described, so that the closing or breaking of the circuit will cause the damper to be opened or closed, according as the temperature of the room falls below or rises to a given height, substantially as described.

2. The damper A, mounted upon a central shaft in the passage B, the drum or pulley D, weight F suspended therefrom by the cord *d*, and an automatically-operated stop, adapted to alternately release the damper to allow the weight to descend and rotate it, and to check it again, all combined, arranged, and adapted to operate as and for the purpose described.

3. The combination, in a heat-regulator, of the damper A, mounted upon a central shaft, and adapted to be automatically rotated, the pins *a*, *a'*, *b*, and *b'*, attached to and adapted to rotate with said damper-shaft, but in two different circular paths, as set forth, and the stop-pin *i* attached to or connected with the armature of an electro-magnet, and to be operated thereby to alternately intercept and release the pins *a*, *a'*, *b*, and *b'*, as and for the purposes described.

4. In combination with a damper adapted to be opened and closed successively by a movement about its axis in the same direc-

tion, a drum or pulley connected therewith, and adapted to revolve freely in one direction without revolving the damper, and to cause the damper to move therewith and be opened or closed when revolved in the other direction, and a weight connected to said drum by a cord or other flexible connection wound thereon, and adapted to rotate said drum and the damper by its descent, and to be wound up, when run down, by revolving the drum without moving the damper, as and for the purposes described.

5. In combination with the damper of a heating apparatus, an electro-magnet and a

battery connected thereto and adapted to control the movements of said damper, a thermometer provided with an adjustable metallic wire or rod inserted in the upper portion of its tube, and adapted to vary the degree of temperature at which the circuit will be closed or broken, as and for the purposes described.

Executed at Boston, Massachusetts, this 11th day of April, 1876.

WM. H. GERRISH.

Witnesses:

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E. A. HEMMENWAY.