

W. S. HILL.  
Heat-Regulator.

No. 167,611

Patented Sept. 14, 1875.

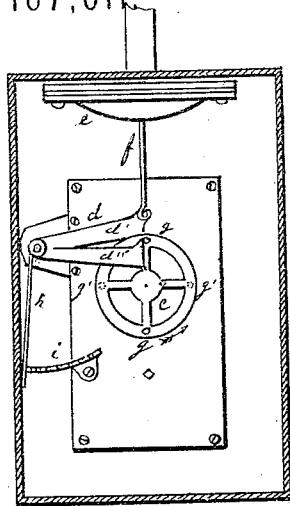


Fig. 1.

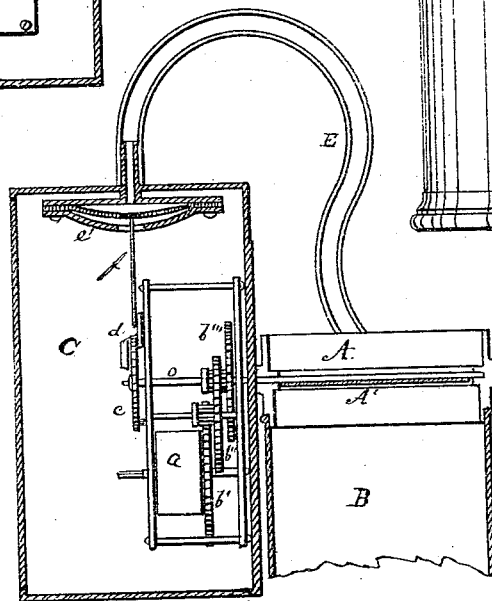
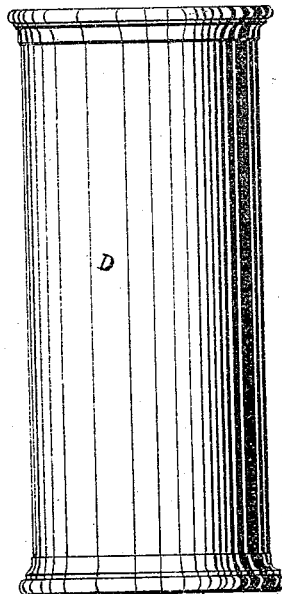


Fig. 2.

W. S. Hill, Inventor.

J. P. Deane  
Robt W. Lord. } Witnessed.

# UNITED STATES PATENT OFFICE

WARREN S. HILL, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN HEAT-REGULATORS.

Specification forming part of Letters Patent No. 167,611, dated September 14, 1875; application filed February 18, 1875.

*To all whom it may concern:*

Be it known that I, WARREN S. HILL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Heat-Regulators, of which the following is a specification:

This invention relates to certain improvements in heat-regulators, whereby the heat of any given room may be made to control the draft of the stove or furnace by closing the draft-valve when the temperature has reached the required height, and opening the same when the temperature has fallen a few degrees; and consists of a draft-valve through which the air going to supply combustion passes, operated by mechanism which may be moved by a weight or spring, with suitable gearing, which is held in check by a pawl and ratchet-wheel. The pawl is connected with a flexible diaphragm so that a movement in one direction releases the pinion-wheel, and allows the valve to turn one-quarter of a revolution, which, if closed, will change its position to that of open, and when the movement is in the opposite direction the change will be from open to shut. Connected with the drum of the diaphragm, by means of a tube of rubber or other material, and at any required distance from it, is an air-chamber, which may be made of tin or other material, in which is confined a body of air having no outlet except through the tube against the flexible diaphragm. When the temperature of the air in the air-chamber is raised, it expands and presses against the diaphragm, causing it to move outward. This moves the pawl, causing it to release the ratchet-wheel when the valve is turned enough to carry it from the position of open to shut, when it is again caught and held by another arm of the pawl. This position will be kept until the temperature of the air in the air-chamber is reduced, when the diaphragm and pawl will resume their former position and the valve will again turn from shut to open. The fire will, of course, burn freely when the draft-valve is open, and lie dormant when it is closed. In the case of a room warmed by a furnace in the cellar, the valve and its mechanism may be placed in close proximity to the furnace, while the air-chamber may be in the room above, and the temperature of the room will

regulate the draft of the furnace automatically, the only attention required being to put on fresh fuel, and to remove the ashes.

In the drawing, A represents a cylinder or ring, which forms the bearings for the shaft of the valve, and in which it revolves. A' is the valve in the position it occupies when closed. B shows a section of the pipe by which the valve is connected with the furnace. C is the case containing the mechanism to operate the valve, which consists of the spring *a*, gears *b' b'' b'''*, the ratchet-wheel *c*, pawl *d*, diaphragm *e*, and connection *f*, and is fastened to a flange projecting from the side of the ring A. D is the air-chamber, and E the tube connecting it with the diaphragm *e*. In Fig. 1, *h* is a spring attached to the end of the pawl *d*, the tension of which is made to balance the weight of the pawl *d*. Its tension can be increased or lessened by moving it to the right or left, it being held in place by notches in the curved piece *i*.

To put the mechanism in operation, the spring is put in tension by winding the same as a clock. This, acting through the medium of the gears *b' b'' b'''*, causes the valve-rod *o* to revolve in the ratchet-wheel *c*. Placed equidistant around its circumference are four pins, each alternate pin projecting on alternate sides of the ratchet-wheel *c*. These are shown at *g g* and dotted lines *g' g'*, in Fig. 1. The pawl *d* has two arms, one above the other, and whose ends diverge so that one of the arms occupy either side of the ratchet-wheel *c*. Supposing the air in the chamber D to be contracted, or cold, there will no pressure on the diaphragm, and the pawl will be carried to its highest point. The shaft *o* will now revolve until one of the pins *g* comes against the arm *d'* of the pawl *d*. The valve, being placed on the shaft *o*, so as to stand perpendicular with the ring at this point, is now open. By raising the temperature of the air in the chamber D, it will expand and cause the diaphragm *e* to move outward, carrying the pawl *d* to its lowest point. This will cause it to release its hold of the pin *g*, when the shaft will again revolve until the pin *g'* is brought against the arm *d''* of the pawl, and the valve will now be closed. By this arrangement it will be seen that the valve will always be open when the air in the

chamber D is contracted, and be closed when it is expanded. The point of its operation being determined by the temperature of the air when the chamber D is connected with the diaphragm *e*. It has been determined by experiment that a change of three degrees is sufficient for its operation.

I am aware that other devices have been used employing a valve of similar construction to the one I have described, and in which the air-chamber and diaphragm are used to act directly to give motion to the valve, but I claim that my invention is distinct from these, inasmuch as I employ an independent power to give motion to the valve, which may be augmented to any extent, and whose movement is only controlled by the air-chamber and diaphragm, and that in this I use a familiar device for a new purpose.

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

1. The pawl *d*, in combination with the ratchet-wheel *c*, provided with pins *g g* and *g' g'*, and shaft *o*, operated by spring *a*, in the manner and for the purpose specified.

2. The combination of the adjustable spring *h*, the pawl *d*, and the diaphragm *e*, operating in connection with a heat regulating device, in the manner and for the purpose specified.

3. The combination of the air-chamber D and diaphragm *e*, with the pawl *d*, and the ratchet-wheel *c*, operating in the manner and for the purpose specified.

WARREN S. HILL.

Witnesses:

JAS. B. BELL,  
ROBT. W. LORD.