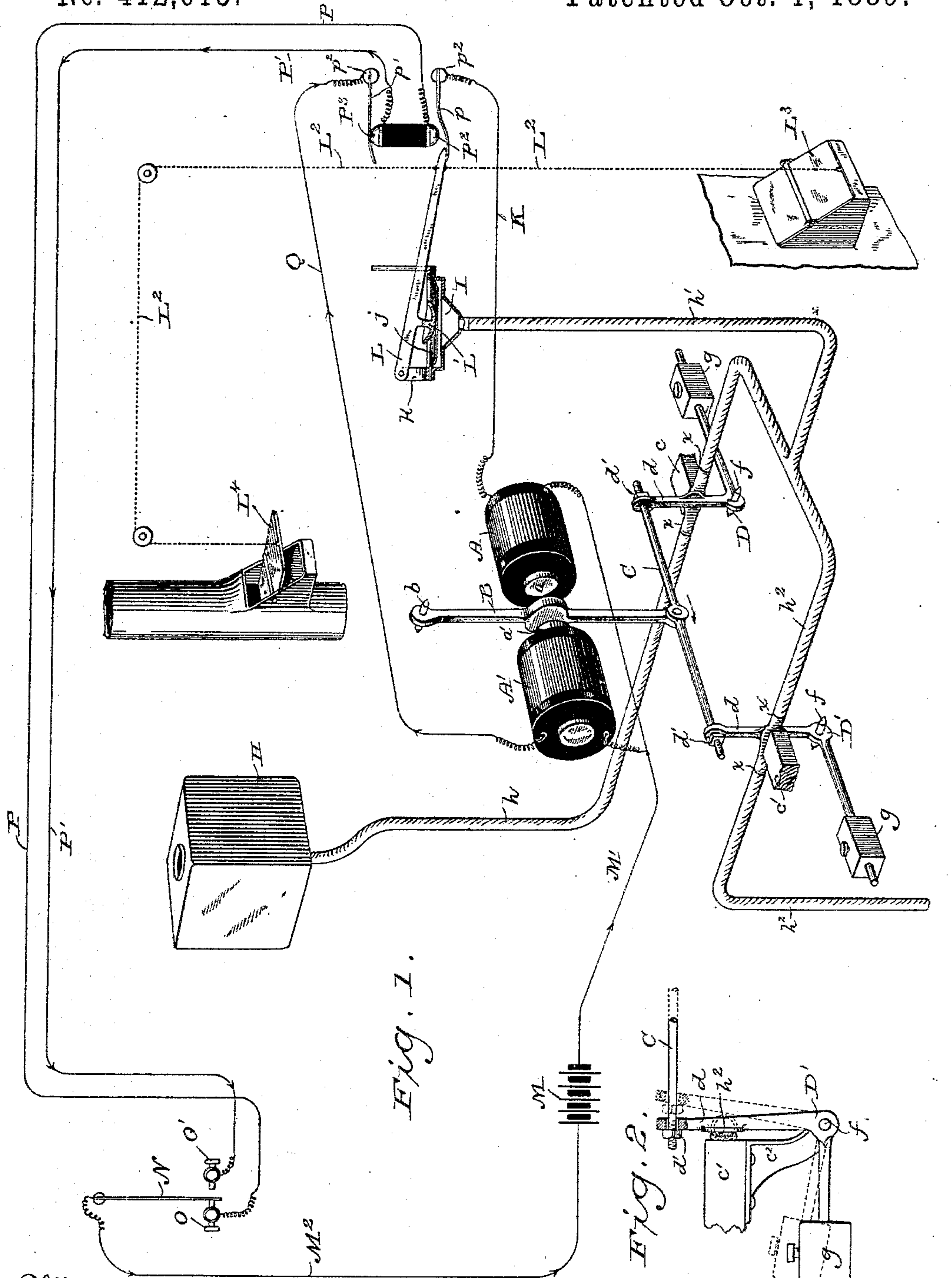


(No Model.)

E. W. BEEBE.
TEMPERATURE REGULATOR.

No. 412,013.

Patented Oct. 1, 1889.



Witnesses
Geo. W. Young
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UNITED STATES PATENT OFFICE.

EUGENE W. BEEBE, OF MILWAUKEE, WISCONSIN.

TEMPERATURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 412,013, dated October 1, 1889.

Application filed April 3, 1888. Serial No. 269,427. (No model.)

To all whom it may concern:

Be it known that I, EUGENE W. BEEBE, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Temperature-Regulators; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to devices for automatically regulating the supply of heated air or steam to a room or building, and will be fully described hereinafter.

In the drawings, Figure 1 is an elevation of my invention, showing all the connections; and Fig. 2 is a detail.

A A' are the spools of electro-magnets.

B is an armature-lever, which is hung by a pivot *b* between the adjacent ends of the cores *a a'* of the magnets, and to the lower end of this armature is hung a rod C, one end of which passes through the upper end of the vertical arm *d* of a bell-crank lever D and the other end through a similar vertical arm *d'* of a like bell-crank lever D'. These bell-crank levers D and D' are each formed with pivot-pins *f*, that are supported by brackets *c²*, that depend from arms *c c'* of the frame of the apparatus, and the horizontal arm of each lever carries an adjustable weight *g*.

The two arms *c c'* may be supported by the frame of my apparatus or by some portion of a furnace, and to one of these arms *c* is hung by wires or other suitable securing device (not shown) a pipe *h*, that leads from a reservoir H, containing water or compressed air, or other fluid under pressure, and this pipe has two branches, one of which *h'* (which I term the "supply" branch) leads to an air or water chamber I, that is covered by a diaphragm or movable wall *j*, and has an arm *k*, to which is pivoted a lever L, having a head L' for contact with the movable wall, and connected at its free end by a cord or chain L² with the dampers L³ L⁴ of the furnaces. The other branch *h²* (which I term the "exhaust" branch) of pipe *h* is supported by another arm *c'* at a point opposite arm *c*, and thence leads to the open air. While the pipe *h* and its branches may be made of flexible material throughout the entire length, it is only necessary for the purposes of my invention to be

flexible at points between the lines *x x*—that is, between the vertical arm *d* of lever D and arm *c* on one side and between the like arm of lever D' and arm *c'* on the other—and normally both the pipe *h* and branch *h²* are closed by the compression of the arms *d d'* against the arms *c c'*, caused by the weights *g g* described.

The ends of rod C slide loosely in arms *d d'*, and the latter are held on rod C by nuts *d' d'*, that may be adjusted to draw arms *d d'* toward each other or to permit them to separate.

M is the battery, which is connected to the spools of the magnets by wire M' (though normally out of circuit therewith) and with the thermostat N by wire M², and the two contact-screws O O' of the thermostat are connected by wires P P' with binding-posts P² P³, respectively. Contact-springs *p p'* are secured to the frame or furnace, each by a post *p²*, and one of these springs *p* extends under the contact-post P², while the other overhangs post P³, (which contact-posts P² P³ are insulated from each other,) and the end of the long arm of lever L projects in between the two springs and in position to strike either one of them and carry it away from its binding-post when it is lifted or dropped by the diaphragm or movable wall *j*.

The operation of my device is as follows: As the parts are shown in Fig. 1 the front furnace-damper L³ or draft has been closed and the ventilating-damper L⁴ opened and the room is being allowed to cool, and this continues until the temperature falls below the minimum for which the thermostat is set, with the battery entirely out of circuit. Now, when this occurs the thermostat N will be warped over to binding-screw O', when the battery will be thrown in circuit through wire P', post P³, spring *p'*, wire Q, spool A', and wire M' back to battery, the current energizing the core of spool A', which, acting on armature-lever B, will draw it and rod C in the direction indicated by the arrow. The rod C by drawing on arm *d* of lever D will overcome the resistance of weight *g* and draw said arm *d* away from pipe *h*, relieving it of compression and permitting water or air to flow from reservoir H to the air-chamber I, which, by pressure on the diaphragm *j*, will

cause it to lift lever L, which, as it rises, will open damper L³ and permit damper L⁴ to close, and at the same time release spring *p*, and then lift spring *p'* out of contact, so as to cut out the battery, thus de-energizing the core of spool A' and releasing the arm of lever D to permit its weight to press it against pipe *h* and close it, when the parts become stationary and will remain so until the thermostat again makes contact with screw O, whereupon circuit will be made through wire P, spring *p*, wire K, spool A, and wire M' back to battery, energizing the core of spool A, which, attracting armature-lever B, will draw the arm *d* of lever D' out of contact with the branch *h*² of pipe *h*, thus opening it to permit water or air to flow through it out of chamber I, which, as it empties, will permit the lever L to drop until it strikes spring *p* and breaks contact, when the core of spool A, being de-energized, will permit armature-lever B to resume a perpendicular, and the weight *g* of lever D' will draw the arm *d* back to compress branch *h*² and close it.

If found more convenient in any given case, there may be a separate armature-lever for each magnet, it being only essential that each of the magnets shall be located adjacent to an armature-lever.

In practice the weight *g* of each lever D or D' is so adjusted on the horizontal arm of its lever as to give to its vertical arm just sufficient pressure to enable it to tightly close the pipe adjacent to it when the magnets are de-energized and no more, and hence that magnet which is energized by change of temperature has no superfluous work to do and need not be as large as those generally required in regulating.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a temperature-regulator, of a reservoir containing water or fluid under pressure, a pipe leading therefrom having supply and exhaust branches, an armature-lever, and weighted levers connected thereto for keeping these pipes normally closed, an expansion-chamber connected to the supply branch and having a lever connected to the dampers of a furnace, a pair of magnets, each located adjacent to the armature-lever, and a battery wired to but normally out of circuit therewith, a thermostat wired to the battery, contact-points located on each side of the thermostat and wired to contact-posts adjacent to the lever on the expansion-chamber, and circuit making and breaking springs located adjacent to said contact-posts and wired to the said magnets.

2. The combination, in a temperature-regulator, of a reservoir containing water or fluid under pressure, a pipe leading therefrom having supply and exhaust branches, said pipe

and branches being compressible at certain points, a pair of magnets, a battery wired to but normally out of circuit therewith, an armature-lever depending between the said magnets, a rod hung to the lower end of said armature-lever, a weighted bell-crank lever suspended from each end of said rod opposite the compressible points of the said pipe and branches, an expansion-chamber at the end of the supply branch, a lever pivoted to said chamber and having a head bearing against the movable wall thereof, and cords or chains at its free end connected to the dampers of a furnace, a thermostat wired to the battery, contact-points located on each side of the thermostat and wired to contact-posts adjacent to the lever on the expansion-chamber, and circuit making and breaking springs located adjacent to said contact-posts and wired to the said magnets.

3. The combination, with a reservoir and expansion-chamber, and a lever operated by the expansion-chamber and connected with a damper, of a flexible connection between said reservoir and expansion-chamber, and a flexible drain-pipe for said chamber, a thermostat and magnets wired thereto, a lever suspended between said magnets, and a lever connected with the armature-lever at one end and carrying an adjustable weight on its other end, and arms supporting the branches in position to be normally compressed by the bell-crank lever.

4. The combination, with the reservoir and expansion-chamber and drain and supply pipe, of a thermostat and electro-magnets wired thereto, a swinging armature hung between the magnets, a pair of levers having weights on one end and connected with the armature-levers at their other end, and arms supporting the pipes in position to be compressed by the last-named levers, substantially as described.

5. The combination, in a heat-regulator, of a fluid-reservoir, a flexible pipe leading therefrom, an expansion-chamber connected with said reservoir by said flexible pipe, a lever connecting the expansion-chamber with a damper or valve, a flexible drain-pipe leading from said expansion-chamber, levers adapted for compressing both flexible pipes, and a thermostat and electro-magnets in circuit, and an armature-lever connected with the compressing-levers and controlling them, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

EUGENE W. BEEBE.

Witnesses:

H. G. UNDERWOOD,
N. E. OLIPHANT.