(No Model.) 3 Sheets—Sheet 1.

W. E. FACER.

ELECTRIC REGULATOR FOR DAMPERS.

No. 332,066. Patented Dec. 8, 1885.

Fig. 1.

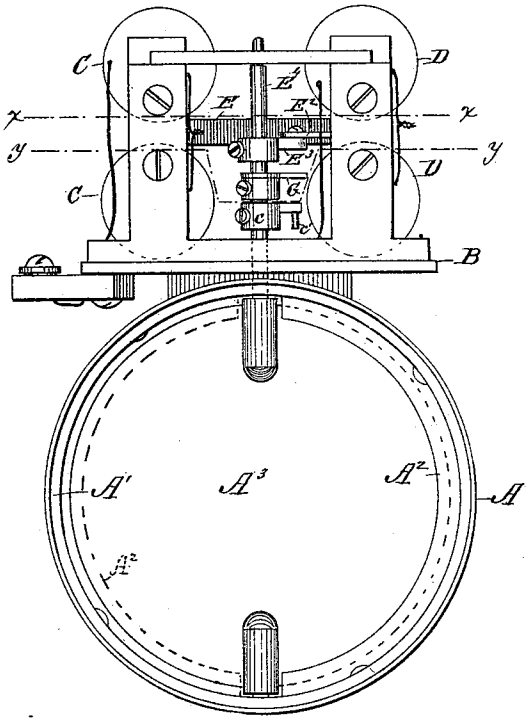
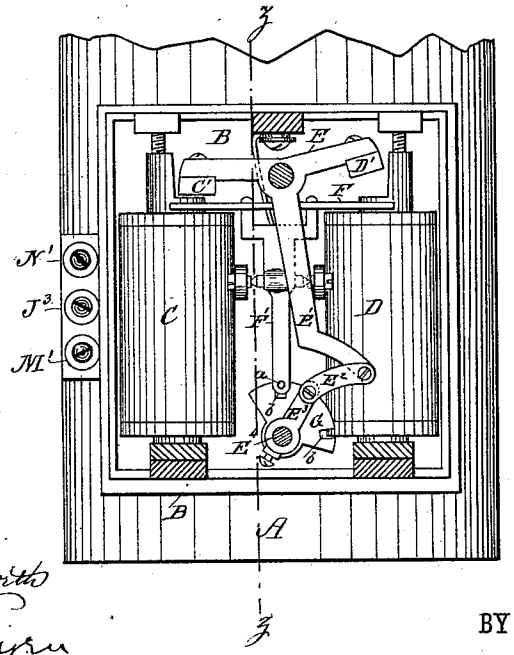


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

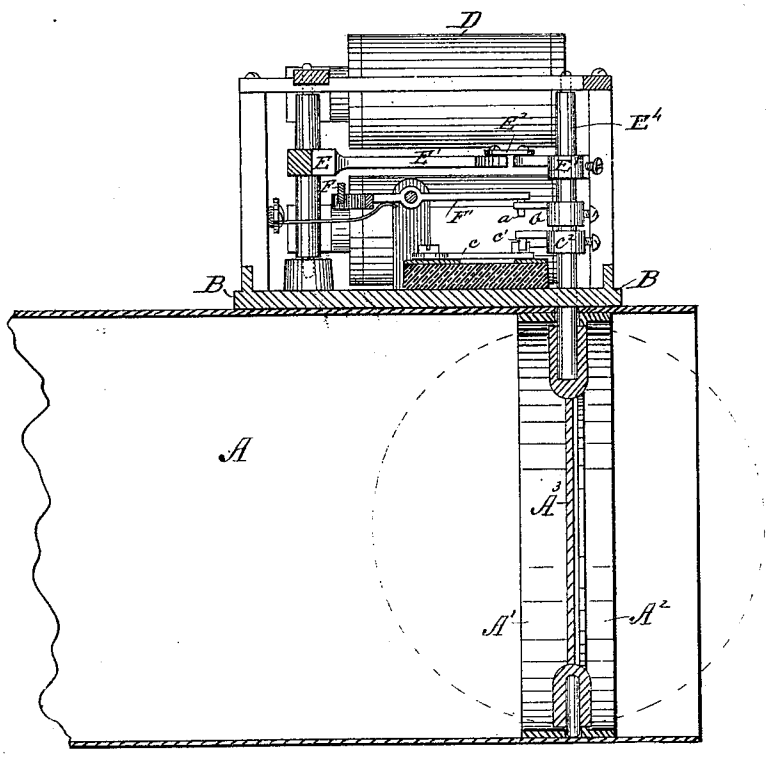
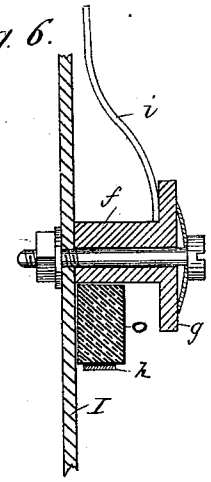


Fig. 6.



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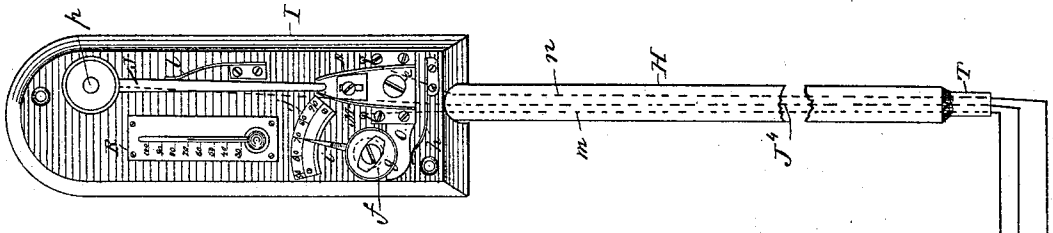


Fig. 5.

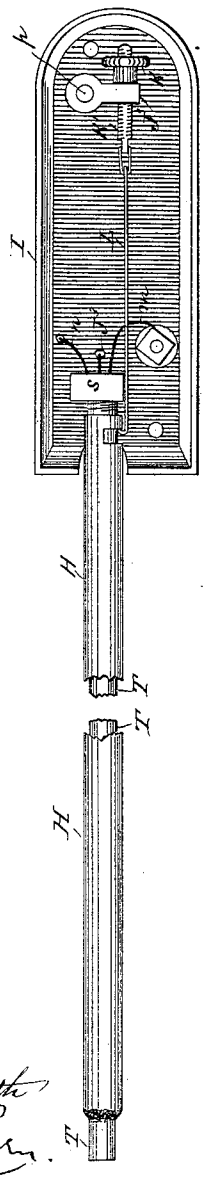
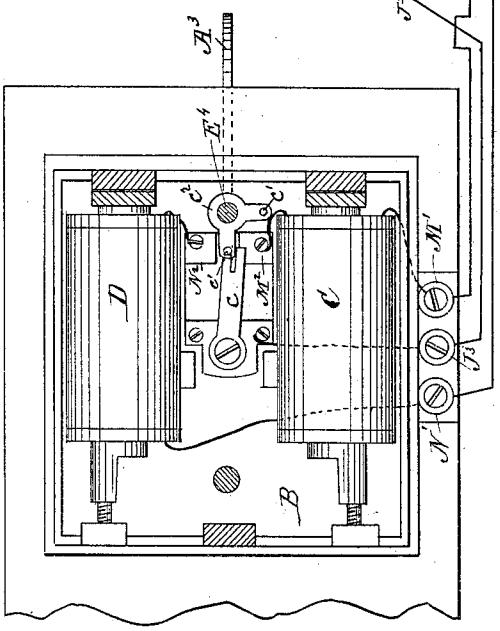


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILSON E. FACER, OF CLEVELAND, OHIO, ASSIGNOR TO HIMSELF, THOMAS MALLEY, AND PATRICK MALLEY, OF SAME PLACE.

ELECTRIC REGULATOR FOR DAMPERS.

SPECIFICATION forming part of Letters Patent No. 332,066, dated December 8, 1885.

Application filed July 14, 1885. Serial No. 171,647. (No model.)

To all whom it may concern:

Be it known that I, WILSON E. FACER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Electric Damper-Regulators; and I do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

Figure 1 is an end elevation of the damper mechanism. Fig. 2 is a sectional plan view through the line *x x* of Fig. 1. Fig. 3 is a vertical section through the line *z z* of Fig. 2. Fig. 4 is a rear view of the thermostat. Fig. 5 is a front view of the thermostat and a sectional plan of the damper mechanism through line *y y* of Fig. 1, showing the electrical connections. Fig. 6 is a sectional detail of the adjusting mechanism of the thermostat.

The object of this invention is to regulate the temperature of buildings by not only controlling the fire in the furnace by the use of a check-damper in the draft-pipe, but also to stop off the supply of heat to the various rooms by dampers introduced into the hot-air passages, and also to open and close ventilators, as required, the whole to be operated by electricity, and capable of adjustment to any desired degree.

I will first describe the construction of damper and its movement.

A, Figs. 1, 2, 3, is a sheet-metal drum of the size required, into which is placed a cast-metal ring, A′, provided with semicircular flanges A^2, which flanges are two in number, and are formed one on one side of the ring A′ and the other upon the other side, and which flanges are also in different planes, so that they rest one upon one side of the plane of the damper, when closed, and the other upon the other side. These flanges thus act as stops for the damper A^3, and make a good joint for the prevention of the passage of air. On top of this drum is located the working mechanism. A cast-metal base, B, is formed with supports for the two sets of electro-magnets C D, one set on each side of the center of motion, and which constitute the motive power for moving the damper. These magnets have projecting poles, portions of them being cut away, (see Fig. 2,) and between these cut sections the armatures C′ D′ move in a tangent to their inner faces, producing a long movement with nearly uniform power. These armatures are fastened to the pivoted lever E, having an arm, E′, extending at right angles to said lever, to which arm a link, E^2, is fastened, which connects to a short arm, E^3, on the shaft E^4 of the damper A^3. It will now be seen that one set of magnets will open the damper and the other set will close the same, whenever the circuit is closed through the magnets of either side. In addition to this, there is another armature, F, Figs. 2 and 3, extending across to both sets of magnets, and operated by one pole of each magnet only. This armature is attached to one end of a pivoted lever, F′, and at its other end a flat steel wedge or stop, *a*, is fastened to its under side. This wedge drops into a slot, *b*, cut into a quadrant, G, or section of disk, which disk is located on the damper-shaft. The object of this is to lock the damper in position, either open or closed, after being moved by the magnets. On the base, centrally located, is a switch, *c*, Figs. 3 and 5, which shifts the current to the opposite magnet at the latter end of the movement, and is moved by small studs *c′*, attached to a forked casting, c^2, also located on the damper-shaft. This general description completes the damper mechanism. In connection with this movement there is an electrical thermostat, Figs. 4 and 5, which is located at any desirable part of the building, the action of which and its construction are as follows: Primarily it consists of a zinc tube, H, of about five feet in length, the expansion and contraction of which under varying temperatures produces the motion to shift the current or battery-power to the magnet corresponding to the increase or diminution of heat, arranged as herein described.

I is a cast-metal base or containing-case, upon which is pivoted a long lever, J, Fig. 5, the pivot-pin *p* of which passes through to the rear and upon which is attached a short arm, J′, Fig. 4, and to this short arm an adjustment is fixed consisting of milled head-nut K and squared bolt, K′, the squared bolt

passing through a square hole in arm, J, to prevent it from turning. Attached to this bolt is a connecting-strip, L, which extends down and fastens to the zinc tube H. Through this zinc tube extends an iron tube, T, which tubes at their lower ends are soldered together, the upper end of the iron tube being screwed into a projection, *s*, of the metal case. It will thus be seen that the zinc and iron tubes have a differential rate of expansion, and the motion produced by the greater contraction or expansion of the zinc tube is transmitted to arm J′ and multiplied by the long lever J. At the lower end of the long lever is a pair of springs, M N, with contact-surfaces mounted on an insulating arm, O, which is pivoted to the metal base at *e*. This arm is adjusted about its center *e* by an eccentric, *f*, provided (see Figs. 5 and 6) with milled head *g*, a spring, *h*, being located under the arm O to take up any loose motion, and keep the arm firmly against the eccentric, and a pointer, *i*, being attached to the eccentric and moving over scale *j*. Another spring, *l*, also presses against the long lever J, near its fulcrum, so that this lever is held firmly between the tension of this spring on one side and the tension of the zinc tube on the other.

The electrical connection of the thermostat and the damper mechanism is as follows: The contact M of the thermostat is connected by wire *m* with binding-post M′ of the damper mechanism, which binding-post connects with magnet C, whose wire terminates in contact-plate M^2. The other contact, N, is connected by wire *n* with binding-post N′, which is connected to the magnet D, whose wire terminates in contact-plate N^2. The long lever J connects with wire J^4, battery J^2, and binding-post J^3, which is electrically connected to the switch *c*. These three wires J^4, *m*, and *n* extend from the thermostat down through the zinc and iron tubes and are thus conveniently carried and disposed of, so as not to be unsightly. Now, when the arm J is held to a certain position by the expansion or contraction of the zinc tube—say, under a temperature of 70°—the contact-springs M N are adjusted by the insulating-arm so that the arm J rests between said springs, but does not touch them. In this position of the insulating-arm the index-hand *i* points to 70° on the graduated scale and the damper is open. Now, if the temperature rises and it gets too hot the expansion of the zinc tube causes arm J to move to the left and come in contact with spring M. This closes the battery-circuit through wires J^4 and *m*, binding-posts J^3 and M′, magnet C, switch *c*, and contact M^2. Magnet C, being thus charged, attracts armature C′, Fig. 2, and throws lever E′ to the right, and closes the damper, the movement of the damper being immediately preceded by the attraction of armature F and the unlocking of pin *a* on lever F′ from the notches *b* of plate G, to permit said movement of the damper. The same motion throws the switch *c* over to the other contact, N^2, Fig. 5, and leaves it there until magnet D is charged by the current passing through arm J and spring N, which cannot take place until the reduction of temperature in the room makes a corresponding shifting of arm J to contact with spring N. It will thus be seen that this regulating mechanism is very sensitive, accurate, and automatic. For convenience a thermometer, R, is attached to the thermostat for the purpose of observing the temperature.

In order to set the apparatus to maintain any desired temperature, the eccentric, with its pointer, is simply moved to the desired degree on the graduated scale and a corresponding adjustment of the springs M and N is made thereby for the thermostat.

Having thus described my invention, what I claim as new is—

1. The combination, with a flue and its damper, of a pair of magnets and armatures operating upon the damper to open and close the same, and a battery and thermostat provided with contact-points for directing an electric current through either of the magnets to automatically open and close the damper for the purpose of maintaining a uniform temperature, as described.

2. The combination, with the damper and its electrical operating mechanism, consisting of separate magnets with armatures and a direct connection with the damper-shaft, of a thermostat having an automatically-adjustable arm, a pair of contacts having independent electrical connection with the damper mechanism and arranged upon opposite sides of the normal position of said arm, and an adjustable carrying arm or block for said contacts, to adapt the thermostat to work at any given temperature, as described.

3. The combination, with the damper and its electrical operating mechanism, consisting of separate magnets with armatures and a direct connection with the damper-shaft, of a thermostat having an automatically-adjustable arm, a pair of contacts having independent electrical connection with the damper mechanism and arranged upon opposite sides of the normal position of said arm, an adjustable carrying-arm for said contacts, a graduated scale and pointer, and means, substantially as described, for effecting a commensurate adjustment of the pointer on the scale and of the contacts with respect to the thermostat-arm, as described.

4. The combination, with the damper and its double set of operating electro-magnets, of a thermostat with contacts and conducting-wires, the said thermostat consisting, primarily, of two metal tubes having a differential rate of expansion for the double purpose of operating the thermostat-contacts and carrying their wires, substantially as described.

5. The combination, with the damper, having an axial shaft, of electro-magnets on each

side of the center of motion, with their projecting poles cut away and armatures arranged to operate the damper-shaft, as and for the purpose described.

6. The combination, with the damper and its working magnets, of a locking device consisting of pivoted lever F′, with pin *a*, armature F, operated by either set of magnets, and disk G, with slots *b*, fastened to damper-shaft, substantially as set forth, for the purpose described.

7. In combination with the damper and its electric mechanism, consisting of conducting-wires, battery-magnets, and armatures, as described, a thermostat composed of a zinc tube, an iron pipe, and a metal containing-case provided with a long lever, J, having short arm J′, spring-contacts M N, and eccentric adjustment for the same, all arranged as herein set forth, and for the purpose described.

WILSON E. FACER.

Witnesses:
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L. W. BRIGHAM.