(No Model.) 2 Sheets—Sheet 1.

C. A. HOWARD.

TEMPERATURE REGULATOR.

No. 550,618. Patented Dec. 3, 1895.

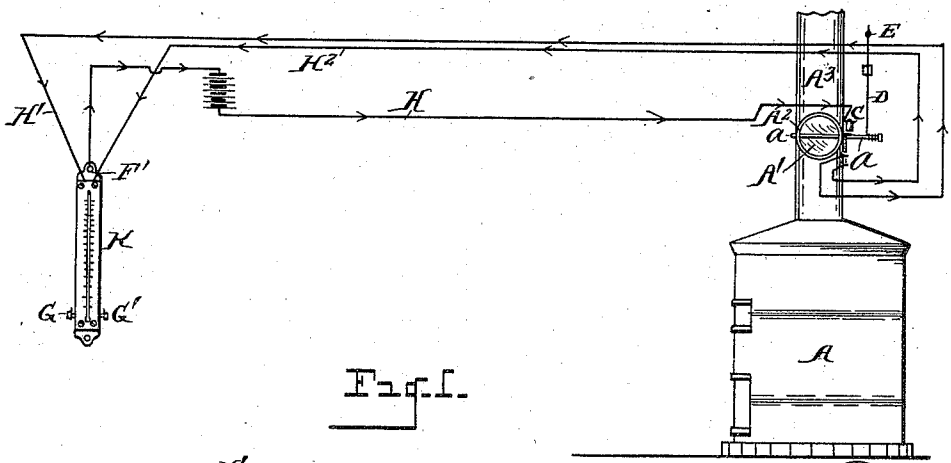

Fig. 1.

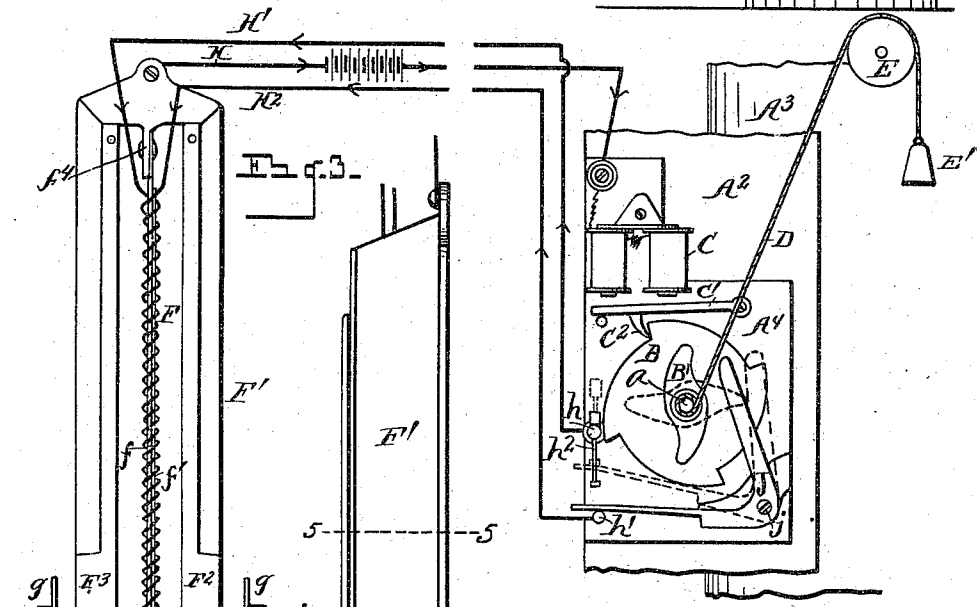

Fig. 3.

Fig. 2.

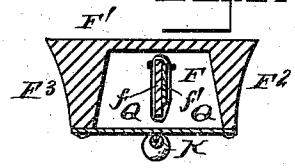

Fig. 5.

Fig. 4.

WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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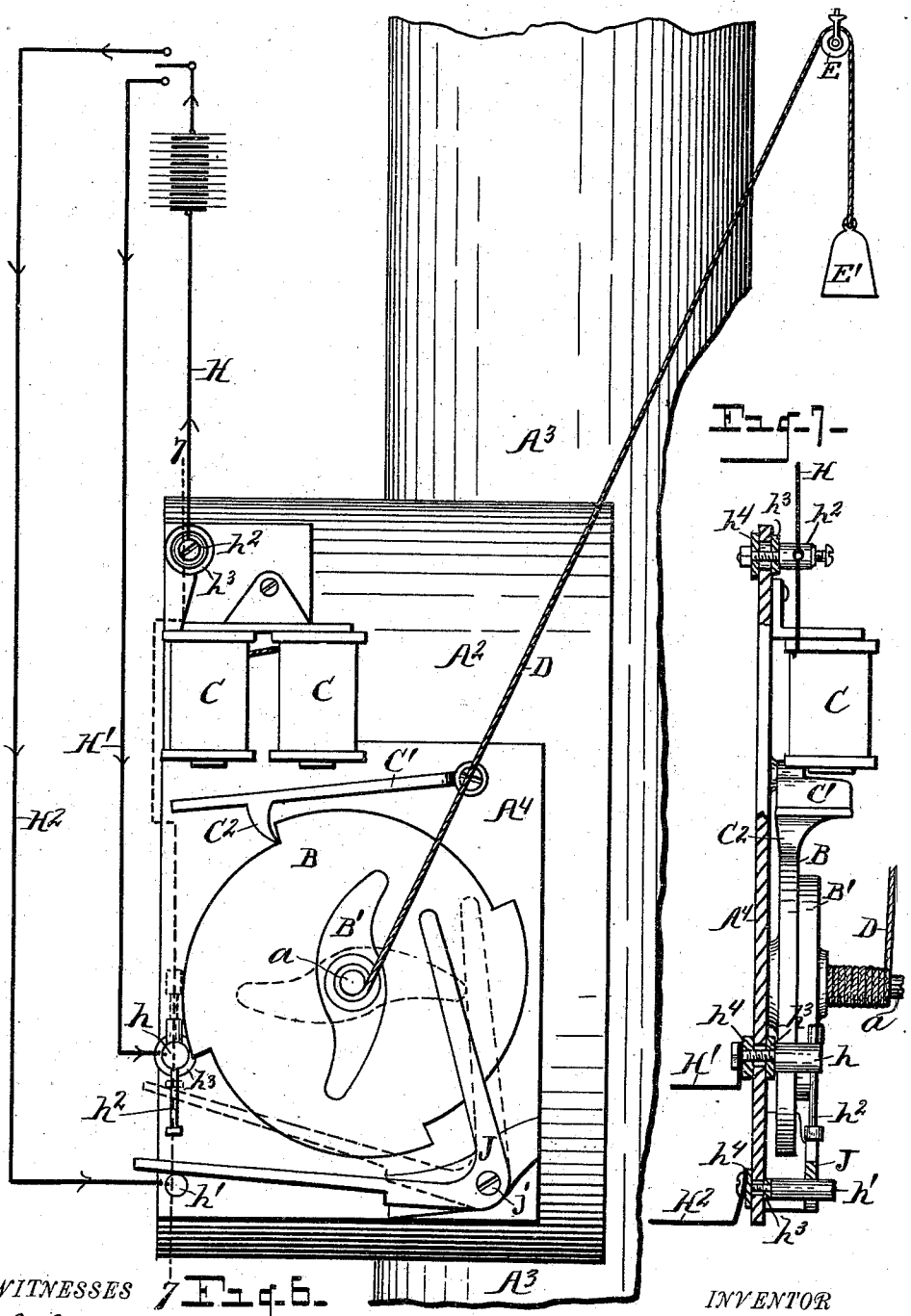

Fig. 6.

Fig. 7.

WITNESSES

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UNITED STATES PATENT OFFICE.

CHARLES A. HOWARD, OF DETROIT, MICHIGAN.

TEMPERATURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 550,618, dated December 3, 1895.

Application filed July 15, 1895. Serial No. 556,012. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. HOWARD, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Temperature-Regulators; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has reference to an improved temperature-regulator for automatically controlling the draft of furnaces and analogous devices; and it consists of the combination, construction, and arrangement hereinafter specified and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a diagram view illustrating my invention. Fig. 2 is a detail view in elevation. Fig. 3 is a view of the thermostat with the thermometer removed. Fig. 4 is an elevation of the thermostat at right angles to Fig. 3. Fig. 5 is a section on the line 5 5, Fig. 4. Fig. 6 is an enlarged view of parts of Fig. 2. Fig. 7 is a vertical section on the line 7 7, Fig. 6.

The purpose of my invention is to provide a temperature-regulator of superior sensitiveness and efficiency and which may readily be adjusted to hold the temperature at any degree desired.

I carry out my invention as follows:

A represents a furnace or other analogous device provided with a damper A′. The damper shown is provided with journals *a*, on which the damper rotates to open or close the draft. In the instance shown the damper is journaled in a case A^2, engaged upon the smoke-flue A^3 of the furnace.

B is a toothed wheel upon one of the journals of the damper and rotatable therewith. B′ is a cam which may conveniently be constructed as an integral part of said wheel.

C indicates in outline an electromagnet, and C′ an armature actuated thereby, said armature being provided with a pawl or dog C^2 to engage the toothed wheel B when the armature is out of electrical contact with the magnet, the attraction of the armature releasing the pawl from the toothed wheel, leaving the damper free to rotate. A cord D is wound upon the journal of the damper and led over a pulley E, the cord being connected with a suitable weight E′, the weight rotating the damper when free to move. The magnet and armature may be mounted upon a plate A^4, secured to the case A^2 and insulated therefrom. The action of the magnet is controlled by a thermostat F.

While I do not confine myself solely to a thermostat constructed as hereinafter described, I prefer that it should be constructed and that it should operate in the following manner.

In the drawings the thermostat is shown as formed with a suitable support or case F′. In the drawings the support or case is shown having sides F^2 F^3, between which is suspended the thermostat proper, consisting in this instance of a strip of rubber (indicated at *f*) having a thin steel strip *f*′ on one of its faces extending nearly to the upper end thereof, as shown. At the base the thermostat proper is provided with suitable conducting-strips of metal (indicated at f^2 and f^3) on the opposite sides of the rubber strip and insulated one from another thereby. The rubber strip is suspended from the upper end of the case, as shown at f^4. It will be understood that the rubber strip *f* will be sensitive to the temperature of the room in which it is located. As the temperature increases, the strip will expand, while as the temperature diminishes said strip will contract. The expansion of the rubber strip will, as is well known, cause the said strip to bend or curl toward one side of the case of the thermostat, while the contraction of the strip will tend to unbend or straighten the strip again. Adjusting devices are provided to regulate the oscillation of the strips. Thus in the two sides of the case I locate adjusting-screws G and G′, which may readily be so adjusted as to permit any desired degree or extent of movement of the free end of the thermostat suspended in the case F′, so that one or the other of the conducting-strips f^2 and f^3 will contact with one or the other of the adjusting-screws upon any desired limit of movement of the rubber strip as it is affected by the temperature. As so arranged, it is evident the ther-

mostat will contact with one of the screws, as the screw G, when the temperature rises to a desired point, and with the other screw, as the screw G′, when the temperature diminishes below a desired point. The case F′ of thermostat is always in electrical connection with a battery-wire H, which wire also leads to the magnet C.

H′ and H² indicate additional conductors, the one electrically connected with the conducting-strip f^2 and the other with the strip f^3. The conductor H′ is led to a binding-post h upon the plate A⁴ and the conductor H² is led to a binding-post h' on said plate, while the conductor H is preferably led to the magnet through a binding-post h^2, said posts being insulated from said plate and the post h being provided with an adjustable contact-pin h^2, reciprocatory through the end of the post. The insulation of the posts is indicated at h^3 and h^4.

J denotes a switch-lever fulcrumed intermediate its ends, as shown at j, upon the plate A⁴. One end of said switch-lever is led adjacent to the cam B′, so as to be actuated thereby, the opposite end of said lever being led between the ends of the binding-posts h and h', so that the lever will contact with the post h' or with the pin h^2 upon the operation of the damper when the armature is attracted to the magnet.

My invention contemplates winding the conductors H′ and H² about the thermostat—that is, about the rubber strip f and metal strip f', as shown.

It will be seen that when by a rise in the temperature the thermostat contacts with the screw G the corresponding conductor H′ connects the binding-post h therewith. The switch-lever J, however, being out of contact with the pin h^2, as indicated in full lines, the circuit is not closed, and there is consequently no loss of current going on from the battery, and the magnet is inactive. When the temperature diminishes, however, sufficiently to cause the thermostat to contact with the screw G, the switch-lever contacting with the post h', the electric circuit is completed and the armature is attracted to the magnet, releasing its pawl from the wheel B, permitting it to rotate and the damper to close. In the operation of the wheel B the cam B′, as shown in dotted lines, has thrown the switch-lever out of contact with the post h' and into contact with the pin h^2, opening the circuit and throwing the mechanism into position to close the circuit when the thermostat contacts with the screw G on a certain rise of the temperature.

I prefer to provide the reciprocatory pin h^2 to afford a more certain closing of the circuit when the adjacent end of the switch-lever rises, although I do not limit myself thereto. A dial may be located on the sides of the case F′, as indicated in Fig. 4, the corresponding screw being provided with an indicator-finger g for convenience and to secure greater accuracy in the adjustment of the screws to make the device operative at a desired degree of temperature. So, also, for convenience I prefer to locate a thermometer K upon the case of the thermostat. There is thus formed, as will be more particularly observed in Fig. 5, passage-ways through the case F′ on either side of the thermostat, as seen at Q Q, through which the air circulates about the thermostat.

The steel strip f', the rubber strip f, and plates f^2 f^3 are all riveted together at the lower end of the thermostat, as shown at f^5. Consequently when expanded by heat the strips f f' must curl or bend and toward one of the screws adjacent thereto. By winding the strips f and f' with the conductors I am enabled to dispense with rivets to hold said parts together, the winding preventing the parts from buckling.

What I claim as my invention is—

1. In a temperature regulator the combination of a damper mechanism, a toothed wheel connected therewith, a cam B′ rotatable with said wheel, a magnet, an armature to control the movement of the wheel and damper, a switch lever J actuated by said cam, and a thermostat with electrical connections to actuate said magnet, said switch lever arranged to open the electrical circuit when the damper has been moved into a given position substantially as set forth.

2. In a temperature regulator the combination of a damper mechanism, a toothed wheel connected therewith, a magnet, an armature to control the movement of said wheel and damper, a switch lever J actuated by said wheel, a thermostat, a support for the magnet, an electrical conductor H, connecting the thermostat with the magnet, electrical conductors H′ H² connecting the thermostat to binding posts h h' upon said support and insulated therefrom, said switch lever vibratory between said binding posts substantially as set forth.

3. The thermostat herein described having in combination an oscillatory rubber strip f, a support therefor, a metal strip f' secured to one face of the rubber strip, adjusting devices to regulate the oscillation of said strips, a conductor electrically connected with the support, and electrical conductors wound about said strips arranged to make electrical contact with the adjusting devices upon the oscillation of said strips, substantially as set forth.

In testimony whereof I sign this specification in the presence of two witnesses.

CHARLES A. HOWARD.

Witnesses:

O. B. BAENZIGER,

HENRY A. SCHULTE.