(No Model.)

# J. R. ROBERTS.

## THERMOSTAT.

No. 490,926. Patented Jan. 31, 1893.

Fig. 1.

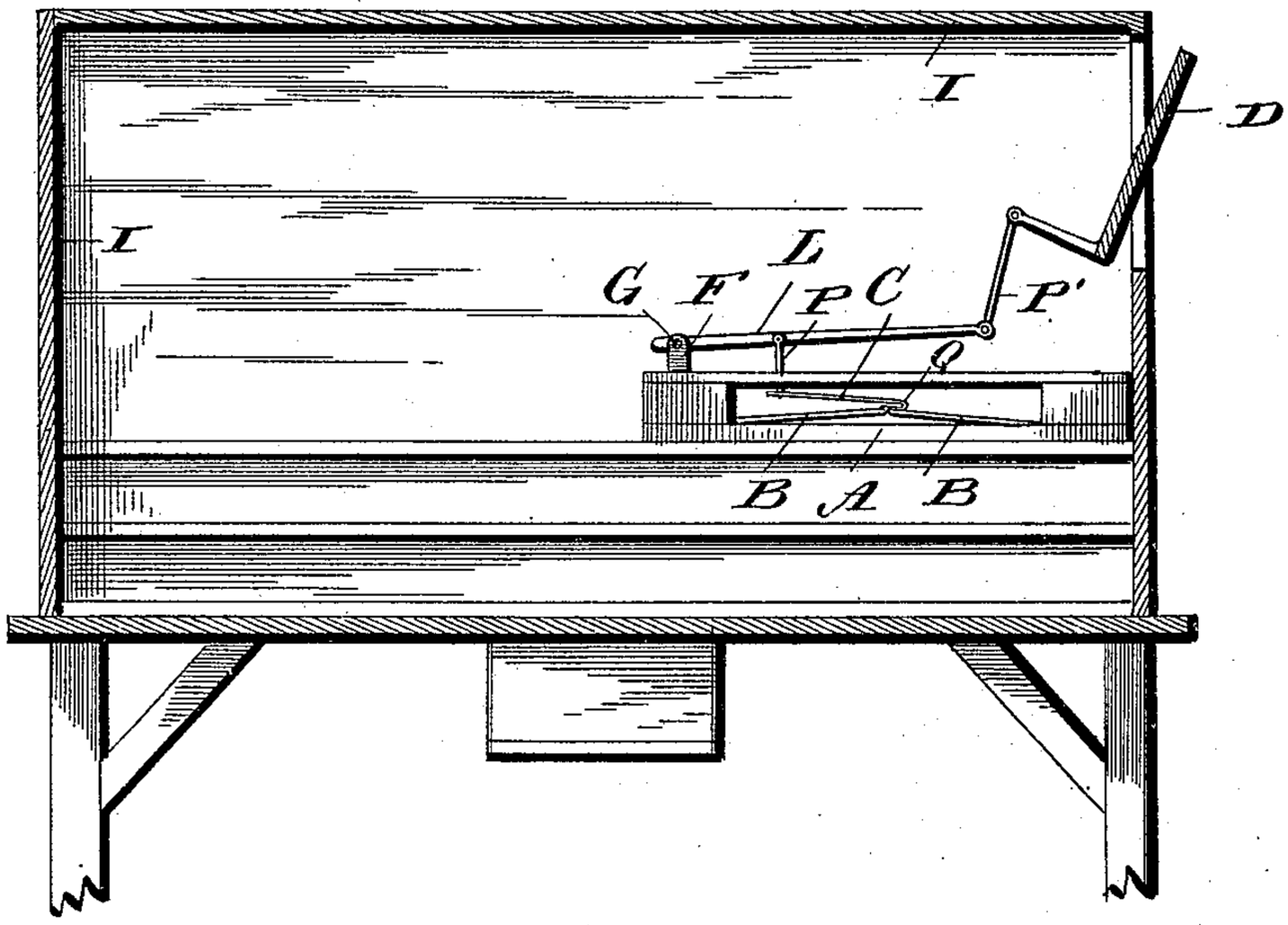



Fig. 2.

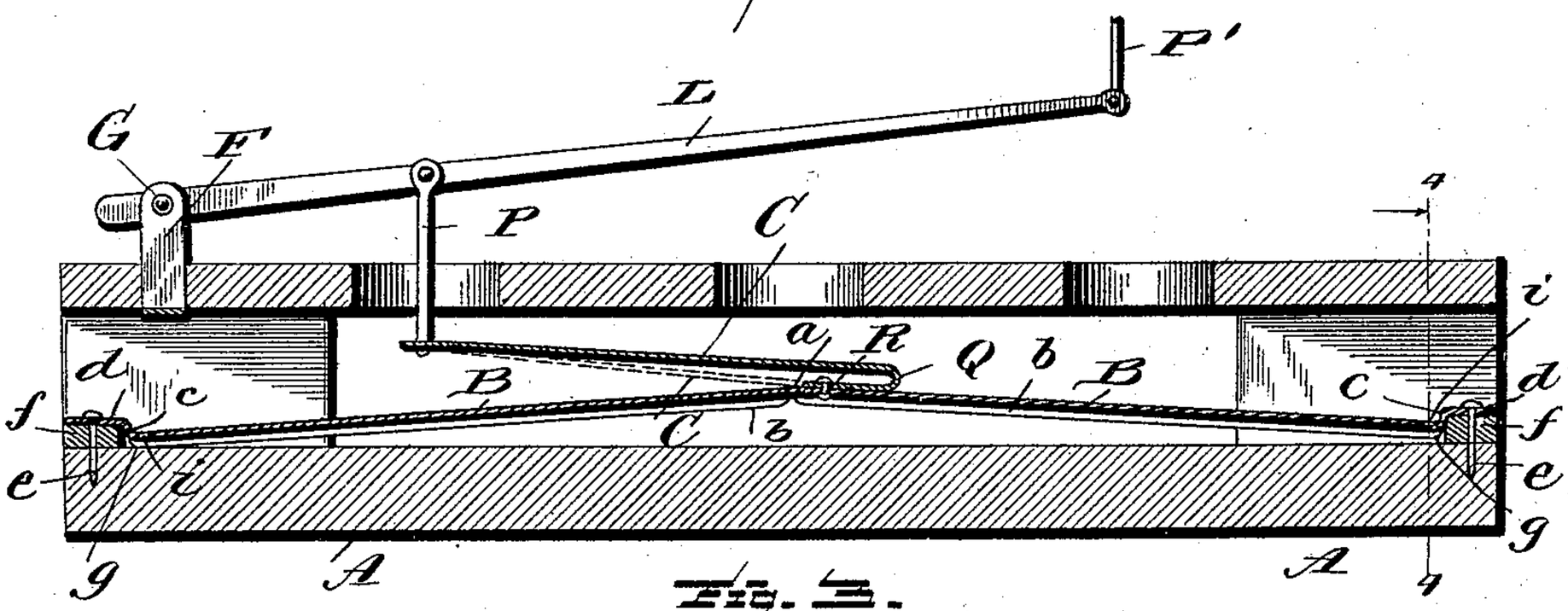



Fig. 3.

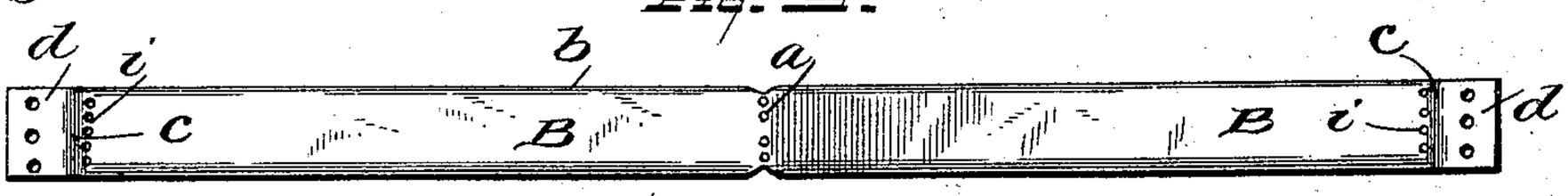
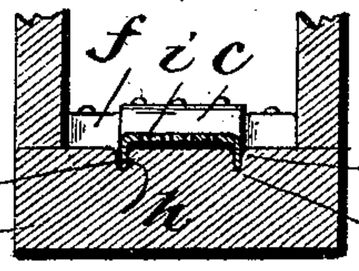



Fig. 4.




Witnesses
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# UNITED STATES PATENT OFFICE.

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## THERMOSTAT.

SPECIFICATION forming part of Letters Patent No. 490,926, dated January 31, 1893.

Application filed August 17, 1892. Serial No. 443,312. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN R. ROBERTS, a citizen of the United States, residing at Homer City, in the county of Indiana and State of Pennsylvania, have invented certain new and useful Improvements in Thermostats; and I do hereby 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.

This invention relates to automatic expansion dampers, and is a thermostat adapted to control a valve or register for regulating the temperature of incubators or brooders, or for other purposes; and the object hereof is to produce a device which will be very sensitive to changes in temperature, no matter how great or small such changes may be.

To this end the invention consists in a device constructed substantially as hereinafter more fully described and claimed, and as illustrated on the sheet of drawings, wherein—

Figure 1 is a longitudinal section of an incubator, showing my improved device in side elevation therein and connected to open or close a ventilating register in one end thereof. Fig. 2 is an enlarged central longitudinal section of this thermostat, showing in dotted lines how the spring may be sometimes constructed.

In the said drawings, the letter A represents a base or casing which may be of any material that does not expand in heat or contract in cold, and of any suitable length, its sides, top, and ends being preferably open to permit the free circulation of air.

B is a strip of brass, iron, or other metal that is affected by heat and cold. This strip is fastened at its ends by the screws, bolts, or rivets to the base A, and elevated between such ends, forming a toggle lever having an obtuse angle of a few degrees. On this strip near the center and at one side of the angle is fastened by screws, bolts, or rivets R a spring C which is of any suitable material—preferably metal—that will answer the purposes for which it is to be used. I prefer to have an angle Q in this spring as seen in full lines in Fig. 2. In this case, the spring, after having been secured as at R, extends toward one end of the strip, then turns in a sharp angle Q, and then passes back and nearly upon its own body to or nearly to the other end of the strip. In some cases, however, the angle may be omitted as seen in dotted lines. Then the spring would have its inner end nearer the end of the strip, and after being fastened as at R would pass above the angle of the strip and to or nearly to the other end thereof. Rising from the base or casing is a pin F to which is pivoted at G a lever L, and the latter is pivotally connected by a rod P with the outer end of the spring C. Thus the point F forms the fulcrum, the spring C and rod P the power, and whatever is connected with the other end of the lever the load—hence this is a lever of the third class. In the present case I have shown the outer end of the lever as connected by a rod P′ with a ventilating register in one end of an incubator I. Still of course its uses could be other than that shown, and the manner of connecting it with the register could be different without departing from the spirit of my invention.

Figs. 3 and 4 illustrate more particularly the construction of the toggle-lever strip B in its preferred form. Heretofore such expansible strips have been made in toggle-lever form with the two members pivotally connected at their meeting ends, but in the present case I prefer to make the entire strip of one piece as shown. At its center this strip is provided with a transverse row of perforations *a* whereby the material is slightly weakened, and it is here that the obtuse angle occurs. Each side of this point, the strip is preferably slightly wider, and its edges are bent down as at *b* so as to give the members of the toggle a certain rigidity; because if they were permitted to bend or spring, the rise and fall of the angle could not be employed as above described. Near the outer ends of the members, they are bent up as at *c* to form a slight shoulder, and then out again as at *d* to form a foot which is secured as by nails or screws *e* to transverse blocks *f* on the base. The side edges *b* which are bent down, stop short of the elbow as seen at *g*, and hence the fastening end is not impeded. When the blocks *f* are small, these edges at the points *g* may embed the base A, and the latter is therefore grooved as at *h* to permit. Just inside the elbows a series of perforations *i* extends across the strip to weaken it, so that it may bend at this point as the toggle rises

and falls. While I do not confine myself to this precise manner of constructing the strip, I consider it advisable that it be adopted.

When the temperature in the incubator rises, the metallic strip B is expanded. As its ends are fast, its center must rise, and this carries the spring C up with it. In so doing, the inner end of the spring is raised for a short distance, whereas its outer end is moved through a greater path. If the angle Q is present in the spring (as it is in my preferred form) it will be obvious that the spring will possess a certain yielding power, and even without this angle some of such yielding will be present. As it rises, the outer end of the spring forces up the rod P which connects the spring and lever and causes the long arm of the latter to rise and thereby to open the register D or to do whatever other work may be desired of it. When the strip B is acted upon by the cold, just the opposite action will take place: that is, the strip will contract and thus draw down the spring to move the register D in the opposite direction. In case the register sticks in place or some of the connections become broken or clogged, it will be seen that the spring will yield and thus prevent breakage of this thermostat. The register may be moved by hand at any time, since the spring will yield to permit; or the register may be locked in open or closed position, and the yielding of the spring will permit the strip to expand and contract without breaking the device.

I do not limit myself to the exact shapes, sizes, and proportions of parts, and it will be obvious that the device may be put to many other uses than that herein described and shown. For instance, it may be employed to regulate the dampers in flues or heating pipes for steam or hot air, or to set valves in tubes, or in other places where a mean and even temperature is desired.

What is claimed as new is—

1. The herein described thermostat, the same consisting of a casing, a strip of expansible material secured at its ends to said casing and forming an angle between them, a lever pivoted to the casing, a spring extending over said angle and secured at one end to the strip near its angle, and a rod between its other end and the lever, as and for the purpose set forth.

2. The herein described thermostat, the same consisting of a casing, a strip of expansible material secured at its ends to said casing and forming an angle between them, a lever pivoted to the casing, a spring extending over said angle with one end bent sharply back and secured to the strip near its angle, and connections between its other end and the lever, as and for the purpose set forth.

3. The combination with an incubator having a ventilating register; of a thermostat comprising a casing within said incubator, a strip of expansible material secured at its ends to said casing and forming an angle between them, a spring extending over said angle and secured at one end to the strip near its angle, and connections between its other end and the register, as and for the purpose set forth.

4. In a thermostat, an expansible strip secured at its ends to a base and bent upward at its center in an angle, a transverse row of perforations being here provided, the strip each side of said angle being wider and its edges bent down; in combination with connections between such angle and the work to be done, as and for the purpose set forth.

5. In a thermostat, an expansible strip having an upward angle at its center and a transverse series of perforations near each end outside of which the ends are bent up and then out to form a foot; combined with connections between said angle and the work to be done, a base, blocks thereon upon which said feet rest, and screws through the ends of the strips into the blocks, as and for the purpose set forth.

6. In a thermostat, an expansible strip bent into an obtuse angle at its center and there provided with a transverse row of perforations, its ends being bent up to form feet, series of transverse perforations just inside said feet, the body of the strip between said center and end perforations being wider and its edges bent down; combined with a base, blocks on the same to which said feet are secured, and connections between said angle and the work to be done, as and for the purpose set forth.

7. In a thermostat, the combination with a base having grooves; of an expansible strip having an upwardly-bent angle at its center and depending side flanges extending from near said angle to near its ends, the outer ends of said flanges resting in said grooves in the base, means for securing the ends of the strip to the base, and connections between said angle and the work to be done, as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN R. ROBERTS.

Witnesses:
S. M. JACK,
H. S. THOMPSON.