No. 832,293 PATENTED OCT. 2, 1906.

L. C. BYCE.

THERMOSTAT.

APPLICATION FILED MAY 19, 1905.

Fig. 1.

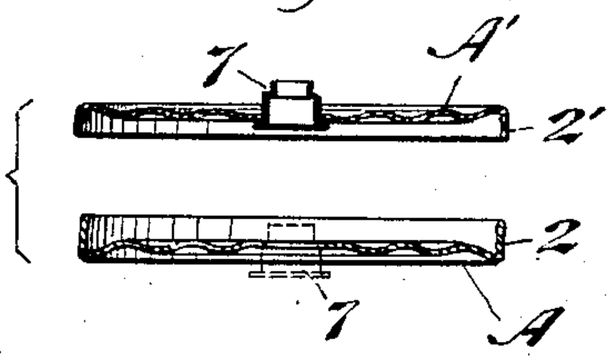



Fig. 2.

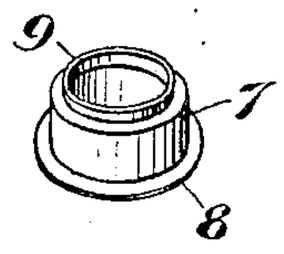



Fig. 3.

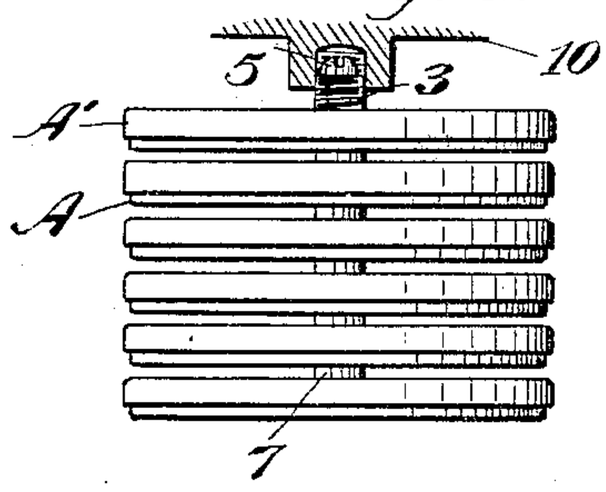



Fig. 4.

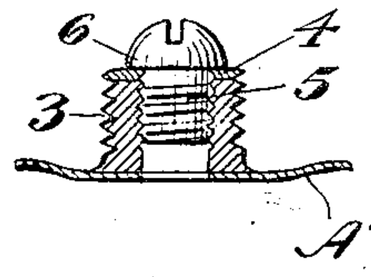
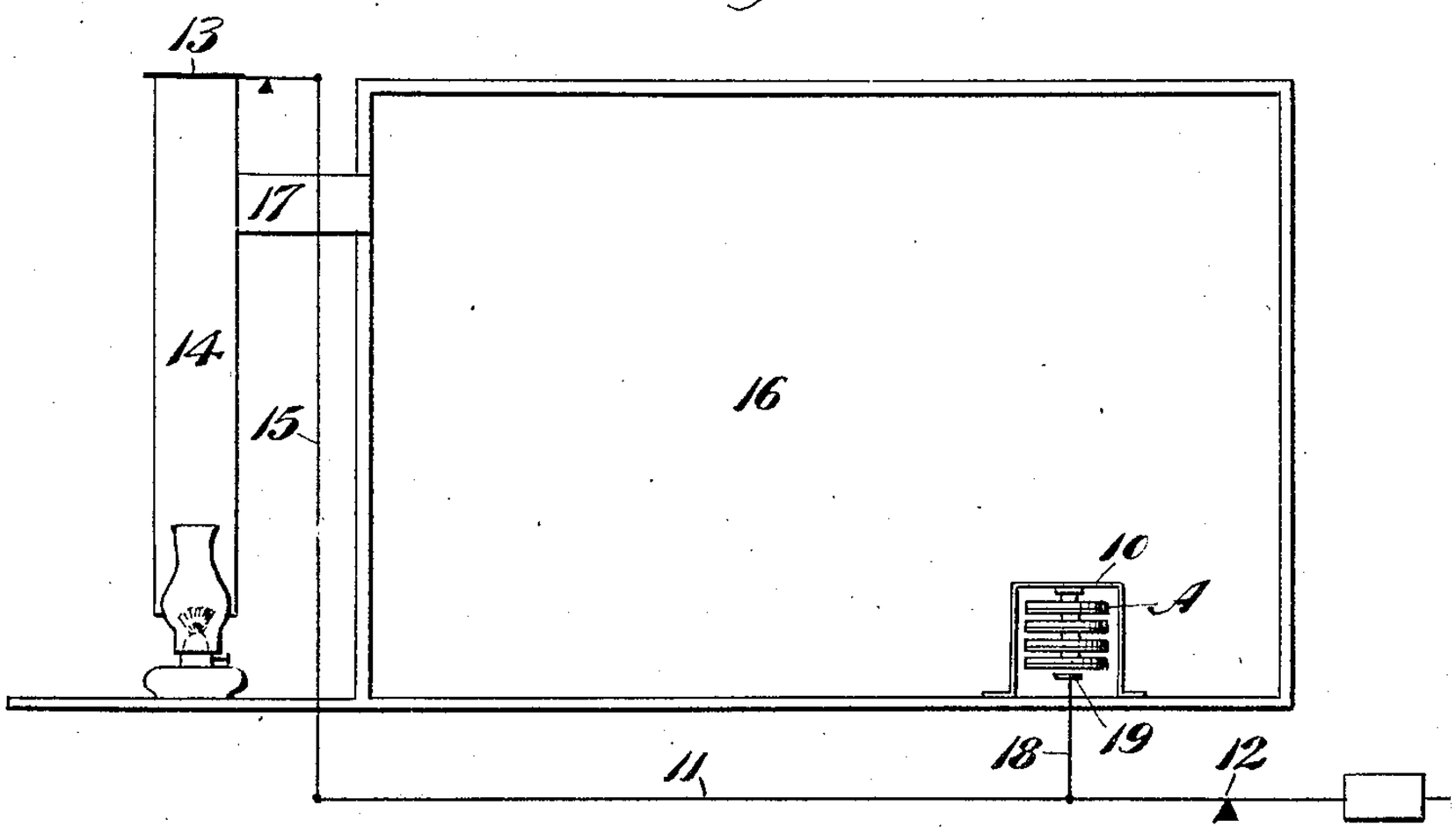



Fig. 5.




Witnesses,
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# UNITED STATES PATENT OFFICE.

LYMAN C. BYCE, OF PETALUMA, CALIFORNIA.

## THERMOSTAT.

No. 832,293. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed May 19, 1905. Serial No. 261,272.

*To all whom it may concern:*

Be it known that I, LYMAN C. BYCE, a citizen of the United States, residing at Petaluma, in the county of Sonoma and State of California, have invented new and useful Improvements in Thermostats, of which the following is a specification.

My invention relates to thermostats or temperature-regulators, and especially to such as are designed for use in the egg-chambers of incubators and other compartments where a uniform temperature is desired or essential.

The object of my invention is to provide a heat-regulating device which shall be durable, delicate, and practical and which shall be simple and cheap to manufacture.

It consists of the parts and the construction and combination of parts, as hereinafter more fully described and claimed and having reference to the accompanying drawings, in which—

Figure 1 shows disks in section. Fig. 2 is a perspective view of connecting-nipple considerably enlarged. Fig. 3 is an elevation of my thermostat. Fig. 4 is a sectional view of supporting-nipple considerably enlarged. Fig. 5 is a diagrammatic view of an incubator, showing thermostat in working position.

It is common to employ in incubators a source of artificial heat, such as an oil-lamp, and to regulate the heat passing therefrom to the egg-chamber by some sort of thermostat arrangement disposed usually in or connected with the egg-chamber. Usually these thermostats are composed of expansible units composed each of two thin spring-metal disks oppositely convexed and corrugated, secured together at their peripheries and otherwise hermetically sealed to form a chamber containing air or other suitable expansive fluid. The disks of a unit are generally secured together only at their edges by solder, and sometimes they are crimped; but in either case they have only a limited area of mutual contact, or, in other words, they touch each other only in a comparatively thin continuous line. The result is that with the constant expanding and contracting of the disks by the variations in temperature the disks work on each other at these points as on an annular fulcrum, and it is not long before the seam is broken and the air-chamber of the unit leaks. Lots of trouble has resulted from leaking thermostats of this construction, and I have been led to devise a means to overcome the difficulty.

In carrying out this part of my invention I take two thin, preferably corrugated, spring-metal disks, as A A′, and form each with opposed telescoping annular peripheral flanges 2 2′. The flange 2 of the female member A is preferably of a length equal to the desired thickness of the completed unit and bears against the opposite disk A′, proximate to the base of flange 2′, to form a spring member or gage in assembling the parts. The flange 2′ of the male member A′ is of such length only as to give this flange a substantial surface of contact with the flange 2 against any material rocking movement of one flange on the other when the parts are soldered together. With the flanges soldered together they form really a double rigid wall having little or no spring and are entirely unaffected by the expansion and contraction of the fluid in the thermostat-chamber, expansion and contraction being provided for by the concentric corrugations of the two disks and the expansion and contraction taking place in the line of the axis of the disks, as contemplated.

Access to or communication with the chamber formed by the disks for any reason is had by means of a solid exteriorly-threaded nipple 3, preferably of brass, which is soldered centrally to the outside of one of the disks, as A′. The end of this nipple is dipped in a bath of soft metal or alloy—such as lead, Babbitt solder, or the like—to form a skin or coating 4 of suitable thickness. The nipple and disk are then tapped centrally and threaded to receive a hard-metal screw-plug 5, having an annular ledge or head 6, which on being screwed down tight on the soft outside metal skin on the end of the nipple forms an air-tight seal and absolutely prevents any leak from the chamber formed by the subsequently assembled and soldered disks.

I am aware that it is old to close an orifice by means of a soft-metal ball or shot seating in the orifice and a plug to compress or squeeze the shot to its place. This form of closure has been found objectionable in practice, because in case the closure is not made absolutely tight and the plug has to be taken out for any reason it is almost impossible to dig the shot out after it has once been compressed in its seating-chamber. By my arrangement the soft-metal seat is not in any

hole at all, but is entirely outside the nipple, and it is an easy matter to redip the nipple, if necessary, without danger of seriously plugging the orifice in the nipple. Furthermore, if some of the soft metal does get onto the threads in the orifice it acts to make the joint between the nipple and plug 5 tighter.

Where the range of expansion and contraction afforded by a single unit is insufficient, several connected units may be used, as shown in Fig. 3, the outermost disk of only one of the units having a screw-threaded nipple. These multiple-unit thermostats are connected in the following fashion:

Each unit is made up of two disks having telescoping flanges, as first mentioned. The adjacent disks or the top and bottom disks of adjacent units are perforated and connected by a tubular section 7, of stamped metal, fitting these perforations, the end of the section being soldered or otherwise connected to the respective disks to form tight joints.

When the tubular sections 7 are stamped out or otherwise made, they have each an external annular flange 8 at one end and a contracted portion 9 at the opposite end.

In constructing a thermostat of this multiple character one of the disks which corresponds, say, to the female member A′ of one unit has a perforation through which a section 7 is slipped from what will eventually be the inner side of the disk and the flange 8 abutted against the disk and soldered in place. This leaves this disk with the tube projecting through and beyond a distance equal to the space between this disk and the succeeding adjacent unit. The male member A of the adjacent unit has a smaller perforation, into which the reduced portion 9 of the tube-section 7 will fit. When the end 9 has been soldered to the disk A, I have two elements of two adjoining units connected by a tube 7.

Other disks and tubes are similarly assembled, and the male and female members of any two of these incomplete assemblages may then be united, as first described, by soldering or other means. The bottom disk of the lowermost unit may be plain, and the upper disk of the topmost unit may be provided with a soft-metal-tipped nipple 3, closed by a plug 5, all the chambers of the several units being in communication through the several tube-sections 7 and the one plug 5 serving to hermetically seal all the units.

The purpose of externally threading the nipple 3 is to enable the device to be conveniently and rigidly supported, as by screwing the nipple into a suitable threaded socket in a stationary support 10. The result of expansion and contraction of the unit or units is then transmitted by suitable connections with the opposite end of the thermostat to regulate the valves, dampers, or other appliances or mechanisms which it may be desired to control. As here illustrated, a counterweighted lever 11 is fulcrumed at 12 and connected with a damper 13 over the flue 14 by a link 15. Heat generated from any suitable source may pass through flue 14 into the egg-box 16 by way of the passage 17 or out to the open air by a shorter passage when the damper is opened. A rod 18 is carried by the delicately-poised lever 11 and has a button 19 bearing continually on the under side of the regulators. An increase in temperature in the box 16 will cause the air or other fluid in the regulator to expand and press the flexible disks outward to operate through rod 18 to open the damper 13. When the chamber of box 16 cools, the regulator will contract and allow the damper to close more or less.

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

An improved thermostat consisting of pairs of metallic disks each having peripheral flanges one fitting within the other and rigidly connected, said disks being corrugated in concentric lines; an exteriorly-threaded nipple carried by one of the disks and having an internally-threaded orifice which communicates with the chamber inclosed by the disks, said nipple having its outer end provided with a permanently-attached skin or coating of soft compressible metal; a screw-plug fitting said orifice and seating on said metallic coating and being freely removable; a support for the thermostat having an internally-threaded socket into which said nipple screws; a sleeve between each pair of disks said sleeve having two diameters the larger of which fits a corresponding perforation in one of the disks and the smaller fits a like perforation in the other disk, said sleeve having a flange surrounding the base of its larger diameter and adapted to abut against the inner side of its disk, and the portion of the smaller diameter projecting beyond the outside of said disk and adapted to be permanently fitted to a perforation in the adjacent disk.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LYMAN C. BYCE.

Witnesses:
W. D. Houx,
Geo. W. Rodehaver