C. D. MILLER.
THERMOSTAT MOTOR.
APPLICATION FILED MAR. 9, 1915.

1,157,889. Patented Oct. 26, 1915.

Fig. 2.

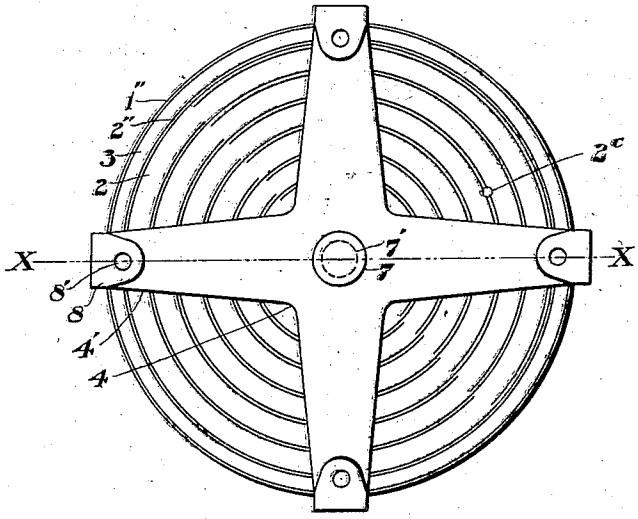


Fig. 1.

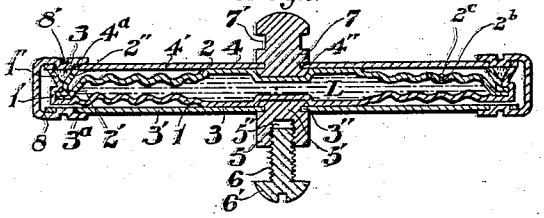


Fig. 3.

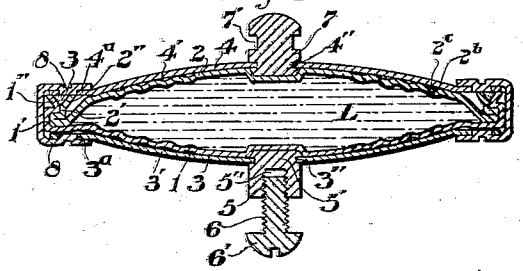
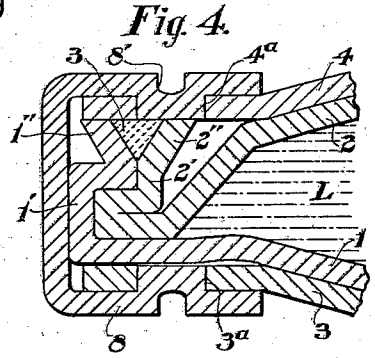


Fig. 4.



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THERMOSTAT-MOTOR.

1,157,889. Specification of Letters Patent. Patented Oct. 26, 1915.

Application filed March 9, 1915. Serial No. 13,235.

To all whom it may concern:

Be it known that I, COSBY D. MILLER, a citizen of the United States, residing at St. Joseph, in the county of Buchanan and State of Missouri, have invented certain new and useful Improvements in Thermostat-Motors, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in thermostat motors, the objects of which are, to provide a highly efficient mechanism of this class, in which the form and arrangement of the parts are such, that the number of the parts is reduced to the minimum, that said parts are extremely substantial and are not materially worn, from long and constant use; thereby providing a thermostat motor that is thoroughly reliable in its operation, and is extremely cheap in cost of manufacture.

Further objects are, to provide extremely substantial movement limiting devices, whereby the expansive movement of the diaphragms is limited, thereby preventing over expansion and consequent injury to the diaphragms, such as fracture of the same or opening of the joint at their edges.

Still further objects are to provide ready securing means for easily and quickly securing the motor to a fixed object, in operative position, and also, to provide a connecting device, whereby the motor can be connected with other mechanisms, for thermostatically operating the same, with perfect freedom of movement, other than spring resistance, until the expansive limit of the diaphragms is reached.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which:—

Figure 1 is a vertical section of the motor on the line X X, seen in Fig. 2, showing the thermostat contracted. Fig. 2 is a top plan of the parts seen in Fig. 1. Fig. 3 is a section, similar to Fig. 1, showing the thermostat fully expanded. Fig. 4 is an enlarged section, showing details of one of the clips and of the marginal joining of the diaphragms.

The motor comprises a bottom diaphragm 1, having the annular, upwardly extended edge portion 1′ which terminates in the outwardly extended edge 1″, formed therewith. Top diaphragm 2 is similarly provided with the upwardly extended edge portion 2′, which terminates in the inwardly extended edge 2″. Said portion 2′ snugly fits inside of portion 1′, with said edges 2″ and 1″ forming a channel between them, which is filled with solder 3; thus forming a liquid tight joint, that is not affected by expansion and contraction of said diaphragms, as hereinafter described. Diaphragm 2 has filling aperture 2^b, formed therethrough, through which a volatile liquid L is passed, until the space between said diaphragms is filled with said liquid. Said filling aperture is then closed with solder 2^c. Said diaphragms are preferably formed of die stamped spring steel.

Bottom spring 3 and top spring 4 are of the same shape and size, and for use on diaphragms of ordinary size, as shown, said springs are made in the form of a cross, each having the four radially extended arms 3′ and 4′, respectively, while for use on larger diaphragms, a greater plurality of said arms may be used. Said springs each have a central aperture 3″ and 4″, respectively formed therethrough. Each one of said arms has a clip aperture 3^a and 4^a, respectively formed through their outer ends. Said springs and their arms are preferably die stamped from spring steel.

Reduced portion 5′ of seat post 5 is passed through aperture 3′ and is headed on the top of spring 3. Said post is provided with screw 6, screwed into a threaded aperture 5″ formed in the lower end portion thereof. Said screw has head 6′ formed thereon, for securing the motor on a fixed object, not shown. Connection stud 7 is similarly secured to spring 4, being passed through its central aperture 4′. Said stud has annular channel 7′, formed therein, which latter is adapted to receive the bifurcated end of a lever, thus formed, (said lever being not shown,) or said channel may be engaged with any other engageable form of movement conveying means, for conveying movement therefrom to any other various mechanisms, such as dampers, shutters, etc.

The four clips 8 are formed of thicker material than said diaphragms, for greater rigidity, and are preferably die stamped from heavier sheet metal. Said clips each have studs 8′ formed with their end portions, said studs being adapted to engage clip apertures 3^a and 4^a. Said clips are first formed of U shape, with their ends farther apart than shown.

In assembling the parts, springs 3 and 4 are placed in the position shown and the studded ends of said clips are crimped into the form shown, with said studs in said apertures.

In operation, with the parts in the position seen in Fig. 1, said thermostat motor is secured to any desired object, as described. Stud 7 is connected in any suitable manner, as described to said other mechanism. When the atmosphere surrounding the described thermostat motor rises, in temperature, liquid L becomes expanded thereby, which causes the parts to move from the position seen in Fig. 1, to the position seen in Fig. 3, if said temperature has reached the highest degree in which the motor is designed to operate. It will be seen, that while in the last mentioned position, both of the diaphragms are expanded into the shape of arcs by reason of the expanded liquid between them, which is permitted by their annular corrugations 9 and 10, and that their marginal portions by reason of the form, as previously described are not thereby reduced in diameter. It will also be seen that the described springs and their arms are similarly arced, which slides their free ends inward on said marginal portions, until said inward movement is stopped by contact of clips 5 against the rigid margin, formed of the previously described parts, of the edges of said diaphragm, and of solder 3. Should said temperature rise still farther, the expansive strain of liquid L against said diaphragms, the farther expansion of the latter, and additional strain thereon, are overcome by the thus held arms and springs.

It will be understood that said arms are elastic and together with their respective springs, act as elastic units. The previously described expansion of the thermostat, raises stud 7 and the lowering of the latter is actuated by said elastic units, when said temperature is lowered, thereby causing contraction of liquid L.

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

1. A pair of metal disks one disk being above the other; rigid marginal portions formed on the edges of said disks; liquid tight joining means whereby the edges of said marginal portions are joined for holding a volatile liquid between said disks, the latter being adapted to be outwardly arced by expansion of said liquid; a top spring on the upper disk; a plurality of top spring members evenly spaced and extending radially from said top spring; a bottom spring beneath the bottom of the lower disk; a like plurality of similarly arranged bottom spring members for said bottom spring, the ends of all of said spring members being adapted to slide radially on said marginal portion of said disks; a plurality of U shaped clips for yoking the ends of said spring members in pairs; and clip securing means whereby the ends of said clips are secured to the ends of said spring members, said clips being adapted to be moved inward against said marginal portion for limiting inward movement of the ends of said spring members; the whole being adapted to limit expansive arcing of said diaphragms.

2. In a thermostat motor, a pair of thermostat diaphragms holding a liquid between them said liquid being adapted to be expanded by heat for expansively moving and thereby arcing said diaphragms; a rigid annular margin formed on the edges of said diaphragms; two flat spring units one of which is loosely applied to the outer surface of each of said diaphragms said spring units being adapted to be moved into the form of arcs by said diaphragms; and connecting means extended around said margin whereby the outer extremities of said spring units are connected, said connecting means being adapted to be moved inward by the arcing of said spring and to have their inward movement limited by contact with said rigid margin; the whole being adapted to limit the expansion of said diaphragms.

3. A diaphragm motor, comprising a seat post; securing means for rigidly securing said post on a fixed object; a flat bottom spring unit the central portion of which is rigidly secured on the upper end of said post; a pair of expansive diaphragms of disk form resting loosely upon said bottom spring unit said diaphragms having the edges thereof connected and holding a liquid between them that is expanded by heat; a rigid annular edge portion formed of the edges of said disk; a flat top spring unit resting loosely on the upper one of said diaphragms; a plurality of unit connecting means whereby the outer extremities of said units are connected said connecting means being extended around said rigid edge portion a slight distance therefrom; a stud having its lower end rigidly secured in the central portion of said top spring unit said stud having a channel formed in the annular surface thereof; the whole being adapted to thermostatically move said stud upward and downward and to limit the movements of said stud.

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

COSBY D. MILLER

Witnesses:
JOHN J. HINTON,
MATTHEW B. HINTON.