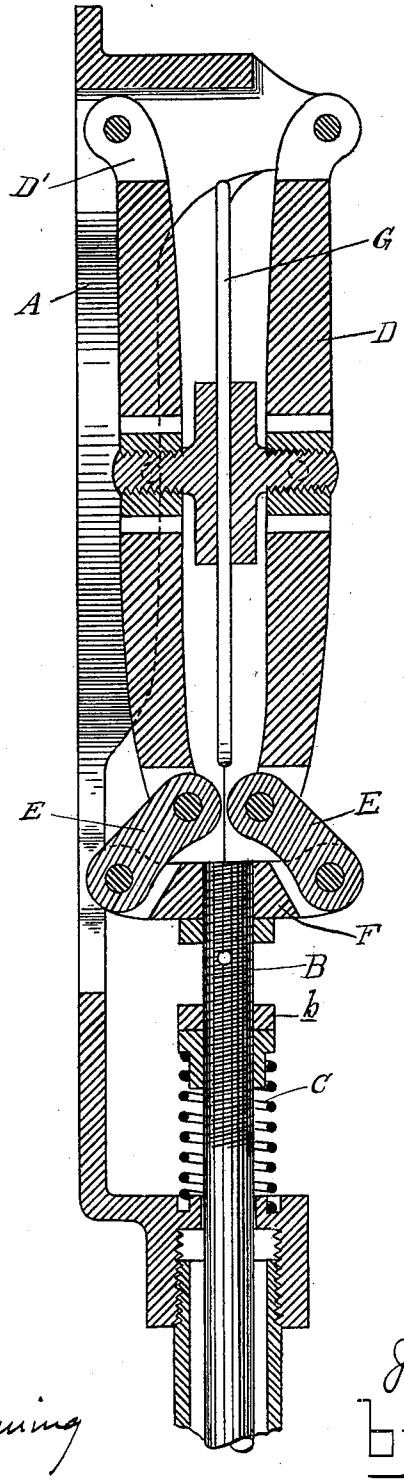
No. 610,998. Patented Sept. 20, 1898.

J. F. McELROY.

THERMOSTAT.

(Application filed Sept. 18, 1891.)

(No Model.)



Witnesses
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UNITED STATES PATENT OFFICE.

JAMES F. McELROY, OF ALBANY, NEW YORK, ASSIGNOR TO THE CONSOLIDATED CAR-HEATING COMPANY, OF WHEELING, WEST VIRGINIA.

THERMOSTAT.

SPECIFICATION forming part of Letters Patent No. 610,998, dated September 20, 1898.

Application filed September 18, 1891. Serial No. 406,108. (No model.) Patented in England February 16, 1892, No. 3,035; in France February 22, 1892, No. 219,592; in Belgium February 22, 1892, No. 98,466; in Germany February 23, 1892, No. 72,164, and in Austria-Hungary June 21, 1893, No. 43/39.

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented a new and useful Improvement in Thermostats, (for which I have obtained Letters Patent in Great Britain, No. 3,035, dated February 16, 1892; in France, No. 219,592, dated February 22, 1892; in Belgium, No. 98,466, dated February 22, 1892; in Germany, No. 72,164, dated February 23, 1892, and in Austria-Hungary, dated June 21, 1893, No. 43/39,) of which the following is a specification.

The invention consists in the peculiar compound employed and in the relation between the amount of compound and the capacity of the thermic cell in which it is placed.

In the previous state of the art thermic cells or expansible vessels have been used containing liquids which would vaporize at or near the temperature desired to be maintained for the purpose of obtaining pressure to actuate a valve or valves in the ordinary use of such devices. In controlling the temperature in dwelling-houses or cars in the use of such compounds such cells have ordinarily been filled, and the temperature to be maintained is approximately 70°, liquids being employed which will vaporize at or near that temperature. During the summer months the temperature in the apartment or car is frequently heated to 80°, 90°, or even 100°, and the continued expansion of the liquid filling the cell is frequently sufficient to burst or permanently distort the form of the cell or its diaphragm, thereby destroying its effectiveness.

In the use of my invention I employ an apparatus, as shown in the accompanying drawing, wherein—

A represents a fixed frame.

B is the valve-actuating rod, having the regulating-nut *b* thereon.

C is coil-spring abutting against the nut and frame for normally holding the valve open.

D D′ are two like frames pivoted to the top of the frame A and pivotally secured at their lower ends to the links E, which in turn are pivotally secured to the head F on the rod B. Between the two frames D D′ is the cell G, in which the different liquids are placed. The variable expansion of the liquids forces the frames D D′ gradually apart and through the medium of the links E forces the rod B down and closes the valve. (Not shown.) This apparatus is the same as that which forms in part the subject-matter of and is fully disclosed in Letters Patent No. 462,503, granted to me on November 3, 1891.

I propose to use a compound made up of two or more liquids having their boiling-points at progressively-higher degrees step by step, commencing below and ranging to at or near the temperature desired to be maintained, and to place in the cell such a quantity of liquid that it will all pass into vapor before it reaches an abnormal temperature—say 80°. The continued expansion of the vapor or gas from 80° to, say, 90° or 100° is not sufficient to distort or damage the thermic cell. In car-heating, to which I have given especial attention, it is ordinarily desired to maintain a temperature of 73°, and if I desire to open or close a valve by the action of my thermostat at that temperature I preferably employ a compound containing two or more liquids, one liquid of which will vaporize at or about 68°. As soon as the temperature reaches this point all or nearly all of that liquid will pass into vapor, filling the cell. Its pressure will overcome any friction in the parts and slightly move the valve. In connection with this I use another liquid which will vaporize at 70°, the expansion of the gases from which will have full effect in actuating the valve. Where the compound is composed of three liquids, a third liquid in the compound is employed which will vaporize at 72°, and the expansion of the gases arising therefrom will give sufficient power to close the valve tight and hold it closed until the temperature lowers.

The relation between the amount of liquid in the thermic cell and the capacity of that cell should be such that all of the liquids of the compound will pass into vapor under, say, 80° temperature. If the temperature in the

room from any unusual cause in winter or in the summer months rises above that point, the vapor, which is dry, will have so little additional expansion as to give but a few pounds more pressure at 100° Fahrenheit than at 80°.

The result of the employment of such a compound in substantially the proportion heretofore described in relation to the capacity of the thermic cell is to produce a quickly-increasing pressure step by step as the temperature rises from a few degrees below to a few degrees above the temperature desired to be maintained. In other words, I have a limited period or range of temperature in which the liquids in my compound pass from a fluid to a gaseous state and quickly augmenting the pressure from zero to several pounds per square inch, if necessary, increasing as the successive liquids vaporize, and then when all the liquid has vaporized I get a minimum increase in pressure equal only to the continued expansion of the gas during any abnormal temperature which may exist, thus preventing any possibility of damage to the thermostat, crushing of the valve-seat, or similar troubles. In cooling down the valve will be held closed until the gases begin to condense into fluid and will gradually open, thus preventing any sudden changes in temperature and aiding in maintaining it evenly at the desired point.

The liquids which I propose to use are those which are volatilized at different temperatures on the principle of fractional distillation—such as cymogene, rhigolene, and the lighter grades of gasolene obtained by the fractional distillation of petroleum—and of which the boiling-points are at or near the temperature desired to be maintained in ordinary compartments or cars.

While I have described the use of three liquids to form my compound, it is obvious that two may be used or more.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

In a thermo-cell, the combination with an expansible cell of an actuating medium in the cell comprising a plurality of independent liquids, each having a boiling-point different from that of the others, the capacity of the cell being such that the same is expanded step by step upon the evaporation of each liquid and permits the evaporation of the liquids, substantially as described.

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

JAMES F. McELROY.

Witnesses:
H. J. NODINE,
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