E. S. HALSEY.

THERMOSTATIC MOTOR.

APPLICATION FILED MAY 20, 1907.

916,861. Patented Mar. 30, 1909.

Fig. 1

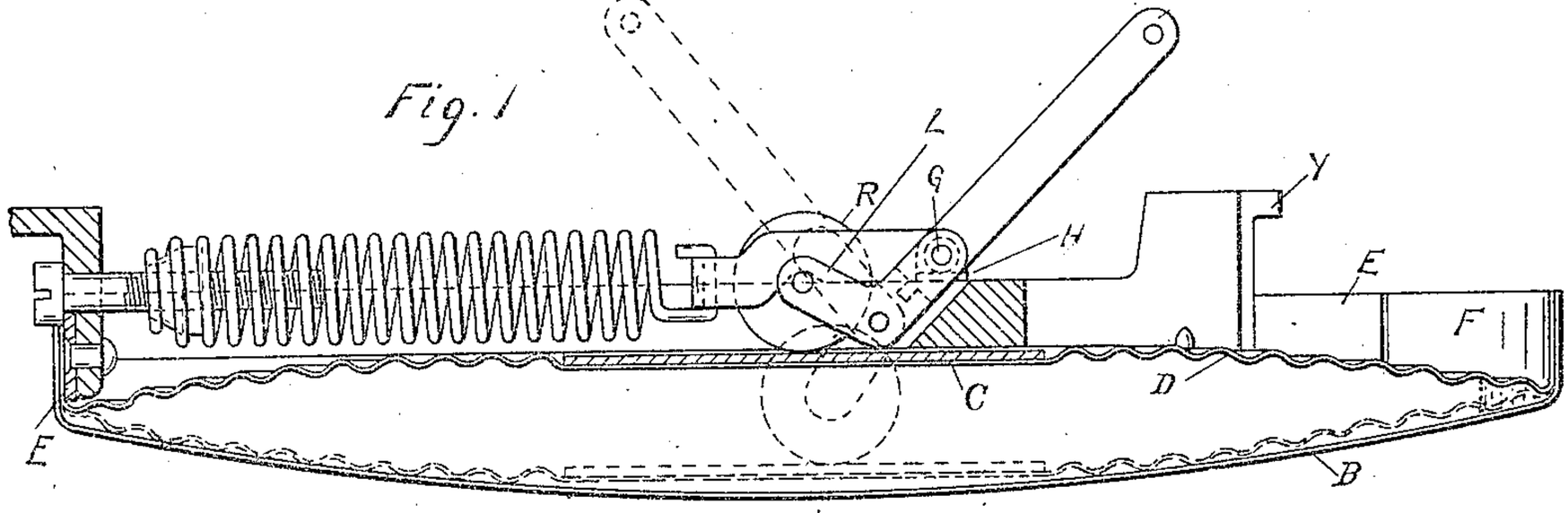
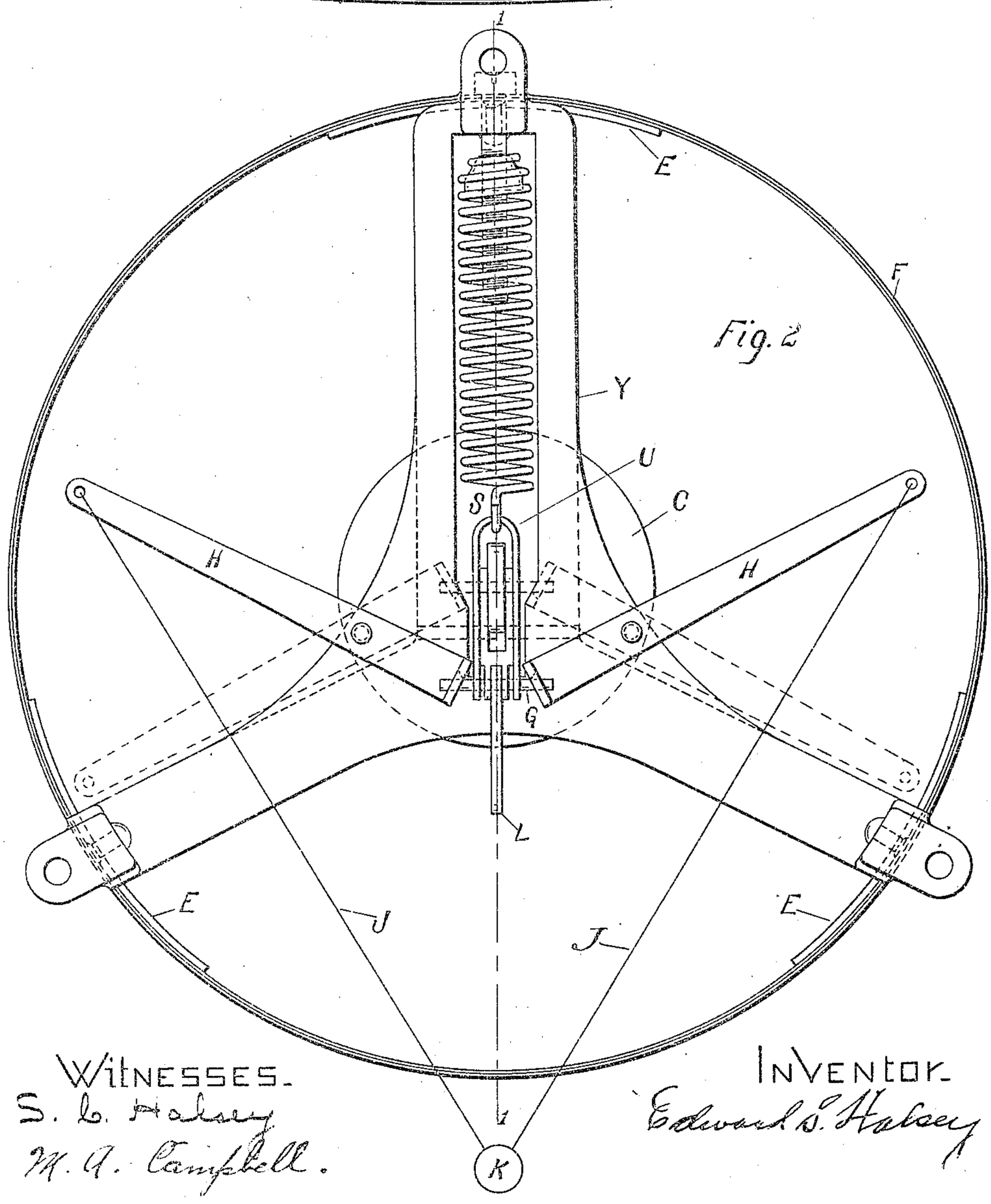


Fig. 2



Witnesses.
S. L. Halsey
M. A. Campbell.

Inventor.
Edward S. Halsey

UNITED STATES PATENT OFFICE.

EDWARD S. HALSEY, OF NAHANT, MASSACHUSETTS.

THERMOSTATIC MOTOR.

No. 916,861. Specification of Letters Patent. Patented March 30, 1909.

Application filed May 20, 1907. Serial No. 374,556.

To all whom it may concern:

Be it known that I, EDWARD S. HALSEY, a citizen of the United States, residing at Nahant, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Thermostatic Motors, of which the following is a specification.

I employ in my device a small quantity of a suitable volatile liquid sealed within the walls of an elastic, metallic thermostat secured to a wall of the apartment of which the temperature is to be controlled, and utilize a system of tension chains, wires, or cords, to convey the stress of the volatilizing liquid on the thermostat walls to distant dampers, drafts or valves, which dominate the temperature of said apartment, and thus lift, turn, rock, or otherwise operate them so as to secure the desired result.

The object of my invention is to supply an extremely simple, permanent, efficient, inexpensive thermostat, and one very cheaply and easily installed and cared for even by a person unskilled in mechanics; and one readily installed on an old heating system with little or no alteration thereto.

Referring to the accompanying drawings which illustrate my invention, similar letters refer to similar parts throughout the several views, in which—

Figure 1 is a vertical cross section through one of my volatile liquid motor thermostats through the line 1—1 Fig. 2, and Fig. 2 is a rear elevation of one of the complete thermostats.

The body of the thermostat, or the sealed metallic casing enveloping the liquid and its vapor, is constructed of two circular dished tin plates about two decimeters in diameter, stamped out so as to throw back a rim of about one centimeter in depth all aroumd the circumference. The inner one D is just enough smaller than the outer one B so that it will slip into the outer one making a close fit, after which the edges of the two rims are readily soldered together all around, thus creating a gas tight casing. It will be observed that the inner plate D is fluted by a system of circular concentric corrugations extending from close to the outer edge to a distance of little over two centimeters from the center. This plate is also made thinner than the outside plate, which together with its corrugated construction makes it quite flexible. Its normal position when not dilated is close up against the concave face of the outer plate B, as indicated by dotted lines in Fig. 1. Its position fully dilated is also shown by this figure. Soldered to the outside of the central uncorrugated portion of this flexible diaphragm is a stiff circular brass plate C to distribute the stress of the contact lever L to a footing of large area on the more fragile diaphragm, thereby increasing the life and efficiency of the diaphragm. The outside plate B is pressed dishing from heavy stock so that it will not be distorted by the great internal pressure to which it is sometimes subjected. Its drawn up rim is still further stiffened by the rim of the diaphragm being soldered inside it, and the whole structure is still further stiffened and strengthened by the three legged webbed cast iron cross bar or spider Y, the three projecting feet of which supply a means of rigidly supporting the thermostat out from the wall a centimeter or more, so as to permit air to circulate back of it. Three wood screws passing through holes in the feet secure them to the wall. The spider and rim F of the tin receptacle are securely joined by means of three short curved strips E of tinned metal provided with holes at their centers by which they are first riveted firmly to the three ends of the spider which then just fits the inside rim, after which they are readily soldered very securely to it. The angle lever L is pivoted at its vertex to the inner edge of cross bar Y so as to work freely in one end of the slot S. The short arm of said lever which is one centimeter in length terminates in a contact roller R which is pivoted in it. The long arm of said lever has a cross pin G driven through it with ends projecting on either side at a distance from its fulcrum equal to that of the pivot of roller R. The two projecting pivot ends of G each engage the short arms of the two levers H, H, of strip metal which are pivoted to the webs of the cast spider, so that the full travel of the diaphragm D and lever L transmits to these two long arms the amount of travel indicated by solid and dotted lines in Fig. 2. Two short wires or chains J link the two extremities of these arms to a ring in order to harness the power developed by the ebullition and condensation, with changes of temperature, of the volatile substance beneath the diaphragm, all of which will be readily understood. It is only necessary to run a

weighted or spring tensioned, ligament, such as chain or wires with short sections of chain, to round the guiding angle pulleys directly from said ring to the heat controlling device it is desired to operate. I prefer, however, where it is found possible, as where new buildings are to be equipped, during construction, or where it is found that wires can be readily fished through the walls without serious obstruction, to connect the wire directly to the eye in the long end of the lever L, and run it concealed in the wall, providing a small hole through the lath and plaster through which to fish the wire and in which said lever will be free to work.

The object of the two arms H and H previously described is to provide a ready means for running and connecting the tension wire on the outside of the wall in such cases as in old work where it is found impossible or impracticable to run through the wall, or where the purchaser desired to install the device himself and lacks the mechanical ability to successfully install the concealed work. The adjustable spiral tension spring adapted to work in the slot S of the iron frame is not essential to the operation of the device at temperatures from three to six degrees above the boiling point of the liquid employed, but is adapted to be adjusted more or less under tension when it is desired to raise the boiling point a few degrees higher than that for which the thermostat is normally adapted. The manner of application of the spring will readily be understood by referring to the drawings from which it is seen that the spring is secured to the rim of the casing and adjusted by a flat headed screw passing through said rim, and engaging a threaded nut anchored in one end of the spring. The other end of the spring hooks into a metal strap loop U, the two extremities of which straddle the friction roller R, and engage the two ends of the cross pin G inside the inner ends of the arms H and H, from which it is obvious that tightening the spring by means of the screw increases the pressure on the diaphragm plate, and therefore increases the boiling and operating point in like proportion. It is important to have a thermostat of large area to get sufficient power to perform the work to be done properly, and consequently it is desirable that it should lie flat to the wall.

One of the important objects which I accomplish by my present invention is to devise a simple and practical means of doing this, and convey the power of the diaphragm away from the thermostat by a simple tensioned ligament within restricted dimensions and conditions, and with small loss of energy; also a simple and effective means of spring adjustment within these limited dimensions.

I am aware that volatile liquid thermostats are not new, but I am not aware and do not believe that the simple, efficient system, such as I have devised, or any of the feature thereof which I claim, have ever before been used.

I claim:—

1. A thermostatic motor comprising two metal plates having upturned rims at the margin, one fitting within the other and said rims being secured together to form a fluid tight joint and to form a stiffening rim, and a lever mounted in position to be actuated by one of said plates, said lever having direct supporting connections with said stiffening ring.

2. A thermostatic motor comprising two metal plates having marginal rims, secured together, said rims forming a stiffening ring a rigid frame directly secured to said ring and a lever pivotally mounted in said frame and having a portion in position to be actuated by one of said plates.

3. A thermostatic motor comprising two metal plates one of which is of relatively stiff inflexible material, said plates having marginal rims one inclosed by the other and both secured together to form a fluid tight joint and to form a stiffening ring, a rigid frame directly secured to said ring and having portions whereby the motor may be secured to a support, and a lever pivotally mounted in said frame and having a portion in position to be actuated by the relatively flexible plate.

4. In a volatile liquid thermostat having an expansion chamber for said volatile fluid constructed of two large metal disks sealed together at their peripheries and held in a rigid framework in which is pivoted an L-shaped compression lever for said expansible chamber, one arm of said lever lying parallel with its diaphragm and compressing it, while the other arm of said lever stands perpendicular to the face of said diaphragm; a coiled spiral spring lying parallel with and in close proximity with the face of said diaphragm one end of said spring engaging said perpendicular end of said lever, while the other end of said spring is adjustably connected to the rigid outer frame of said thermostat so that its tension upon said chamber and fluid can be graduated to alter the temperature of volatilization of said fluid as may be desired.

5. A thermostatic motor comprising two metal plates having marginal rims standing at substantially a right angle to the plane of said plates, said rims being secured together to form a fluid tight joint and forming a stiffening ring, a spider frame rigidly connected with said rim and in close proximity to one of said metal plates, and a lever mounted in said frame.

6. In a thermostatic motor having a fixed rigid frame "F" and a flexible diaphragm "D" secured by said frame; a rigid cross bar "Y" secured to said frame and spanning said diaphragm; an L shaped lever pivoted i

said frame and actuated by said diaphragm; two levers "H" and "H" intermediately pivoted one on either side of the perpendicular arm of said L shaped lever, the inner short arm of each of said levers "H" and "H" engaging with opposite sides of said vertical arms by means of sliding pivots; a short tensioned ligament "J" engaging the outer extremities of the two long arms of the levers "H" and "H" so as to connect them with the transmitting ligament at "K" for the purpose specified.

7. In a thermostatic motor a flexible actuating diaphragm; a stiffening frame encircling said diaphragm; a rigid cross piece engaged with said frame and spanning the face of said diaphragm; a primary L-shaped transmitting lever pivoted in said cross piece and in working engagement with said diaphragm; and a pair of levers mounted to oscillate in a plane approximately parallel with the face of said diaphragm and pivoted one on each side of said primary lever; the short inner arms of said pair of levers being engaged with said primary lever the other ends of said levers being joined to a common central main transmitting ligament coupling by means of two short branch ligaments.

In testimony that I claim the above I hereunto set my hand in the presence of two witnesses.

EDWARD S. HALSEY.

Witnesses:
S. C. HALSEY,
M. A. CAMPBELL.