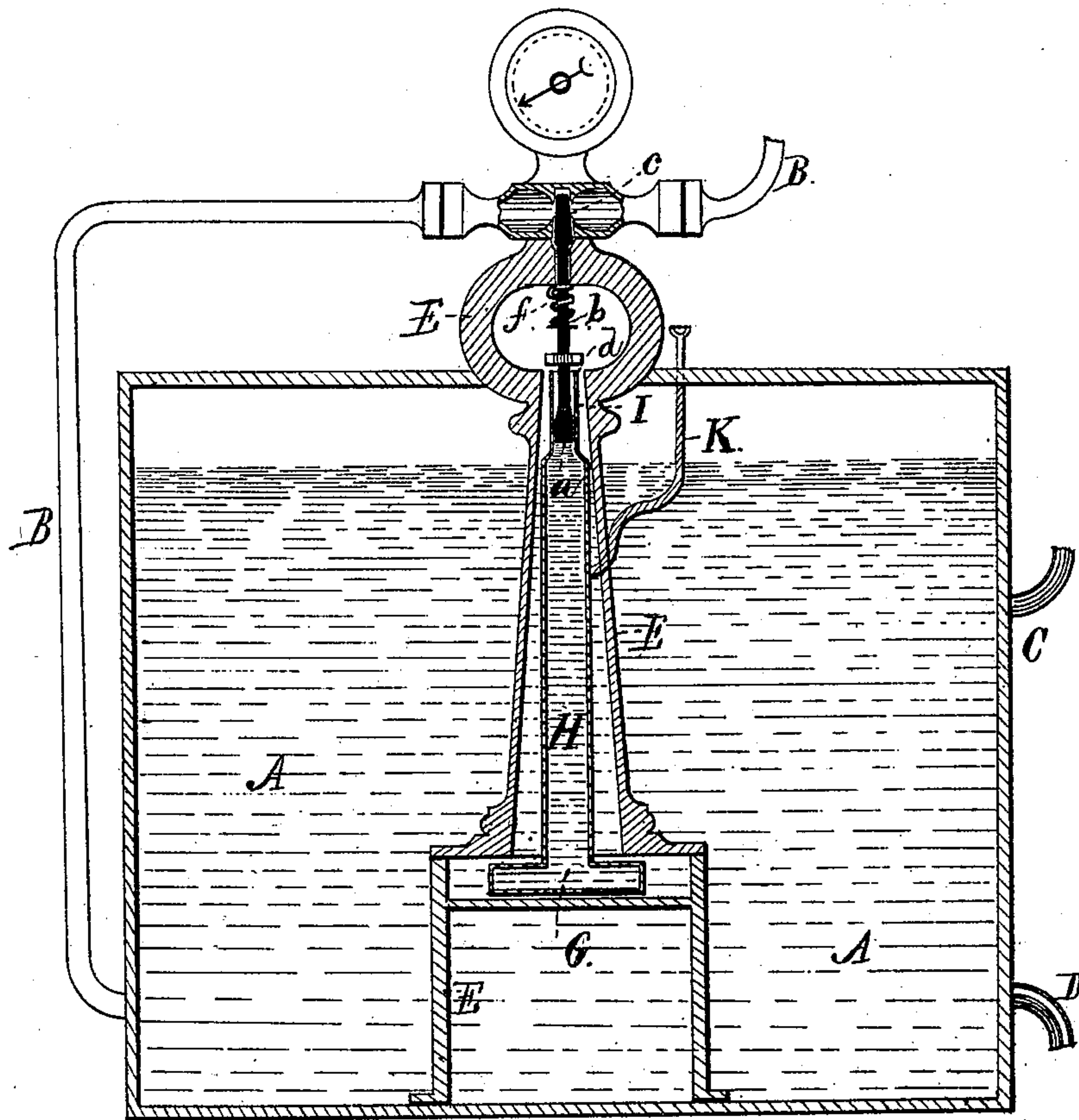


H. R. RANDALL.

THERMOSTATIC APPARATUS FOR CONTROLLING VALVES.

No. 174,571.

Patented March 7, 1876.



Witnesses;
Lewis Hickman
Jno. H. Manning

Inventor;
Henry R. Randall,
E. A. Hampton,
Atty.

UNITED STATES PATENT OFFICE.

HENRY R. RANDALL, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN THERMOSTATIC APPARATUS FOR CONTROLLING VALVES.

Specification forming part of Letters Patent No. **174,571**, dated March 7, 1876; application filed December 23, 1875.

To all whom it may concern:

Be it known that I, HENRY R. RANDALL, of the city of Brooklyn, county of Kings and State of New York, have invented certain new and useful Improvements in Controlling Valves by means of expansible fluids, of which the following is a specification:

This invention relates to that class of devices designed for automatically operating and controlling valves in steam or other pipes, and has for its object the retaining at a stated temperature either water or air, by controlling the valve regulating the supply of the heating medium, the expansion and contraction of a fluid or solid, governed by the heated fluid or air in which it is immersed, giving the actuating impulse to the apparatus operating the valve, the construction, application, and operation of which will be fully pointed out and described.

The drawing represents a sectional elevation of an apparatus in which is fully embodied my invention, and showing its application to the heating of water.

A represents a boiler or tank of water, which is to be heated by the introduction therein of live steam, and an even temperature of the same maintained. B is the steam-pipe, through which the steam is conducted. C is the inlet and D the exit pipe, by means of which water is introduced and withdrawn from the boiler or tank. These parts may be of any ordinary form of construction, and therefore call for no detailed description. E is a stand or frame, constructed from metal and inserted in the boiler A, the feet of the frame resting on the bottom thereof, to which they may be bolted. The upper part of this frame may extend above the boiler and act as a support for the steam-pipe B. The frame or stand is made hollow, so as to permit the free access of the water, in which it is immersed to every part. Instead of being in the shape of a stand, as shown, it may simply be made a frame of rods. G is a hollow disk made from brass, and preferably about six inches in diameter and one inch thick. Extending upwardly from its center is a brass tube, H, usually about one and a fourth inch in diameter, and of such length as is needed, ordinarily about two feet. This disk and tube are made of as thin sheet metal as is possible, so as to be very sensitive to the

variations in temperature. At the upper end of the tube H it is reduced to a less diameter, as shown at I, so as to confine the action of expansion and contraction of the fluid, with which the disk and tube may be filled, to a small column, thus increasing its sensibility and rapidity of action. This disk and tube are placed centrally in the frame E and supported therein by any suitable device, the upper and reduced end I of the tube reaching just above the water-line, as shown in the drawing. Into this reduced tube is inserted a piston or plunger, *a*, suitably packed, and attached to a connecting-rod, *b*, which extends upwardly through the upper frame of the boiler to the valve *c* in the steam-pipe B, to which it is attached. It is provided with a check-nut, *d*, which may be adjusted at will to limit and control the extent of motion as it falls, the nut resting upon the top of the tube or other suitable stop that may be provided. The disk G and tubes H and I are completely filled with an expansible fluid before insertion in the supporting-frame in the boiler, or they may be filled by means of a small pipe, K, connected with it and extending through the top of the boiler. This will also be useful in adding to the fluid to replace loss by evaporation or other causes. A light spiral spring, *f*, is attached to the connecting-rod operating the valve *c*, and operates to force down the plunger *a* as the fluid in the tube I contracts.

It is obvious that the operation of the apparatus will be as follows: The boiler being filled with cold water, the expansible fluid in the disk and tube H is contracted so as to drop the plunger *a* to the full extent of its downward motion, opening wide the valve *c*. Live steam then being admitted to pipe B, it freely passes through the open valve and enters the water in the boiler, heating the same to the degree of temperature desired. This heating of the water conveys its action to the fluid and expands it in the disk and tube, forcing the plunger or piston *a* upward, thus closing the valve *c* and shutting off the supply of steam, or so much of it as may be necessary. As the temperature of the water falls the fluid in the disk and tube contracts and the piston drops with it, again opening the valve and admitting a new supply of steam.

The operation of the plunger *d* may be so adjusted that it will rise and fall at a certain degree of heat, or close the valve and open the same at specified degrees of heat, which points may be indicated upon an indicator located above the apparatus and connected with the lever operating the valve, and actuated thereby. It is evident that this indicator will, as the valve rises or falls, indicate the changes and present temperature of the water in the boiler.

I have found, by careful experiment, that where low degrees of heat are to be controlled, ether, alcohol, or similar fluids that vaporize or boil at a low degree of temperature, are preferable in use; but where high degrees of heat are to be controlled, mercury, and sometimes a solid metal immersed in the body to be heated, is best.

My apparatus may be modified and adapted to the controlling of heated air, but the main purpose sought is the controlling a valve gov-

erning the admission of a heating medium into a fluid.

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

The combination of a tank for containing water, a frame, *E*, within the tank extending above the same, a tube or chamber, *H*, arranged in said frame for containing an expansible fluid, and a valve arranged above said tube, and directly controlled by the expansion of the fluid in the tube or chamber, for controlling the admission of the steam or hot air into the tank.

In testimony that I claim the above I have, this 16th day of December, A. D. 1875, hereunto subscribed my name in the presence of two witnesses.

HENRY R. RANDALL.

Witnesses:

A. L. MUNSON,
LEWIS WILKINSON.