(No Model.)

H. B. TATHAM, Jr.

HEAT REGULATING DEVICE.

No. 333,899. Patented Jan. 5, 1886.

Fig. 1.

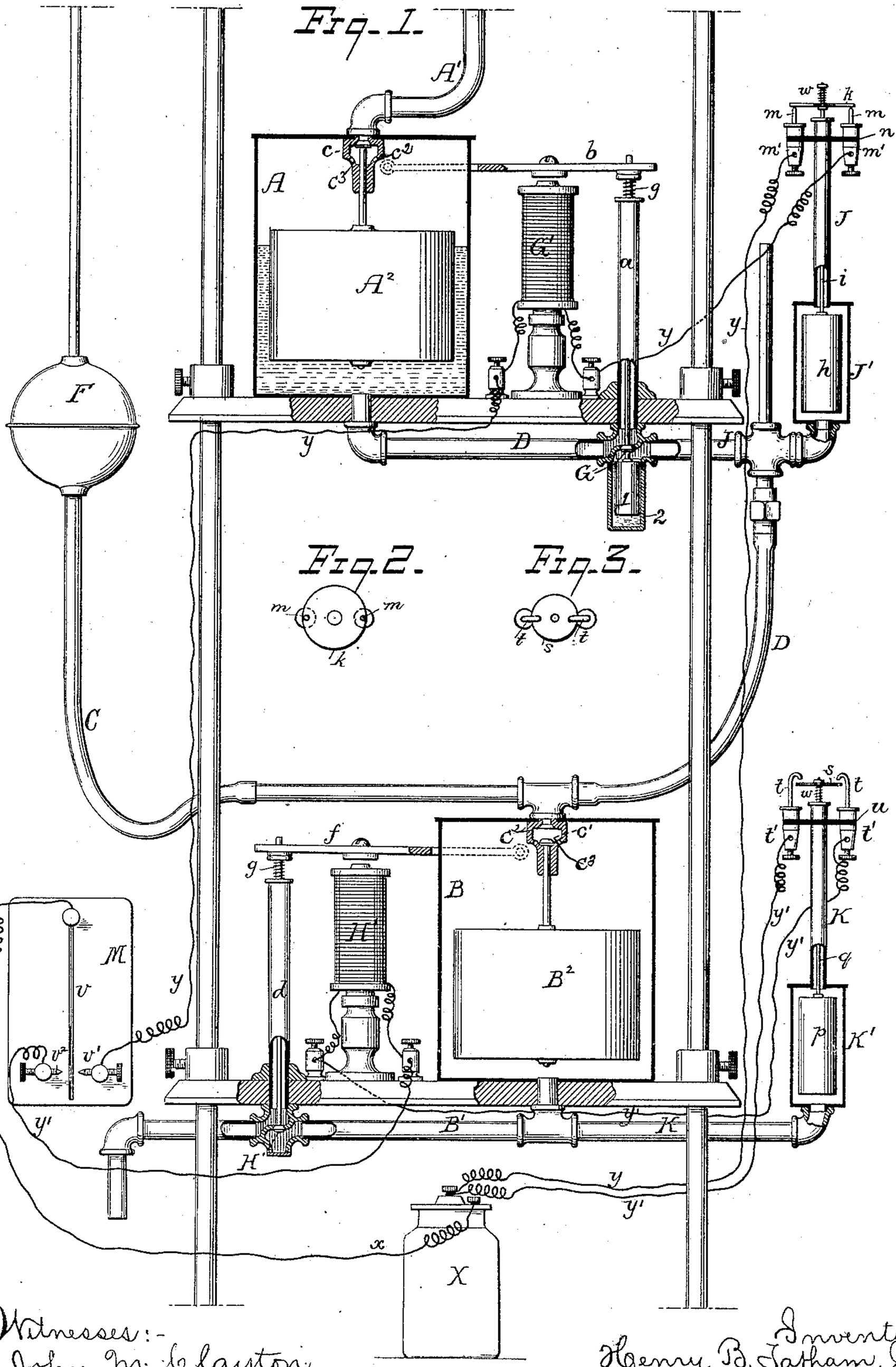

Fig. 2.

Fig. 3.

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HENRY B. TATHAM, JR., OF PHILADELPHIA, PENNSYLVANIA.

HEAT-REGULATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 333,899, dated January 5, 1886.

Application filed May 24, 1884. Serial No. 132,675. (No model.)

To all whom it may concern:

Be it known that I, HENRY B. TATHAM, Jr., a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Heat-Regulating Devices, of which the following is a specification.

My invention is an improvement upon that for which I filed application for patent on the 23d day of July, 1883, Serial No. 101,639, the objects of my present improvement being to lessen the battery-power necessary to operate the valve-controlling magnets and to locate the two water-vessels at any desired distance apart.

Figure 1 in the accompanying drawings is a side view, partly in section, of my improved heat-regulating apparatus, and Figs. 2 and 3 are plan views of circuit-breaking devices forming part thereof.

A and B are two water-vessels; A′, a water-supply pipe communicating with the vessel A; B′, a discharge-pipe communicating with the vessel B, and D a pipe forming a communication between the two vessels, and having a flexible branch, C, communicating with a vessel, F, which is supposed to be suspended from a window, damper, or valve, as in the above-mentioned application. The pipe A′ has at its discharge end a valve, *c*, contained in a chest, c^2, with perforations c^3, and controlled by a float, A^2, in the vessel A, and the pipe D has a similar valve, *c′*, contained in a like perforated chest and controlled by a float, B^2, in the vessel B, the rise of the float closing the valve, and the fall of the float opening the same. In the pipe D is a valve, G, and in the pipe B′ a valve, H, the stem of the valve G passing through a tube, *a*, and being connected to the armature *b* of a magnet, G′, while the stem of the valve H passes through a tube, *d*, and is connected to the armature *f* of a magnet, H′, springs *g* acting upon collars on the valve-stems, so as to lift the same, the attraction of the magnet tending to depress them. Communicating with the pipe D is a branch pipe, J, forming part of which is a vessel, J′, containing a float, *h*, the stem *i* of which has a disk, *k*, beneath which are pins *m*, secured to binding-posts *m′* on a plate, *n*, carried by the pipe J. The pipe B′ has a similar branch pipe, K, with vessel K′, having a float, *p*, the stem *q* of which carries a disk, *s*, which is directly beneath the hooked upper ends of pins *t*, secured to binding-posts *t′* on a plate, *u*, on the pipe K. The disks are loose on the stems, and are acted upon by springs *w*, so that said disks are free to yield, so as to insure their contact with the points of both pins.

X is a battery of any of the usual constructions, and M a thermostat consisting of a bar, *v*, fixed at one end, but free at the opposite end, the free end of the bar projecting between two threaded and adjustable contact-pins, v' v^2. The positive wire *x* of the battery connects with the fixed end of the bar *v*, and the battery has two negative wires, *y y′*. The wire *y* extends from the battery to one binding-post *m′*, and from the other post *m′* to and around the magnet G′, and thence to the pin *v′* of the thermostat. The wire *y′* is similarly arranged in respect to the binding-posts *t t′*, magnet H, and pin v^2 of the thermostat. The bar *v* of the thermostat consists of two strips of material, one of which is more susceptible than the other to the expanding and contracting influences of heat. For instance, one strip may be of zinc and the other of hard rubber, it being understood that when subjected to a degree of heat which is normal—that is to say, the degree desired for the room or apartment in which the apparatus is placed—both strips will be of the same length, and the end of the bar will be free from contact with either of the pins v' v^2; but the rise of the temperature above the normal degree will cause a greater expansion of the rubber strip than of the zinc strip, the bar being caused to buckle and its end being thrown over to one side, while a fall of the temperature below the normal degree will cause the contraction of the rubber strip and a buckling of the bar, so as to throw its end in the opposite direction. The rubber strip should have an opening at the lower end to insure electrical contact of the zinc strip with the pin v^2 as well as with the pin *v′*.

The operation of the device is as follows: When the apartment is at normal temperature, the valves G and H are both closed, the vessel A contains a supply of water sufficient to raise the float A^2 and close the valve of the pipe A′, the vessel B and pipes D, B′, J, and K are empty, the floats *h* and *p* depressed, the

connection between the binding-posts m' completed by the bar k and pins m, the connection between the posts t' t' broken, and the bar v occupying a position midway, or thereabout, between the points of the pins v' v^2, so as to break the circuit through both of the wires y y'. On an undue increase of temperature the end of the bar v is thrown over so as to come in contact with the pin v', thus completing the circuit through the wire y, and causing the magnet G′ to attract its armature and open the valve G. This permits the water to flow from the vessel A into the pipe D, the first effect being to fill the pipe B′ and partially fill the vessel B and pipe K, so that the float B^2 closes the valve of the pipe D, and the float p causes the bar s to come in contact with the pins t and complete the connection between the posts t' t'. The water then flows through the branch C of the pipe D into the vessel F and causes the latter to descend, so as to open the window, valve, or damper to which it is connected. At the same time the water rises in the vessel J′ of the pipe J and elevates the float h, so as to lift the disk k from the pins m m and break the circuit through the magnet G′, the spring g closing the valve G and cutting off the flow of water from the vessel A, the entrance of water to which from the pipe A′ is then cut off by the rise of the float A^2. The parts remain in this position until, owing to a reduction of temperature, the end of the bar v is thrown over so that the zinc plate strikes the pin v^2, whereupon the circuit is completed through the magnet H′, the armature of the latter is attracted, and the valve H opened. This permits the water to escape from the pipe B′, vessel B, and pipe K, and the fall of the float B^2 opens the valve c', and permits the escape of the water from the vessel F and pipes C, D, and J. As the water escapes from the vessel F, the valve or damper to which the same is connected closes, and the escape of water from the vessel J′ permits the float h to fall, so as to bring the disk k into contact with the pins m. As the level in the vessel B falls, there is a like fall in the vessel K′, and the float p drops, so as to carry the disk s away from the pins t, as shown, thus again breaking the circuit through the magnet H′, and permitting the closing of the valve H under the action of the spring g'.

The vessels A and B are adjustable as to height, and a magnet is used for each of the valves G and H, so that the two vessels A and B can be placed at any desired distance apart, and a head of water insured for operating the regulating valve or damper, a further feature being the employment of an independent circuit for each magnet, and an automatic circuit-breaker under control of the water, for by this means the circuit through each of the magnets is broken as soon as the magnet has held its valve open long enough to do the required work, without waiting for the more slowly-acting thermostat to break the circuit; hence I am enabled to operate the device with a light battery, and do not exhaust the latter by keeping the circuit closed.

Instead of using springs to raise the valves G and H, floats 1, connected to the valve and contained in water-vessels 2, communicating with the valve-casing, may be used, as shown, in connection with the valve G.

The use of the vessels A and B enables me to use in connection with the valve G and float h, and with the valve H and float p, pipes extending above the level to which the water can ascend in said vessels A and B, so that no stuffing-boxes are required to prevent the water from overflowing around the stems of the valves or floats, and the operation of the latter can hence be effected with the exertion of very little power, owing to the absence of friction, the device being thereby rendered very delicate in its action.

It is not essential to my invention that the vessel F should be used as a means of operating the window, valve, or damper which controls the temperature of the apartment, as any of the devices shown in my application for Patent No. 101,638, filed July 23, 1883, may be used with the improved valve-operating mechanism.

I claim as my invention—

1. The combination of a liquid-receiver forming part of a device for operating a valve or damper, an elevated liquid-reservoir, a pipe communicating with said reservoir and with the liquid-receiver, valves G and H, whereby the liquid is caused to flow from the elevated reservoir to the receiver, and is discharged from the latter, an electro-magnet for each valve, two electrical circuits, one for each magnet, and a thermostat controlling both circuits, all substantially as specified.

2. The combination of a liquid-receiver forming part of a device for operating a valve or damper, a liquid-reservoir, a pipe communicating with said reservoir and with the receiver, a valve controlling the flow through said pipe, an electro-magnet for operating said valve, a thermostat controlling the circuit through the magnet, and an automatic circuit-breaker independent of the thermostat, all substantially as specified.

3. The combination of a liquid-receiver forming part of a device for operating a valve or damper, a liquid-reservoir, a pipe communicating therewith and with the receiver, a valve controlling the flow of liquid through said pipe, an electro-magnet for operating said valve, a thermostat controlling the circuit through said magnet, a circuit-breaker independent of said thermostat, and a vessel communicating with the liquid-reservoir and containing a float connected to one of the contacts of said independent circuit-breaker, all substantially as specified.

4. The combination of the two vessels A and B, located one above the other, a liquid-receiver forming part of a device for operating a valve or damper, a pipe, D, connecting the two vessels and communicating with said re-

ceiver, a discharge-pipe communicating with the said vessel B, valves in said connecting and discharge pipes, an electro-magnet for operating each valve, two electrical circuits, one for each magnet, and a thermostat controlling both circuits, all substantially as specified.

5. The combination of the two vessels A and B, located one above the other, a liquid-receiver forming part of a device for operating a valve or damper, a pipe, D, connecting the two vessels and communicating with said receiver, a discharge-pipe communicating with said vessel B, valves in said connecting and discharge pipes, an electro-magnet for operating each valve, two electrical circuits, one for each magnet, a thermostat controlling both circuits, and an automatic circuit-breaker independent of the thermostat in each circuit, all substantially as specified.

6. The combination of a liquid-reservoir, a discharge-pipe having a valve, a tube surrounding the stem of the valve and extending above the level of the water in the reservoir, and an electro-magnet for operating the valve, all substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY B. TATHAM, JR.

Witnesses:
JOHN M. CLAYTON,
HARRY SMITH.