(No Model.)

H. B. TATHAM, Jr.

THERMO PNEUMATIC TEMPERATURE REGULATOR.

No. 511,066. Patented Dec. 19, 1893.

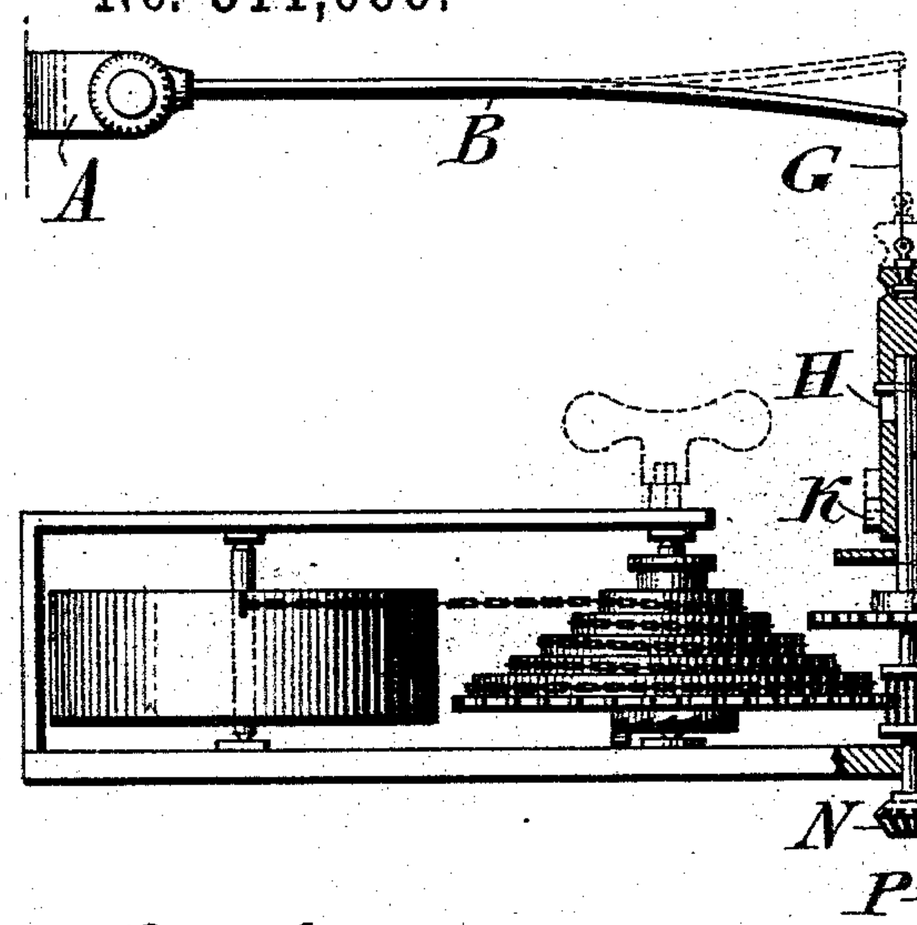


Fig. 1.

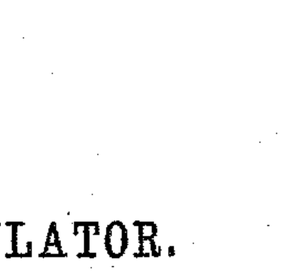


Fig. 2.

Fig. 3.

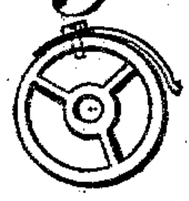


Fig. 6.

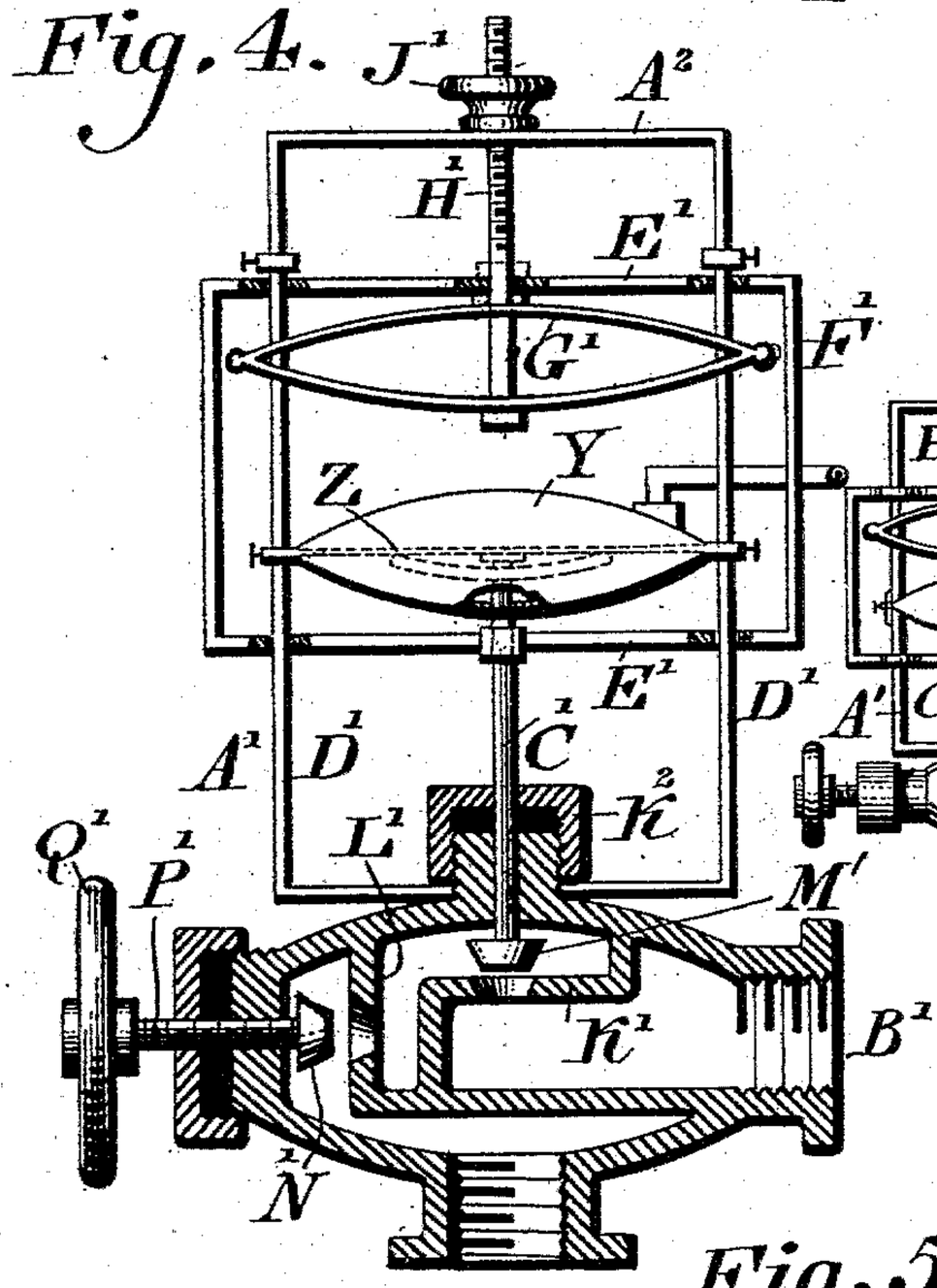
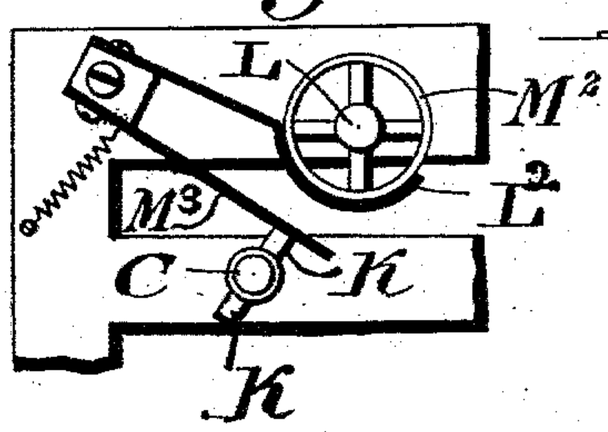


Fig. 4.

Fig. 5.



WITNESSES:

P. H. Eagles.

L. Douville.

INVENTOR

Henry B. Tatham Jr.

BY John A. Wiedersheim

ATTORNEY.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

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

THERMO-PNEUMATIC TEMPERATURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 511,066, dated December 19, 1893.

Application filed June 26, 1893. Serial No. 478,801. (No model.)

To all whom it may concern:

Be it known that I, HENRY B. TATHAM, Jr., a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Thermo-Pneumatic Temperature-Regulators, which improvement is fully set forth in the following specification and accompanying drawings.

My invention relates to the class of inventions employed for controlling the temperature of apartments by automatically cutting off or admitting the supply of heat, and it consists of certain peculiarities of construction, as will be hereinafter fully set forth.

Figure 1 represents a side elevation of a thermo-pneumatic temperature regulator embodying my invention. Fig. 2 represents a view of the interior of a box which contains the valve mechanism thereof. Fig. 3 represents a partial side elevation and partial section of the crank of said valve mechanism and the anti-friction roller thereon. Fig. 4 represents a partial side elevation and partial vertical section of the regulating valve and operating mechanism on an enlarged scale. Fig. 5 represents a top or plan view of a brake, preferably flexible, preventing a possible jamming and causing a gradual stoppage thereof. Fig. 6 represents another form of brake, the catch being preferably flexible, enabling it to strike and pass the lugs several times before coming to a stop, thereby preventing a possible sudden jamming of the same and causing a gradual stoppage thereof.

Similar letters of reference indicate corresponding parts in the several figures.

Refering to the drawings: A designates a support for the thermostat B, whose outer end has attached to it the pendant C, which is telescopically fitted on the vertical shaft D of the train E of clock gearing, so as to be adapted to be raised and lowered on said shaft, said pendant having a swiveled connection F with the cord, wire or rod G, by which the pendant is secured to the thermostat. In the pendant is a horizontally-extending slot H, which receives the pin J on the upper end of the shaft D, whereby the motion of the latter may be communicated to said pendant. Projecting from the pendant are lugs K, one of which is located above the other, as most clearly shown in Fig. 1.

L designates a reduced power shaft, which carries a gear wheel which meshes with a proper wheel of the train E, so as to be rotated by the same, said shaft having secured to it the arm M, which is adapted to engage with either of the lugs K, as will be hereinafter fully set forth.

On the shaft D is a bevel gear wheel which meshes with a bevel or other gear wheel P on the shaft Q, the latter carrying a crank R, whose outer limb carries an anti-friction roller which is adapted to bear against either of the springs S, on each of which is a valve T, the seats of said valves being on the box U. Connected with one of the valves T is the induction pipe V, which is connected with a tank or vessel W containing air under pressure. Connected with the box U is the eduction pipe X, which leads to the chamber Y, containing the flexible diaphragm Z, said chamber being sustained on the frame A′, from which depends the valve B′, whose stem C′ is secured to the diaphragm Z.

The side pieces D′ of the stationary frame A′ pass through and act as guides to the movable frame F′, which is supported by the spring G′, which may be spiral if desired, and screw H′ which passes loosely through the top of the spring G′, and cross piece E′, and carries on its upper end the regulating nut J′, which bears upon the top cross piece A^2 of the stationary frame A′, by which provision the tension of the spring G′ which raises the valve M′ by means of the movable frame F′ may be adjusted as desired.

The valve B′ has two diaphragms K′, L′, therein, each having a seat, one for the valve M′ which is carried by the stem C′, and one for the valve N′ which is carried by the stem P′, the latter having a hand operating wheel Q′ connected therewith.

The operation is as follows: When the temperature of the apartment or room rises, the thermostat lifts the pendant C, whereby the upper lug K clears the arm M. As the latter is released, the train E is set in motion and the pendant rotates. The arm M also rotates due to the rotation of the shaft L, until it strikes the lower lug K, which has been raised to the position in the path of said arm, and thus the train is stopped. As the shaft D rotates, the gearing N, P, is also rotated, whereby motion is communicated to the shaft Q

and the crank R, and thus the latter is adapted to engage with the lower valve T, so as to open the same, the upper valve being closed, whereby the full power of the pressure may be admitted into the box or chamber U, and thus act upon the diaphragm Z, thereby closing the valve M', and consequently shutting off from the place of service the heat that is passed through the valve B'. When the temperature of the apartment or room falls, the pendant is lowered by the contracting thermostat, and the arm M is released and it rotates until it strikes the upper lug K. Motion is again imparted by the action of the train to the crank R, when the lower valve is released so as to close, and the upper valve forced open, and thus the pressure may escape into the atmosphere. As the diaphragm Z is relieved of pressure, and it returns to its normal position, the valve M' is raised by the spring G', and accordingly opened, and thus heat may be admitted to the place of service.

In Fig. 5 the arm M, shown in Fig. 1, is substituted by a wheel or disk M^2, which is secured to the shaft L, and a brake L^2, which is preferably flexible, is adapted to engage with said wheel M^2, the arm M^3 of said brake being adapted to be engaged by lugs K on the pendant C.

In Fig. 6, the arm M shown in Fig. 1, is substituted by a wheel having a flexible projection adapted to engage with the lugs K and strike several times before coming to a full stop, reducing the speed thereby and preventing any possible sudden jamming of the same.

In lieu of air in the reservoir or tank W, I may use pneumatic, hydraulic, steam or other suitable pressure.

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

1. The combination in a heat regulator of a shaft operating a valve, directly or by gearing, a motor operating said shaft, gearing from said shaft to a reduced power shaft, lugs adapted to rotate with said power shaft, an arm or lever connection from the reduced power shaft with said lugs, a valve chamber, and a source of pressure, whereby the heat regulating valve may be controlled by the reduced power shaft after the same has been set in motion by a thermostat, substantially as described.

2. The combination with a thermostat of lugs pendent therefrom, a main power shaft connected with said lugs, a reduced power shaft geared with said main power shaft, and adapted to engage with said lugs after the same have been set in motion by a thermostat, a valve geared with or upon said main power shaft, a valve chamber, a source of pressure connected with said chamber, and a heat-regulating valve in communication with said chamber, substantially as described.

3. In a thermo-pneumatic temperature regulator, a valve chamber with valves therein, a source of pressure, an eduction pipe connected with said chamber, and a heat-regulating valve, and an intermediate regulator controlled by a reduced power shaft after the same has been set in motion by a thermostat, substantially as described.

4. In a thermo-pneumatic temperature regulator, a rotatable shaft, a valve box with an inlet valve and an outlet valve, said valves being normally closed by springs, a crank arm on said shaft adapted to open either of said valves a compressed air supply communicating with said inlet valve, a heat supply with a valve having its stem connected with an air chamber containing a flexible diaphragm, and a pipe leading from said valve box to said chamber, said parts being combined substantially as described.

5. A thermo-pneumatic temperature regulator consisting of a thermostat with a rising and falling pendant, a train of gearing with rotatable shaft connected to said pendant, a rotatable crank shaft having gearing meshing with gearing on said train shaft, a valve box having an exhaust or outlet valve and an inlet valve, said crank shaft being adapted to open either of said valves, a compressed air supply with pipe leading into said valve box, a frame supporting a controlling valve of a heat supply, and a pipe leading from said valve box to a chamber having therein a flexible diaphragm on the stem of said controlling valve of said heat supply, said parts being combined substantially as described.

6. In a thermo-pneumatic temperature regulator, a rotatable shaft with a crank arm on one end, a valve box with an exhaust valve opening into the atmosphere, and an inlet valve in communication with a compressed air supply, and an eduction pipe leading from said valve box, said exhaust valve and inlet valve being normally closed, said parts being combined substantially as described.

7. In a thermo-pneumatic temperature regulator, a heat supply-controlling valve with a flexible diaphragm on the stem thereof, a stationary frame on which said diaphragm moves, a movable frame guided on said stationary frame and connected with said valve stem, and a spring connected with said stationary frame and bearing against said movable frame, said parts being combined substantially as described.

8. In a thermo-pneumatic temperature regulator, a heat supply-controlling valve having a flexible diaphragm on the stem thereof, an air chamber in which said diaphragm is located a pipe connecting said diaphragm chamber with a compressed air supply, a stationary frame, a movable frame guided on said stationary frame, and connected with said valve stem, and a spring for operating said movable frame, said parts being combined substantially as described.

HENRY B. TATHAM, JR.

Witnesses:
ROBT. H. ENGLE,
JOHN A. WIEDERSHEIM.