(No Model.) 3 Sheets—Sheet 1.

W. P. POWERS.

GAS CONTROLLING VALVE.

No. 555,399. Patented Feb. 25, 1896.

Fig. 1.

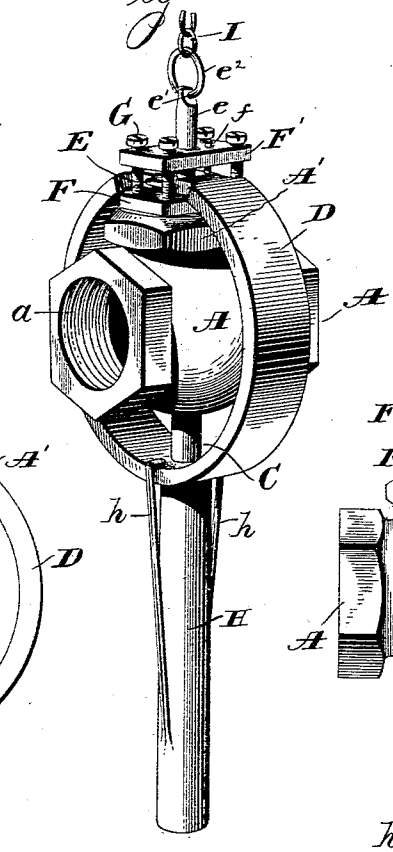


Fig. 2.

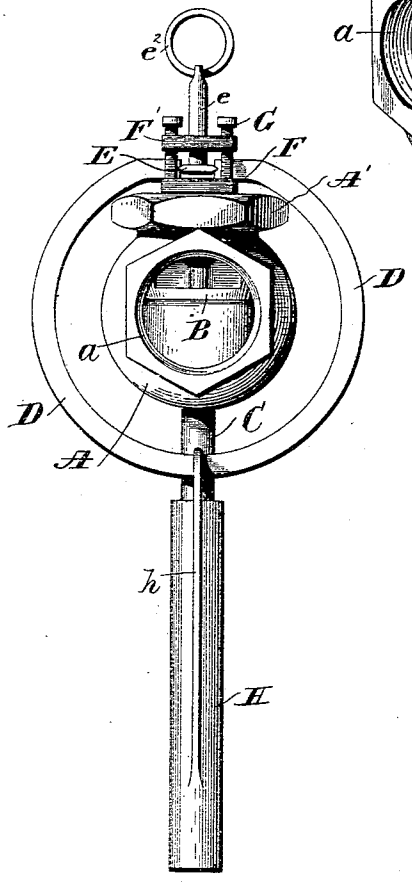
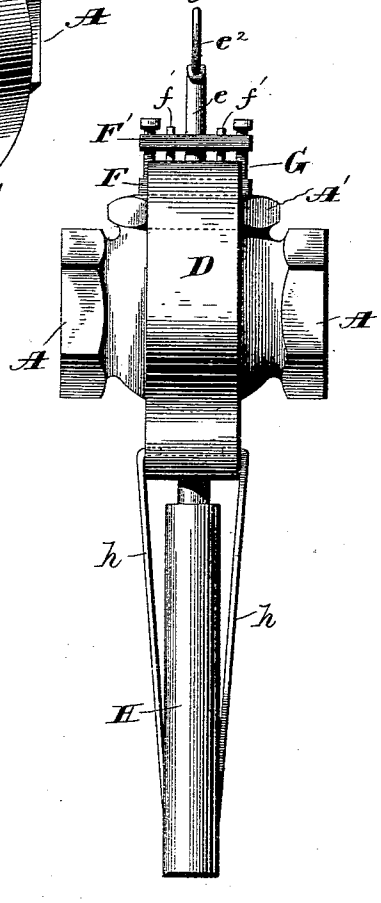


Fig. 3.



Witnesses:
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Inventor.
William P. Powers, by
Brindle and Russell, his Attys.

(No Model.) 3 Sheets—Sheet 2.

W. P. POWERS.

GAS CONTROLLING VALVE.

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Fig. 4.

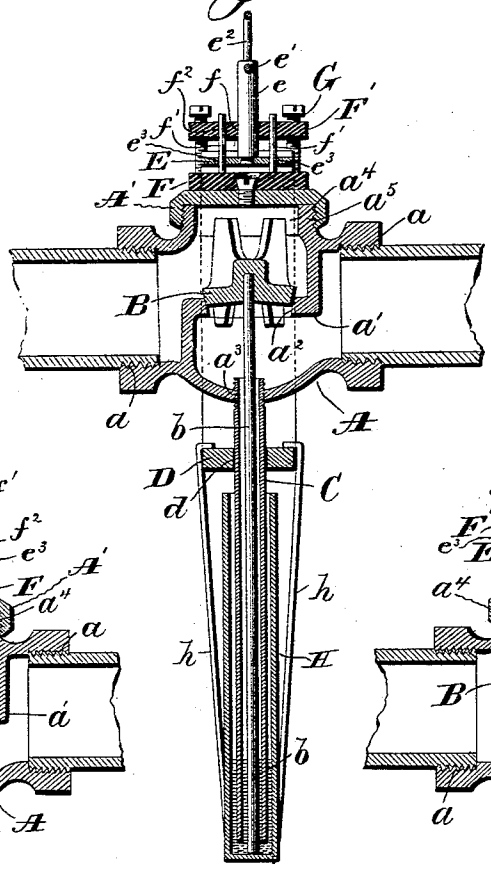


Fig. 5.

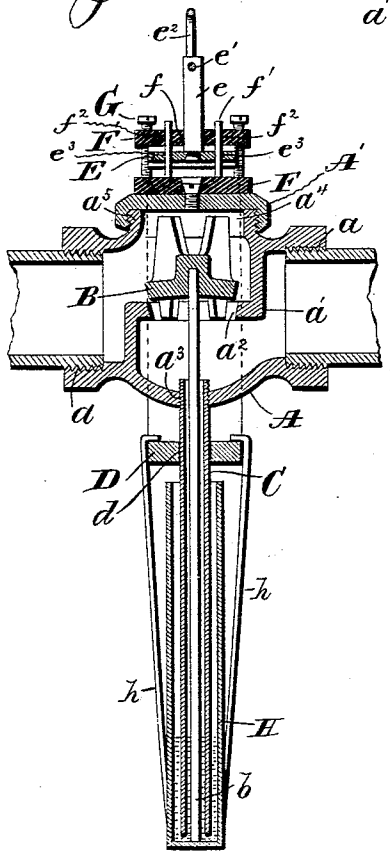
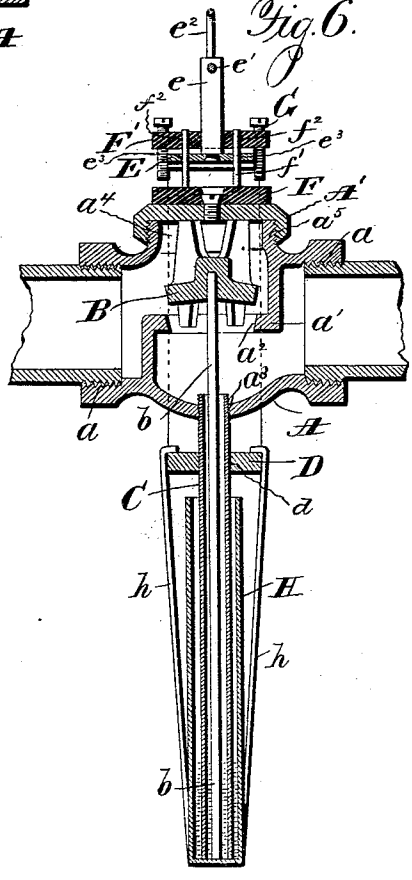


Fig. 6.



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(No Model.)

3 Sheets—Sheet 3.

W. P. POWERS.

GAS CONTROLLING VALVE.

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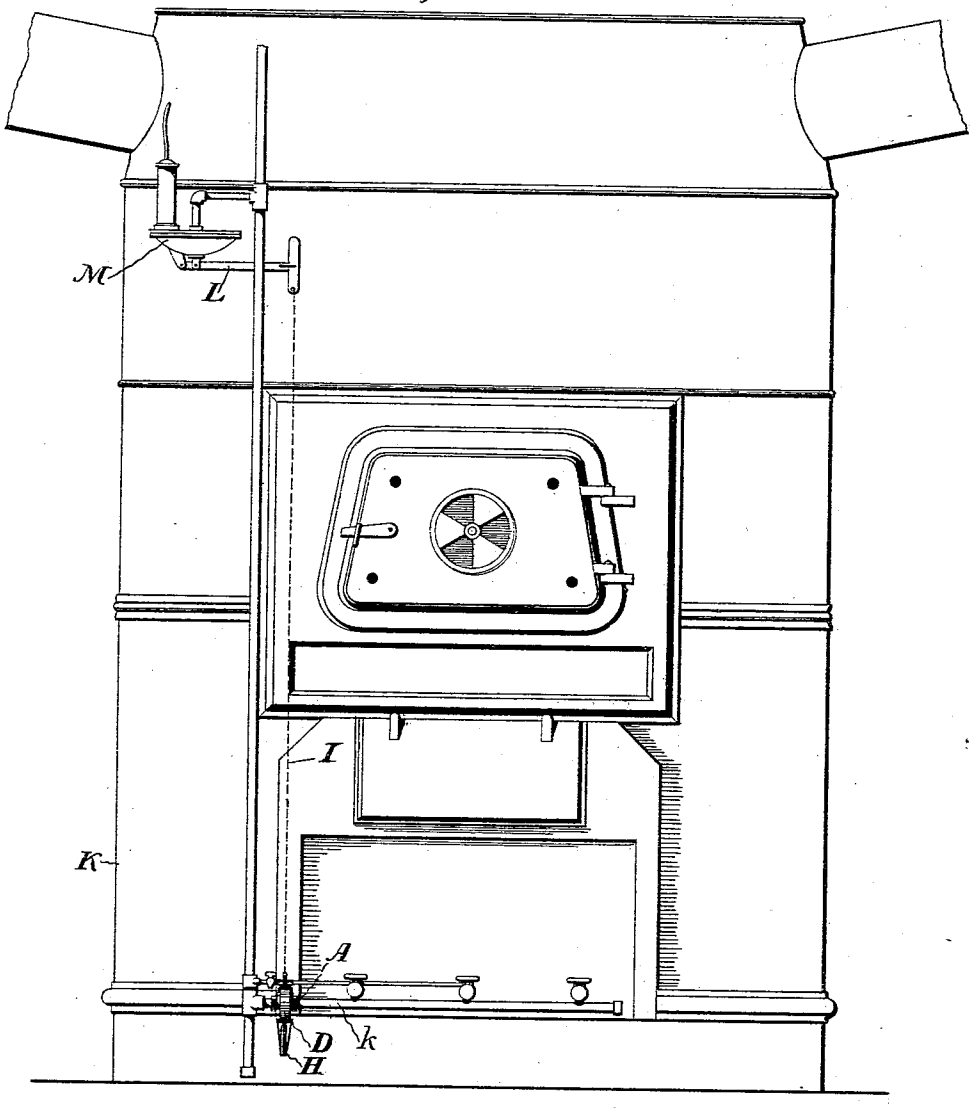
Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM P. POWERS, OF CHICAGO, ILLINOIS.

GAS-CONTROLLING VALVE.

SPECIFICATION forming part of Letters Patent No. 555,399, dated February 25, 1896.

Application filed June 12, 1893. Serial No. 477,344. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. POWERS, of Chicago, in the county of Cook, and in the State of Illinois, have invented certain new and useful Improvements in Gas-Controlling Valves; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my device ready for connection with a gas-supply pipe. Fig. 2 is a front elevation of the same with the valve closed. Fig. 3 is a side elevation of said device. Figs. 4, 5 and 6 are vertical central sections of the same and show, respectively, the relative positions of parts when the valve is arranged to entirely cut off the gas and to supply the minimum and maximum quantities required, and Fig. 7 is a front elevation of a gas-burning furnace with my mechanism applied.

Letters of like name and kind refer to like parts in each of the figures.

The design of my invention is to enable the supply of gas to heating apparatus to be easily and perfectly controlled through mechanism which is automatically operated by changes of temperature; and to such end my said invention consists in the means employed for varying the position of the valve used for controlling the supply of gas, substantially as and for the purpose hereinafter specified.

In the carrying of my invention into practice any desired construction of valve may be used; but that preferably employed consists of a casing A, which at opposite sides is provided with threaded openings a and a for the reception of the threaded ends of pipes, and within its central globular body has a horizontal partition a', that separates the interior into two parts, each of which communicates with one of said openings a and a.

Within the partition a' is provided a conical valve-seat a^2, which receives a correspondingly-shaped valve B, that, when resting upon such seat, operates to close the opening and prevent the passage of anything through the casing. A rod b, loosely connected with or formed upon the center of the valve, extends downward through an opening a^3 in the bottom of the casing A and affords means whereby said valve may be raised, when desired, so as to open communication between the ends of the latter. Within said opening a^3 is secured one end of a tube C, which has such diameter of interior as to permit of the free passage of such rod or valve-stem, and from said casing A extends down to the lower end of said stem when said valve is raised to its upper limit of motion.

Within the upper side of the casing A is provided an opening a^4 of sufficient size to enable the valve B to be inserted through the same into the interior of said casing, which opening is then inclosed by means of a cap A′ fitted over an exteriorly-threaded curb a^5, that surrounds the same.

Surrounding the casing A is a curved steel magnet D, which at its longitudinal center is provided with an opening d, that enables it to move freely over the tube C, and at its ends or poles is connected by means of a short brass plate E, that has secured to and extending upward from its center a rod e, which rod has within its upper end an opening e', that contains a ring e^2.

Secured upon the cap A′ is a plate of soft iron F, which has a length somewhat greater than the width of the magnet D and a width sufficient to cause its sides to project beneath the ends of said magnet, while above such plate is a second similar plate of soft iron F′, which has a central opening f for the passage of the rod e, and is loosely connected with the plate F by means of two vertically-arranged dowel-pins f' and f', that extend from the latter through openings e^3 and e^3 in the brass plate E and through like openings f^2 and f^2 in said iron plate F′. Four longitudinally-adjustable screws G and G, which pass downward through the corners of the latter with their ends resting upon said lower plate, furnish means whereby said plate F′ is supported by said plate F, and the distance between the same may be varied at will.

Suspended by spring-clips h and h from the lower portion of the magnet D is a tube H, which has its lower end closed and has such diameter of interior as to enable it to slide freely over the tube C and such length as to cause its lower closed end to engage with

the lower end of the stem *b* when the valve B is closed and said magnet rests upon the lower plate F, as shown in Figs. 1, 2, and 4.

The device is now complete and is used by connecting the threaded ends of the valve-casing with the supply-pipe *k* of a gas-burning furnace K, partly filling the tube H with a liquid (preferably mercury) to seal the lower end of the tube C and prevent the escape therefrom of gas, and then connecting the ring e^2 of the rod *e*, preferably by means of a chain I, with a lever L, which is connected to a thermostat M and is operated by the same, so as to cause an upward pull when the temperature falls, and to permit said parts to drop downward when the temperature rises, the points at which the valve shall open and close being determined by the length of the connecting-chain, which length is varied to secure different temperatures.

When there is no gas required, the position of parts is as shown in Figs. 1, 2, and 4, the plate E being at the lowest point of its motion and the ends of the magnet in contact with the lower plate, F, in which position of said magnet the tube H has dropped so low as to enable the valve B to rest upon its seat.

Should a fall in temperature cause the controlling mechanism to pull upward upon the rod *e* and plate E, when sufficient force has been exerted to overcome the attraction of the magnet for the soft-iron plate F, said magnet will rise into contact with the upper plate, F′, and at once lift the valve and permit the passage of gas to the burner, so that by adjusting said upper plate vertically the quantity of gas which can then pass to the burner will be sufficient to supply the same at the lowest point at which it can be depended upon to burn without flashing and burning back into the air-mixer.

Should more than the minimum quantity of gas be required in order to maintain the predetermined temperature, the upward pull upon the rod *e* will continue and the plate F′ will rise with the magnet and the valve be still farther opened, which action may continue until the limit in such direction is reached.

When the temperature is too high and less gas is required, the reverse action of parts takes place, and if the minimum quantity of gas which it is safe to burn proves to be too much the release of pressure upon the rod *e* will finally cause the weight of the magnet and its connecting parts to overcome the attraction of the upper plate, F′, and said magnet will then drop into contact with the lower plate, F, and instantly shut off the gas from the burner.

By means of the mechanism described gas may be used with absolute safety in so far as concerns its flashing or burning back into the air-mixer, as the valve passes instantly from the point of safety to the point of entirely cutting off the gas, or from the latter point to the point where it permits a safe quantity of gas to escape into the mixer, and between such points there is no interval of appreciable pause.

While the construction shown is preferably employed, changes therein can be made which will involve no departure from my invention. For instance, the positions of the principal parts may, if desired, be changed by placing the magnet and other parts above the casing, or only the magnet above the valve-casing and the soft-iron plates below the same, in which event a connection between said magnet and valve would be secured by means of a rod passing from the former to the latter through a packed or sealed opening in the upper side of said casing.

Having thus described my invention, what I claim is—

1. As a means for controlling the flow of gas, the combination of a valve, a source of power for moving the same, a temporarily effective resistance which is initially superior to the initial power of the valve-moving means, and means for causing said power to be relieved of or to preponderate over said resistance, substantially as and for the purpose specified.

2. As a means for controlling the flow of gas, the combination of a valve, thermostatic means for moving said valve, a temporarily effective resistance which is initially superior to the initial power of the thermostatic means, and means for causing the power of the thermostatic means to be relieved of or preponderate over said resistance, substantially as and for the purpose shown.

3. As a means for controlling the flow of gas, the combination of a valve, a magnet for controlling the movement of the valve, a plate for which said magnet has an attraction and means to disconnect the latter and said plate that operate against the force exerted by the magnet, substantially as and for the purpose set forth.

4. As a means for controlling the flow of gas, the combination of a valve, a magnet, an armature, one of which parts is connected with and moves with the valve, and means to disconnect the magnet and armature that operate against the force exerted by the magnet, substantially as and for the purpose specified.

5. As a means for controlling the flow of gas, the combination of a valve, a magnet connected therewith two plates, from one to the other of which the magnet is adapted to be moved, and means to thus move the magnet, substantially as and for the purpose described.

6. As a means for controlling the flow of gas, the combination of a valve having a stem, or rod, a curved magnet connected to the latter, a soft-iron plate upon which the ends of the magnet rest, a second like plate supported above the other and the magnet ends, and a rod attached to the magnet to

raise the same, substantially as and for the purpose specified.

7. As a means for controlling the flow of gas, the combination of a valve having a stem or rod, a magnet connected with the latter, a plate upon which the attractive portion of the magnet rests, a like movable plate supported above the other, and the magnet, and a lifting-rod attached to the magnet, substantially as and for the purpose set forth.

8. As a means for controlling the flow of gas, the combination of a puppet-valve, a casing a permanent magnet that encircles the casing, connections between said magnet and the valve, a fixed, soft-iron plate upon which the ends of the magnet rest, a second, vertically movable, and adjustable, soft-iron plate, supported above the other, a rod that passes loosely through the movable plate and is non-magnetically connected with the ends of the magnet, and means connecting the magnet with the lower end of the valve-stem, substantially as and for the purpose shown.

9. As a means for closing the opening around the valve-lifting stem, the combination of the valve-casing, the valve, the valve-stem, a tube through which said stem passes, attached to the casing, a second tube, with a closed end, encircling the other, and moving with the valve, and a liquid seal between said tubes, substantially as and for the purpose specified.

10. As a means for closing the opening around the valve-lifting stem, the combination of the valve-casing, the valve, the valve-stem, a tube having one end secured within the valve-casing and projecting therefrom around and nearly to the end of the stem, a second tube having its lower end closed and surrounding and movable vertically over said first-named tube, and a liquid within said outer tube, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand this 5th day of June, 1893.

WILLIAM P. POWERS.

Witnesses:

F. W. POWERS,

BLANCHE HART.