No. 652,024. Patented June 19, 1900.

J. GRAY.

VALVE MECHANISM FOR AUTOMATIC WATER HEATERS.

(Application filed Dec. 8, 1898.)

(No Model.)

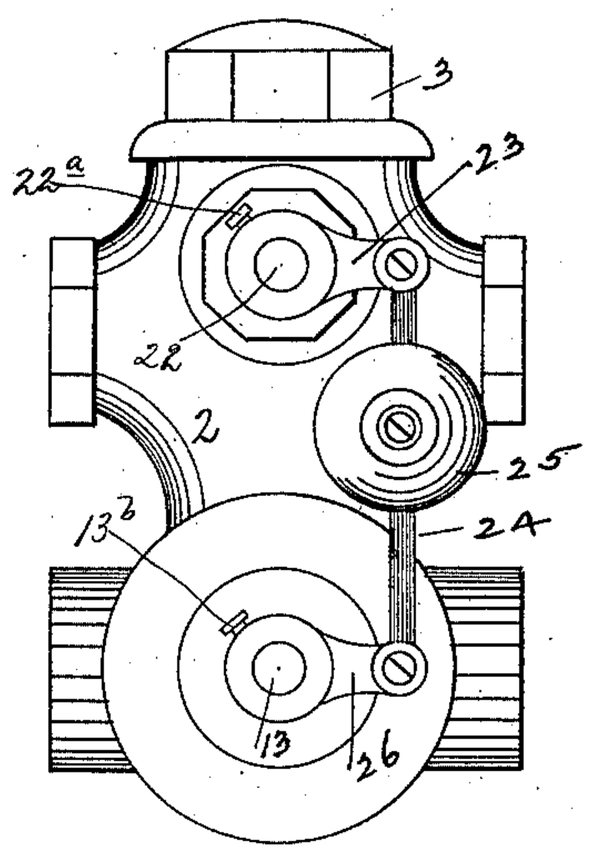

Fig. 1

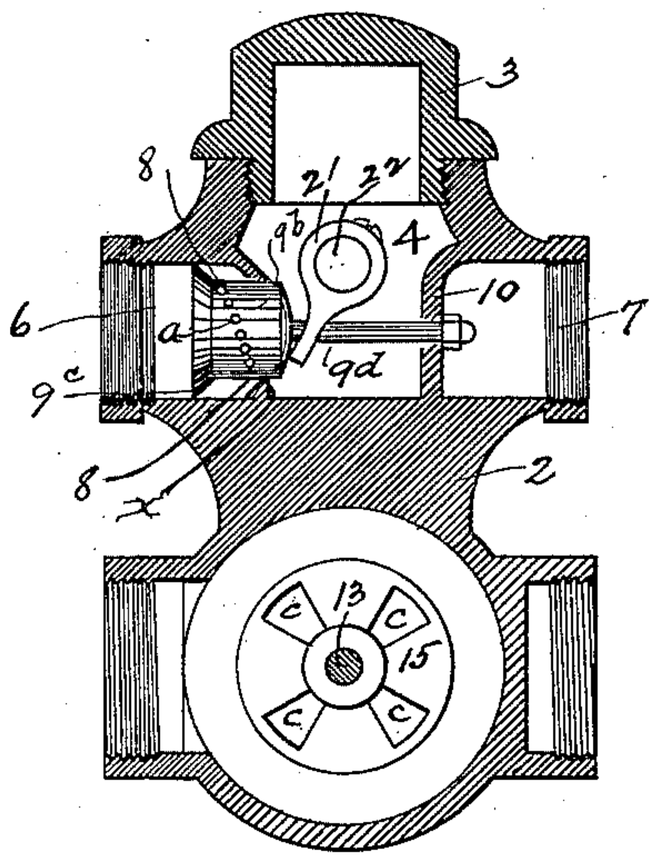

Fig. 2

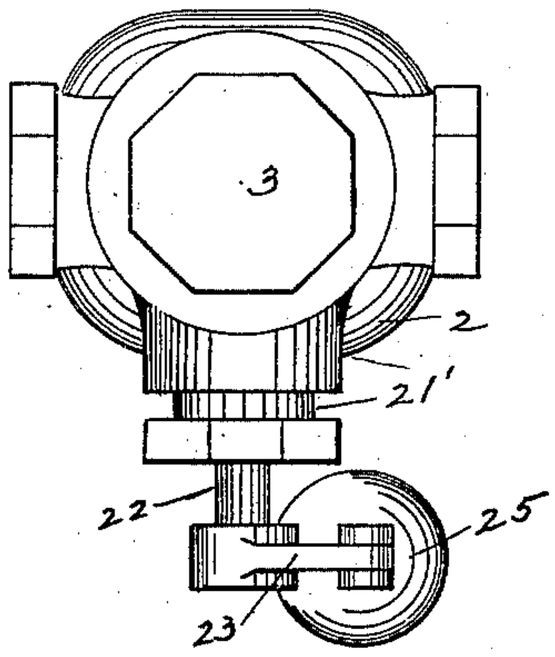

Fig. 3

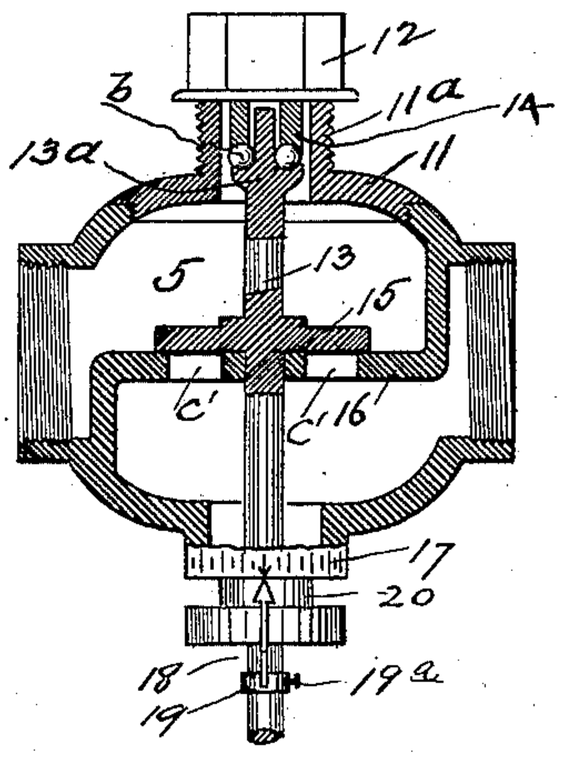

Fig. 4

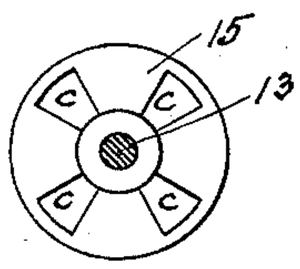

Fig. 6

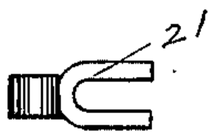

Fig. 5

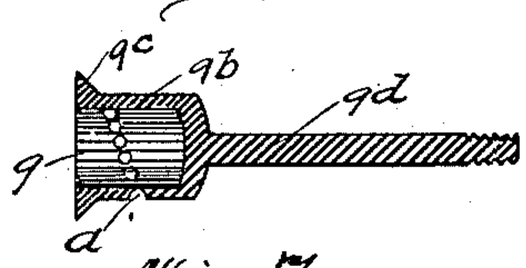

Fig. 7

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VALVE MECHANISM FOR AUTOMATIC WATER-HEATERS.

SPECIFICATION forming part of Letters Patent No. 652,024, dated June 19, 1900.

Application filed December 8, 1898. Serial No. 698,595. (No model.)

To all whom it may concern:

Be it known that I, JAMES GRAY, a citizen of the United States of America, and a resident of Pittsburg, Allegheny county, State of Pennsylvania, have invented certain new and useful Improvements in Valve Mechanism for Automatic Water-Heaters, of which the following is a specification.

Figure I is a side elevation of my improvement. Fig. II is a detail vertical section of Fig. I. Fig. III is a plan view of my improvement. Fig. IV is a horizontal section through the gas-valve. Fig. V is a detail of the yoke operated by the water-valve. Fig. VI is a plan of the gas-valve. Fig. VII is a longitudinal section through the water-valve.

My invention, generally stated, relates to improvements in valve mechanism used for operating automatic water-heaters; and it consists in improvements hereinafter more particularly set forth and described.

In the several views, which make part of this specification, 2 is a valve-body made by casting in the ordinary way.

3 is a suitable screw-cap inclosing an opening in the upper part of the valve-body and through which a portion of the mechanism may be introduced. The valve-body is provided with two chambers—the upper chamber 4, in which are located the water-valve and the mechanism operated therefrom, and the lower chamber 5, in which is located the gas-valve. Said upper chamber 4 communicates with the general water system through the opening 6 and with the hot-water-supply pipes through the opening 7. In said chamber 4 is provided a suitable valve-seat 8 for the water plug-valve. The water plug-valve has a hollow cylindrical interior 9, with diagonally-arranged openings *a* arranged in a shell 9^b of the valve. At its outer end the valve has a flaring flange 9^c, adapted to rest upon seat 8 when the valve is opened.

9^d is a valve-stem which is guided in its movement by passing through a suitable bridge-piece 10, formed, preferably, integrally with the valve-body 2.

Coming now to the lower part of the valve-body, 11 is a cap closing the opening in the rear of the valve-body through which the gas-valve and other operative mechanism are admitted to the chamber 5.

12 is a suitable screw-cap which fits down over the threaded boss 11^a of the cap 11 and is designed to apply a varying degree of pressure through the ball-bearings to the gas-valve hereinafter described, causing it to bear more or less closely upon its seat, as desired.

13 is the stem of the gas-valve. Near its rear end the stem is provided with the grooved flange 13^a, in which track the balls *b b*. This bearing is completed by the cone 14.

15 is the gas-valve, preferably made integrally with the gas-valve stem 13, as shown in Fig. VI. This valve has four radial ports *c c*, spaced equal distances apart.

16 is a valve-seat for the disk-shaped gas-valve. This also has the four radial ports *c′ c′*. Upon a boss formed upon the lower and forward side of the valve-body is a graduated scale 17 for the purpose hereinafter to be described. 18 is an arrow acting as a pointer on said scale, said arrow being attached to a collar 19 on the valve-stem 13 and held by a set-screw 19^a.

20 is an ordinary stuffing-box.

Referring now to Figs. II and V, 21 is a yoke set on shaft 22, which is supported in any suitable bearing on the inside of the valve-body and also in the gland of the stuffing-box 21′. The stem 9^d of the water-valve passes between the forks of the yoke 21, and the rear end of the valve-shell 9^b rests against the lower end of said forks. Outside of the valve-body shaft 22 is connected with crank 23, which in turn is pivotally connected with the connecting-rod 24, bearing weight 25. The lower end of connecting-rod 24 is pivotally connected to crank 26, which is connected to stem 13 of the gas-valve. The position of the shaft 22 relatively to the crank 23 and of the valve-stem 13 relatively to the crank 26 may be adjusted by the set-screws 22^a and 13^b, respectively.

The operation of the mechanism will now be apparent. When the hot-water faucet is open, the water-pressure on the inner side of the water-valve 9^b will be reduced below the water-pressure on said valve on the side next to the general water system. The valve 9^b will therefore move inwardly, passing a graduated amount of water, dependent upon the number of openings *a a* exposed. This movement of the valve 9^b will rock the yoke 21,

turning shaft 22, raising crank 23, connecting-rod 24, and crank 26, turning valve-stem 13 and opening the gas-valve a predetermined distance. The ordinary pilot-light (not shown, but which is kept always burning) will ignite the gas and heat the water. When the hot-water faucet is closed, the pressure on both sides of the valve 9^b will be equalized and the weight 25 will pull on the connecting-rod 24, closing both water and gas valves.

The scale 17 is designed merely to facilitate the setting of the gas-valve, so that it shall open as determined either after a greater or less partial revolution of the gas-valve stem 13. In other words, as the gas-valve stem 13 is controlled by the extent of opening of the water-valve the gas-valve can be set so as to open more quickly or more slowly or fully or less fully, dependent upon the extent that the water-valve is open. If, for instance, only a little hot water is needed, the set-screw 13^a is loosened, when the gas-valve can be turned so as to admit only a small quantity of gas for heating purposes.

By the construction just described and by the novel form of the water-valve I secure a graduated inlet of the water and also secure a valve which is seated when it is open directly contrary to the ordinary valve. I also provide a simple and effective connection between the water and the gas valves. By means of the scale and pointer I secure the proper relative seating of the gas and water valves.

So far as the gas-valve itself is concerned, it is a quick-opening rotary valve having a perfectly-flat disk held firmly in position on a flat seat. By the antifriction-ball-bearing cone a perfect union between the valve and seat is secured and its ease of movement preserved.

Heretofore rotary valves have been constructed on the bell or cone order and the seating attempted by a system of rigid screws operating from one side of the valve, thereby forcing the valve up into a wedge-shaped seat. This creates so much friction as to render the valve unsatisfactory for the ordinary uses for which such valves are designed. Another disadvantage resulting from wear is the constant reduction of port areas, caused by the shortening up of the disk, while the regrinding or reseating of such valves involves a trip to a machine-shop. My improvements overcome all of these disadvantages. In my gas-valve the integrity of port areas is always maintained, while the smooth even contact of the disk and seat, secured by means of the ball-bearing cone, is a guarantee against possible leaks. The bearing also reduces the friction to such an extent that the slightest pressure is sufficient to operate the valve, and reseating or regrinding where such becomes necessary can be accomplished by an ordinary workman without removing the valve from the line to which it may be attached. The graduated scale, ranging from zero to a full-open valve, gives the most accurate adjustment at once.

Having described my invention, I claim—

1. The combination of a valve-body; a hollow-plug water-valve in said valve-body having a series of openings adapted to be successively brought into and taken out of play by the traverse of the valve; means for limiting the opening movement of said valve; a gas-valve also seated in said valve-body; and connections intermediate the water and gas valves, whereby the opening or closing of the former will produce a like effect upon the latter.

2. The combination of a valve-body; a hollow-plug water-valve seated therein; a rotary shaft turning in suitable bearings in said valve-body; a yoke upon said shaft adapted to be engaged by the water-valve; a crank upon the outer end of said shaft; a gas-valve seated in said valve-body; a gas-valve stem; a crank upon the outer end of the gas-valve stem; a connecting-rod uniting said cranks; and a weight upon said connecting-rod.

3. The combination of a valve-body; a hollow-plug water-valve seated therein; a gas-valve stem; connections between said water-valve and said gas-valve stem; a rotary disk valve mounted on said gas-valve stem; and means for applying a varying pressure upon ball-bearings on the end of said gas-valve stem so as to hold the gas-valve to the proper degree of pressure upon its seat.

Signed by me at Pittsburg, Pennsylvania, this 27th day of October, 1898.

JAMES GRAY.

Witnesses:
WM. L. PIERCE,
LUCY DORSEY IAMS.