

July 19, 1932.

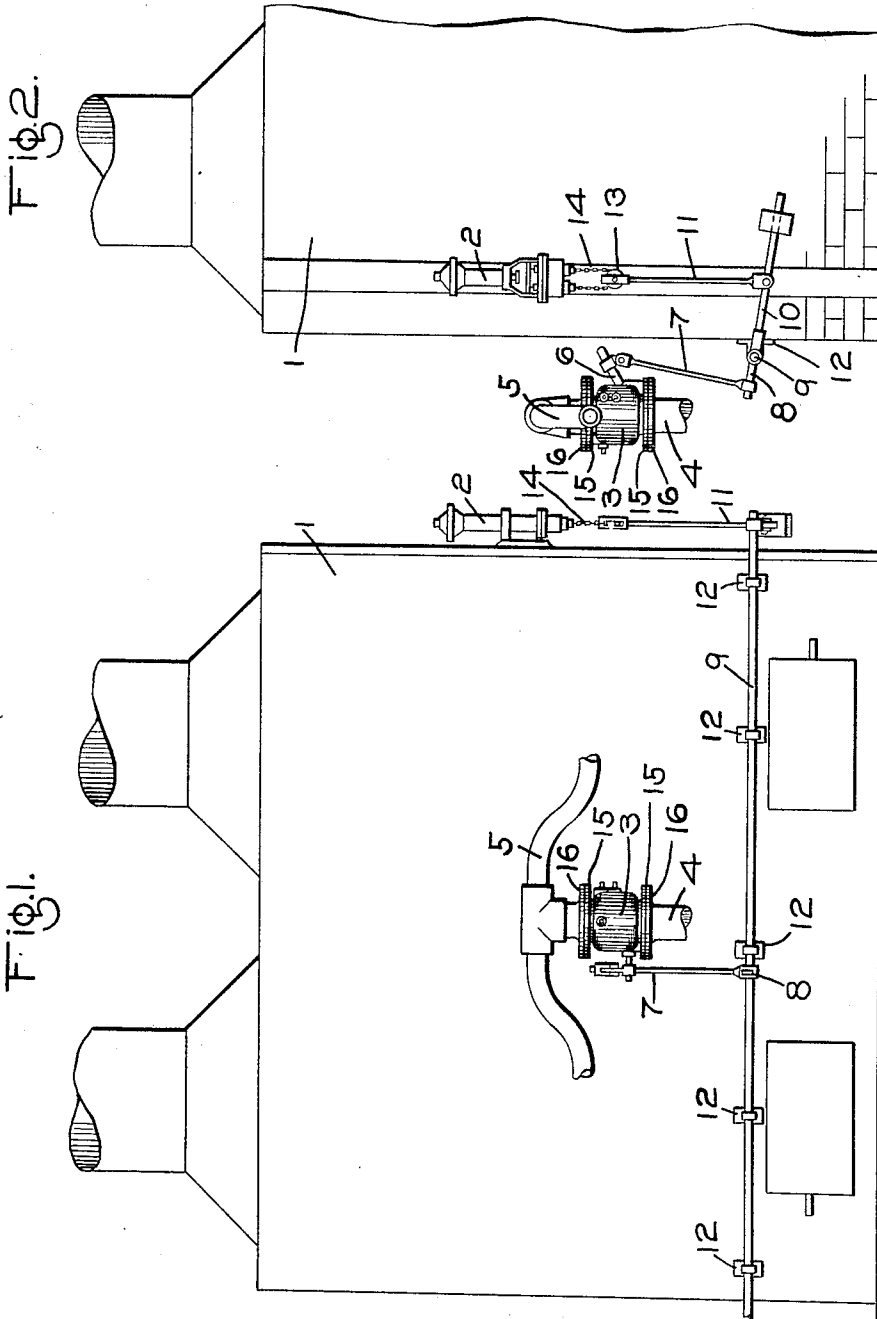
H. R. HUGHES

1,868,324

GAS REGULATOR VALVE MECHANISM

Filed July 28, 1931

2 Sheets-Sheet 1



INVENTOR.

HOWARD R. HUGHES

By

Wm. M. Brady

ATTORNEY.

July 19, 1932.

H. R. HUGHES

1,868,324

GAS REGULATOR VALVE MECHANISM

Filed July 28, 1931

2 Sheets-Sheet 2

Fig. 3.

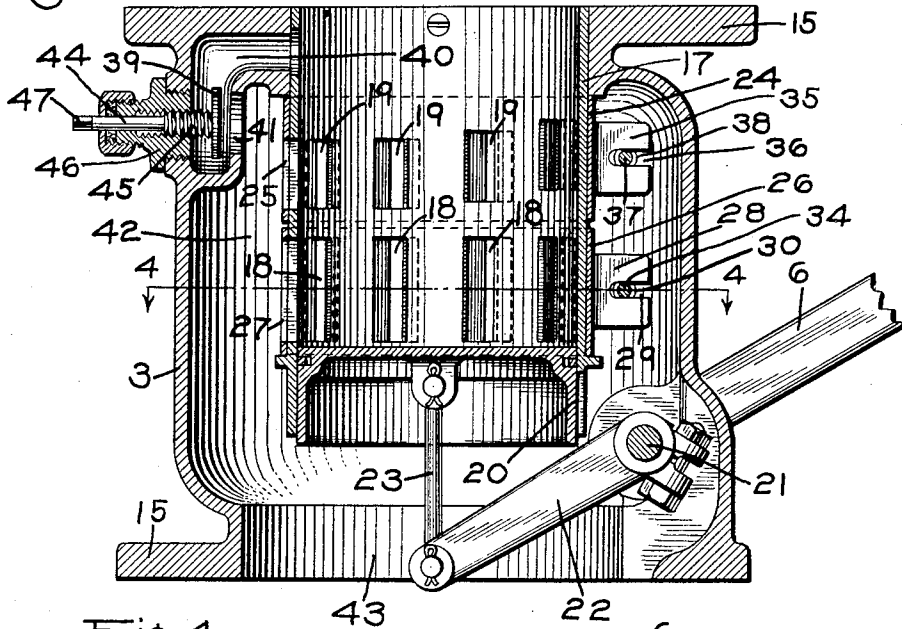
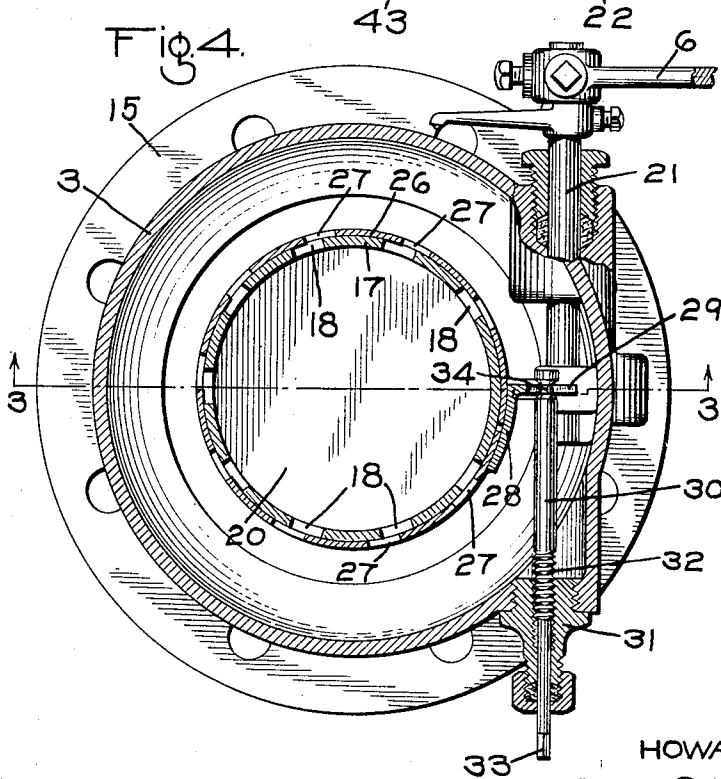


Fig. 4.



INVENTOR.
HOWARD R. HUGHES

By

Wm. M. Eady

ATTORNEY.

UNITED STATES PATENT OFFICE

HOWARD R. HUGHES, OF OAKLAND, CALIFORNIA, ASSIGNOR TO ASSOCIATED ENGINEERING AND SUPPLY COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA

GAS REGULATOR VALVE MECHANISM

Application filed July 28, 1931. Serial No. 553,547.

This invention relates to fluid fuel burning furnaces and more particularly to valve mechanism for regulating the flow of fuel to the burners of the furnace.

The principal object of my invention is to provide a simple and inexpensive valve means adapted to automatically adjust the rate of flow of fuel in steps according to the degree of fire required and having means for manually adjusting the flow area for the different automatically adjusted steps.

Other objects and advantages will appear in the following more detailed description of the invention.

In the accompanying drawings: Fig. 1 is a front elevation of a furnace equipped with a fluid fuel controlling apparatus embodying my improved fuel regulating valve mechanism; Fig. 2 a side elevation thereof; Fig. 3 a sectional view of my improved regulating valve mechanism taken on the line 3—3 of Fig. 4; and Fig. 4 a sectional view, taken on the line 4—4 of Fig. 3.

In order to illustrate an application of my improved regulating valve mechanism, I have shown in Figs. 1 and 2 a steam generating furnace indicated generally by the reference numeral 1. Associated with the furnace is a controlling device 2 which is adapted to be operated according to the pressure of steam generated in the steam boilers of the furnace to adjust the fuel regulating valve device so as to vary the rate of flow of fluid fuel to the burners of the furnace, the controlling device 2 also operating dampers (not shown).

The improved fuel regulating valve device 3 controls the supply of fluid fuel from a supply main 4 to a pipe 5, which supplies fuel to the burners (not shown) of the furnace 1. The valve device 3 is provided with a valve operating arm 6, which is connected by a link rod 7 to an arm 8, which is secured to a shaft 9 carried in bearings 12, mounted in the furnace 1.

An arm 10, secured to the shaft 9, is operatively connected to a rod 11, at the upper end of which is carried a pulley 13, on which a chain 14 works. The chain 14 is adapted to be pulled up and let down by operation of the controlling device 2, in accordance

with variations in the pressure of steam generated in the steam boilers of the furnace.

The fuel regulating valve device 3 is shown in detail in Figs. 3 and 4 of the drawings and comprises a body or casing adapted to be disposed between sections of a fuel supply pipe of the usual size, the body being provided with flanges 15 adapted to be secured to pipe flanges 16 carried by the supply pipe sections.

Secured to and axially disposed within the body of the valve device 3 is a cylinder 17, provided with two or more tiers of orifices 18 and 19. Mounted to reciprocate within the cylinder 17 is a piston valve 20. A rock shaft 21 is mounted in suitable bearings in the body of the valve device and secured to said shaft is an arm 22, which is operatively connected to the piston valve 20 by a connecting rod 23.

The shaft 21 extends out of the body of the device and secured to the outer end thereof is the arm 6.

In order to manually adjust the flow areas of the orifices 19, a ring valve 24 is mounted to rotate on the outer cylindrical face of the cylinder 17, the ring valve being provided with orifices 25, adapted to register with the orifices 19 in one position of the valve and adapted to vary the effective flow area of the orifices 19 when the ring valve is rotated.

The flow areas of the orifices 18 are adjusted by a similar ring valve 26 mounted to rotate on the outer surface of the cylinder 17. The valve 26 is provided with a plurality of openings 27 adapted in one position of the valve to fully register with the orifices 18.

Secured to the ring valve 26 is a member 28 having a slot 29. An adjusting rod 30 is mounted in a member 31 secured to the body of the valve device and said rod is provided with a threaded portion 32 adapted to engage screw threads provided in the member 31 and the rod 30 extends out of the member 31 and is provided at its outer end with a key section 33, to which may be applied a suitable handle or wrench for rotating the rod.

The inner end of the rod 30 is provided with a reduced portion 34 which is adapted to engage in the slot 29 of the member 28. The ring valve 24 has secured thereto a member 35 provided with a slot 36 in which a re-

duced portion 37 of an adjusting rod 38 engages.

In order to maintain a minimum or pilot fire, when the main flow orifices are closed, a manually adjustable valve 39 is provided. The valve 39 is mounted in a valve chamber 40 which opens to the fuel outlet side of the valve device. The valve 39 controls the rate of flow through an orifice 41 which opens to chamber 42, which chamber is open to the fuel inlet 43.

Secured to the valve 39 is an adjusting rod 44 having a threaded portion 45 adapted for screw-threaded engagement in a plug 46 which is secured to the body of the valve device. The rod 44 extends out of the plug 46 and is provided at its outer end with a key section 47, adapted to receive an operating handle or wrench for rotating the rod.

By rotating the rod 44, the valve 39 may be adjusted so as to provide a flow area through the opening 41, sufficient to maintain a pilot fire at the burners of the furnace.

The piston valve 20 is shown in Fig. 3 in its extreme lower position, in which both series of orifices 18 and 19 are uncovered. This permits the maximum flow of fluid fuel for the maximum amount of fire.

When the piston valve 20 is moved up by operation of the controlling device 2, to a position in which the piston valve closes the orifices 18, the supply of fuel is such as required for an intermediate fire, the flow being only by way of the orifices 19. When the piston valve 20 is moved by operation of the controlling device 2 to the minimum fire position, both series of orifices 18 and 19 are closed by the valve 20, so that fluid fuel can only flow by way of the flow area provided by the valve 39.

The controlling device 2 in operating to move the valve 20, as above described, also operates to open and close the draft dampers to an amount suitable for each stage of the fire.

It is desirable to have the damper movement lead the fuel valve opening movement by a slight amount, and this is provided for by causing the valve 20 to overtravel the position for closing the orifices 19, so that it will require a certain movement of the shaft 21 by the operation of the controlling device 2, before the valve 20 is moved downwardly from its extreme upper position, sufficiently to open the orifices 19.

The flow area of the orifices 19 may be adjusted by rotating the ring valve 24 so as to vary the effective area of the orifices 19, by operating the adjusting rod 38, and similarly the flow area of the orifices 18 may be varied by rotating the ring valve 26 by operation of the adjusting rod 30.

The orifices 19 may be staggered, as shown in the drawing, if desired, so as to provide for a somewhat more gradual increase in the flow

of fuel as the piston valve 20 is moved from one position to another. To the same degree that the damper movement precedes the actual opening of the orifices 18 and 19, the damper movement lags behind the closing movement of the orifices.

It will be noted that the piston valve 20 is subject on its lower face to the pressure of fluid fuel supplied through the fuel inlet 43, so that if any member of the operating linkage should break, the piston valve 20 would be automatically shifted by the pressure of fluid fuel to its uppermost position, in which the supply of fuel to the furnace is cut off, except for the flow by way of the pilot fire valve 39.

While one illustrative embodiment of the invention has been described in detail, it is not my intention to limit its scope to that embodiment or otherwise than by the terms of the appended claim.

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

A fluid fuel regulating valve device comprising a cylinder provided with a plurality of tiers of fluid fuel flow openings, a piston valve mounted to reciprocate in said cylinder for controlling the opening and closing of said openings, means for automatically operating said valve, a separate ring valve for each tier of openings mounted to rotate on said cylinder and each ring valve independently movable to vary the flow areas of the corresponding tier of openings, and manually operated means for rotating each of said ring valves.

In testimony whereof I have hereunto set my hand, this 8th day of July, 1931.

HOWARD R. HUGHES.