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W. R. RAY

AUTOMATIC OIL FEEDING AND REGULATING VALVE

Filed June 26, 1926 2 Sheets-Sheet 1

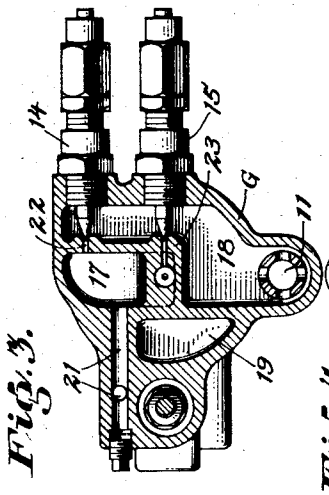


Fig. 3.

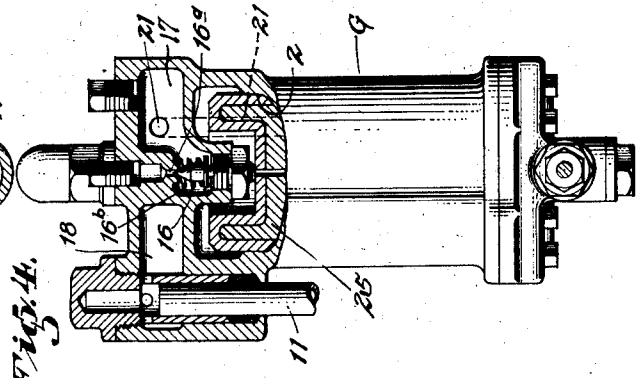


Fig. 4.

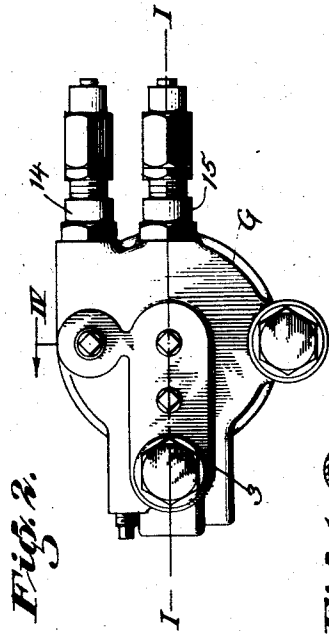


Fig. 2.

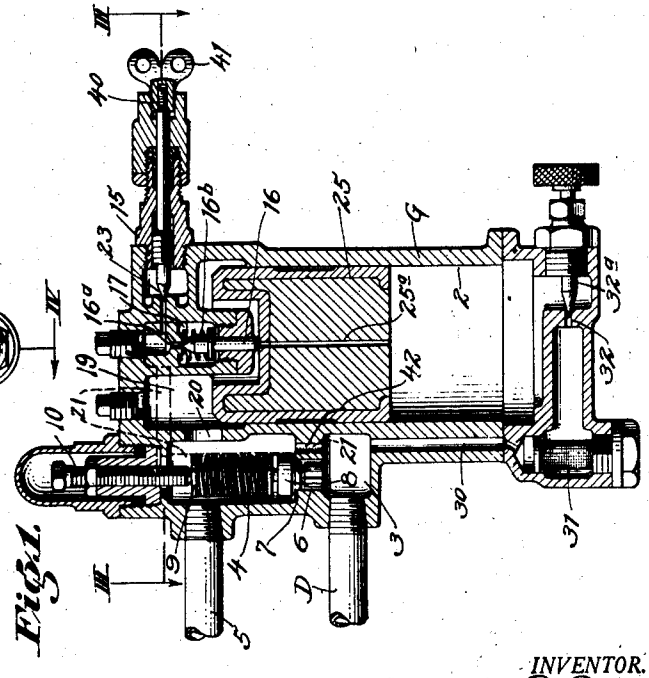


Fig. 1.

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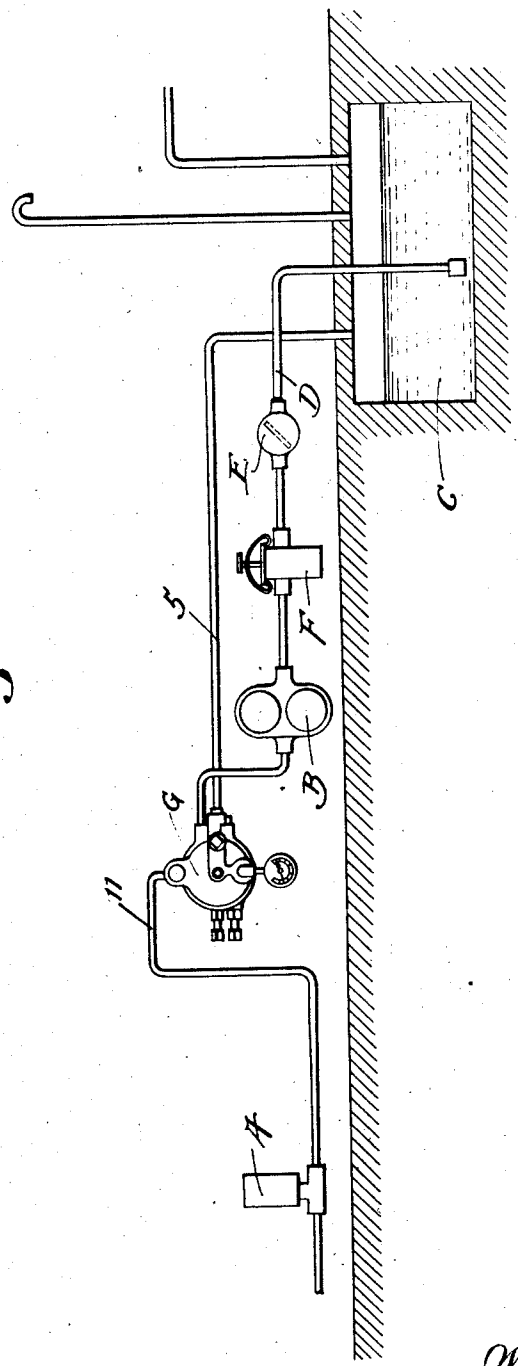


Fig. 5.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC OIL FEEDING AND REGULATING VALVE.

Application filed June 26, 1926. Serial No. 118,772.

This invention relates to an automatic oil feeding and regulating valve for oil burners of the atomizing type.

In the operation of automatic oil burners of the atomizing type, whether rotary pressure actuated or otherwise, it is common practice to automatically ignite the oil when the burner is started by means of a gas flame, an electric spark or the like.

In order to insure ignition during the starting period, it is necessary to adjust the burner so that a rich mixture is obtained, this being usually manually accomplished, and it is later necessary to reduce the oil feed or mixture, as incomplete combustion would otherwise result. It is accordingly desirable, especially when oils of heavy gravity are used, to increase the oil supply during the starting period in order to produce this rich mixture, thus making ignition prompt and positive. It is furthermore desirable to maintain this rich mixture until the temperature of the furnace is high enough to sustain combustion, when the mixture may be reduced to normal to insure a clear and smokeless flame.

The object of the present invention is to provide an oil feeding and regulating valve operable in conjunction with a burner of this character which will automatically deliver a rich mixture to the burner during the starting period; to provide a valve of this character which will maintain the rich mixture until the furnace attains the proper temperature, and further, to provide a valve of this character which will automatically reduce the mixture to normal after proper temperature has been attained so as to insure a clear and smokeless flame.

The invention is shown by way of illustration in the accompanying drawings, in which—

Fig. 1 is a central vertical longitudinal section of the oil feeding and regulating valve, taken on line I—I of Fig. 2.

Fig. 2 is a plan view of the automatic oil feeding and regulating valve.

Fig. 3 is a cross-section taken on line III—III of Fig. 1.

Fig. 4 is a partial vertical section and side elevation of the oil feeding and regulating valve, taken on line IV—IV of Fig. 2.

Fig. 5 is a diagrammatic view showing the position of the automatic feeding and regulating valve with relation to an oil burner and a pump delivering oil to the same.

Referring to the drawings in detail, and particularly to Fig. 5, A diagrammatically indicates an oil burner of the atomizing type, B a power-driven pump for delivering oil to the same, C a storage tank for the oil, D a pipe line connecting the tank with the pump, E a check valve in the pipe line, F an oil strainer in the pipe line, and G an automatic oil feeding and regulating valve, which is interposed between the pump and the burner. The automatic oil feeding and regulating valve forms the subject matter of the present application and it is constructed and operated as follows:

Referring to Figs. 1, 2, 3 and 4, G indicates a cylindrical shaped casing, interiorly of which is formed a cylinder 2. Formed in one side of the casing is a chamber 3 and communicating therewith is a pipe D, whereby oil from the pump B is delivered to the casing. Formed above the chamber 3 is an overflow or return chamber 4 and communicating therewith is a pipe 5 which forms a return or overflow between the oil feeding and regulating valve and the storage tank C. Forming a communication between the chambers 3 and 4 is a passage 6. The upper end of this passage terminates in a valve seat 7 to receive a valve 8. This valve is normally held against the seat by means of a spring 9 and the tension of this spring is adjusted by means of a screw 10.

Oil pumps employed in oil burner installations of this character are usually of the rotary gear type and they are capable of building up considerable pressures. The pressure built up by the oil when delivered to the chamber 3 is in this instance regulated and controlled by the spring 9 acting on the valve 8; that is, if a pressure of three pounds is desired, the spring 9 is adjusted so that the valve 8 will automatically lift the moment the pressure in the chamber 3 exceeds three pounds. All surplus oil supplied by the pump will thus be by-passed to enter the chamber 4 and will then be returned by pipe 5 to the storage tank. The chamber 3 is also in communication with a feed pipe 11; (see Figs. 4 and 5) this being the pipe which delivers oil to the burner.

The automatic regulating device controlling the flow of oil through the pipe 11 to the burner is in this instance provided with

three valves which regulate the flow, these valves being interposed between the chamber 3 and the feed pipe 11. These valves are indicated at 14, 15 and 16, and will hereinafter be referred to as the running valve, which is indicated at 14, the starting valve, which is indicated at 15, and the automatic valve, which is indicated at 16.

Formed in the upper end of the casing are three chambers such as indicated at 17, 18 and 19. Chamber 19 is in communication with the overflow or return chamber 4 through means of a port 20 (see Fig. 1) and it is also in communication with the upper end of the cylinder chamber 2. The function of this chamber will hereinafter be described. Chamber 17 is in communication with chamber 3 through means of the port indicated by dotted lines at 21 (see Fig. 1), and chamber 18 is in communication with the feed pipe 11 and also with the chamber 17 through ports 22 and 23, the flow of oil through the port 22 being regulated by means of the running valve 14, and the flow of oil through the port 23 being regulated by the automatic valve 16 and the starting valve 15.

By referring to Figs. 1 and 4, it will be noted that the cylinder 2 is provided with a weighted piston such as indicated at 25, and it will further be noted that the automatic valve 16 is normally held in engagement with a seat 16^a by means of the piston. It will further be noted that this valve is automatically lowered with relation to the seat when the piston is lowered through means of a spring 16^b. The operation of the automatic oil feeding and regulating valve will be as follows:

When the burner is first started and the furnace is cold, it is desirable, as previously stated, to deliver a rich mixture to the burner so that ignition will be insured. A rich mixture of this character is insured in the present instance as the oil under pressure delivered to chamber 3 from pump B first builds up a pressure due to the tension of the spring 9 before the surplus can overflow and return to the tank through the pipe 5. The oil under pressure in chamber 3 is delivered to chamber 17 through port 21 and there discharges through the valves 14, 15 and 16 into chamber 18 from where it is fed through pipe 11 to the burner, the amount of oil delivered being regulated by the valves 14 and 15. Part of the oil under pressure is also delivered to the lower end of the cylinder 2 through a port 30, a strainer 31 and a discharge orifice 32. This orifice is comparatively small and cylinder 2 is accordingly filled at a fairly slow speed. Piston 25 is positioned at the lower end of the cylinder when the burner is started, but as the oil slowly enters the piston gradually rises and when it finally reaches its uppermost position, as shown in Fig. 1, it engages the automatic valve 16 and forces it up against the seat 16^a, thereby automatically closing further flow of oil through the valves 16 and 15. The time required to raise the piston to its uppermost position, where it closes off the valve 16 is controlled by the size of the orifice 32, or by providing a needle valve at this point as indicated by dotted lines at 32^a. It is thus possible to increase or decrease the time period for the delivery of a rich mixture to the burner.

In actual operation one and one-half to three minutes are sufficient as the furnace usually reaches ignition temperature by that time. When the piston does reach its uppermost position and valve 16 is automatically closed, the only oil delivered to the feed pipe 11 and the burner connected therewith will be the oil which discharges through port 22 into chamber 18. The amount of oil there discharged is regulated by the valve 14, which is termed the regulating valve, and a normal mixture is thus insured after the furnace reaches ignition temperature, the amount of oil required during normal running being regulated by the valve 14 and when once adjusted requires no further attention. The amount of oil discharging by the valve 15 is also adjusted to obtain the richness of mixture desired and requires no further attention thereafter. In other words all adjustments are made when the burner is installed and the ends of the valve stems 14 and 15 are therefore provided with key extensions such as shown at 40. The mechanic installing the burner is equipped with a key such as shown at 41, and after the mechanic has adjusted the valves, the key is removed so as to prevent tampering.

The piston 25 remains in elevated position and the valve 16 in closed position as long as the burner is in operation, but when the burner is closed down and chamber 3 is relieved of pressure, piston 25 slowly settles back to the bottom of the cylinder. It is filled with lead or otherwise weighted to insure such movement. When returning it forces the oil back through the orifice 32, the strainer 31, passage 30, chamber 3 and enters the overflow chamber 4 through a port 42. Oil is in fact discharging through this port at all times when the burner is in operation, but it is so small that the amount escaping does not interfere with the normal operation of the mechanism as a whole. In fact, if comparatively heavy crude oil is being burned, it is also desirable to form a port in the piston as indicated at 25^a. This port serves the same function as the port 42 and accordingly permits the piston to settle more rapidly into inoperative position. The communication formed between the upper end of the cylinder and the chamber 19

is to permit oil to freely discharge through the port 25ª, and also to prevent compression at the upper end of the cylinder when the piston moves on its upward stroke.

A burner equipped with a valve of this character requires no manual attention when it is once installed and adjusted. It automatically insures a rich mixture when the burner is started and it automatically cuts off the rich mixture or reduces it to a normal fire the moment the furnace reaches proper temperature. A smoking fire is prevented and personal attention is entirely obviated.

While certain features of the present invention are more or less specifically illustrated, I wish it understood that various changes in form and proportion may be resorted to within the scope of the appended claims. I similarly wish it understood that the materials and finish of the several parts employed may be such as the experience and judgment of the manufacturer may dictate or various uses may demand.

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

1. An oil feeding and regulating mechanism for oil burners comprising a casing having a chamber formed therein adapted to receive oil under pressure, an oil feed discharge pipe connected with the casing, a valve interposed between the oil receiving chamber and the feed discharge pipe adapted to regulate the flow of oil delivered to the oil feed discharge pipe, a second valve also interposed between the oil receiving chamber and the feed discharge pipe and adapted to control an excess feed of oil to the discharge pipe, means normally maintaining said second-named valve in an open position, and means actuated by the pressure of the oil delivered to the casing for closing said valve after a predetermined time period.

2. An oil feeding and regulating mechanism for oil burners comprising a casing having a chamber formed therein adapted to receive oil under pressure, an oil feed discharge pipe connected with the casing, a valve interposed between the oil receiving chamber and the feed discharge pipe adapted to regulate the flow of oil delivered to the oil feed discharge pipe, a second valve also interposed between the oil receiving chamber and the feed discharge pipe and adapted to control an excess feed of oil to the discharge pipe, a spring normally maintaining said second-named valve in an open position, a piston movable in one direction by oil under pressure delivered to the casing and engageable with the second named valve after a predetermined time period, said piston being movable in the opposite direction by gravity when oil delivery to the casing is stopped so as to permit the spring to again open the second named valve, and a third valve cooperating with the second-named valve and adapted to regulate the flow of oil by the second-named valve during its open period.

3. An oil feeding and regulating mechanism of the character described comprising a casing, a chamber formed therein adapted to receive oil under pressure, means for automatically regulating the pressure and maintaining the oil in the casing at a predetermined pressure, an overflow connection in communication with the oil receiving chamber, a feed discharge pipe in communication with the oil receiving chamber, a valve interposed between the oil receiving chamber and the feed discharge pipe, means normally maintaining said valve open, pressure actuated means adapted to close said valve after a predetermined time period, a second valve interposed between the oil receiving chamber and the feed discharge pipe, said valve being manually adjustable to control a continuous flow of oil from the oil receiving chamber to the feed discharge pipe.

4. An oil feeding and regulating mechanism for oil burners comprising a casing having three chambers formed therein, to-wit, an oil receiving chamber, an oil discharging chamber, and an oil over-flow chamber, means for delivering oil under pressure to the receiving chamber, a valve between the receiving chamber and the over-flow chamber, said valve regulating the pressure of the oil in the receiving chamber and also permitting over-flow of excess oil into the over-flow chamber, a manually regulated valve disposed between the receiving chamber and the discharge chamber to regulate a normal flow of oil to the discharge chamber, a second valve disposed between the receiving chamber and the discharge chamber and adapted to control a secondary flow of oil from the receiving chamber to the discharge chamber, said valve being normally open, and means for automatically closing said valve at a predetermined time period after oil under pressure is delivered to the receiving chamber.

5. An oil feeding and regulating mechanism for oil burners comprising a casing having three chambers formed therein, to-wit, an oil receiving chamber, an oil discharging chamber, and an oil over-flow chamber, means for delivering oil under pressure to the receiving chamber, a valve between the receiving chamber and the over-flow chamber, said valve regulating the pressure of the oil in the receiving chamber and also permitting over-flow of excess oil into the over-flow chamber, a manually regulated valve disposed between the receiving chamber and the discharge chamber to regulate a normal flow of oil to the discharge chamber, a second valve disposed between

the receiving chamber and the discharge chamber and adapted to control a secondary flow of oil from the receiving chamber to the discharge chamber, said valve being normally open, spring actuated means whereby said second named valve is normally maintained in an open position, a cylinder in the casing, and a piston in said cylinder, said piston being gravity actuated to normally remain in one end of the cylinder and said piston being movable in the opposite direction by oil under pressure when oil is delivered to the receiving chamber, said piston during such movement adapted to engage the second named valve and move the same to a closed position at a predetermined time period after oil under pressure is delivered to the receiving chamber.

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