Feb. 14, 1933. A. KLOTZMAN 1,897,432

LIQUID FUEL FEEDING DEVICE

Filed Nov. 2, 1929

Fig. 1

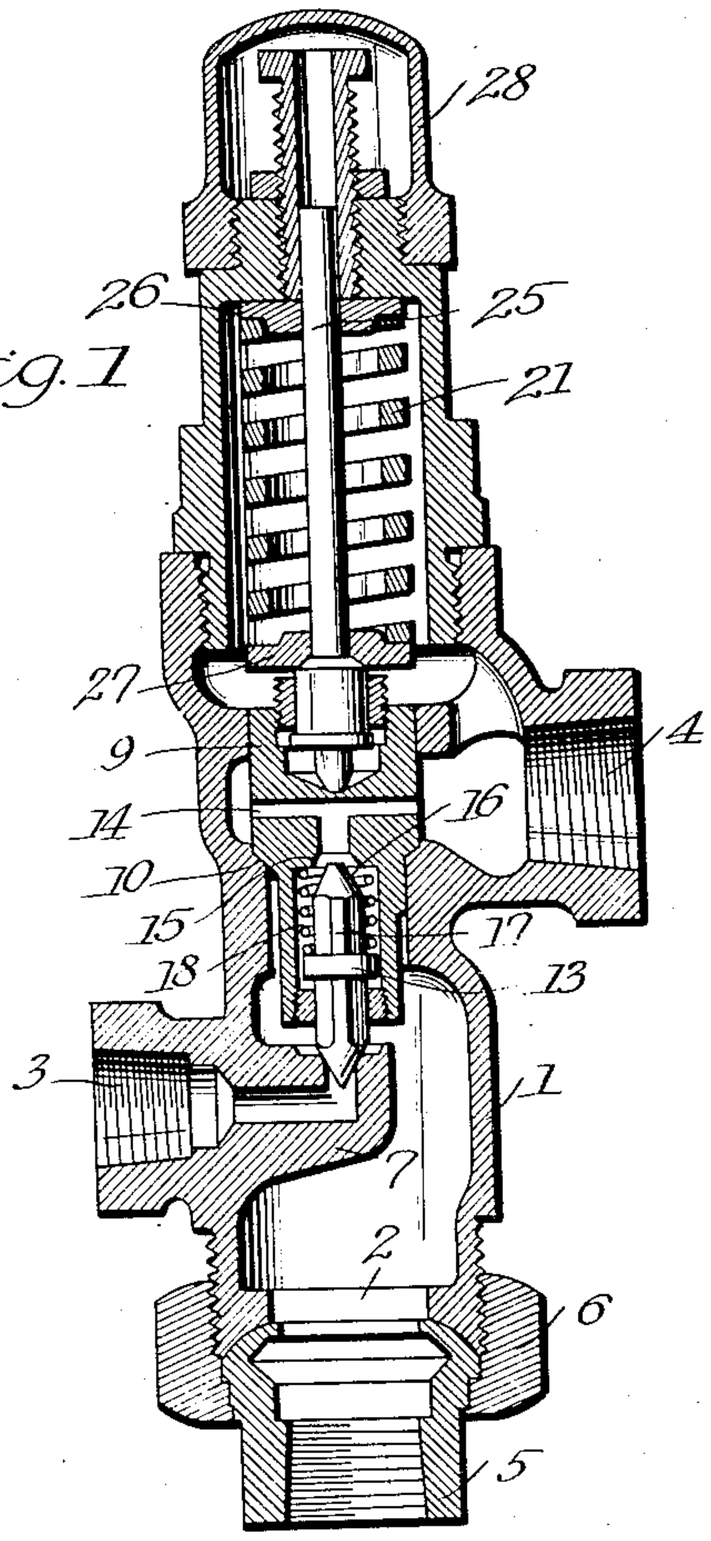


Fig. 2.

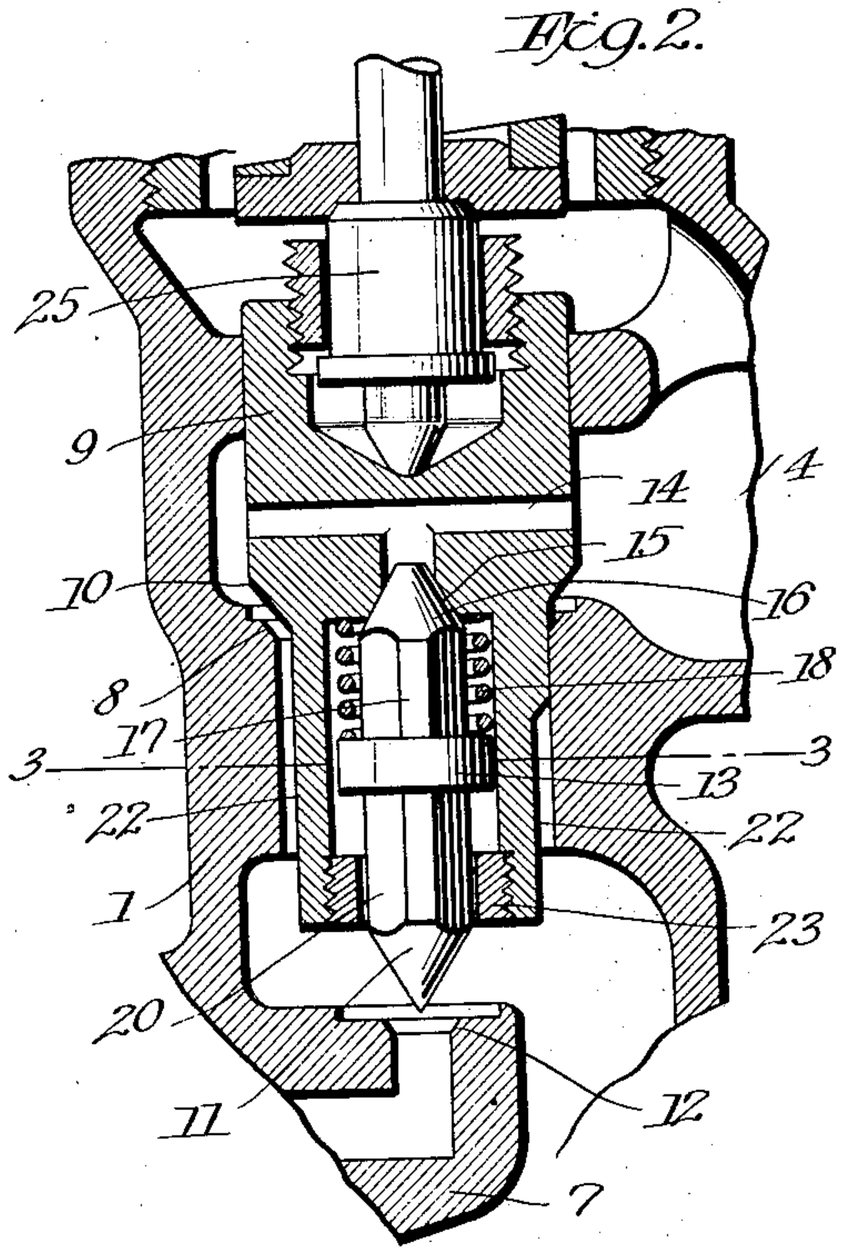
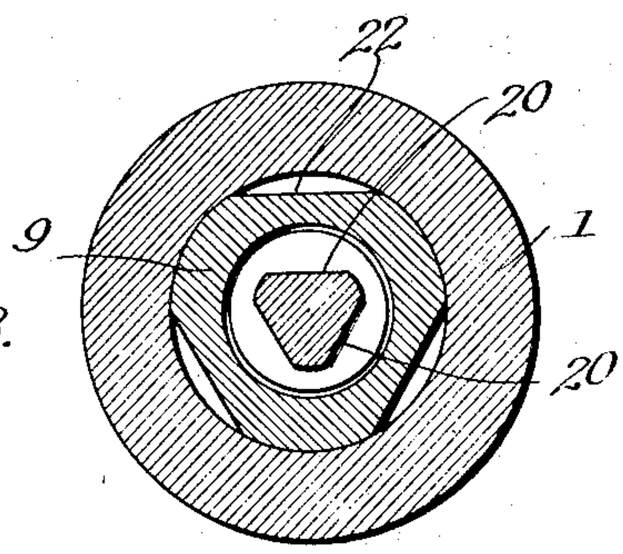


Fig. 3.



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LIQUID FUEL FEEDING DEVICE

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The present invention relates to improvements in liquid fuel feeding devices and particularly to a construction of valve means primarily adapted for use in connection with force feed oil burners.

Among the objects of the invention are the provision of a relatively simple construction, the parts of which can be easily disconnected and replaced, if necessary, for regulating the pressure of liquid fuel supplied to a burner.

Another object is to provide a construction which will permit a free discharge of air from the pump line or valve casing prior to the fluid fuel passing to the burner, and also for automatically stopping the flow of fuel when the burner is cut off.

In the accompanying drawing:

Figure 1 is a vertical sectional view through an embodiment of the invention showing the relation of the parts when the feed pump is inactive.

Figure 2 is a similar fragmentary section, on an enlarged scale, showing the valve mechanism in the position assumed when excess liquid fuel is being supplied to the device by the pump.

Figure 3 is a transverse section substantially on the line 3—3 of Figure 2.

Referring to the drawing, in the several views of which corresponding parts are designated by the same reference characters, the improvements include a casing 1 which is provided with an inlet port 2, a burner supply port 3 and an outlet or by-pass port 4.

As shown, the inlet port 2 is arranged at the lower end of the casing 1, and a pipe 5 leading to the outlet of a suitable pump (not shown) is connected to the casing to communicate with said port by a nut 6. The burner supply port is shown as having an interior thread adapted to be engaged with a pipe leading to a suitable burner, and the outlet port 4 is similarly threaded for engagement with a by-pass pipe leading to a suitable tank (not shown) to receive surplus liquid fuel. Such tank ordinarily is also connected with the inlet port of the force pump.

As shown, the casing has an inwardly extending tubular boss 7 which communicates with the burner supply port 3, and the passageway in such boss terminates at its inner end in an upwardly directed branch about which is provided a suitable valve seat.

As shown, the outlet or by-pass port 4 is arranged above the plane of the burner supply port and a valve seat 8 is provided within the casing adjacent said outlet port. A pressure relief valve 9 has a valve face 10 adapted to cooperate with the valve seat 8 and, except when the pressure is excessive or the burner is cut off, prevents flow of liquid from the inlet port to the by-pass port.

As has been heretofore proposed, the pressure relief valve is connected with a valve 11 which cooperates with the valve seat 12 at the inner end of the boss 7 to control flow through the burner outlet port 3.

The valve 11 is connected with the pressure relief valve so as to be independently movable relative thereto.

As shown, the depending stem of the pressure relief valve is provided with an interior chamber that opens through the lower end of the relief valve, and the stem of the burner supply port control valve 11 extends into said chamber and is provided therein with an enlarged portion or piston-like member 13.

The chamber in the pressure relief valve referred to, communicates with an air escape conduit or passage 14 that opens through the sides of the valve and establishes communication between said chamber and the outlet or by-pass port 4. A valve seat 15 is shown as located at the point of connection of the air escape conduit with said chamber, and a valve 16 is provided for cooperating with this seat.

As shown, the valve 16 is carried by an upward extension 17 of the fuel feed valve 11, and a spring 18 is provided between the enlarged, piston-like, portion of the valve stem 11 and the upper end of the chamber in the pressure relief valve whereby the valves 11, 16 will be maintained in the position shown in Figure 1 when the feed pump is not operating.

In such position, it will be seen that the flow of fuel through the burner supply port 3 is cut off and the outlet or by-pass port 4

is in direct communication with the inlet port 2 and the interior of the valve casing. Preferably, the stem or body of the valve 11 has flattened portions 20 formed on its periphery and the piston member 13 is of such diameter that it is spaced slightly from the wall of the chamber in the pressure relief valve. Therefore, air can freely pass from the lower portion of the valve casing into the chamber in the pressure relief valve and through the passage 14 to the outlet or by-pass port 4.

When the pump is started, therefore, any air contained in the pipe line 5 or lower portion of the valve casing will be forced out through the passage 14 and the outlet or by-pass 4. As liquid fuel is pumped into the chamber in the pressure relief valve, it will act upon the piston-like member 13 and raise the same against the action of the spring 18, moving the air escape valve 16 to closed position and simultaneously raising the burner supply port valve 11 so that the liquid fuel can flow through the latter port. If the pressure developed by the feed pump exceeds a predetermined amount, or the burner control valve is cut off, the pressure of the liquid fuel will raise the valve 9 from its seat 8 against the action of the ordinary pressure spring 21, and the liquid fuel will then flow directly from the inlet port 2 about the valve seat 8 to the outlet or by-pass port 4. The position of the several parts under such condition is illustrated in Figure 2.

As shown, a plurality of flattened surfaces 22 are provided on the depending body of the pressure relief valve 9 to insure a liquid passage of the desired size between the interior of the valve casing and the by-pass port 4.

As shown, the auxiliary valve chamber in the pressure relief valve is closed at its lower end by a removable plug 23, so that, by detaching this, the connected valves 11, 16 may be readily withdrawn from such chamber.

The spring 21 which coacts with the pressure relief valve to determine the amount of pressure necessary to lift such valve from its seat 8, is shown as arranged about a rod 25 and between abutments 26, 27, the former being adjustable so that the pressure exerted by said spring may be fixed as desired. The lower end of the rod 25 is seated in a suitable socket at the upper end of the pressure relief valve, and the outer end of this rod is enclosed by a cap 28 shown as being threaded on the upper end of the valve casing.

It is believed that the operation and advantages of the improvements will be readily understood from the foregoing description in connection with the drawing.

When the feed pump is idle the parts will be in the relative position shown in Figure 1. On starting the pump any air within the pipe line 5 or lower portion of the valve casing will be forced through the passage in the pressure relief valve and the outlet or by-pass port 4, while the burner supply port remains closed. As the liquid fuel is pumped into the casing, the valves 11, 16 will be raised, closing the air escape passage, and opening the burner supply port. So long as the pressure of the fuel does not exceed a predetermined amount and the burner is operating, the parts will remain in this relation.

If, however, the pressure exceeds the resistance of the spring 21, due to the burner control valve being closed or any other cause, the parts will be automatically shifted to the relation shown in Figure 2, permitting the liquid fuel to flow through the by-pass port 4 to the tank connected therewith.

I claim:

1. A liquid fuel feeding device comprising a casing having an inlet port adapted to be connected with a pump outlet, a burner supply port and an outlet port, a relief valve between the inlet and outlet ports, a valve controlling flow through the burner supply port, means acting to hold the last said valve in position to close the burner supply port, means providing a passage through the relief valve normally establishing communication between the inlet and outlet ports, and a third valve controlling flow through said passage and adapted to be automatically moved toward closed position when the first said valve is moved to open the burner supply port.

2. A liquid fuel feeding device comprising a casing having an inlet port adapted to be connected with a pump outlet, a burner supply port and an outlet port, a relief valve between the inlet and outlet ports, a valve controlling flow through the burner supply port, means acting to hold the last said valve in position to close the burner supply port, means providing a passage past the relief valve normally establishing communication between the inlet and outlet ports, a third valve controlling flow through said passage, and connections between the burner supply port valve and the last said valve whereby the third valve will be moved toward closed position when the burner supply port valve is moved to open the burner supply port.

3. A liquid fuel feeding device comprising a casing having an inlet port adapted to be connected with a pump outlet, a burner supply port and a by-pass port, a valve seat between the inlet port and the by-pass port, a pressure relief valve adapted to cooperate with said valve seat, a second valve supported by the relief valve and controlling flow through the burner supply port, an air escape passage being provided in the relief valve to normally connect the inlet port and by-pass port, and a valve adapted to close said passage when the valve controlling the burner supply port is moved to open position.

4. A liquid fuel feeding device comprising

a casing having an inlet port adapted to be connected with a pump outlet, a burner supply port and a by-pass port, a valve seat, a relief valve cooperating with said seat to control flow of liquid from the inlet port to the by-pass port, a second valve interconnected with the relief valve and cooperating with the burner supply port, a spring normally holding the relief valve against its said seat, an air escape passage being formed in the relief valve and connecting the inlet port and the by-pass port, and a valve adapted to close said air escape passage when the burner supply port valve is moved to open position.

5. A liquid fuel feeding device comprising a casing having an inlet port adapted to be connected with a pump outlet, a burner supply port and a by-pass port, a valve seat, a relief valve cooperating with said seat to control flow of liquid from the inlet port to the by-pass port, a second valve carried by and independently movable relative to the relief valve cooperating with the burner supply port, an air escape passage connecting the inlet port and by-pass port, and a valve connected to the burner supply port valve and adapted to close said passage as the burner supply port valve is moved to open the port controlled thereby.

6. A liquid fuel feeding device comprising a casing having an inlet port adapted to be connected with a pump outlet, a burner supply port and a by-pass port, a valve seat, a relief valve cooperating with said seat to control flow of liquid from the inlet port to the by-pass port, said relief valve having an interior chamber that communicates with both the inlet port and the by-pass port, a second valve interconnected with the relief valve and cooperating with the burner supply port, and a valve within the chamber in the relief valve adapted to be automatically actuated to close the connection between said chamber and the by-pass port when the valve of the burner supply port is moved to open the last said port.

7. A liquid fuel feeding device comprising a casing having an inlet port adapted to be connected with a pump outlet, a burner supply port and a by-pass port, a valve seat, a relief valve cooperating with said seat to control flow of liquid from the inlet port to the by-pass port, said relief valve having an interior chamber that communicates with both the inlet port and the by-pass port, a second valve cooperating with the burner supply port and independently movable relative to the relief valve, an air escape valve within said chamber in the relief valve adapted to cut-off communication between said chamber and the by-pass port, a spring acting to hold the last said valve in open position, and connections between said escape valve and the burner supply port valve for moving the air escape valve in opposition to the spring as the burner supply port valve moves to open said port.

8. A liquid fuel feeding device comprising a casing having an inlet port adapted to be connected with a pump outlet, a burner supply port and a by-pass port, a valve seat, a relief valve cooperating with said seat to control flow of liquid from the inlet port to the by-pass port, said relief valve having an interior chamber that communicates with both the inlet port and the by-pass port, a second valve cooperating with the burner supply port and having its stem extending into the chamber in the relief valve, an air escape valve within said chamber in the relief valve adapted to cut off communication between said chamber and the by-pass port, and a spring acting to hold the last said valve in open position, the stem of the valve of the burner supply port acting to move said air escape valve against the action of the spring as the valve of the burner supply port moves to open the port controlled thereby.

9. A liquid fuel feeding device comprising a casing having an inlet port adapted to be connected with a pump outlet, a burner supply port and an outlet port, a valve seat between the inlet port and the outlet port, a tubular relief valve adapted to cooperate with said seat and provided with an interior seat, a member adapted to reciprocate in the relief valve and provided at one end with a valve cooperating with said interior seat and at its opposite end with a second valve cooperating with the burner supply port, and a spring acting to hold said member in position to close the burner supply port and out of contact with the valve seat within the relief valve, said valve member being movable in opposition to said spring by the pressure of liquid pumped through the inlet port.

10. A liquid fuel feeding device comprising a casing having an inlet port adapted to be connected with a pump outlet, a burner supply port having an upwardly directed valve seat at its inner end, and a by-pass port, a valve seat between the inlet port and by-pass port, a relief valve cooperating with said seat, a second valve carried by the relief valve and cooperating with the seat at the inner end of the burner supply port, both said valves being adapted to be lifted from their seats by pressure of liquid pumped through the inlet port, the relief valve having formed therethrough a passage establishing connection between the inlet port and the by-pass port, and an air escape valve adapted to be moved by pressure of liquid in the casing to close said passage.

11. In a valve mechanism of the class described, a casing having an inlet for fluid under pressure, a service outlet and a by-pass outlet, a valve to control the service outlet, yieldable means tending to hold said valve closed, cooperating elements for controlling

communication between said inlet and bypass outlet, one of said elements being normally stationary and the other being movable with the service valve and opening the bypass communication as the service valve closes and closing such communication as the service valve opens, and means for normally holding the first named element stationary and yieldable in response to pressure in excess of a predetermined maximum after the service valve has opened.

In testimony whereof I have hereunto set my hand.

AARON KLOTZMAN.