C. H. KNUDSEN.

VALVE CONSTRUCTION FOR FUEL OIL MOTORS.

APPLICATION FILED MAY 6, 1919.

1,363,470. Patented Dec. 28, 1920.

FIG. 1.

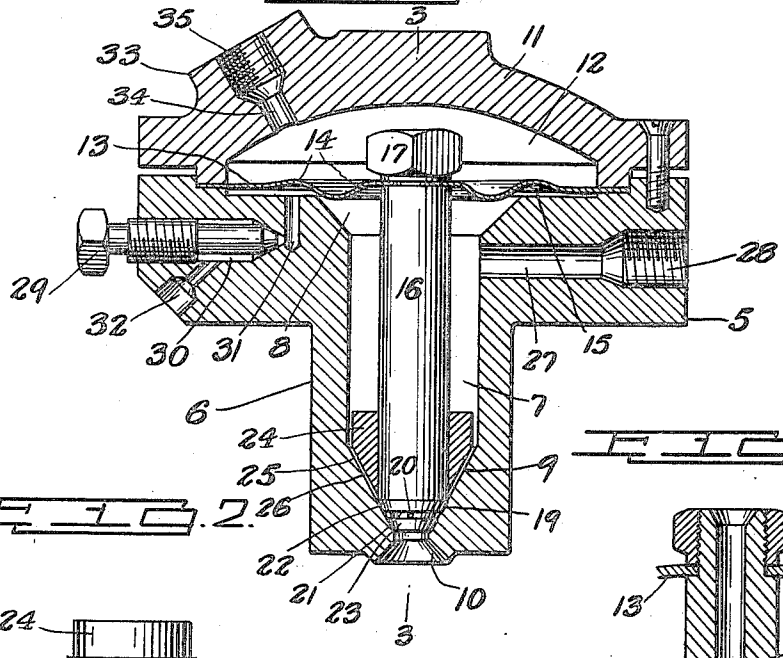


FIG. 2.

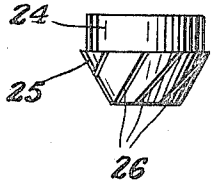


FIG. 3.

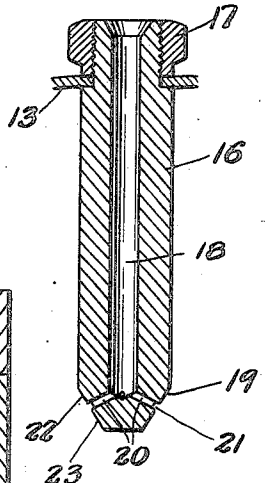
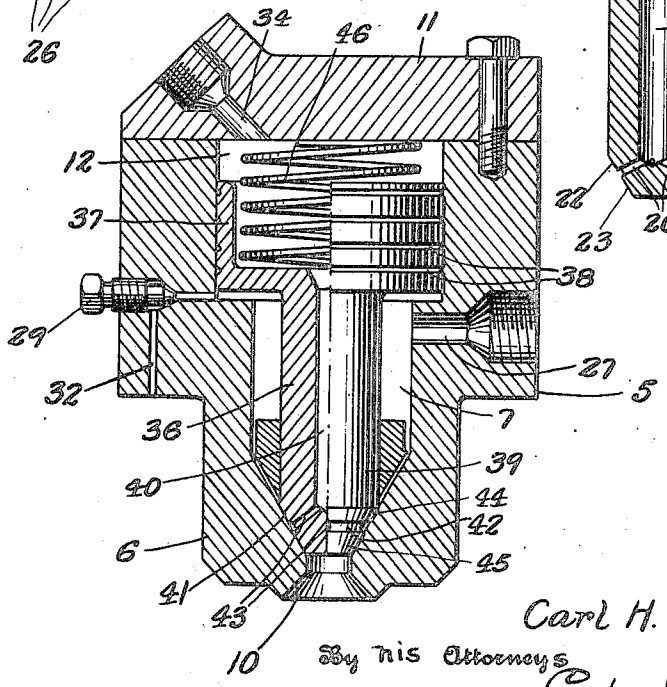


FIG. 4.



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VALVE CONSTRUCTION FOR FUEL-OIL MOTORS.

1,363,470. Specification of Letters Patent. Patented Dec. 28, 1920.

Application filed May 6, 1919. Serial No. 295,251.

To all whom it may concern:

Be it known that I, CARL H. KNUDSEN, a citizen of the United States, and residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Valve Constructions for Fuel-Oil Motors, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to valve constructions particularly designed for use in connection with what are known as fuel oil engines or motors, and the object of the invention is to provide a device of the class specified which will be automatic in operation and the action of which will be that of a spray device or which will operate in the same manner as an atomizer; a further object of the invention being to provide a device of the class specified which is simple in construction and operation and efficient in use; and with these and other objects in view the invention consists in a valve device constructed and operating as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which:—

Figure 1 is a sectional side view of my improved valve device in its normal position;

Fig. 2 a detail side view of a part of the construction which I employ;

Fig. 3 a section on the line 3—3 of Fig. 1, of a part of the construction shown in said figure detached; and,

Fig. 4 a view similar to Fig. 1 but showing a modified form of construction.

In Fig. 1 I have shown at 5 the main body of the valve device which is preferably cylindrical or disk-shaped in form and provided with a tubular stem 6, the parts 5 and 6 are provided with a central bore 7 which is made conical in form at the top and bottom as shown at 8 and 9, and this bore forms a fuel oil chamber. The bottom conical portion 9 of the bore 7 opens out through a flaring discharge 10 in the bottom of the part 6.

Secured to the top of the part 5 of the valve device is a concavo-convex cap 11 which forms between the same and the top of the part 5, a chamber 12. Secured between the cap 11 and part 5 of the valve device is a diaphragm 13 which is corrugated or otherwise strengthened as shown at 14, and the connection or supporting of the diaphragm between the part 5 and the cap 11 is such as to provide a space 15 between the diaphragm and the top of the part 5.

Connected centrally with the diaphragm 13 is a plunger 16, the top of which is provided with a nut 17 which secures the plunger in connection with the diaphragm, as will be readily understood, and as clearly shown in Figs. 1 and 3, and the plunger 16 is provided with a central bore 18, and the bottom portion of said plunger is conical in form as shown at 19, and the conical portion 19 is provided with a plurality of bores or apertures 20, which communicate with the bottom of the bore 18, as clearly shown in Fig. 3. The conical portion 19 of the plunger 16 is adapted to normally seat in the conical portion 9 of the bore 7, as clearly shown in Fig. 1, and it will be noted that the apertures or bores 20 open outwardly into an annular recess 21 in the conical portion 19, and this recess forms on said conical portion top and bottom beveled seats 22 and 23.

A sleeve 24 is mounted on the plunger 16 within the bore 7 of the parts 5—6 of the valve device, said sleeve being provided at the bottom thereof with a conical portion 25 having a plurality of tangentially arranged grooves 26. The sleeve 24 is adapted to move longitudinally of the plunger 16 and the conical portion 25 thereof is adapted to seat in the conical portion 9 of the bore 7 as clearly shown in Fig. 1.

The part 5 of the valve device is provided at one side thereof with an intake bore 27, and the outer end of which is enlarged and threaded as shown at 28 to permit of the connection therewith of a fuel oil supply pipe, which is not shown, but is adapted to supply fuel oil to the bore 7 under a predetermined pressure.

The part 5 of the valve device is also provided preferably opposite to the bore 27 with a discharge valve 29 which is adjustably mounted in a bore 30, which communicates with a vertical bore 31 placed in communication with the bore 7 of the part 5

through the space 15, and communicating with the bore 30 is a discharge port or passage 32.

The cap 11 is provided at one side thereof with a lug 33 having a bore 34, the outer end of which is threaded as shown at 35 to receive a pipe, not shown, through which air under pressure is adapted to pass into the chamber 12.

The foregoing clearly describes the construction shown in Figs. 1 to 3 inclusive and, in practice, or in the use of a valve device, such as above described, air under predetermined pressure is first introduced into the chamber 12 and this serves to hold the plunger 16 in its closed position, or to bring the seats 22 and 23 on the conical portion 19 thereof in engagement with the conical portion 9 of the bore 7, after which the valve 29 is opened to permit the passage of air through the bores 31 and 30 and the discharge port or passage 32, after which fuel oil under predetermined pressure is passed into the bore 7 through the bore 27, the air in the bore 7 being discharged through the discharge port or passage 32, as will be readily understood, and when said fuel oil begins to discharge through the port or passage 32, the valve device 29 is closed, and by continuing the feeding of fuel oil into the bore 7, the diaphragm 13 will be raised against the air pressure in the chamber 12, and this operation will raise the plunger 16 to unseat the beveled faces 22 and 23 to permit of the passage of air from the bore 18 in the plunger 16 through the bores 20 and out through the flaring discharge 10 in the bottom of the part 6, and in this operation the fuel oil from the bore 7 is also discharged through the flaring discharge 10, said oil passing through the tangentially arranged grooves 26 in the conical portion 25 of the sleeve 24.

It will be understood that the extent of the upward movement of the plunger 16 by the diaphragm 13 will depend upon the pressure of the fuel oil in the bore 7, and the pressure of air in the chamber 12, but my improved valve device will operate automatically to supply the desired fuel to engines or motors of the class specified, as will be readily understood.

With the construction shown in Figs. 1 to 3 inclusive, I provide a valve device which is simple in construction and operation, and which is positive and automatic in action, and which will properly mix the air and fuel oil prior to the discharge of the same into the cylinder or cylinders of an engine.

The construction shown in Fig. 4 is of the same general form as that shown in Figs. 1 to 3 inclusive, except for a slight change in the design and by substituting for the plunger 16 a piston 36. The piston 36 comprises a sleeve head 37, the periphery of which is provided with a plurality of grooves 38, and a downwardly directed stem 39 having a central bore 40. The bottom of the stem 39 is provided with a conical portion 41 having a central annular groove or recess 42 and a plurality of bores 43 which form a communication between the bore 40 and the annular groove or recess 42, and the annular groove or recess forms in the conical portion 41 top and bottom beveled seats 44 and 45 which operate in the conical portion 9 of the bore 7 of the valve device.

In the form of construction shown in Fig. 4 I also preferably employ a spiral spring 46 which is placed in the sleeve head 37 of the piston 36 and adapted to bear on the underside of the cap 11, and in the operation of this form of construction air under pressure is first admitted into the chamber 12 between the top of the piston 36 and the cap 11, through the bore 34, after which the valve 29 is opened and oil under pressure is passed into the bore 7 through the bore 27 until fuel oil begins to pass through the discharge port or passage 32, after which the valve 29 is closed and pressure of the fuel oil in the bore 7 will then operate to raise the piston 36 against the compressed air in the chamber 12 to unseat the beveled faces 44 and 45 on the stem 39 and permit the passage of air through the bores 43 and the passage of fuel oil through the tangential grooves 26 and the sleeves 24 out through the flaring discharge 10 at the bottom of the part 6 of the valve device.

It will be readily understood that the spring 46 is not an essential feature of the construction shown in Fig. 4, as the compressed air in the chamber 12 will doubtlessly be sufficient to produce the desired result, or control the extent of the upward movement of the piston 36, but it will be noted that with both forms of construction shown my improved valve device is automatic in its operation and discharges therefrom the required amount of fuel oil and air in a spray fashion and thus produces a very desirable mixture for engines or motors that use or that may use valve devices of the class specified, and it will be readily understood that while I have shown certain details of construction for carrying my invention into effect I am not necessarily limited to these details, and various changes therein and modifications thereof may be made, within the scope of the appended claims, without departing from the spirit of my invention or sacrificing its advantages.

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

1. A device of the class described comprising a body portion divided into independent air and fuel oil chambers, means

whereby air under pressure may be supplied to the air chamber, means whereby fuel oil under pressure may be supplied to the fuel oil chamber, said device being provided with an air and fuel oil discharge, a plunger member mounted in the device, said plunger member being provided with a bore one end of which communicates with said air chamber, a plurality of bores communicating with said first named bore and through which air from said chamber is adapted to pass into the air and fuel discharge, a sleeve mounted on said plunger member within the fuel oil chamber the face of said sleeve being provided with a plurality of grooves through which fuel oil in said chamber is adapted to pass out through said air and fuel discharge, and means whereby the passage of air and fuel oil into said air and fuel oil chambers will automatically operate said plunger member to permit of the passage of air and fuel through said discharge.

2. A device of the class described comprising a body portion divided into independent air and fuel oil chambers, means whereby air under pressure may be supplied to the air chamber, means whereby fuel oil under pressure may be supplied to the fuel oil chamber, said device being provided with an air and fuel oil discharge, a plunger member mounted in the device, said plunger member being provided with a bore one end of which communicates with said air chamber, a plurality of bores communicating with said first named bore and through which air from said chamber is adapted to pass into the air and fuel discharge, a sleeve mounted on said plunger member within the fuel oil chamber the face of said sleeve being provided with a plurality of grooves through which fuel oil in said chamber is adapted to pass out through said air and fuel discharge, means whereby the passage of air and fuel oil into said air and fuel oil chambers will automatically operate said plunger member to permit of the passage of air and fuel through said discharge, and a discharge valve communicating with said fuel oil chamber.

3. A device of the class described comprising a body portion, a plunger member mounted therein and adapted to divide said body portion into independent air and fuel oil chambers, means whereby air under pressure may be supplied to the air chamber to hold said plunger member normally in an inoperative position, means whereby fuel oil under pressure may be supplied to the fuel oil chamber to move said plunger member into operative position against the pressure in the air chamber, said device being provided with an air and fuel oil discharge, means whereby air under pressure in the air chamber may pass into said member and be discharged through the lower end portion thereof, means for passing fuel oil in said fuel oil chamber around the discharge end of said member, and means for controlling the passage of air and fuel oil through the said air and fuel oil discharge.

4. A device of the class described comprising a body portion, a plunger member mounted therein and adapted to divide said body portion into independent air and fuel oil chambers, means whereby air under pressure may be supplied to the air chamber to hold said plunger member normally in an inoperative position, means whereby fuel oil under pressure may be supplied to the fuel oil chamber to move said plunger member into operative position against the pressure in the air chamber, said device being provided with an air and fuel oil discharge, means whereby air under pressure in the air chamber may pass into said member and be discharged through the lower end portion thereof, means on said plunger member for controlling the passage of fuel oil around the discharge end of said member, and a discharge valve communicating with said fuel oil chamber.

In testimony that I claim the foregoing as my invention I have signed my name in presence of the subscribing witnesses this 3rd day of May, 1919.

CARL H. KNUDSEN.

Witnesses:
C. E. MULREANY,
H. E. THOMPSON.