Jan. 27, 1953 A. ECKSTEIN 2,626,635

VALVE CONSTRUCTION

Filed Aug. 12, 1949 3 Sheets-Sheet 1

FIG. 1

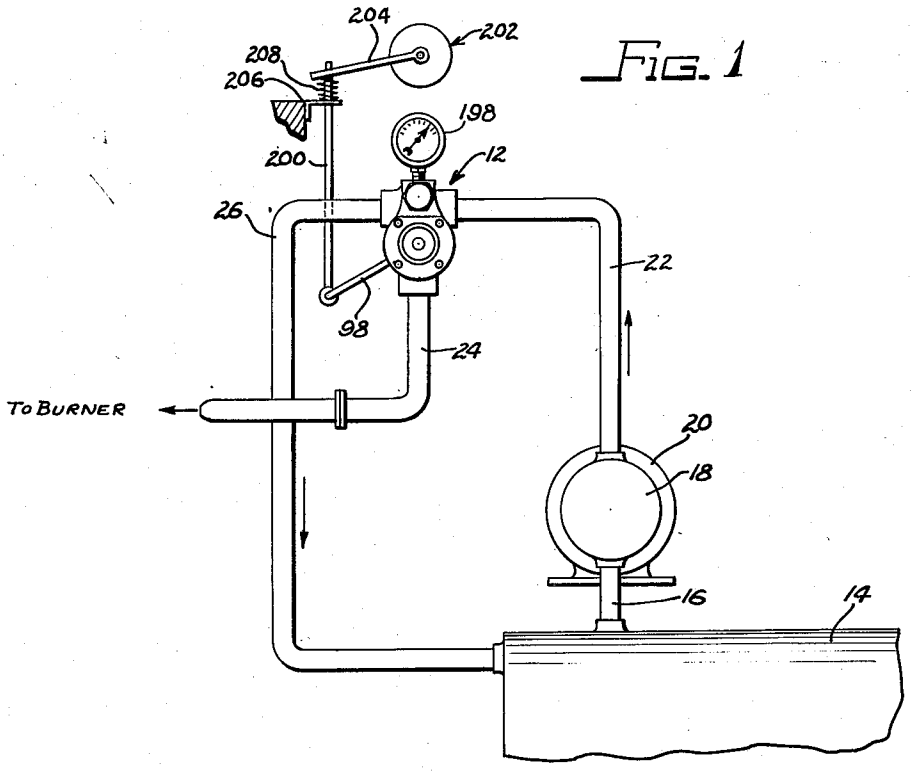
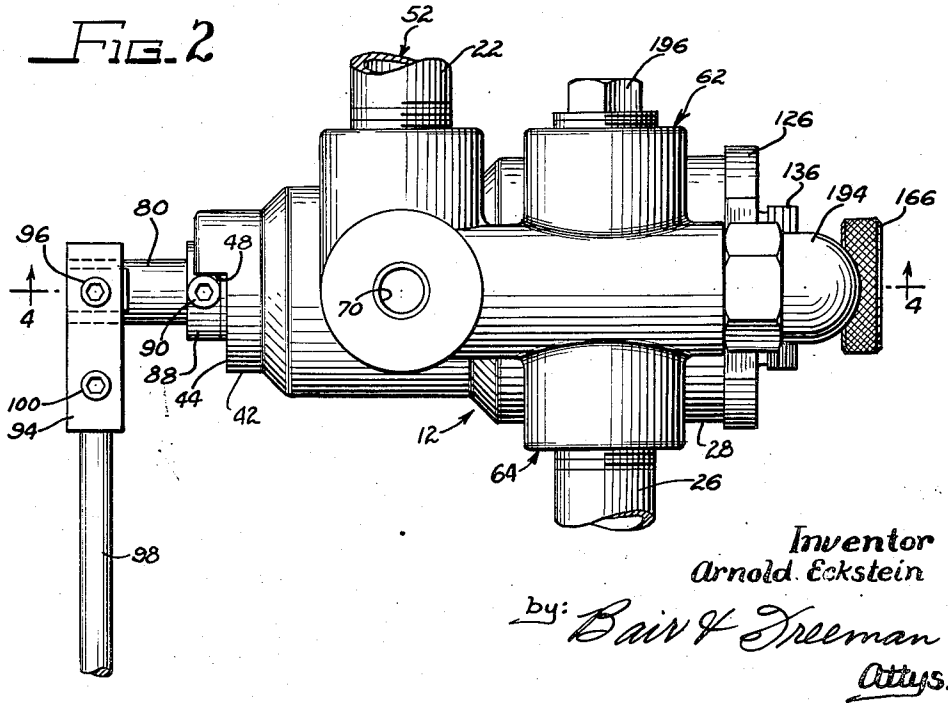


FIG. 2



Inventor
Arnold Eckstein
by: Bair & Freeman
Attys.

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VALVE CONSTRUCTION

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Fig. 3

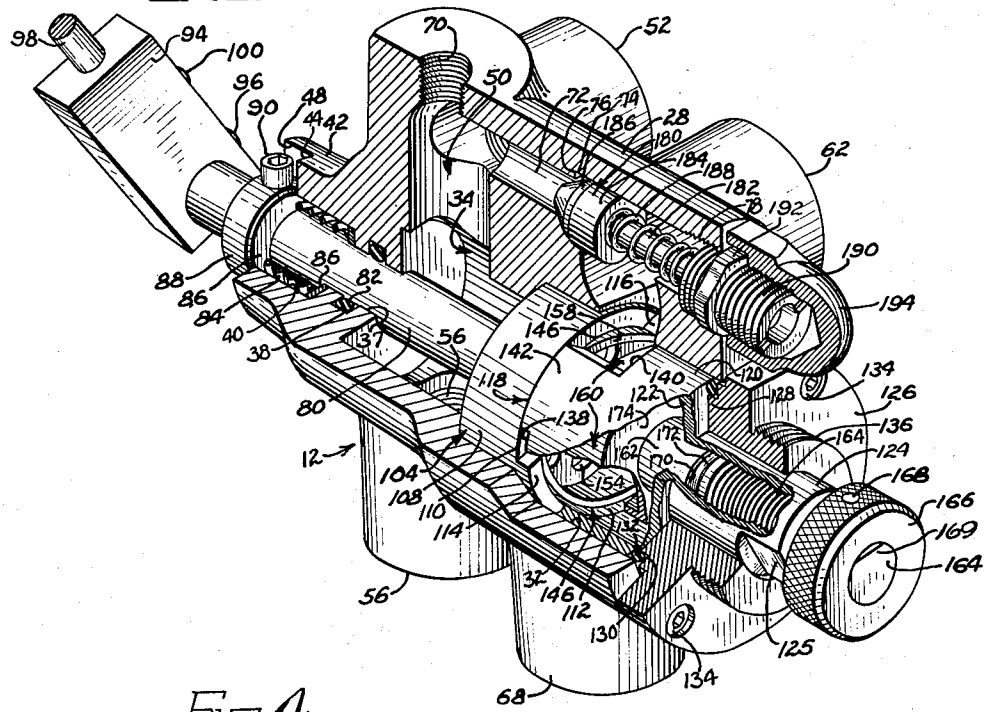
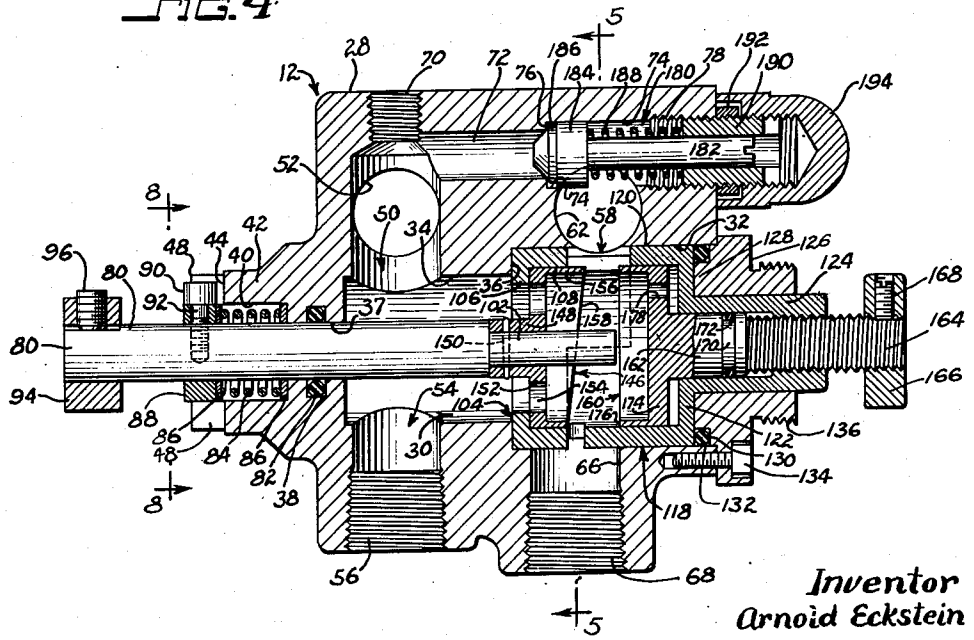


Fig. 4



Inventor
Arnold Eckstein
by: Baird & Freeman
Attys.

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VALVE CONSTRUCTION

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FIG. 5

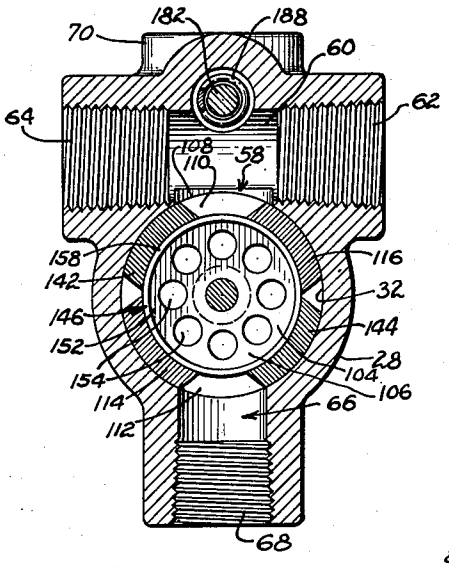


FIG. 6

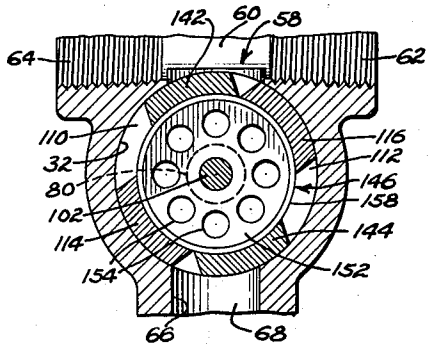


FIG. 7

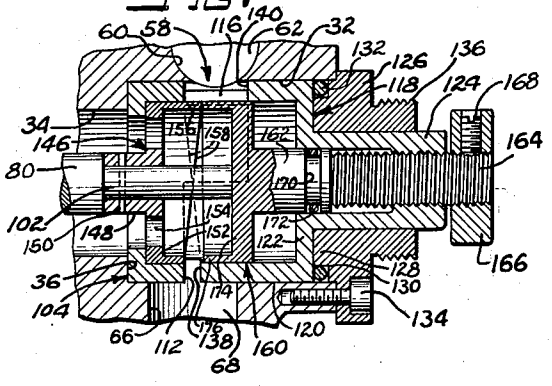


FIG. 8

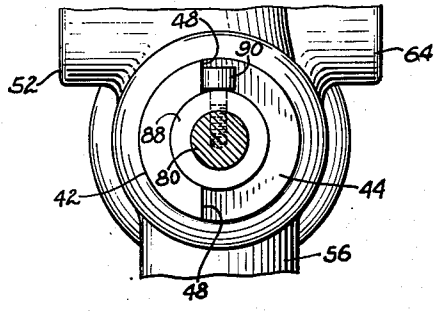


FIG. 9

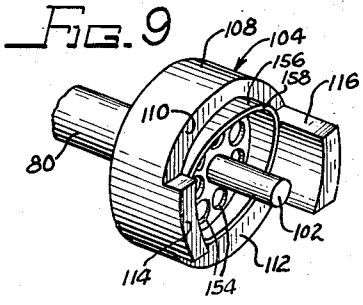
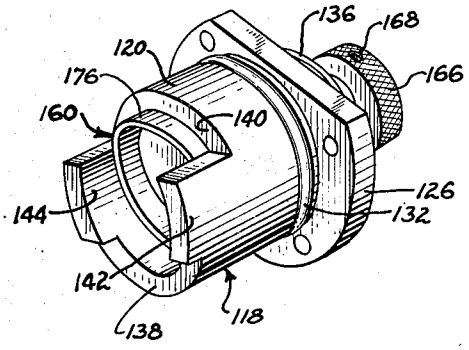


FIG. 10



Inventor
Arnold Eckstein

by: Bair & Freeman

Attys.

Patented Jan. 27, 1953 2,626,635

UNITED STATES PATENT OFFICE

2,626,635

VALVE CONSTRUCTION

Arnold Eckstein, McHenry, Ill., assignor to Ace Engineering Company, Chicago, Ill., a corporation of Illinois

Application August 12, 1949, Serial No. 109,941

25 Claims. (Cl. 137—610)

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This invention relates to a valve adapted for use in means for supplying oil to a burner by means of a pump.

More particularly, the present invention has to do with a valve for controlling oil in such a way that a portion of the oil is delivered to the burner and a portion returned to a supply tank.

Ravnsbeck patent, No. 2,103,299, issued December 28, 1937, discloses a valve for use in connection with oil burners; the present invention constitutes an improvement over the invention disclosed in that patent.

An object of the invention is the provision of a modulating valve for regulating the quantity of oil delivered to the burner and the quantity returned to the supply tank, in accordance with the load on the burner.

Another object is the provision of a modulating valve having means for adjusting and controlling the ports to the supply tank and burner, in which adjustments may be readily and easily made in the field.

Still another object is the provision of a valve embodying a modulating action, whereby throttling action characteristic of most previous types of valves is eliminated.

Another object is the provision of a modulating valve of the character referred to, and a spring return damper motor, in which the damper motor is operable to decrease the flow of oil to the oil burner, so that the burner starts on low fire, and after the burner starts, the opening to the burner is increased.

A further object is the provision of a valve of the character referred to, having means for varying the size of the return port to the supply tank, for adjusting and controlling the discharge pressure of the pump to a satisfactory level.

A still further object is the provision of a valve of the character referred to, having means for controlling both the return port to the supply tank and the burner supply port, for controlling the capacity of the valve to accommodate the particular size burner with which it is used.

Another object is the provision of a modulating valve having a novel arrangement of elements and operating parts for carrying out the objects stated above.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, wherein:

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Figure 1 is a diagrammatic view of a system embodying the modulating valve of the present invention;

Figure 2 is an enlarged plan view of the valve;

Figure 3 is an enlarged perspective cut-away view of the valve;

Figure 4 is a vertical longitudinal sectional view of the valve;

Figure 5 is a sectional view taken on line 5—5 of Figure 4;

Figure 6 is a view similar to Figure 5, showing certain parts in different positions;

Figure 7 is a view similar to a portion of Figure 4 showing certain parts in different positions;

Figure 8 is a view taken on line 8—8 of Figure 4; and

Figures 9 and 10 are perspective views of certain of the operating parts of the valve.

Referring in detail to the drawings, Figure 1 illustrates diagrammatically a system embodying the modulating valve of the present invention and the system is introduced at this point to illustrate the general type of valve and the use to which it is to be put.

The modulating valve constituting the present invention is shown in its entirety at 12 and is included in a system which includes a supply tank 14 from which leads a pipe line 16 to a constant capacity pump 18 driven by a motor 20. The pump delivers the oil from the supply tank 14 through the pipe line 22 to the valve 12 in which the oil is divided into streams, one being delivered through the pipe line 24 to the burner as indicated, and the other being delivered through the pipe line 26 back to the supply tank 14. The details of the valve proper will now be described as illustrated in the subsequent figures of the drawings.

The valve 12 includes a valve housing 28 which may be in the form of a casting having a central bore indicated in its entirety at 30, having an enlarged portion 32 opening out of the housing and a reduced portion 34 between which is a shoulder 36; the portion 32 may also be termed a distributing chamber. Leading from the reduced portion 34 is a small diameter bore 37 having an annular recess 38. Outwardly of the recess 38 is a cavity 40 formed by a tubular portion 42. The cavity 40 is of greater diameter than the bore 37 for purpose which is to be explained later. The outer end of the tubular portion 42 has a part cut away forming a cut-back portion 44 extending partially around the periphery thereof, and shoulders 46.

Leading upwardly from the reduced portion 34 of the central bore is a passage 50 which communicates with a laterally extending port 52 which will be termed an inlet port, and similarly leading downwardly from the reduced portion 34 is another passage 54 communicating with a port 56 which is also an inlet port.

Leading upwardly from the chamber 32 is a passage 58 having a vertical component and communicating with a transverse passage 60 opening out on one side of the valve body in a port 62 and on the other side in a port 64. The ports 62 and 64 are herein termed return ports. Leading downwardly from the chamber 32 is another vertical passage 66 terminating in a port 68 which is herein termed an outlet port, or burner supply port. Opening outwardly from the upper end of the passage 50 is another port 70 for the insertion therein of a pressure indicator. The various ports just described are formed by tubular portions having interior threads for the insertion therein of pipe lines etc. as is well understood in the valve art.

Leading from the passage 50 is a horizontal longitudinal passage 72 having a larger portion 74 forming a shoulder 76, the larger portion opening out of the end of the valve in a threaded segments 78.

The foregoing description covers the valve body and the following description has to do with the operating parts contained in the valve.

A shaft 80 is journalled in the reduced portion 36 of the bore of the valve body and is surrounded by a resilient ring 82 of rubber or other material for sealing that point against outward flow of oil from the valve. Surrounding the shaft 80 and disposed in the cavity 40 is a compression spring 84 which is biased between a pair of washers 86 one of which abuts the inner end of the cavity 40 and the other of which is held in place by means of a washer or ring 88 which in turn is secured to the shaft 80 by means of a set screw 90 having a threaded shank 92 inserted through a radial hole in the ring 80 and threaded into a tapped recess in the shaft. The spring 84 biases against the outer washer 86 and thereby the ring 88 and biases the shaft toward the left. The head of the set screw 90 is received in the cut-back portion 44 of the tubular element 42 and is adapted alternately to engage the shoulders 48 on rotation of the shaft.

Fixed to the outer end of the shaft 80 is a block 94 secured by means of a set screw 96 which engages a flat portion of the shaft. Extending from the block 94 is a modulating rod 98 which is also secured in position by means of a set screw 100 threaded into a tapped opening in the block.

The inner end of the shaft 80 has a reduced portion 102 which extends into the chamber 32 Fixed in the chamber 32, as by a press fit, is a ring 104 (Figures 4 and 9) cup-shape in effect, having a radially extending portion 106 which is abutted against the shoulder 36, and an axially extending flange 108 which engages the wall of the chamber 32. The axially extending flange 108 is provided with cut-back portions 110 and 112 forming extensions 114 and 116 the latter of which has considerably greater axial length than the former. When the ring or member 104 is in position in the chamber 32 the flange 108 thereof extends partially into the projection of the outlet port 68 while it does not extend into the projection of the passage 58 (leading to the return ports). However, the ring 104 is so positioned that the short extension 114 is disposed adjacent the bottom while the long extension 116 is disposed adjacent the top of the valve and extends into the circumferential projection of the passage 58.

Forming the counterpart and cooperating with the ring 104 is a cylindrical or cup-shape member 118 rotatably mounted in the chamber 32, the elements 104 and 118 being disposed with their open sides facing each other. The element 118 has a cylindrical portion 120, engaging the wall of the chamber 32, a radial portion 122 and a reduced tubular portion 124, the outer end of the latter being interiorly threaded, and having exterior flattened faces 125. The element 118 is secured in place by means of a ring 126 fitted over the tubular portion 124 and having a projection 128 extending into the chamber 32, the projection being formed with an annular recess 130 in which is disposed a resilient ring 132 for sealing this point of the valve against outflow of oil from within the valve. The ring 126 is secured in place by means of screws 134 inserted through holes in the ring and threaded into tapped holes in the valve body. The outer end of the ring 126 may be of reduced dimension, and exteriorly threaded as indicated at 136.

Returning attention to the element 118, the cylindrical portion 120 thereof is formed with cut-back portions 138 and 140 between which are extensions 142 and 144. It will be noted in this case that the portion 140 is of lesser axial dimension than the portion 138 while the extensions 142 and 144 are of the same length with respect to each other.

The elements 104 and 118 are so disposed that the extensions thereon are intermeshed and arranged in such a way that the extensions on one of the elements are fitted between the extensions on the other element, and each extension engages the respective cut-back portion. It will be noted also that each cut-back portion is of greater circumferential extent than the extension therein to permit relative rotation of the two elements.

As stated above the extension 116 extends into the circumferential projection of the outlet port or passage 58 and similarly the extension 142 on the element 118 lies in the circumferential projection of the outlet port 58, or in other words the extensions 116 and 142 are co-extensive in axial dimension.

The numeral 146 indicates a control element which is provided with a hub 148 fitted on the reduced portion 106 of the shaft 80 and secured thereon by means of a pin 150. Extending from the hub 148 is a transverse plate 152 having a plurality of circumferentially arranged holes 154, and extending from the periphery of the plate 152 is an axial flange 156 engaging the inner surface of the axial flange 108. The extended edge of the flange 156, as indicated at 158, lies in a plane which is disposed at an angle to the perpendicular to the axis of the chamber and shaft. The relationship is best shown in Figures 4, 7 and 9. The portion of the flange 156 having the greatest axial dimension is greater than the axial dimension of the flange 108, while the portion of the flange 156 of least axial extent is substantially the same as the axial dimension of the flange 108.

An additional control element is indicated at 160 having a shank portion 162 fitted in and extending outwardly beyond the tubular portion 124, the outer extremity being threaded as indicated at 164 and threaded in the interiorly thread-

ed part of the tubular portion 124. Secured to the outer end of the shank 162 is a knurled knob 166 provided with a set screw 168 which is adapted to engage a flat portion 169 on the shank. Inwardly of the threaded portion 164 is an annular cavity 170 in which is a resilient ring 172 for sealing this point against the outflow of oil from the valve. Extending from the shank portion 162 is a radial plate 174 having an axial flange 176 which is of uniform axial dimension throughout its circumference. The plate 174 is provided with a port or hole 178.

The numeral 180 indicates a safety release mechanism and includes a rod 182 having an enlarged head 184 disposed in the enlarged portion 74 of the passage 72. Secured to the head 184 is a resilient sealing gasket 186 adapted to abut against the shoulder 76. Surrounding the rod 182 is a compression spring 188 biased between the head 184 and a threaded sleeve 190 which is threaded into the threaded portion 78. The rod 182 is axially slidable in the sleeve 190. The outer end of the rod 182 and sleeve 190 may be provided with screw driver slots. The sleeve 190 extends out of the bore in the valve housing and a lock nut 192 secures the sleeve in place after it has been turned to adjusted position. An interiorly threaded cap 194 is threaded over the sleeve 190 and has a portion enclosing the lock nut 192.

It will be understood that the inlet ports 52 and 56 are to be alternately used, that is, when one is in use the other is plugged, the purpose being for accommodating different desired piping arrangements. The same is true of the return ports 62 and 64. As the valve is connected in the system in Figure 1 the pipe 22 is threaded into the inlet port 52 and the bottom inlet port 56 is plugged. The pipe 26 is threaded into the return port 64 and the alternate return port 62 is plugged by means of a screw plug 196. A pressure gauge 198 is threaded in the port 70 for determining the pressure within the valve.

The system in Figure 1 illustrates a means for automatically controlling the valve and includes a vertical arm 200 connected to the swinging end of the modulating rod 98. A control device illustrated diagrammatically at 202 is provided with an operating lever arm 204 which is connected with the vertical link 200. The link 200 is inserted through a hole in a member 206 which is fixedly mounted in stationary position and a compression spring 208 is biased between the member 206 and the lever arm 204. The operation of the control device 202 and its effect on the valve will be referred to later.

Operation

There are three different phases or ways of operating the valve. One is to control by simultaneously opening and closing the outlet port and return port to thereby adjust the effective size of the valve to fit the particular size of burner with which it is used.

The second is to adjust the size of the return port only, so that the discharge pressure of the pump can be adjusted to and maintained at a satisfactory level.

The third is to variably control or adjust the size of the outlet or supply port to the burner. It is this means that is employed for directly controlling the flow of oil to the burner for regulating it as to high-low, on-off or modulating.

As stated above, the pump 18 is a constant capacity pump and after it has begun operating the flow of oil to the valve from the pump is of course constant. The oil enters through port 52 (or 56), and into the bore 34, and from there through holes 154 into the distributing chamber 32. It is desired to maintain the pressure within the valve fairly constant so that the flow of the oil to the valve can be controlled more readily. In order to maintain the desired pressure in the valve, the arrangement is such that more oil is pumped than necessary for the burner, and a portion of the oil is returned to the supply tank, and the pressure can be more readily controlled.

Certain pressures are desired so that the desired flow of oil can be maintained in spite of obstructions in the pipe lines.

The adjustment to be made for sizing the valve to fit the particular installation is made in connection with the elements 118 and 104. A wrench is applied to the flat faces 125 of the tubular element 124 for rotating the element 118. Figure 3 illustrates the element 118 in the position wherein both the outlet and return ports are wide open. The extension 142 is separated from the extension 116 whereby the oil from the chamber 32 can flow most freely through the passage 58 and outlet port 64. This relationship is also shown in Figure 5 which shows section cutting through both the extensions 142 and 116. At the same time the extension 144 is separated from the extension 114 providing a space for the oil to flow from the chamber 32 downwardly through the outlet port 68. To close off the outlet and return ports, the tubular member 124 is rotated clockwise as viewed from the end of the axis nearest the observer in Figure 3. This rotation moves the extension 142 toward the extension 116 and likewise the extension 144 toward the extension 114. It is obvious that the member 118 can be rotated only a slight or greater extent, as desired, to close off the outlet and return ports the desired degree. By thus closing off the outlet and return ports to the desired degree, the capacity of the valve is regulated to accommodate the particular size of burner with which it is to be used.

The next adjustment is in connection with the return port only. The element 160 can be moved bodily axially in the chamber 32 by rotation of the knurled knob 166. It is preferred that the threads 164 are left hand threads so that the port opening is enlarged as the knob is turned clockwise. The member 160 can be backed up against the flat portion 122 in which position the axial flange 176 is entirely within the flange 120 and within that portion determined by the cutback portion 140 so that the flange 176 does not project to obstruct the flow of oil through the return port 58. The port 178 permits the oil to flow behind the element 160 and to flow therefrom, to permit ease in actuation thereof.

When it is desired to reduce the return port 58, the element 160 is threaded or moved into the projection of the outlet port or moved to the left from the position shown in Figure 4, toward the position shown in Figure 7. The member 160 progressively projects farther into the outlet or return port 58 and thereby progressively obstructs the flow of oil through that port. The reduced portion 102 of the shaft 80 acts as a stop for limiting the movement of the element 160 to its fully advanced position. The member 160 it will be noted is a cup shaped member and is freely rotatable within the member 118 whereby the axial flanges of the two members are in engagement with one another.

The member 146 which is also cup shaped and

is so arranged on the shaft 80 that when the modulating rod 98 is in raised position the outlet port 68 is in fully open position. This is brought about by the fact that the portion of the flange 156 which is shortest axially is disposed at the bottom and therefore the portion of greatest length is disposed at the top and a part of it is projected into the outlet port or return port 58. When the element 160 is retracted to full open position, the element 146 exerts the least effect on the return port 58. When the modulating rod 98 is moved to lowered position, the outlet port is fully closed because the portion of the flange 156 which is of greatest axial extent is disposed over the outlet port as shown in dotted lines in Figure 7. The axial extent of this portion of the flange is of the proper length that it fully closes the outlet port. The element 160 is moved for the purpose of adjusting the discharge pressure of the pump to a satisfactory level. This member closes or opens only the return port and by reason of that fact the discharge pressure of the pump, and the pressure reflected in the valve, can be regulated. Such pressure can be detected by the gauge 198.

As the member 146 is rotated it will be noted that the outlet port 68 is not abruptly opened or closed, but is only progressively so because of the inclination of the marginal edge of the flange 156. This permits an effective modulating effect as distinguished from an abrupt on-off control. The element 146 therefore is suitably adapted to automatic control.

For the purpose of automatic control reference is directed to Figure 1 in which the control device 202 may be any of various types depending on the use to which the burner is put, such as pressure responsive control, temperature responsive control, aquastat, etc. Assume that the burner is used to heat a steam boiler. The pressure in the steam boiler is transmitted to the control 202 and as the pressure builds up and approaches the desired limit, it actuates the lever arm 204 to force the link 200 and thereby the modulating arm 98 downwardly. This rotates the member 146 from the position shown in Figure 7 in full lines toward the position shown in dotted lines in the same figure. The build up of steam pressure is of course gradual and the lowering of the modulating arm 98 is accordingly gradual, so that a truly modulating effect is accomplished in reducing the outlet port to the burner. The fire of the burner is reduced and eventually the steam pressure is also reduced or balanced, and when it is reduced to the desired limit, the opposite movement of the modulating arm 98 is brought about by the compression spring 206.

When the member 160 is in its fully advanced position as shown in Figure 7, the member 146 is effective for fully closing either the outlet port or supply port alternately. These ports can also be gradually or partially closed as explained above.

The valve can also be used in a high-low arrangement for starting the burner on low fire. The modulating rod 98 can be moved to lowered position so that the outlet port 68 is nearly closed. It is usually desirable to light the burner on low fire to prevent flash backs and other undesirable effects which might occur if an excessive amount of oil were delivered to the burner before the burner was lighted. After the burner is lighted, greater quantities of oil can be delivered thereto almost immediately and the burner will consume all of the oil delivered. The arrangement for operating the modulating rod to close the outlet port 68 for starting the burner on low fire may be of any desired character such as a damper motor arranged to operate only after the fire has been started. Such an arrangement does not constitute a part of the present invention and any desired arrangement may be used. Such an arrangement may also be used in conjunction with the type of control illustrated in Figure 1 and described above.

The compression spring 84 acts to bias the shaft 80 to the left to the position in which the member 146 engages the ring 104 and thereby the shaft and all of the elements connected thereto are retained in proper position. The set screw 90 is adapted to engage alternately the shoulders 48 to limit the rotation of the shaft 80.

The relief valve indicated generally at 180 operates as a safety measure. If any of the pipe lines should become clogged, such as the lines 24 and 26, and particularly the line 24 to the burner, excessive pressure would be built up with danger of damaging the valve. However, in that case the plunger 182 is forced out of seating position and the oil returns through the port 72 and return port 64.

One of the chief advantages of the invention will now be apparent and that is that the valve can be set or adjusted in the field to accommodate the particular size burner. The capacity of any valve is determined to a great extent in the factory but there are always many factors which affect the burner or valve in the field. This can be taken care of by the simple expedient of rotating the tubular element 124 the desired extent. After the burner is in operation the adjustment can be made to suit the particular accidental characteristics of the burner and the operating conditions.

All adjustments made by means of the members 118 and 160 are made with the modulating rod 98 in raised position or in other words with the member 146 in position for opening the outlet port. After those adjustments are made then the actuation or operation of the member 146 will become properly effective.

Another advantage of the present invention is that all throttling action as it is generally known is eliminated. In contrast therewith the present valve is fully modulating.

While I have herein shown and described a preferred form of my invention, manifestly it is susceptible of modification and rearrangement of the parts without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting my invention to the precise form herein disclosed, except as I may be so limited by the appended claims.

I claim as my invention:

1. In a valve, a valve body having a cylindrical chamber, an inlet port, an outlet port and a return port, said outlet and return ports opening through the wall of said chamber, and a pair of cylindrical members in said chamber, one of said cylindrical members being rotatable in said chamber, said cylindrical members having axially extending, interengaging extensions, whereby, upon rotation of said rotatable cylindrical member, the extensions on the respective cylindrical members are moved relatively toward and from each other and effective for closing and opening said outlet and return ports simultaneously.

2. In a valve, a valve body having a cylin-

drical chamber, an inlet port, an outlet port and a return port, said outlet and return ports opening through the wall of said chamber, and a pair of cylindrical cup-shape members in said chamber having axial flanges and disposed with their open sides facing each other, the axial flange of each cup-shape member having cut-back portions and extensions, the extensions of each cup-shape member being fitted in the cut-back portions of the other, each cut-back portion being of greater peripheral extent than the extension fitted therein, one of said cup-shape members being rotatable, whereby the extensions thereon move toward and from the extensions on the other cup-shape member, the extensions on the respective cup-shape members being thereby effective for progrssively closing and opening said outlet and return ports simultaneously.

3. In a valve, a valve body having a cylindrical chamber, an inlet port, an outlet port and a return port, said outlet and return ports opening through the wall of said chamber, and a pair of cylindrical cup-shape members in said chamber having axial flanges and disposed with their open sides facing each other, the axial flange of each cup-shape member having cut-back portions and extensions, the extensions of each cup-shape member being fitted in and engaging the cut-back portions of the other, each cut-back portion being of greater peripheral extent than the extension fitted therein, one of said cup-shape members being rotatable, whereby the extensions thereon move toward and from the extensions on the other cup-shape member, the extensions on the respective cup-shape members being thereby effective for progressively closing and opening said outlet and return ports simultaneously, the cut-back portions on one of said cup-shape members being of different axial lengths relatively to one another, whereby said outlet and return ports are opened to different extents relatively to one another.

4. In a valve of the character disclosed, a valve body having a cylindrical chamber, an inlet port, an outlet port and a return port, annular cylindrical means rotatably mounted in said chamber and engaging the wall thereof, said cylindrical means being operable for closing and variably opening said outlet and return ports, a first blocking member rotatably mounted within said cylindrical chamber, a second blocking member axially movable within said cylindrical chamber, said second member being adapted to be axially advanced to partially close one of said ports, and said first member being rotatable to positions for alternately closing one of said outlet and return ports when said second member is in fully advanced position.

5. In a valve, a valve body having a distributing chamber, an inlet port, an outlet port, and a return port, said outlet port and return port opening through the wall of the distributing chamber, a first pair of members in said distributing chamber each having extensions thereon extending into recesses between extensions on the other member, said extensions being adapted, upon movement of said extensions relatively toward and from each other, to effectuate variable partial blocking of the outlet and return ports, said first pair of members adapted to leave a portion of both the outlet port and the return port unblocked, and a second pair of members in said chamber adapted to cooperate with each other to variably block the unblocked portion of one of said ports.

6. A device as set forth in claim 5 wherein one of said second pair of members is adapted to variably block the other of said ports.

7. A device as set forth in claim 5 wherein one of said second pair of members is rotatable with respect to the second member, and said second member being bodily movable toward and away from said first member.

8. In a valve, a valve body having a cylindrical distributing chamber, an inlet port, an outlet port, and a return port, said outlet and return ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block the outlet and return ports, said first pair of members adapted to leave a portion of both the outlet port and return port unblocked, a second pair of members in said chamber adapted to cooperate with each other to variably block the unblocked portion of one of said ports, and one of said second pair of members adapted to variably block the unblocked portion of the other of said ports.

9. In a valve, a valve body having a cylindrical distributing chamber, an inlet port, an outlet port, and a return port, said outlet and return ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block the outlet and return ports, said first pair of members adapted to leave a portion of both the outlet port and the return port unblocked, and a first blocking member normally positioned to block a part of the unblocked portion of the return port and adapted to be rotated to a position to fully block the outlet port.

10. In a valve, a valve body having a cylindrical distributing chamber, an inlet port, an outlet port, and a return port, said outlet and return ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block the outlet and return ports, said first pair of members adapted to leave a portion of both the outlet port and return port unblocked, a first blocking member normally positioned to block a part of the unblocked portion of the return port and adapted to be rotated to a position to fully block the outlet port, and a second blocking member movable to a position where it is adapted to cooperate with said first blocking member to fully block the return port.

11. In a valve, a valve body having a cylindrical distributing chamber, an inlet port, an outlet port, and a return port, said outlet and return ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block the outlet and return ports, said first pair of members adapted to leave a portion of both the outlet port and return port unblocked, a second pair of cylindrical blocking members concentrically positioned within said first pair of cylindrical members and adapted to cooperate with each other to variably block the unblocked portion of one of said ports, and one of said second pair of mem-

bers adapted to variably block the unblocked portion of the other of said ports.

12. In a valve, a valve body having a cylindrical distributing chamber, an inlet port, an outlet port, and a return port, said outlet and return ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block the outlet and return ports, said first pair of members adapted to leave a portion of both the outlet port and return port unblocked, a second pair of cylindrical blocking members concentrically positioned within said first pair of cylindrical members the first of said second pair of cylindrical blocking members being normally positioned to block a part of the unblocked portion of the return port and adapted to be rotated to a position to fully block the outlet port, and the second of said second pair of cylindrical blocking members being axially movable with respect to said first cylindrical blocking member to a position where it is adapted to cooperate with said first blocking member to fully block the return port.

13. In a valve, a valve body having a cylindrical distributing chamber, an outlet port, and a return port, said outlet and return ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block the outlet and return ports, said first pair of members adapted to leave a portion of both the outlet port and return port unblocked, a second pair of blocking members in said chamber adapted to variably block unblocked portions of said ports, and inlet means for introducing fluid into the space between said second pair of blocking members.

14. In a valve, a valve body having a cylindrical distributing chamber, an outlet port, and a return port, said outlet and return ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block the outlet and return ports, said first pair of members adapted to leave a portion of both the outlet port and return port unblocked, a second pair of members in said chamber adapted to variably block unblocked portions of said ports, and inlet means in one of said blocking members for introducing fluid into said cylindrical distributing chamber.

15. In a valve, a valve body having a cylindrical distributing chamber, an outlet port, and a return port, said outlet and return ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block the outlet and return ports, said first pair of members adapted to leave a portion of both the outlet port and return port unblocked, and a second pair of cylindrical members in said chamber adapted to variably block unblocked portions of said ports, one of said second pair of members being axially movable, inlet means for introducing fluid into the space between said second pair of cylindrical members, and a relief vent in said axially movable member for equalizing the fluid pressure thereon, so as to provide for ease in axial movement thereof.

16. In a valve, a valve body have a cylindrical distributing chamber, an inlet port, an outlet port, and a return port, said outlet and return ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block the outlet and return ports, said first pair of members adapted to leave a portion of both the outlet port and return port unblocked, a first blocking member normally positioned to block a part of the unblocked portion of the return port and adapted to be rotated to a position to fully block the outlet port, a shaft secured to said first blocking member and extending out of said valve body, and automatically controlled means connected to said shaft for rotating said first blocking member.

17. In a valve, a valve body having a cylindrical distributing chamber, a pair of ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block said ports, said first pair of members adapted to leave a portion of both ports unblocked, a second pair of members in said chamber adapted to cooperate with each other to variably block said unblocked portion of one of said ports, and one of said second pair of members adapted to variably block the unblocked portion of the other of the said ports.

18. In a valve, a valve body having a cylindrical distributing chamber, a pair of ports opening through the cylindrical wall of said chamber, a first pair of cylindrical members in said chamber rotatable with respect to each other, portions of said first pair of cylindrical members cooperating to variably block said ports, said first pair of members adapted to leave a portion of both ports unblocked, a second pair of members in said chamber adapted to variably block unblocked portions of the ports, and a porting means in one of said second pair of members communicating with said cylindrical distributing chamber.

19. In a valve, a valve body having a cylindrical distributing chamber, a pair of ports opening through the cylindrical wall of said chamber, a pair of cylindrical blocking members in said cylindrical distributing chamber, the first of said pair of blocking members being normally positioned to block a part of one port and adapted to be rotated to a position to fully block the second port, and the second of said blocking members being axially movable with respect to said first blocking member to a position where it is adapted to cooperate with said first blocking member to fully block said partially blocked port.

20. A valve as set forth in claim 19 including a stop member extending from one of said blocking members adapted to engage the other blocking member to limit the relative axial movement of said blocking members.

21. A valve as set forth in claim 19 including means for introducing fluids into the space between said pair of blocking members, and a relief vent in said axially movable member for equalizing the fluid pressure thereon, so as to provide for ease in axial movement thereof.

22. A valve as set forth in claim 19 including a shaft secured to said first blocking member and extending out of said valve body, and automatically controlled means connected to said shaft for rotating said first blocking member.

23. A valve as set forth in claim 19 including

inlet means in one of said pair of blocking members for introducing fluid into said distributing chamber.

24. In a valve, a valve body having an elongated distributing chamber therein, a pair of ports opening through the wall of said chamber and having portions thereof displaced from each other along the length of said chamber, a pair of blocking members in said distributing chamber. the first of said blocking members adapted to be positioned to block a portion of the first of said ports and adapted to be rotated to a position to variably block the second port, and the second of said blocking members being longitudinally movable with respect to said first blocking member to variably block the unblocked portion of said first port.

25. A valve as set forth in claim 24 including a stop member extending from one of said blocking members adapted to engage the other blocking member to limit the relative longitudinal movement of said blocking members.

ARNOLD ECKSTEIN.

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