Nov. 10, 1953 W. F. JACKSON 2,658,515

SAFETY RESET VALVE DEVICE FOR BURNERS

Filed May 15, 1951 4 Sheets-Sheet 1

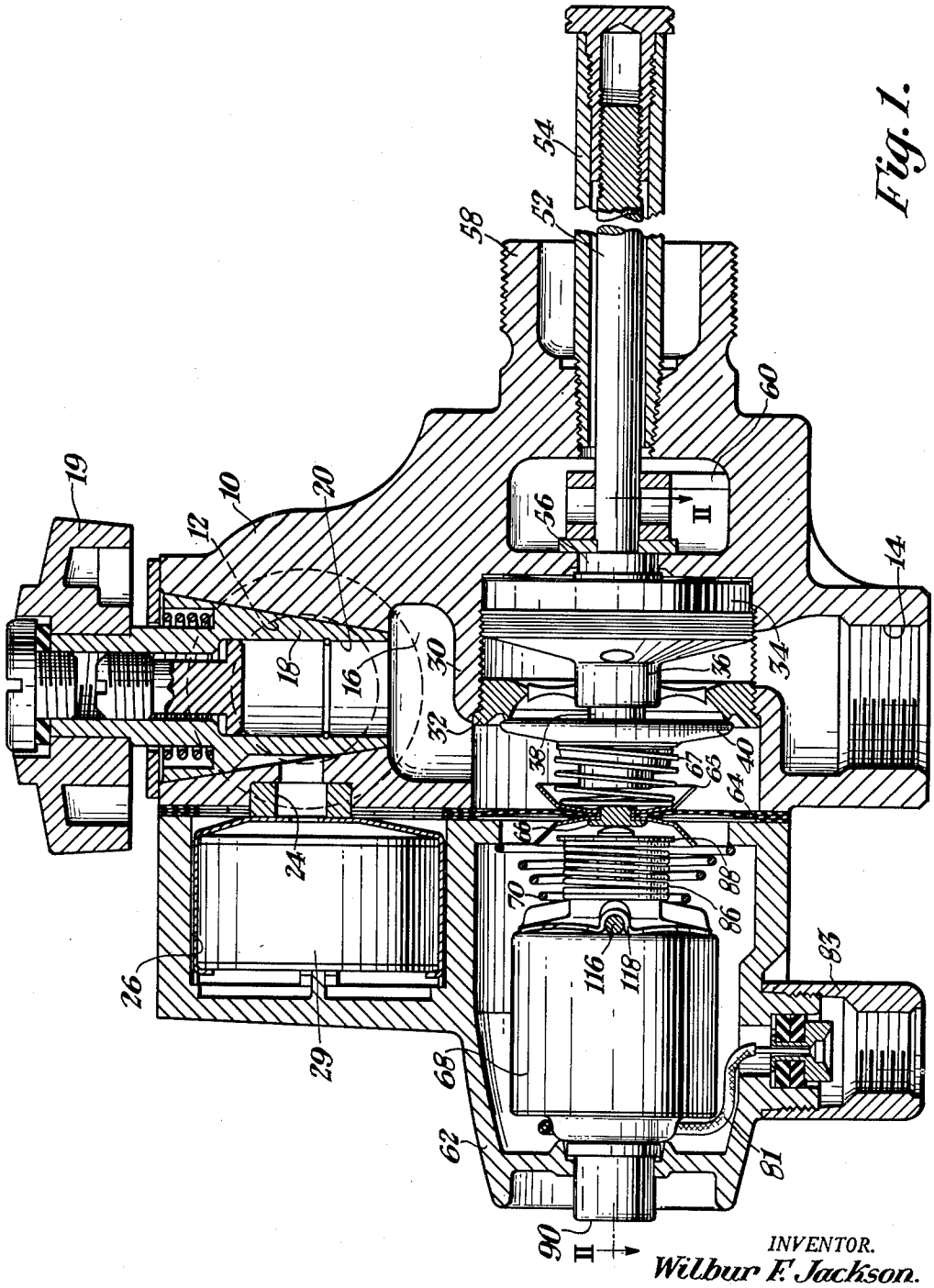


Fig. 1.

INVENTOR.
Wilbur F. Jackson.
BY
Albert J. Henderson
HIS ATTORNEY

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SAFETY RESET VALVE DEVICE FOR BURNERS

Filed May 15, 1951 4 Sheets-Sheet 2

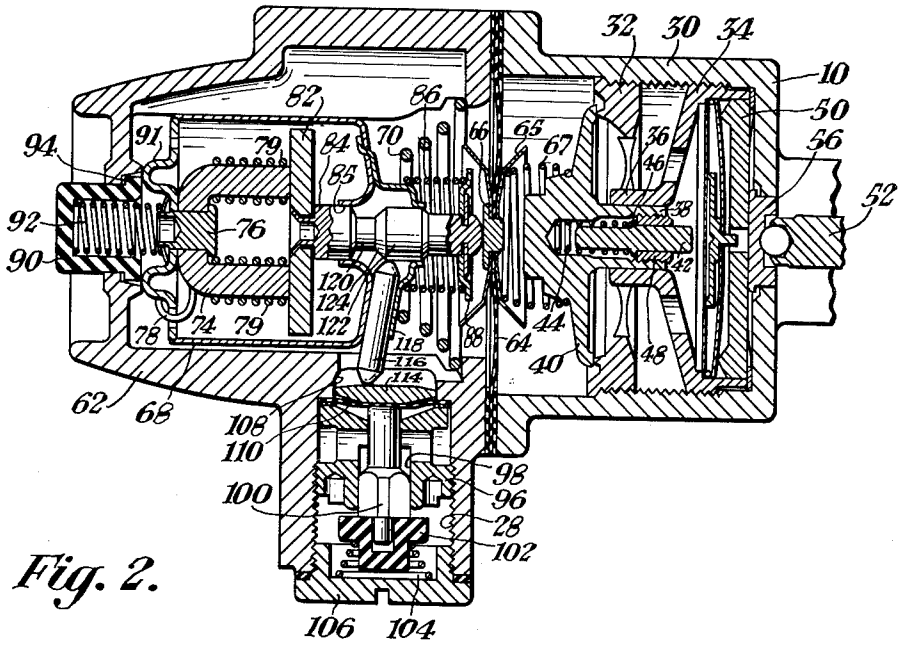


Fig. 2.

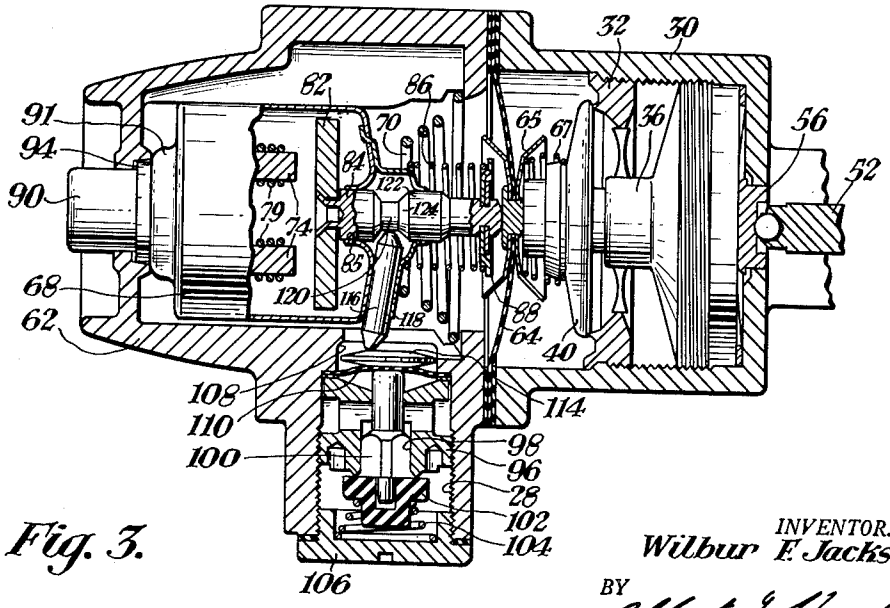


Fig. 3.

INVENTOR.
Wilbur F. Jackson.

BY
Albert J. Henderson

HIS ATTORNEY

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SAFETY RESET VALVE DEVICE FOR BURNERS

Filed May 15, 1951 4 Sheets-Sheet 3

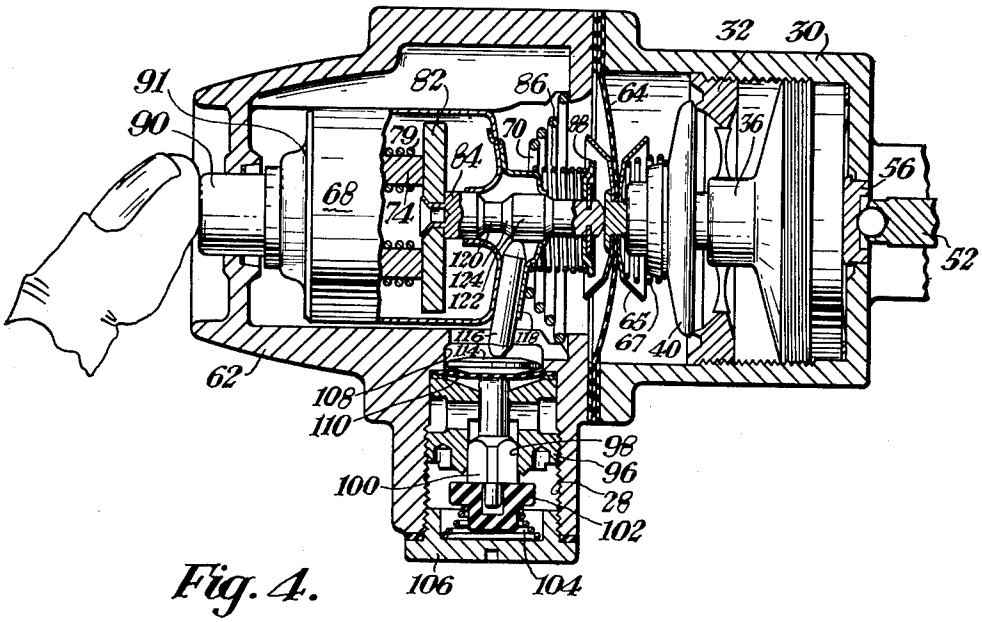


Fig. 4.

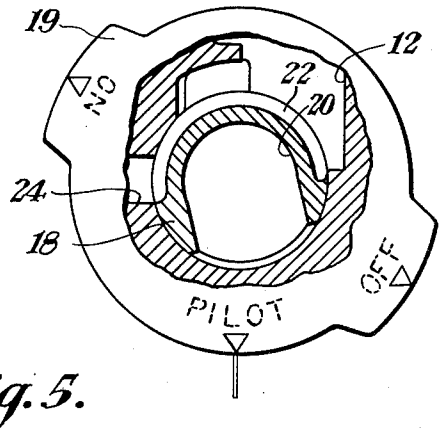


Fig. 5.

INVENTOR.
Wilbur F. Jackson.

BY
Albert J. Henderson

HIS ATTORNEY

Nov. 10, 1953 W. F. JACKSON 2,658,515

SAFETY RESET VALVE DEVICE FOR BURNERS

Filed May 15, 1951 4 Sheets-Sheet 4

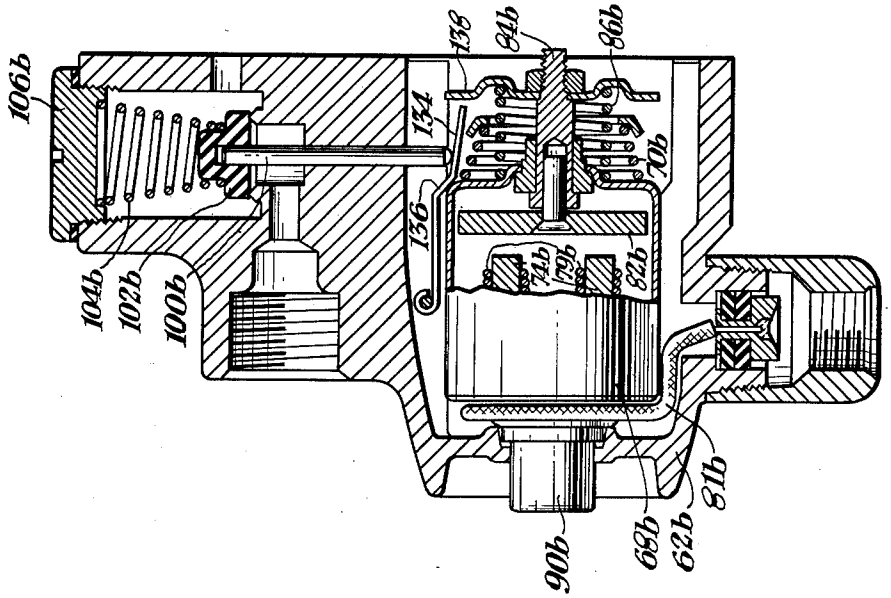


Fig. 7.

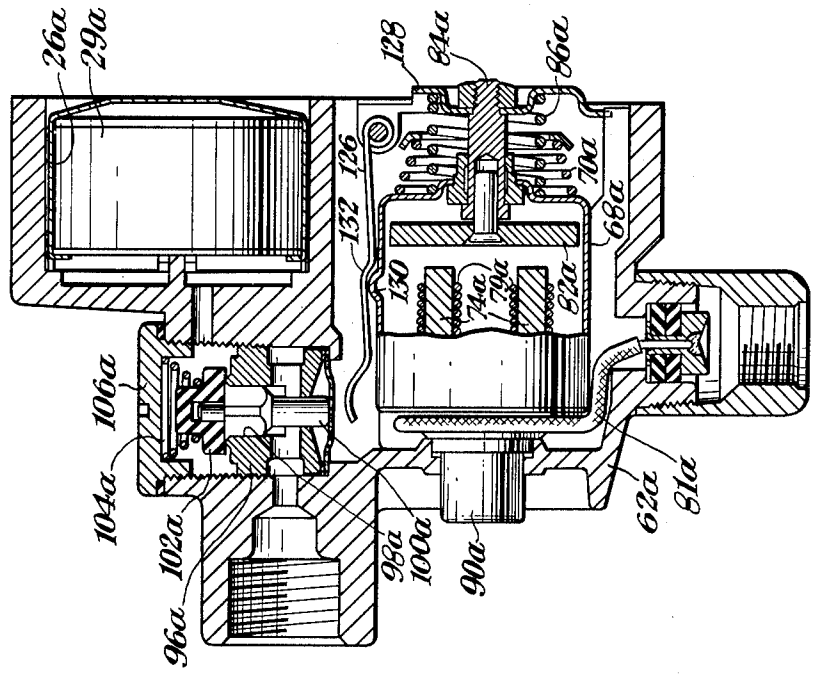


Fig. 6.

INVENTOR.
Wilbur F. Jackson.
BY
Albert J. Henderson
HIS ATTORNEY

Patented Nov. 10, 1953

2,658,515

UNITED STATES PATENT OFFICE

2,658,515

SAFETY RESET VALVE DEVICE FOR BURNERS

Wilbur F. Jackson, Compton, Calif., assignor to Robertshaw-Fulton Controls Company, Greensburg, Pa., a corporation of Delaware

Application May 15, 1951, Serial No. 226,354

14 Claims. (Cl. 137—66)

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This invention relates to combination controls for gaseous fuel burners and more particularly to controls wherein a safety shut-off operates upon a main burner control valve and the safety shut-off device also operates a pilot valve.

The present invention is characterized by a movable electromagnet which picks up its armature in response to energization by a condition responsive device when the electromagnet is moved into engagement with the armature, the electromagnet with the armature in its attracted position returning to its initial position upon completion of this resetting operation. The control valve is thus free to be moved between closed and open positions and may be actuated by a thermostat such as the rod-and-tube type operating through a snap-action mechanism. However, when a preselected condition is established such as the extinguishment of the pilot flame the electromagnet is deenergized and the armature is released to return under spring bias to its original position. The return movement of the armature is in a path substantially coaxial with the valve member so that the latter is moved to closed position should the thermostat be holding it open. In this respect, the control is similar to that disclosed and claimed in the copending application of Wilbur F. Jackson, Serial No. 98,486, filed June 11, 1949, now Patent Number 2,604,266. The pilot valve is disposed laterally of the electromagnet and has an operating member operatively associated therewith for positioning the pilot valve to admit fuel to the pilot burner only during the resetting operation and while the armature is in attracted position.

It is a principal object of this invention to provide 100% shut-off of fuel to all burners upon failure of the pilot flame.

Another object of this invention is to prevent flow of fuel to the main burner while permitting flow of fuel to the pilot burner during the resetting operation.

Other objects and advantages will appear from the following specification taken in connection with the accompanying drawings wherein:

Fig. 1 is a sectional view of a control device embodying this invention;

Fig. 2 is a fragmentary sectional view taken on the line II—II of Fig. 1;

Figs. 3 and 4 are similar to Fig. 2 with the parts of the device shown in different operating positions;

Fig. 5 is a fragmentary plan view of the device shown in Fig. 1 with a portion thereof shown in section;

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Fig. 6 is a fragmentary sectional view of another embodiment of this invention; and

Fig. 7 is a fragmentary sectional view of still another embodiment of this invention.

Main shut-off cock

Referring more particularly to Figs. 1 and 2 of the drawing, the control device may comprise a casing 10 provided at one end with a lateral inlet opening 12 for fuel and at the other end with an outlet opening 14 which is adapted to be connected by suitable piping with the main or heating burner of a water heater or other appliance (not shown).

A valve chamber 16 is formed in the casing 10 intermediate the inlet 12 and outlet 14 and the passage of fluid fuel between the inlet 12 and the valve chamber 16 is under control of a main shut-off cock 18. As best shown in Figs. 1 and 5 the shut-off cock 18 is provided with an angular port 20 which is movable upon rotation of the cock 18 by the usual knob 19 to open and close communication between the inlet 12 and the valve chamber 16.

The shut-off cock 18 is also provided with an arcuate groove 22 through which communication may be established between the inlet 12 and a pilot passage 24. The arcuate groove 22 is movable into and out of registry with the pilot passage 24 upon rotation of the shut-off cock 18, the cock 18 thus controlling the passage of fuel through the pilot passage 24.

Communicating with the pilot passage 24 is a filter chamber 26 in which is disposed a fuel filter 29 of a type well known in the art. The filter chamber 26 also communicates by way of a passage (not shown) with a pilot valve chamber 28 which is provided with an outlet (not shown) adapted for connection to a conduit leading to the pilot burner of the appliance.

Control valve mechanism

A partition 30 projects from diametrically opposite walls of the valve chamber 16 and provides a support for an annular valve seat member 32 therein. Also supported on the walls of the valve chamber 16 is an annular bearing support member 34 which carries an axial hollow boss 36 through which a hollow valve stem 38 slidably extends. A disk valve member 40 is mounted on the valve stem 38 for movement therewith between open and closed positions relative to the seat 32. The valve member 40 is normally biased toward the seat 32 by means to be more fully described. The central portion of the valve seat 32

is perforate to provide communication between the valve chamber 16 and the outlet 14 when the valve member 40 is in open position.

The hollow valve stem 38 contains an override mechanism comprising a plunger 42 and biasing spring 44 which serves to urge a collar 46 on the plunger 42 into engagement with a bushing 48 closing the inner end of the hollow valve stem 38. The plunger 42 projects through the bushing 48 for operative engagement with a clicker mechanism of well known form including a thrust element 50 which is disposed within the annular bearing support member 34 for imparting snap-action movement to the valve member 40.

Temperature regulation

Thermostatic means for operating the valve member 40 through the clicker disk mechanism is provided and, in this embodiment, consists of an element of the rod-and-tube type. The tube 54 of this thermostatic element is mounted at one end in the valve casing 10 and has a rod 52 threadedly secured thereto at the opposite end. The inner end of the rod 52 extends into the casing 10 for operative engagement with one side of a slidable cap element 56 which is carried in the valve casing 10. The opposite side of the cap element 56 engages the thrust element 50 of the clicker mechanism for operating the same as will more fully appear.

Suitable means for mounting the control in the water heater or other appliance is provided by an elongated boss 58 projecting from the casing 10 around the rod-and-tube element 52, 54. The temperature at which the valve member 38 will be operated may be adjusted by means of the usual lever 60 carried by the rod 54 and manually operable for rotating the rod 52 relative to the tube 54. It will be understood that other well known thermostatic devices may be substituted for the rod-and-tube element 52, 54.

Automatic shut-off

Electromagnetic means is provided for moving the valve member 40 to closed position in response to a predetermined condition, preferably extinguishment of the pilot burner flame, regardless of the thermal condition of the thermostat 52, 54. To this end, a magnet housing 62 is provided at one side of the casing 10 opposite the elongated boss 58 and extending coaxially with the valve member 40. The interior of the magnet housing 62 communicates with the valve chamber 16 and a flexible sealing disk 64 extends across the interior of the housing 62 at its junction with the valve chamber 16 for closing the communication therebetween. Thus, passage of fluid from the valve chamber 16 to the interior of the magnet housing 62 is prevented.

The sealing disk 64 carries a spring retainer 65 secured thereto by an axially located rivet 66. A coil spring 67 is operative between the valve member 40 and the retainer 65 and serves to bias the valve member 40 toward the seat 32 as previously indicated.

A magnet cover 68 is mounted within the housing 62 for slidable movement therein toward and away from the sealing disk 64. The cover 68 is biased toward the outer end of the magnet housing 62 by a coil spring 70 operative between the cover 68 and the housing 62. An electromagnet comprising a horseshoe frame 74 has its bight secured to one end of the cover 68 by a rivet 76 extending through these members. The usual winding 78 has one end secured to the rivet 76 to provide a ground connection and the winding continues in the form of a pair of coils 79 around the legs of the horseshoe magnet 74. The opposite end of the winding 78 extends through a suitable aperture in the cover 68 to the exterior thereof and is formed into a loop 81 between the inner face of the cover 68 and the adjacent end of the housing 62. The looped end is secured in a socket 83 which is adapted for electrical connection to a source of electrical energy which source may comprise a thermocouple (not shown) having a hot junction adapted for exposure to the pilot burner flame.

An armature 82 is supported within the magnet cover 68 on an armature stem 84 and is separable from the pole faces of the magnet 74 for movement between attracted and released positions. The armature stem 84 is slidably supported in a bearing 85 formed in the cover 68 and projects out of the cover into abutting engagement with the rivet 66 on the sealing disk 64. The armature 82 is biased to its released position by a coil spring 86 operable between the cover 68 and a retaining plate 88 carried on the projecting end of the armature stem 84. As the spring 86 is considerably stronger than the valve spring 67, sufficient force is exerted thereby on the valve member 40 to hold the same in its closed position relative to the valve seat 32 whenever the armature 82 is disengaged from the pole faces of the magnet 74. It should be observed however that the coil spring 70 is considerably stronger than the armature spring 36 for a purpose which will more fully appear.

In devices of this type wherein a thermocouple adapted to be heated by the pilot flame is utilized to generate the electrical energy, the energy so generated is insufficient to attract the armature 82 from its released position but is sufficient to hold the same in its attracted position after the usual resetting operation has been conducted. Consequently, manual resetting means is provided for moving the magnet 74 into engagement with the armature 82 and takes the form of a resetting button 90 which projects from the magnet housing 62 and engages at its inner end with an annular boss 91 formed on the end face of the cover 68. A coil spring 92 is housed within the button 90 and engages at its inner end with the magnet cover 68 for biasing the button 90 outwardly of the magnet housing 62. A flange 94 is formed on the inner end of the button 90 for cooperation with a suitable flanged end of the magnet cover 62 to prevent ejection of the button 90 therefrom under the bias of its spring 92.

Pilot burner control

To obtain 100% shut-off of fuel to all burners, auxiliary or pilot valve means is provided for controlling the supply of fuel to the pilot burner and is operatively associated with the electromagnetic shut-off device so that the pilot valve is in open position only while the resetting means is in operation and while the armature is in the attracted position.

The pilot valve means may take the form of the pilot valve chamber 28 which, as hereinbefore pointed out, communicates with the filter chamber 26 and with a conduit leading to the pilot burner (not shown). An annular valve seat member 96 is positioned in the valve chamber 28 in threaded engagement with the walls thereof and is provided with a centrally disposed valve port 98. Slidably carried in the valve port 98 is a non-circular valve stem 100 which carries a

disk valve member 102 at one end. A spring 104 acting between the valve member 102 and a cap 106 threaded into the open end of the valve chamber 28 serves to bias the valve member 102 toward the valve seat member 96. When the valve member 102 is in its biased position and in engagement with the valve seat member 96, fluid flow through the valve chamber is prevented. Conversely, when the valve member 102 is positioned away from the valve seat 96, fuel is permitted to flow from one side of the valve seat member 96 to the other side thereof through the valve port 98, passing between the surface of the non-circular valve stem 100 and the walls of the port 98 and thence to the pilot burner. Thus the flow of fuel to the pilot burner is controlled by the valve member 102.

The valve chamber 28 is open at one end and is positioned laterally of the electromagnetic shut-off device to register with an aperture 108 formed in the magnet housing 62. Communication between the valve chamber 28 and the interior of the magnet housing 62 is prevented by a flexible sealing disk 110 which is clamped across the open end of the valve chamber 28 by the annular valve seat member 96. Abutting one side of the flexible disk 110 is the free end of the valve stem 100 and abutting the other side of the disk is a movable plate 114. Operatively connected to the plate 114 is an operating member movable laterally of the armature stem 84 during the resetting operation. The operating member is here shown as a pin 116 slidably mounted on the magnet cover 68 in a bearing 118 to extend substantially normal to the axis of the armature stem 84. One end of the pin 116 engages the plate 114 and the other end contacts a cam surface formed on the armature stem 84.

The cam surface with which the pin 116 engages is formed by a portion 120 of the armature stem 84 having a relatively small diameter, a portion 122 of the valve stem 84 having a relatively large diameter and spaced axially from the portion 120, and a frustro-conical portion 124 of the armature stem 84 connecting the portions 120 and 122. It will be apparent that the bias of the spring 104 acting on the pin 116 through the valve member 102, valve stem 100, flexible sealing disk 110 and movable plate 114 will hold the pin 116 in engagement with the armature stem 84 so that when the pin 116 is moved with the magnet cover 68, it will follow the contours of the portions 120, 124, 122 and the cam surface formed thereby will thus be effective to control the lateral displacement of the pin 116 relative to the magnet housing 62.

Operation

When no fuel is flowing to the main or pilot burners, the various parts of the control device are positioned as shown in Fig. 3. The armature 82 is in its released position with the armature stem 84 acting under the bias of the spring 86 to hold the valve member 40 against the valve seat 32 and the pin 116 engaging the portion 120 of the armature stem 84 to permit the pilot valve member 102 to engage the valve seat 96 under the bias of the spring 104.

To place the control device in operative condition, the main shut-off cock 18 is manually rotated to the position shown in Fig. 5 wherein the arcuate groove 22 establishes communication between the inlet 12 and the pilot passage 24. In such position of the shut-off cock 18, fuel will flow from the inlet 12 through the arcuate groove 22, the pilot passage 24, the filter 29 in the filter chamber 26 and through the communicating passage (not shown) to the pilot valve chamber 28.

The resetting operation is then conducted by applying manual pressure to the button 90 for moving the magnet cover 68 and magnet 74 jointly relative to the armature 82 to positions shown in Fig. 4. During this movement, the coil spring 70 is compressed, the bearing member 85 moves relatively to the stem 84 and the coil spring 86 is somewhat compressed. It will be observed that the winding 78 does not interfere with free movement of the magnet 74 due to the provision of the loop 81 which also eliminates any stress in the electrical connections. This movement also causes the pin 116 to move axially of the stem 84, the end thereof riding up the frustro-conical portion 124 of the stem 84 and onto the surface of the relatively large diameter portion 122.

The pin 116 is thus moved laterally relative to the armature stem 84 to force the movable plate 114 and its associated valve stem 100 downward, as viewed in the drawings, against the bias of the spring 104 to position the pilot valve member 102 in its open position away from the valve seat 96. Fuel will then flow through the valve port 98 in the valve seat 96 to the pilot burner (not shown) where it may be ignited by a match or the like.

The flame at the pilot burner may heat the hot junction of the thermocouple (not shown) to cause the same to develop sufficient current to energize the winding 78 of the electromagnet. The reset button is then released and the bias of the spring 70 serves to retract the magnet cover 68 and the magnet 74 to their initial positions. However, the armature 82 is now carried along with the magnet 74 and the coil spring 86 is retained in its compressed condition. The various parts of the device are now as shown in Fig. 2.

It will be apparent that the armature stem 84 can no longer exert a force on the rivet 66 carried by the sealing disk 64 so that the valve member 40 is freed for movement to open position relative to the valve seat 32. It will be apparent that when the armature 82 is in its attracted position and thus movable with the magnet 74 there can be no movement of the armature stem 84 relative to the pin 116 since the pin 116 is also movable with the magnet 74. Thus upon completion of the resetting operation, the pin 116 remains in contact with the surface of the relatively large portion 122 of the stem 84 to maintain the pilot valve member 102 in its open position and fuel will continue to flow to the pilot burner.

The main shut-off cock 18 may now be rotated to a position wherein the angular passage 20 formed therein is in communication with the inlet 12 to permit flow of fuel into the valve chamber 16. In such position of the cock 18, the arcuate groove 22 still maintains communication between the inlet 12 and the pilot passage 24.

It should be observed that movement of the valve member 40 to open position cannot occur, due to the bias of the valve spring 67, until the thermostat 52, 54 is adjusted by manual operation of the lever 60 to a desired temperature setting and operation of the main burner is demanded by the thermal conditions sensed by the thermostat. Upon a demand for heat, the rod 52 exerts a force on the thrust element 50 and the clicker mechanism opens the valve member

40 against the bias of the valve spring 67. Flow of fuel from the inlet 12 through the valve chamber 16 and the perforate valve seat member 32 to the outlet 14 is now permitted and operation of the main burner in the usual manner can occur.

When the temperature sensed by the thermostat 52, 54 reaches that for which the adjustment has been set, closure of the valve member 38 occurs under bias of the spring 67 and is permitted due to reverse positioning of the clicker mechanism as is well known to those skilled in the art. During this normal reciprocation of the valve member 40 in controlling flow of fuel to the outlet 14 the armature 82 remains engaged with the pole faces of the magnet 74.

In the event that the flame at the pilot burner is extinguished, the supply of current to the electromagnet will be cut off and, upon deenergization of the electromagnet, the armature 82 will move away from the pole faces of the magnet 74. Such movement of the armature 82 is due to the bias of the coil spring 86 and serves to bring the armature stem 84 into operative engagement with the rivet 66 carried by the sealing disk 64 to force the rivet 66 into engagement with the valve member 40 and cause closure thereof. As previously indicated, such closure will occur regardless of whether the thermostat 52, 54 is operating to hold the valve member 38 in open position due to the provision of the override connection within the hollow valve stem 38, the bias of the override spring 44 being overcome upon release of the armature 82 by the stronger bias exerted by the coil spring 86. The hollow stem 38 moves relatively to the plunger 42 during compression of the override spring 44 without causing reverse operation of the clicker mechanism as in normal thermostatic operation.

Movement of the armature 82 from attracted to released position will also cause the armature stem 84 to move relative to the pin 116 to position the surface of the smaller portion 120 of the stem 84 in engagement with the pin 116. The pin 116 thus is moved laterally relative to the armature stem 84 to permit the spring 104 to move the pilot valve member 102 into engagement with the valve seat 96 thereby cutting off the flow of fuel to the pilot burner. The various parts of the control device are now positioned as shown in Fig. 3 and no fuel can flow to any of the burners.

The modified construction illustrated by Fig. 6, in which parts corresponding to parts heretofore described are designated by corresponding reference numerals having the suffix "*a*," is a departure from that shown in Figs. 1–5 in that different means is employed for imparting movement to the pilot valve member 102*a*. In the embodiment of Fig. 6, the operating member movable laterally of the electromagnetic device for actuating the pilot valve takes the form of a lever 126 pivotally mounted at one end on a plate 128 secured to the free end of the armature stem 84*a*. The lever 126 is positioned alongside the magnet cover 68*a* and underlies the pilot valve means for operative engagement with the free end of the valve stem 100*a*.

A cam element carried by the magnet cover 68*a* is cooperable with the lever 126 to move the free end thereof into operative engagement with the valve stem 100*a*. The cam element may take the form of a rounded boss 130 formed on the magnet cover 68*a* and adapted for engagement with an offset portion 132 of the lever 126.

In the resetting operation, axial movement of the magnet 74*a* and magnet cover 68*a* relative to the armature 82*a* will cause the offset portion 132 of the lever 126 to ride up on the boss 130 pivoting the lever 126 about its pivotal support and forcing the free end thereof into operative engagement with the pilot valve stem 100*a* to move the pilot valve member 102*a* against the bias of the spring 104*a* to its open position. Upon completion of the resetting operation, the magnet cover 68*a* and magnet 74*a* are returned to their initial positions by the bias of the spring 70*a*, the magnet 74*a* carrying along the armature 82*a* and the lever 126 attached thereto. Thus, there is no relative movement between the armature 82*a* and the magnet cover 68*a* and the free end of the lever 126 is retained in its laterally extended position to maintain the pilot valve member 102*a* in the open position.

Upon movement of the armature 82*a* to its released position, the lever 126, being movable therewith, will move relative to the magnet cover 68*a* causing the offset portion 132 thereof to ride down the surface of the boss 130 to move the free end of the lever 126 toward the magnet cover 68*a* and out of engagement with the valve stem 100*a*. The valve member 102*a* will then move under the bias of the spring 104*a* to the closed position and supply of fuel to the pilot burner will be cut off.

The modified construction illustrated by Fig. 7, in which parts corresponding to parts heretofore described are designated by corresponding reference numerals having the suffix "*b*," is a departure from that shown in Figs. 1–6 in that the operating member movable laterally of the electromagnetic device takes the form of a lever 134 pivotally mounted on the magnet housing 62*b*. The lever 134 is positioned alongside the magnet cover 68*b* with its free end underlying the pilot valve stem 100*b* and is provided with an offset medial portion 136. A circular plate 138 having a diameter substantially equal to the diameter of the magnet cover 68*b* is secured to the free end of the armature stem 84*b* and serves to retain the free end of the lever 134 in a laterally extended position as will more fully appear.

In the resetting operation, movement of the magnet 74*b* toward the armature 82*b* causes the magnet cover 68*b* to move relative to the lever 134, the inner edge of the magnet cover 64*b* engaging the offset portion 136 of the lever 134 to move the lever 134 in a counterclockwise direction as viewed in the drawings. Counterclockwise rotation of the lever 134 imparts an upward movement to the valve stem 100*b* to move the pilot valve member 102*b* against the bias of the spring 104*b* to open position.

Upon completion of the resetting operation, the magnet cover 68*b* and magnet 74*b* are returned to their initial positions under the bias of the spring 70*b* and the armature 82*b*, in engagement with the pole faces of the magnet 74*b*, is carried along therewith. The plate 138, which is movable with the armature 82*b*, is thus carried under the free end of the lever 134 to retain the same in its laterally extended position wherein it holds the pilot valve member 102*b* in open position.

When the magnet 74*b* is deenergized, the armature 82*b* moves to its released position under the bias of the spring 86*b*. The plate 138, moving with the armature 82*b*, is moved from under the free end of the lever 134 thereby releasing the lever 134 to move in a clockwise direction and permit the pilot valve member 102*b* to be moved

into engagement with its valve seat under the bias of the spring 104b.

It will be apparent from the foregoing that the illustrated embodiments provide 100% shut off of fuel to all burners upon failure of the pilot flame. It will also be apparent that the illustrated embodiments prevent flow of fuel to a main burner while permitting flow of fuel to a pilot burner during the resetting operation and accordingly accomplish the objects of the invention. On the other hand, it will be understood that many changes may be made in the details of construction and arrangement of parts to accomplish the purposes of this invention without departing from the scope of the invention as defined in the appended claims.

It is claimed and desired to secure by Letters Patent:

1. In a control device, the combination of valve means movable between controlling positions, electromagnetic means adapted to govern the operation of said valve means, said electromagnetic means including a movable electromagnet having an armature separable therefrom for movement between attracted and released positions, resetting means operable for moving said electromagnet into engagement with said armature, auxiliary valve means movable between controlling positions, auxiliary valve actuating means cooperable with said electromagnet and said armature for moving said auxiliary valve means to one of said positions during the resetting operation, means for retaining said auxiliary valve means in said one position, and an operative connection between said armature and said last named means for rendering said last named means effective while said armature is in said attracted position and ineffective while said armature is in said released position.

2. In a control device, the combination of a movable electromagnet having an armature separable therefrom for movement between attracted and released positions, valve means movable between controlling positions independently of said armature and having operative engagement with said armature in said released position thereof, means for biasing said armature to said released position and holding said valve means in one of said controlling positions, resetting means operable for moving said electromagnet into engagement with said armature, means effective upon completion of the resetting operation for retracting said electromagnet and causing movement of said armature out of operative engagement with said valve means to free the same for movement to another of said controlling positions, auxiliary valve means movable between controlling positions, and auxiliary valve actuating means cooperable with said electromagnet and said armature for moving said auxiliary valve means to one of said controlling positions during the resetting operation and retaining said auxiliary valve means in said one position while said armature is in said attracted position.

3. A control device as claimed in claim 2 wherein said actuating means is ineffective to retain said auxiliary valve means in said one position while said armature is in said released position.

4. In a control device, the combination of control valve means movable between controlling positions, electromagnetic means adapted to govern the operation of said control valve means, said electromagnetic means including a movable electromagnet having an armature separable therefrom for movement between attracted and released positions, resetting means operable for moving said electromagnet into engagement with said armature, auxiliary valve means disposed laterally of said electromagnetic means and movable between controlling positions, an operating member operatively associated with said auxiliary valve means, said operating member being mounted for longitudinal movement with said electromagnet and being free to move laterally thereof, and cam means defining a surface engageable with said operating member during the resetting operation for placing said auxiliary valve means in one of said controlling positions, said cam means defining a second surface engageable with said operating member for retaining said auxiliary valve means in said one position, and connecting means between said cam means and said armature for maintaining said second surface in engagement with said operating member while said armature is in said attracted position.

5. A control device as claimed in claim 4 wherein a housing is operatively associated with said electromagnet for movement therewith, said operating member comprising an element slidably carried by said housing.

6. In a control device, the combination of control valve means movable between controlling positions, electromagnetic means adapted to govern the operation of said control valve means, said electromagnetic means including a movable electromagnet having an armature separable therefrom for movement between attracted and released positions, resetting means operable for moving said electromagnet into engagement with said armature, auxiliary valve means disposed laterally of said electromagnet and movable between controlling positions, and operating member operatively associated with said auxiliary valve means, cam means movable with said electromagnet and engageable with said operating member during the resetting operation for placing said auxiliary valve means in one of said controlling positions, means for retaining said auxiliary valve means in said one position, and an operative connection between said armature and said last named means for rendering said last named means effective while said armature is in said attracted position and ineffective while said armature is in said released position.

7. A control device as claimed in claim 6 wherein said operating member comprises a pivotally mounted lever.

8. A control device as claimed in claim 7 wherein said lever is operatively connected to said armature to be movable therewith.

9. Actuating means for a valve mechanism having a valve member movable between controlling positions and biased to one of said positions comprising an electromagnet having an armature separable therefrom for movement between attracted and released positions, said electromagnet being movable relative to said valve mechanism, resetting means operable for moving said electromagnet into engagement with said armature, a cam element carried by said armature, and a follower element mounted for longitudinal movement with said electromagnet but being free for lateral movement relative thereto, said follower element being operatively connected to said valve member and cooperable with said cam element only during the resetting operation and while said armature is in said attracted position to place said valve member in another of said controlling positions.

10. In a control device, the combination of a movable electromagnet having an armature separable therefrom for movement between attracted and released positions, valve means movable between controlling positions independently of said armature and having operative engagement with said armature in said released position thereof, means for biasing said armature to said released position and holding said valve means in one of said controlling positions, resetting means operable for moving said electromagnet into engagement with said armature, means effective upon completion of the resetting operation for retracting said electromagnet and causing movement of said armature out of operative engagement with said valve means to free the same for movement to another of said controlling positions, auxiliary valve means disposed laterally of said electromagnetic means and movable between controlling positions, an operating member operatively associated with said auxiliary valve means, said operating member being mounted for longitudinal movement with said electromagnet and being free to move laterally thereof, and cam means carried by said armature to be engageable with said operating member during the resetting operation and while said armature is in said attracted position for placing said auxiliary valve means in one of said controlling positions, said cam means being ineffective to so position said auxiliary valve means while said armature is in said released position.

11. A control device as claimed in claim 10 wherein a housing is operatively associated with said electromagnet for movement therewith, said operating member comprising an element slidably carried by said housing.

12. In a control device, the combination of a movable electromagnet having an armature separable therefrom for movement between attracted and released positions, valve means movable between controlling positions independently of said armature and having operative engagement with said armature in said released position thereof, means for biasing said armature to said released position and holding said valve means in one of said controlling positions, resetting means operable for moving said electromagnet into engagement with said armature, means effective upon completion of the resetting operation for retracting said electromagnet and causing movement of said armature out of operative engagement with said valve means to free the same for movement to another of said controlling positions, auxiliary valve means disposed laterally of said electromagnet and movable between controlling positions, an operating member operatively associated with said auxiliary valve means, cam means movable with said electromagnet and engageable with said operating member during the resetting operation for placing said auxiliary valve means in one of said controlling positions, and means operatively connected to said armature and cooperable with said operating member for retaining said auxiliary valve means in said one position while said armature is in said attracted position, said last named means being ineffective to so position said auxiliary valve means while said armature is in said released position.

13. A control device as claimed in claim 12 wherein said operating member comprises a pivotally mounted lever.

14. A control device as claimed in claim 13 wherein said lever is operatively connected to said armature to be movable therewith.

WILBUR F. JACKSON.

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