Fig. 1

Inventor
Charles C. Lamar

by
Cleve Kihlman, R. Barthman and W. E. Kyne.
Attorneys.
Fig. 2

Inventor
Charles C. Lamar

by
Bronson, Ralston and Ugly
Attorneys.
The present invention relates to a safety device for burners and has for its primary object the provision of a new and improved combined shutoff and safety control valve for gas burners. The safety valve art is a highly developed one and various types have been made heretofore. In many provisions made against resetting of the safety valve unless an associated shutoff valve is in a predetermined position, such as an "off" or "pilot." There are a few in which resetting can be effected in any position of the shutoff valve and the present invention relates to this type of construction.

It is, accordingly, an object of the present invention to provide a new, improved and simplified combined shutoff and safety control valve for burners including safety control valve reset means which cooperates with the safety control valve to permit gas to flow to a pilot burner but which prevents the valve from a main burner outlet during the resetting operation so that resetting can be effected in any position of an associated shutoff valve.

The valve of the present invention may be used in connection with various types of burners, such as a broiler burner. It includes a gas inlet passageway and main burner and pilot burner outlet passageways. A safety control valve is provided to terminate the flow of gas to both outlet passageways upon occurrence of an abnormal condition, such as failure of a pilot flame. A shutoff valve is provided between the safety valve and main burner outlet for regulation of the flow of gas to the main burner. This valve is preferably of the rotatable plug type and is rotatable by a valve handle which is also movable axially for resetting the safety valve. The resetting is effected by a gas flow controlling open ended tubular member reciprocable by the axial movement of the handle and which is so constructed and arranged as to permit gas flow to the pilot burner outlet passageway and to prevent gas flow to the main burner outlet through the shutoff valve during the resetting operation. The resetting operation is effected by slidingly mounting the tubular reset member in the valve body so that gas will not flow around the outside of the member and so that during resetting an open end of the tubular reset member engages the safety valve to prevent flow through the tubular member. The pilot outlet passageway is located radially outwardly of the tubular member but radially inwardly of the safety valve seat so that once the safety valve is moved away from the seat during resetting or maintained away from the seat, as upon proper ignition of the pilot burner, gas flows to the pilot burner. After resetting and proper ignition, the safety valve is held open by suitable latching means and the tubular member is retracted from engagement with the valve so that gas is permitted to flow to the main burner outlet as regulated by the shutoff valve. Upon failure of the pilot burner, the safety valve returns to its seat to shut off the flow of gas to both the main and pilot burner outlet passageways. The safety valve and reset means are coaxial with each other and these may be coaxial with the rotary shutoff valve or they may be located to one side of the rotary valve.

Further objects and advantages of the present invention will become apparent from the ensuing description, in the course of which reference is had to the accompanying drawings, in which:

Fig. 1 is primarily an axial cross sectional view through a valve embodying the present invention; and

Fig. 2 is a view similar to Fig. 1 illustrating another embodiment thereof.

Referring now to the drawings, and first to Fig. 1, it will be noted that the combined shutoff and safety control valve of the present invention has been indicated as a whole by reference character 10. It comprises a valve body 12 provided with a gas inlet passageway 14, a main burner outlet passageway 16, and a pilot burner outlet passageway 18. The main burner outlet passageway 16 may be coupled in suitable manner to a burner which may be a broiler burner, a main burner, or an oven burner although in the following description of the invention it will be assumed that it is connected to a broiler burner. The passageway 16 includes an axially extending portion 19 and a portion 20 extending in a transverse or radial direction.

The pilot burner passageway 18 is adapted to be coupled to a pilot burner, not shown, through a suitable conduit, also not shown. Passageway 18 is preferably formed in a projecting small diameter portion of a filter housing 21 within which is mounted a suitable filter element 22. The filter housing is mounted in a recess 24 in the valve body in which it is secured by a plate 26 secured to the body by the screws 28. The filter element 22 is open to an axially extending portion 30 of the pilot burner outlet passageway and, in turn, communicates with a transverse or radially extending portion 32.

The valve of the present invention includes a safety control valve indicated generally by the reference character 34 and a shutoff valve indicated generally by the reference character 36. In the illustrated embodiment of the invention these valves are located in coaxial relationship. The shutoff valve includes a tapered rotatable valve plug 38 located in a tapered plug receiving chamber 40 in the valve body at a point between the inlet 14 and the main burner outlet passageway portion 20. The plug is provided with a cylindrical axial bore 42 and a transverse port 44 movable into and out of registry with the main burner outlet passageway portion 20 thereby to control the flow of gas to the main burner, i.e., the broiler burner. The valve plug 38 is shown with the port 44 in full registry with passageway 20, whereby the broiler burner is supplied with a maximum quantity of gas. By turning the plug, the flow of gas may be reduced and shut off. It should be noted, however, that the valve plug may be of a different construction. For example, it may be constructed to provide either high and low or other predetermined volumes of gas to the burner or it may be constructed to supply different quantities of gas to one or more of a plurality of burners.

The safety control valve 34 includes the safety valve proper, indicated by the reference character 50, to which is connected an armature 52 for cooperation with the pole 54 of an electromagnet forming part of a thermocouple energized latching means indicated generally by the reference character 56 and energized from a thermocouple 58. The thermocouple 58 and the thermocouple energized electromagnet may be of conventional construction and will, therefore, be described but briefly herein.

The thermocouple 58 is connected to an electromagnet winding 60 in known manner through a tubular
2,886,050 3 conduit 62. The latter is connected at the end opposite the thermocouple to a coupling member 64 to an electromagnet housing 66 secured to the internally threaded upper end of an inlet chamber 68 formed in the valve body and into which the inlet passageway 14 opens. The lower end of the housing 66 is closed by an end cap indicated generally by the reference character 70 and provided with a central aperture 72 slidably receiving a valve stem 74 interconnecting valve 50 and armature 52. The valve 50 includes a valve disc element 76 of suitable plastic or resilient material and a backing plate 78 which may be made of metal. The valve 50 is shown in its closed position, to which it is returned by a biasing spring 79 upon failure of the pilot burner and accompanying deenergization of the electromagnet winding 60, so as to cut off the flow of gas to the pilot burner outlet and to the main burner outlet through the rotary plug valve. In the closed position, the valve disc element 76 engages a valve seat 80 which is annular in construction and located at the upper end of a counterbore or annular recess 82 coaxially disposed relative to and at the end of the valve plug receiving chamber 40 and into which recess the radially extending portion 32 of the pilot burner outlet passageway extends.

The valve plug is rotatable by a handle 84 mounted at the outer end of an outer valve stem portion 86 which is slidably but axially restrained 112 at an inner valve stem portion 88 forming an integral part of the valve plug 38. The two stem portions are telescopically related to each other and secured to the inner end of the outer portion 86 is a valve plug position indicating and movement limiting washer 90 forming no part of the present invention. The washer 90 be of known form and end which, therefore, has not been shown in full and having a radially inwardly extending tongue 92 fitting in a slot 94 in the valve stem portion 88 whereby the two parts are axially but non-rotatably disposed relative to each other. The valve is provided in known manner with an end cap 98, which also holds the valve plug 38 seated in its chamber 40.

Resetting of the safety control valve 50 is effected by axial movement of the handle and the outer valve stem portion 86. The resetting is effected through an axially coiled push rod 100 coupled by a generally hairpin type of connector element 102 to an open end tubular reset element 104, the upper end of which is preferably normally out of engagement with the valve disc element 76 but is moveable upwardly into engagement therewith in order to prevent flow of gas to the main burner outlet and to move the safety valve and armature 52 upwardly into engagement with the pole pieces 54, whereby the armature will be latched or maintained against the latter in the event the pilot burner is properly ignited and sufficient current is energized to hold the armature in reset position against the force exerted by the biasing spring 79 which is effective to move the safety valve to closed position upon failure of the pilot flame.

The push rod 100 is mounted for axial movement in the axial passageway 107 in the inner stem portion 88 and the reset element 104 is similarly mounted in its axial passageway 108. A C-ring 110 secures the two and is engageable with the end of the passageway 42. Inward movement of the push rod is effected by inward movement of the valve handle and outer valve stem portion and by engagement of washer 108 by an internal shoulder 111 in the outer stem portion. The connector element 102 has its bight portion mounted in a recess opened 112 at the top of the rod 100 and the bight is insertable into the enlarged opening through a smaller opening 114 at one side of the push rod. The arrangement is such as to provide some relative movement between the push rod and the tubular element 104. The connector is secured to tubular member 104 by the ends 116 of the element which are projected a short distance into the transverse openings 118 in the element.

The valve of the present invention is so constructed and arranged that during the reset operation there is no flow of gas to the main burner outlet in any position of the rotary valve plug. In order to accomplish this, the tubular element 104 has a close fit in the outer end of the axial passageway 42 in the valve plug so that there will be no flow of gas around the exterior of the tube, i.e., between it and the valve plug. Also, the upper end of the tubular element is provided with what may be considered a movable valve seat 120 engageable with the valve disc element 76 upon upward movement of the tubular element during the reset operation.

When it is desired to reset the valve, the valve handle is moved inwardly with resulting inward movement of the push rod 100, coupling element 102 and tubular element 104. The upper end 120 of the latter sealingly engages the valve element, thereby to prevent flow of gas through the tubular element to the main burner outlet passageway during the resetting operation. However, as the safety valve 50 is moved upwardly from its seat 80, gas does flow upon the inner valve stem portion 88 through the annular recess 82, which is opened to the inlet passageway when the valve 50 moves away from the seat 80. Accordingly, if it is desired to light the broiler, the pilot light has to be ignited first and, once it has been properly ignited, the thermocouple 58 generates sufficient current to energize the coil 60 sufficiently to hold the armature 52 against the pole pieces 54, thereby to maintain the safety valve 50 in its open position. Then, upon release of the valve handle and its return to its retracted position, as indicated, the tubular valve element 104 is separated from the safety valve 50 so that gas can flow to the main burner outlet through the tubular element 104.

Upon failure of the pilot burner, the coil 60 is deenergized and the spring 79 forces the armature away from the pole pieces 54 and effects closure of the safety valve 50, thereby cutting off the flow of gas to both the pilot burner outlet passageway and the main burner outlet passageway.

The present invention may be embodied in other valve constructions and Fig. 2 is illustrative of one in which the rotary valve plug is located to one side of the safety valve and its associated reset mechanism.

The valve body is constituted of several pieces, which may be described as a valve body as in Fig. 1. The valve body 144, the tubular reset element 146, and the push rod 148. It will be noted that the latter elements are coaxial and located to one side of the axis of the rotatable valve plug. They are two arc-connected for reset by the valve handle 150 by a lever 152 having one end pivotally mounted on the valve body by a pin 154 and having an outer portion 156 engageable with the rounded and enlarged outer end 158 of the push rod 148. The push rod is biased outwardly and the lever 152 is biased for movement in a clockwise direction relative to its pivot by a spring 160 engaging the enlarged head 158 of the rod and a boss 164 formed on the valve body.

The valve plug is rotated in the same manner as in the embodiment of Fig. 1. The valve handle 150 is axially slidable and the valve stem includes the telescopically arranged outer and inner valve stem portions 86 and 88. The valve body is provided with the inlet passageway 166 opening into chamber 168, the outer end of which is closed by the electromagnet housing 170 connected to the thermocouple in a manner, not shown, but which can be as illustrated in the other end of the element.

The valve body includes also a pilot burner outlet passageway 172 opening into the annular recess 174 lo-
2,886,050 5 cated below the safety valve seat 176 and surrounding the upper end of the tubular reset element 146.

The safety valve 144 includes the valve disc element 178, the backing plate 180, the stem 182, and the armature 184 arranged for cooperation with the pole pieces 186 of the thermocouple energized electromagnet. The safety control valve is biased to closed position by the spring 188. The reset means includes the tubular element 146 and the push rod 148 already noted. The two are interconnected at the lower end of the tubular element, which is provided with an apertured generally truncated conical portion 190 provided with a plurality of apertures 192 for the flow of gas through the element. The tubular element may be made to occupy the reduced diameter inner end 194 of the push rod in suitable manner, as by the enlarged head portion 195.

The tubular element is mounted in gas tight sliding relation at the inner end of the cylindrical chamber 196 in the valve body. The outer end of the chamber is connected by a transverse passageway 198 to the plug receiving chamber 200. The plug is illustrated as including a radial port 202 and an axially extending passageway 204 open to a main burner outlet passageway 206.

In operation, the safety valve 144 is closed in the absence of flame at the pilot burner. In its closed position, no gas flows from the inlet passageway 172 or through the tubular reset member 146 to the rotary shutoff valve 142 and through it to the main burner.

In order to reset the safety shutoff valve, the valve handle 150 is pushed in at any rotary position of the plug valve 142. Inward movement of the valve handle pivots the lever 152 in a counterclockwise direction. The outer end 156 of the lever engages the push rod 148 and moves it inwardly. Inward movement of the push rod moves the tubular reset member 146 inwardly into engagement with the safety shutoff valve disc 178 with the result that the gas is permitted to flow from the gas inlet 166 to the pilot burner outlet. No gas flows to the main burner outlet because of the sealing relationship between the tubular member 146 and the valve disc 178. The valve handle is pushed inwardly sufficiently to move the safety valve armature 164 into engagement with the pole pieces 186 of the thermocouple energized electromagnet. When the pilot burner has been ignited and the thermocouple energized electromagnet, the armature 184 is retained in latched position against the pole pieces 186. This means that the valve 144 will be maintained in open position upon release of the valve handle and return of the tubular reset member 146 to its indicated position. Gas now flows not only to the pilot burner outlet passageway but through the tubular reset member 146 and the openings 192 therein and through passageway 198 to the rotary shutoff valve so that regulated amounts of gas will flow through the main burner outlet passageway to the associated burner.

While the present invention has been disclosed in connection with illustrative embodiments, it should be understood that the details thereof are not intended to be limitative of the invention except as set forth in the accompanying claims.

Having thus described my invention, what is desired to be secured by Letters Patent of the United States is:

1. A gas valve including a body having an inlet passageway and pilot burner and main burner outlet passageways, a safety valve interposed between the inlet and said outlet passageways associated with said safety valve arranged that when the valve is closed on said seat no gas flows from the inlet to either of said outlet passageways, means for biasing said valve to its closed position, means for resetting said valve in its open position including a movable tubular reset member movably mounted in said valve body and sealed against flow of gas at its exterior and having a central opening which communicates with and is adapted to serve as a gas passage to the main burner outlet passageway, said pilot burner outlet passageway including a portion located between said valve seat and one end of said tubular reset member, means for moving said tubular reset member so that said end engages said valve to open said valve whereby gas is supplied from the inlet to said pilot burner passageway but gas is prevented from flowing through said tubular member to the main burner outlet passageway because of the engagement between the valve and tubular member, safety means for holding said valve in open position and said tubular reset member being retractable from said valve when the latter is held in its open position whereby gas is enabled also to flow from the inlet through the tubular reset member to the main burner outlet passageway.

2. A gas valve including a body having an inlet passageway, a pilot burner outlet passageway and a main burner outlet passageway and having a rotary shutoff valve therein including axial and transverse passageways, a safety valve interposed between the inlet and both said outlet passageways coaxially located relative to said shutoff valve, a valve seat associated with said safety valve and so arranged that when the valve is closed on said seat no gas flows from the inlet to either of said outlet passageways, means for biasing said safety valve to its closed position, means for resetting said safety valve in its open position including a tubular reset member slidably mounted in gas-tight relation in the axial passageway in said rotary shutoff valve and having a central opening which is adapted to serve as a gas passage to the radial passageway in the shutoff valve and thence to main burner outlet passageway, the pilot burner outlet passageway including a portion adjacent the outside of said tubular reset member, means for moving said tubular reset member into engagement with said safety valve and displacing said safety valve off said seat whereby gas is supplied from the inlet to said pilot burner passageway but gas is prevented from flowing through said tubular member to the main burner outlet passageway because of the engagement between the safety valve and tubular member, means for holding said safety valve in open position, and said tubular reset member being retractable from said valve when the latter is held in its open position whereby gas is enabled also to flow from the inlet through the tubular reset member and shutoff valve to the main burner outlet passageway.

3. A gas valve including a body having an inlet passageway and pilot burner and main burner outlet passageways, a safety valve interposed between the inlet and both said outlet passageways, means for holding said valve in its open position including a tubular reset member movably mounted in said valve body and sealed against flow of gas at its exterior and having a central opening which communicates with and is adapted to serve as a gas passage to the main burner outlet passageway and movable to open said valve thereby to connect the inlet to said pilot burner passageway and to prevent gas from flowing through said tubular member to the main burner outlet passageway because of engagement between the valve and tubular member, safety means for holding said valve element in open position, and said tubular reset member being retractable from said valve element when the latter is held in its open position whereby gas is enabled also to flow from the inlet through the tubular reset member to the main burner outlet passageway.

4. A gas valve as claimed in claim 2, wherein said shutoff valve is rotatable by a handle movably axially of said valve and wherein means are provided for interconnecting said handle and reset member to move the latter in response to axial movement of said handle.

5. A gas valve as claimed in claim 4 wherein said means for interconnecting said handle and reset member in-
includes a push rod and a generally U-shaped connector element having a bight portion and arm portions terminating in ends projecting into transverse openings in said tubular element and the bight portion is received in a transverse opening in said push rod.

6. A gas valve including a body having an inlet passageway and a pair of outlet passageways, a movable safety valve, an annular valve seat associated therewith, said valve being operable when closed against said seat to cut off flow from the inlet to both outlet passageways and when open to supply gas for flow to both outlet passageways, means for resetting said valve in its open position including a slideable tubular reset member movably mounted in said valve body and sealed against flow of gas at its exterior and of smaller size than said valve seat and having a central opening which communicates with and is adapted to serve as a gas passage to one outlet passageway and movable to open said valve to connect said inlet to another outlet passageway and to prevent gas from flowing through said tubular member to said one passageway because of engagement between the valve and tubular member, safety means for holding said valve element in open position, and said tubular reset member being retractable from said valve when the latter is held in its open position, whereby gas is enabled to flow from the inlet through the tubular reset member to the main burner outlet passageway.

7. A gas valve including a body having an inlet passageway and a pair of outlet passageways, a movable safety valve, an annular valve seat associated therewith, said valve being operable when closed against said seat to cut off flow from the inlet to both outlet passageways and when open to supply gas for flow to both outlet passageways, means for resetting said valve in its open position including a slideable tubular reset member movably mounted in said valve body and sealed against flow of gas at its exterior and of smaller size than said valve seat and having a central opening which communicates with and is adapted to serve as a gas passage to one outlet passageway, said reset member being normally spaced and disengaged from said valve and being movable to engage and to open said valve to connect said inlet to another outlet passageway and to prevent gas from flowing through said tubular member to said one passageway because of engagement between the valve and tubular member, safety means for holding said valve element in open position, and said tubular reset member being retractable from said valve when the latter is held in its open position, whereby gas is enabled to flow from the inlet through the tubular reset member to the main burner outlet passageway.

References Cited in the file of this patent

UNITED STATES PATENTS

2,213,844 Mantz ................ Sept. 3, 1940
2,229,826 Thornbery ............. Jan. 28, 1941
2,342,316 Mantz .................. Feb. 22, 1944
2,645,238 Thornbery ............. July 14, 1953