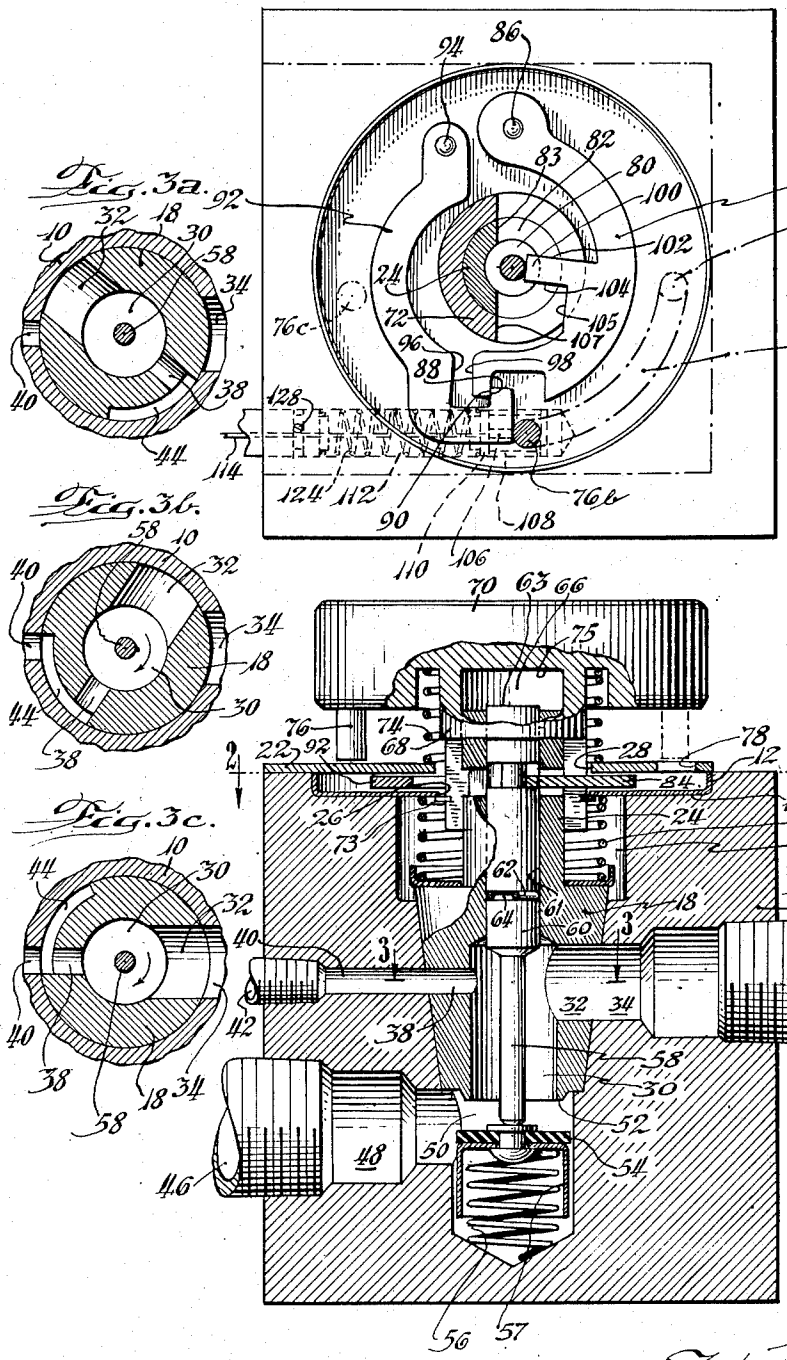
Aug. 6, 1957 Z. J. LANSKY ET AL 2,801,642

PILOT CONTROLLED SAFETY VALVE MECHANISM

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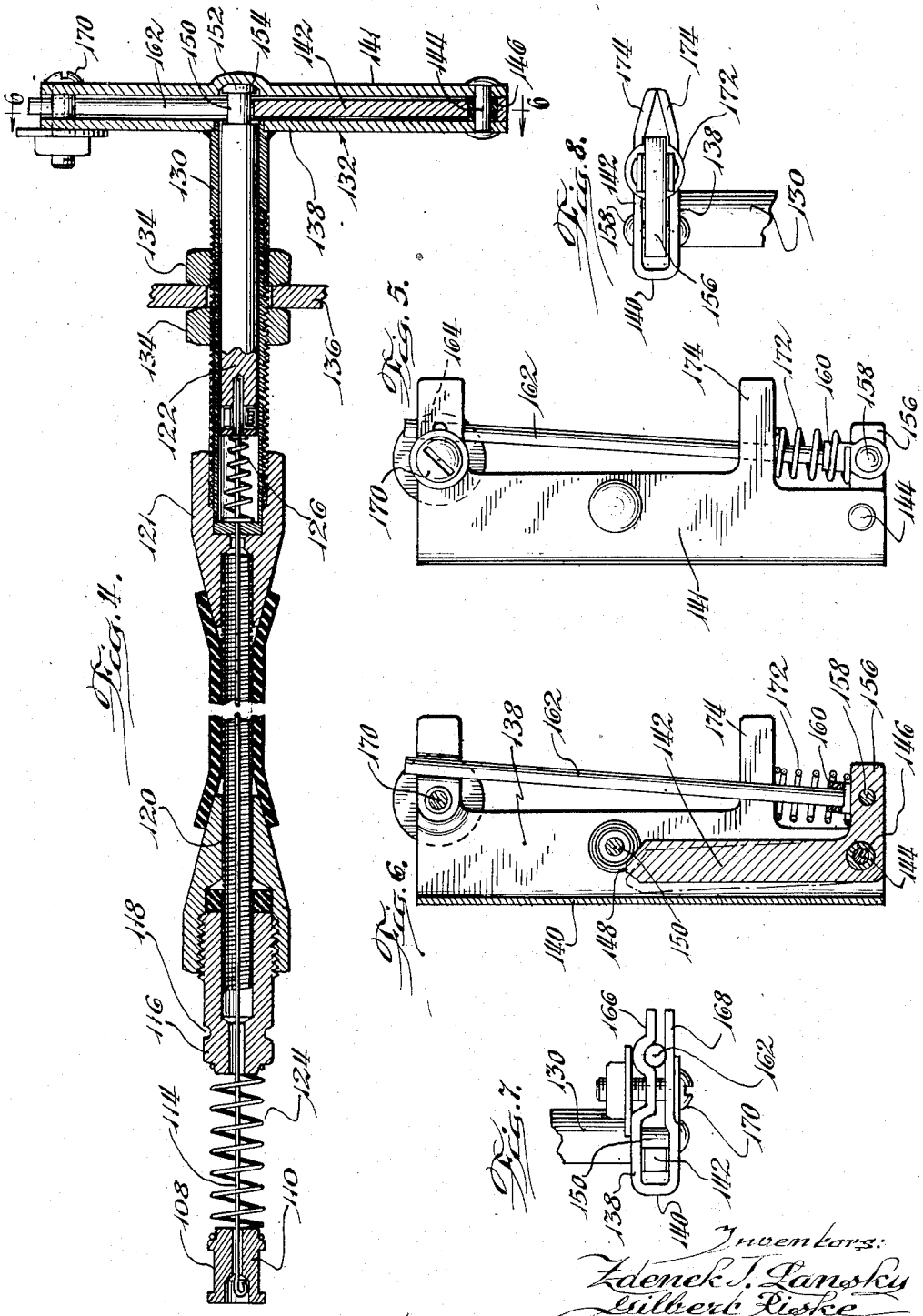


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United States Patent Office 2,801,642 Patented Aug. 6, 1957

2,801,642

PILOT CONTROLLED SAFETY VALVE MECHANISM

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Application October 12, 1953, Serial No. 385,518

7 Claims. (Cl. 137—65)

The present invention relates to safety valve mechanisms. More particularly it is concerned with the provision of a safety valve mechanism for the control of the pilot burner and main burner of a fuel gas consuming appliance such as a space heater or water heater, for instance, which is under the control of the pilot burner.

One of the objects of our invention is to provide an improved automatic valve mechanism for controlling the pilot and main burner of a gas consuming appliance, which is easy to use by the person placing the appliance in operation and which cannot be misused so as to create a dangerous condition.

An additional object is to provide a novel valve mechanism having the above characteristics which is so arranged as to shut off the main burner and pilot burner completely in the event of a malfunctioning of the apparatus and which retains these burners in shut-off condition until the valve is manually reset and the pilot relighted by the operator.

A further object of the present invention is to provide an improved safety valve mechanism for the control of a gas appliance which makes it impossible for an operator to turn on the gas to the pilot burner and leave it on unless the pilot burner is lighted and in satisfactory operation.

Still another object is to provide a novel mechanism of the type discussed above which is so arranged as to make it impossible for the main burner of a gas appliance to be turned on until after the pilot burner is in satisfactory operation.

Yet another object is to provide an improved valve mechanism of this character which is completely mechanical in operation and which therefore requires no electrical connections and no source of electrical energy.

Still another object is to provide a novel mechanism as outlined above which fails safe in the event that its thermostatic control element fails in use.

Other objects and advantages will become apparent from the following description of a preferred embodiment of our invention which is illustrated in the accompanying drawings.

In the drawings, in which similar characters of reference refer to similar parts throughout the several views:

Fig. 1 is a vertical medial sectional view through one portion of the valve mechanism which comprises the subject matter of the present invention. In this view, in order to give greater clarity of illustration, a small portion of the mechanism is shown in elevation;

Fig. 2 is a horizontal sectional view which may be considered as taken downwardly as indicated by the arrows substantially along the line 2—2 of Fig. 1. A portion of the mechanism is in an alternating position, however, so as to obtain greater clarity of illustration;

Fig. 3*a* is a fractional horizontal sectional view through the valve parts and related structure and may be considered as taken in the direction of the arrows substantially along the line 3—3 of Fig. 1. This view shows the valve in "off" position;

Fig. 3*b* is similar to Fig. 3*b*, but shows the valve in "pilot" position;

Fig. 3*c* is similar to Figs. 3*a* and 3*b*, but shows the valve in "main burner" position;

Fig. 4 is a vertical, longitudinal, medial sectional view through the valve actuating mechanism. This structure is connected to the valve of Fig. 1 and forms a portion of the present invention;

Fig. 5 is a right hand end elevation of the mechanism of Fig. 4;

Fig. 6 is a vertical transverse sectional view which may be considered as taken in the direction of the arrows substantially along the line 6—6 of Fig. 4;

Fig. 7 is a top elevation of the portion of the mechanism illustrated in Fig. 5; and

Fig. 8 is a bottom view of the portion of the mechanism illustrated in Fig. 5.

Better quality gas consuming appliances, such as space heaters, water heaters, and the like are automatic in operation and there is a necessity therefore for the main burner to cycle on and off as required by some control mechanism. In order to accomplish re-lighting of the main burner when it is turned on, a pilot burner is customarily provided in close proximity to the main burner, the intention being that the pilot burner will be in continuous operation unless the equipment is shut down. With such an arrangement a dangerous situation can arise if the pilot burner becomes extinguished unless there is safety equipment to shut off all the gas supply to the appliance in this contingency.

The valve and associated mechanism of the present invention is of the type outlined above and makes it necessary for the operator first to supply gas to the pilot burner and to light the pilot. The pilot must then remain lighted sufficiently long to heat a thermostatic control element. Then and only then can the main burner be turned on. If subsequently the pilot becomes extinguished the gas supply to both the pilot burner and the main burner is shut off and remains off until reestablished as outlined above by manual intervention. In addition, if for any reason the thermostatic element heated by the pilot burner fails in use, the gas supply to both main and pilot burners is shut off and the appliance cannot be put back into operation until the thermostat is repaired or replaced.

Referring now to Figs. 1, 2, 3*a*, 3*b* and 3*c* of the drawings, the gas valve mechanism includes various elements attached to and housed within a machined casting **10**. This casting is a generally rectangular structure cored and machined to provide for a shallow circular recess in its upper surface which contains a generally complementary sheet metal dish **12** having a shallow recess **14** in its top surface. The recess containing the dish **12** is extended downwardly at its center to provide an intersecting generally cylindrical recess **16** of smaller diameter which is shaped at its bottom to inverted frusto-conical form to provide a seating surface for a similarly shaped plug valve **18**. The valve plug **18** is urged downwardly into its seat by a coil spring **20** which bears with its lower end against the upper face of the conical portion of the plug valve **18**, while the upper end of this spring is retained by the bottom surface of the dish **12**. This dish in turn is held in its recess by an overlying cover plate **22** secured to the top face of the body portion **10** in any suitable fashion. The valve plug **18** has an upwardly extending cylindrical stem **24** which passes through the center of the spring **20** and through aligned openings **26** and **28** in the dish **12** and cover plate **22** respectively.

The lower tapered portion of the valve plug **18** is drilled out from below to provide a downwardly opening axially aligned cavity **30** which communicates with a comparatively large drilled outlet port **32** extending radially through the side wall of the plug **18** in alignment—in the position shown in Fig. 1—with a similar passage **34**

in the body 10 leading to an outlet connection 36. This connection 36 serves to supply fuel gas to the main burner of whatever appliance the valve of the present invention is to control.

Directly opposite the large port 32 there is a small radial port 38 through the side wall of the plug 18 shown in alignment with a drilled passage 40 in the main body casting 10. This passage 40 leads to an outlet 42 which supplies fuel gas to the pilot burner associated with the main burner which receives its gas from the connection 36. The valve ports 32 and 38 are shown in Fig. 1 in the positions they assume when the appliance connected to our valve is in operating condition.

By referring to Figs. 3*a*, 3*b*, and 3*c*, where it is most apparent, it will be seen that there is a groove 44 which extends circumferentially around the surface of the valve plug 18 from the port 38 for a distance of about 40° or so, such that the plug 18 can be turned counterclockwise from the position shown in Figs. 1 and 3*c* sufficiently to bring the main valve port 32 out of alignment with the outlet port 34, while still maintaining communication between the pilot burner port 40 and the groove 44 and thence by way of the valve port 38 to the interior 30 of the valve plug 18. Thus, gas supplied to the interior cavity 30 will flow, with the plug 18 in the position shown, both to the pilot burner and to the main burner, while if the plug is turned 40° or so in a counterclockwise direction, the pilot burner will still receive fuel, whereas the main burner will be shut off. Additional turning movement of the plug 18 in a counterclockwise direction from this last position will shut off both the pilot burner and main burner.

Fuel gas is brought to the device by a pipe 46. It flows through a passage 48 in the body portion 10 to a cylindrical member 50 directly below the open end of the central cavity 30 of the valve plug 18. The lower end of the valve plug 18 is shaped to form an annular seat 52 for a resilient valve disc 54. This disc is urged upwardly against the seat 52 by a coil spring 56 disposed between the bottom surface of the valve disc 54 and the bottom of the inlet recess 50. In order to prevent tilting of the disc 54 it is secured to the top of an inverted cup or cage 57 which loosely fits around the spring 56. When the valve disc 54 therefore is urged upwardly by the spring 56 against the valve seat 52, all communication between the interior 30 of the valve plug and the inlet pipe 46 is cut off so that no fuel gas can reach either the main burner or the pilot burner regardless of the position of the valve plug 18. Under operating (gas flowing) conditions the valve disc 54 is held downwardly as indicated in Fig. 1, by the lower end of a valve stem 58, the upper portion of which is larger, as at 60, and is fitted to slide in a drilled passage 61 extending vertically through the upper stem portion 24 of the valve plug 18. The top end 63 of the poppet valve stem 58—60 is slightly above the top of the rotary valve stem 24 when the valve stem 58—60 is in its downwardly position; that is, when it is holding the valve disc 54 well away from its seat 52. Gas seepage around the upper portion 60 of the poppet valve stem is prevented by a resilient sealing ring 62 disposed within a circumferential groove 64 formed in the side wall of the valve stem portion 60.

The top end of the rotary valve stem 24 is fitted into a socket recess 66 within a downwardly extending sleeve 68 which forms a portion of a generally circular control knob 70. The socket 66 in the knob 70 is D-shaped as is the complementary top of the stem 24, or their elements are otherwise splined together so that the knob 70 can move upwardly and downwardly with respect to the rotary valve stem 24, but the two of them move together in rotation. The tubular extension 68 on the underside of the cap 70 extends downwardly sufficiently to embrace the top portion of the valve stem 24 all around its circumference when the knob is in its up position (so as to prevent the knob from rocking) but below this position the extension 68 is cut away at one side so that only the other side 72, which is somewhat less than half the stem thickness, extends downwardly along the side of the poppet valve stem 24 into a position below the dish or tray member 12. Near its lower end, the extension 68 carries a shoulder forming split ring 73 which is positioned to impinge against the bottom of the dish member 12 when the control knob 70 is urged upwardly into the position shown in Fig. 1 by a coil spring 74 located between the under surface of the knob 70 and the upper surface of the cover plate 22.

The vertical distance between the top 75 of the socket 66 (when the knob is in the up position) and the top end 63 of the poppet valve stem should be such that the spring 56 can raise the poppet valve disc 54 against its seat 52, thereby carrying the valve stem 58—60 along with it, without the top end 63 of the valve stem 60 quite striking the upper end 75 of the socket 66. As explained above, slightly more than half of the thickness of the knob sleeve 68 is cut away, so that only a portion 72 at one side thereof passes downwardly through the shallow recess 14. This cut is made at such a level that the main portion remaining of the sleeve 68 will not quite project into the recess 14 when the knob 70 is pushed downwardly from the position shown in Fig. 1 by the amount of the spacing shown as existing between the upper end 75 of the socket 66 and the top end 63 of the valve stem 60. The reason for this is that, as will appear presently, there is mechanism lying within the shallow recess 14 in a position close to the center line of the valve stem 60 at one side which would otherwise interfere with downward movement of the knob 70.

Projecting downwardly from the underside of the control knob 70 there is a pin 76 positioned near the knob rim. Its lower end is at such a level that it clears the top plate 22 when the knob 70 is in the "up" position. If, however, it is attempted to push the knob downwardly, the end of this pin will strike the plate 22 before the knob has moved enough to strike the end 63 of the stem 60.

When, however, the knob 70 is positioned within a certain range of its rotational movement, downward or inward movement of the knob is permitted by an arcuate slot 78 cut through the cover plate 22 in alignment with the pin 76. This slot, as best seen in Fig. 2, extends throughout an arc of something less than 90°. It is shown in phantom in this view, since the section is taken just below the plate. When the pin 76 is at one end of the slot, in the position 76*a*, indicated in Fig. 2, the plug valve elements are in the position of Fig. 3*a*. This is the "off" position for the valve, since as an inspection of Fig. 3*a* will show, there is no communication between the central passage 30 in the valve plug and either the outlet port to the main burner or the port 40 to the pilot burner.

When the valve knob 70 is held in and rotated in a clockwise direction, something less than 90°, so as to bring the stop pin 76 against the other end of the slot 78—in other words, into the position shown at 76*b* in Fig. 2—the plug valve elements are in the position shown in Fig. 3*b*. Under these conditions there is communication from the central gas passage 30 by way of the port 38 to the circumferential slot 44 and thence to the outlet port 40 leading to the pilot burner. There is, however, no communication between the main port 32 and the outlet passage 34 to the main burner.

If now the knob 70 is released such that it can be pushed outwardly by the spring 74 so as to bring the end of the pin 76 above the level of the plate 22, the knob can be rotated additionally in a clockwise direction until the pin 76 is in approximately the position indicated at 76*c* in Fig. 2. In this position the plug valve is oriented as indicated in Fig. 3*c*, with the plug port 38 feeding gas to the pilot passage 40 and the plug port 32 directly connected with the main outlet port 34 leading to the main burner.

From the above it is apparent that with the knob **70** held inwardly it can be rotated only far enough in the clockwise direction to light the pilot burner, and that it must be released so as to be pushed outwardly by the valve spring **74** before it can be rotated sufficiently to bring the main burner into action. Also it is apparent that without the latching arrangement, to be described presently, it would be impossible to light the main burner because as soon as the knob **70** is released so that it can move outwardly, the poppet valve stem **58—60** will also move outwardly, thereby bringing the poppet valve **54** against its seat **52**. It is possible, however, to light the pilot and to maintain the pilot in operation so long as the knob **70** is held inwardly against the pressure of the spring **74**.

Referring now to Figs. 1 and 2 together, it will be seen that the poppet valve stem **60** is circumferentially grooved to provide a slot **80** which is at the level of the shallow recess **14** when the poppet valve stem **60** is in its lowermost position, that is, when it is in the position shown in Fig. 1, where it holds the poppet valve **54—52** open. Also where it falls within the limits of the recess **14** the stem **24** of the plug valve is slotted from one side as indicated at **82**. This slot extends across the plug valve stem **24** to a position such that the flat surface of the remaining uncut portion of the stem is in alignment with the flat surface of the uncut portion of the downwardly extending sleeve **72** which forms a portion of the knob **70**.

Within the shallow space **14** there is a C-shaped latching leaf **84** which has one end pivoted to a vertical pin **86** anchored in the bottom of the dish **12**. This leaf extends around the periphery of the stem **72** of the control knob **70** for approximately 180°. Near its free end the leaf is slotted inwardly to provide an outwardly extending hook **88** which overlaps and catches a similarly formed inwardly extending hook **90** formed by a slot cut outwardly from the inside surface of a second generally similar C-shaped leaf **92**. The opposite end of this leaf **92** is pivoted to a vertical pin **94** relatively close to the pin **86**. Thus if the free end of the leaf **92** is moved toward the left as seen in Fig. 2 it will catch the free end of the leaf **84** and swing the latter so that it also moves toward the left. There is, however, considerable lost motion between the two leaves so that once the leaf **84** has been moved toward the left to a certain position, it will be necessary to move the free end of the leaf **92** an appreciable distance to the right before a flat substantially radial surface **96** thereon strikes against the free end **98** of the leaf **84**. Once this contact has been made, additional movement of the free end of the leaf **92** toward the right will urge the free end of the leaf **84** in the same direction.

At about its center, the leaf **84** carries an inwardly projecting latching finger or tab **100** which extends into the circumferential slot **80** in the poppet valve stem when the free end of the leaf **84** is moved toward the left to a certain position and which clears this slot when the leaf **84** is moved to the right thereof. If therefore the poppet valve stem **60** is pushed downwardly by pushing inwardly upon the knob **70** so as to bring the slot **80** into the plane of the leaf **84**, the latch **100** can be moved into this slot so as to prevent the stem **60** from being moved back upwardly by the spring **56** when the knob **70** is released.

The edge **102** of the latch finger **100** which is shown uppermost in Fig. 2, acts with the flat surface at the inner end of the slot **82** as a stop to limit rotation of the plug valve stem **24** in a clockwise direction beyond a position where the plug valve is oriented as shown in Fig. 3*c* with the main burner passage **32—34** open. The opposite or lower edge **104** of the latch **100** similarly operates to prevent the plug valve stem **24** from being rotated in the counterclockwise direction beyond the "off" position shown in Fig. 3*a*. Note that the lower edge **104** of the latching finger has a camming portion **105** at its root which will be engaged by the flat face, indicated at **107** of the knob extension **72** when the knob is rotated to the valve closing position, **76***a*. Thus, rotating the knob **70** to closed position wedges the latching finger **100** out of the groove **80** and permits the poppet valve **52—54** to close as well as shutting off communication of the valve ports **38** and **32** with their outlets.

At the outer or lower edge of the free end of the leaf **92**, as seen in Fig. 2, there is a downwardly bent tab **106** which extends into a circumferential groove **108** formed in the side wall of a plunger **110**. This is best seen in Fig. 4. Thus the free end of the leaf **92** will move from right to left as the plunger **110** is moved from right to left. There is, however, considerable lost motion in this connection (the groove **108** is wider than the tab **106**) for a purpose to appear presently. It should also be noted that when the pin **76**, which projects downwardly from the knob **70**, is entered into the slot **78** by pushing the knob **70** inwardly and the knob then swung to the position **76***b*, that is, the pilot lighting position, this pin strikes against the end of plunger **110**, which in turn strikes against the tab **106** at the end of the leaf **92**. Both the plunger and leaf are therefore swung toward the left as seen in Fig. 2. This causes the other leaf **84** to be swung to its left hand position with the latch finger **100** entered into the circumferential slot **80** of the poppet valve stem **60**.

The mechanism of Figs. 4 to 8 inclusive is associated with that of Figs. 1 and 2 by a drilled passage **112** which extends into the main body casting **10** in a position just below the dish **12**. This will be explained more fully presently.

By referring to Fig. 4 it will be seen that the plunger **110** is connected to the end of a wire **114** which extends through a bushing **116** having a circumferential groove **118** near its outer end. From this bushing **116** the wire passes through a flexible hollow sheath **120** of any convenient length to a position beyond the end of a fitting **121** at the opposite end of this sheath where the wire is connected to a second plunger **122**. The wire is kept in stretched condition by a coil compression spring at each end. These springs are indicated at **124** and **126** and bear respectively against the inner ends of the plungers **110** and **122** with their opposite ends supported against the ends of the fitting **116** and **121**, respectively. Of these, the spring **124**, which tends to move the plunger **110** outwardly is much the stronger and overrules the other when permitted to do so.

In the assembly which forms the principal portion of Figs. 1 and 2, it will be seen that the plunger **110** lies in the drilled cavity **112** in the position previously mentioned and that the end of the bushing or end fitting **116** of the sheath **121** also extends into and closes the end of this cavity and is secured in this relationship by a set-screw **128** or the equivalent.

The fitting **121** at the inner end of the flexible sheath is connected to a threaded sleeve **130** which at its extreme end is welded to a transversely extending sheet metal frame or housing indicated generally at **132**. A pair of nuts **134** threaded to the sleeve **130** are used for mounting the housing **132** in the combustion chamber wall of the appliance to be controlled by this device, the appliance wall being indicated at **136**.

The housing **132** is formed from a continuous piece of sheet metal having high resistance to corrosion at reasonably high temperatures. The metal is bent to U shape so as to form a flat back surface **138** which is welded to the end of the sleeve **130**. This back plate is connected by a rib **140** at right angles thereto, to a front plate **141** which lies generally parallel to the back plate **138**. An L-shaped lever **142** is disposed between the front and back plates and is hinged at its heel to a pin **144** which passes through the plates **138** and **141**. Conveniently this pin can be formed as a rivet which is headed at both ends and

which passes through a short spacer bushing **146** disposed between the front and back plates, the external surface of the spacer bushing actually forming the bearing surface. The free end **148** of the long arm of the lever **142** is so positioned as to lie within a circumferential groove **150** near the free end of the plunger **122** when this plunger end is urged into the space between the plates **138** and **141**. To allow greater entry of the plunger into this space, a shallow recess **154** is provided for the plunger head **152** by drawing the center of the front plate **141** outwardly slightly at this location.

The position of the lever nose **148** and the depth of the groove **150** are such that this nose can move completely through the groove **150**. Thus, if the latching nose **148** is in a central position the plunger **122** will be locked outwardly with the spring **124** compressed. If the nose **148** of the lever **142** moves either to the right or left, as seen in Fig. 6, from this position a predetermined amount it will move out of the slot **150** thereby releasing the plunger **122** for retracting movement under the influence of the spring **124**.

The short offset arm **156** of the L-shaped lever **142** carries a clevis pin **158** which extends therethrough and through the arms of a clevis **160** which at its center is connected to a heavy wire formed of stainless steel or other heat and corrosion resistant material having a high temperature coefficient of expansion, the wire being indicated by the numeral **162**. This wire extends the length of the housing **132** and at its opposite end is clamped as at **164**. This clamp is formed simply by properly shaping a pair of wings **166** and **168** which extend outwardly from the ends of the side walls **138** and **141**, respectively. These two wings are clamped to the wire **162** by a screw, nut and washer combination indicated at **170**.

The housing is so placed in the combustion chamber that the pilot burner will heat the wire **162** to a dull red temperature over a portion of its length, thereby causing elongation of this wire whenever the pilot is burning. The clamp **166—168—170** is loosened and the clamped end of the wire so positioned that with the wire **162** heated by the pilot, the nose **148** is within the slot **150** of the plunger **122**. With the elements in this position the clamp is tightened so as to fix the upper end of the wire **164**.

In order to take up any lost motion and to keep the wire **162** stretched straight, and for an additional purpose to be mentioned presently, the clevis **160** and the lower end of the wire **162** are surrounded by a coil compression spring **172**. This spring bears against the offset arm **156** of the L-shaped lever **142** at one end, while its opposite end bears against a pair of wings **174** which extend outwardly from the main body of the housing **132** into a position such that the wire **162** passes between them. As shown, the ends of these wings may be bent together to give them greater stiffness. The tendency of the spring **172** is to urge the offset arm **156** of the lever **142** downwardly so as to swing the nose **148** of this arm toward the right as seen in Fig. 6.

From the above it will be apparent that when the wire **162** is hot, that is, when the pilot is burning, it will be of such length that the spring **172** will swing the nose **148** of the lever **142** into the groove **150** of the plunger **122** thereby retaining this plunger in the position shown in Fig. 4. If the wire **162** cools, such as when the pilot becomes extinguished, the wire will contract and swing the nose **148** out of the slot **150** toward the left as seen in Fig. 6. If while the device is in operation the hot wire **162** should break, this releases the offset arm **156** of the lever **142** thereby permitting the spring **172** to swing the nose **148** of the lever **142** out of the slot **150** toward the right as seen in Fig. 6. It is apparent, therefore, that the plunger **122** can be locked in the retracted position shown in Fig. 4, only if the pilot is properly functioning and the wire **162** is intact.

If it is assumed that the appliance to which the device of the present invention is attached is not operating and that the wire **162** is therefore cold, such that the plunger **122** has been pulled away from the housing **132** by the spring **124**, the position of the collar **110** will be such that the blade **92** will be toward the right as seen in Fig. 2. Thus blade **84** will also be to the right. The detent **100**, therefore, will be out of the groove **80** in the poppet valve stem **60**. The poppet valve **52—54** will, therefore, be closed. Under these conditions no gas can get from the inlet pipe **46** to the central valve chamber **30**.

Now if the knob **70** is rotated to the "off" position, if it is not already there, and pushed inwardly by the operator, this will cause the pin **76** to enter the slot **78** and will cause the poppet valve stem **60** to be pushed downwardly thereby opening the poppet valve **52—54**. The knob, while being held in, is then rotated in a clockwise direction as seen in Fig. 2 as far as it will go. This causes the pin **76** to hit the opposite end of the slot **78** at the position **76*b*** and also causes this pin **76** to strike against the end of the blade **92** and swing this blade toward the left as seen in Fig. 2.

In the manner previously described, such movement of the blade **92** causes the blade **84** to be swung toward the left so that the latch **100** is entered into the groove **80** of the poppet valve stem **60**. Also, movement of the free end of the lever **92** toward the left as seen in Fig. 2 urges the plunger **110** toward the right as seen in Fig. 4 so as to cause the plunger **122** to move toward the right in Fig. 4, with its head end **152** against the inside surface of the front face member **141** of the housing **132**. In addition, rotation of the knob from the position **76*a*** to the position **76*b***, causes the plug valve to shift from the position in Fig. 3*a* to that of Fig. 3*b*, thereby permitting gas to pass to the pilot burner. The pilot can therefore be manually lighted.

Although the pilot burner has been lighted, it will be appreciated that the knob **70** cannot be released immediately because if it is, the poppet value **52—54** will close thereby shutting off the gas supply to the pilot. Also the knob **70** cannot be turned beyond the position **76*b*** until the knob is released so as to extract the pin **76** from the slot **78**. The operator therefore cannot turn on the gas to the main burner until the wire **162** has been sufficiently heated by the pilot to cause the latching nose **148** to move into the groove **150** near the end of the plunger **122**.

After the wire **162** has been sufficiently heated by the pilot and the latching nose **148** is in position within the groove **150**, the knob **70** can be released because the latching finger **100** will now remain within the groove **80** of the poppet valve stem **60** thereby preventing the spring **56** from closing the poppet valve **52—54**.

When the knob **70** has been released and springs outwardly under the influence of the spring **74**, thereby extracting the pin **76** from the slot **78**, the knob will be turned in a clockwise direction as far as it will go, thereby bringing the pin **76** to the position **76*c*** and causing the surface **83** of the plug valve stem to be brought against the flat face **102** which acts as a stop therefor. With the main burner being supplied with gas and with the pilot burner in operation, the device may be safely left by the operator and will continue to function.

If the pilot should go out, the wire **162** will quickly shrink in length, thereby swinging the nose **148** of the latching member **142** out of the groove **150**. The spring **124** therefore pulls the plunger **122** toward the left as seen in Fig. 4 and pushes the plunger **110** in the same direction. This movement of the plunger **110** which is toward the right in Fig. 2, causes the tab **106** and the free end of the blade **92** to be moved toward the right as seen in Fig. 2 freely for a short distance. Abruptly, however, the flat striking face **96** near the end of the blade **92** strikes the head **98** of the blade **84** a hammer-like blow which knocks the blade **84** toward the right thereby extracting the detent **100** from the slot **80** in the poppet valve stem **60**. Since the poppet valve stem **60** is now free to rise under the influence of the spring **56**, the

poppet valve 52—54 is closed thereby cutting off the gas flow to both the main and pilot burners.

As previously explained, failure of the thermostatic wire 162 causes the spring 172 to swing the nose 148 of the latching lever 142 toward the right as seen in Fig. 6, with the result described above, which follows release of the plunger 122.

If it is desired to turn off the appliance manually, it is necessary merely to turn the control knob 70 to the "off" position, that is, with the pin in the position 76*a*. This corresponds to the plug valve position illustrated in Fig. 3*a* from which it is apparent that gas is shut off from both the main and pilot burners. Also the edge 107 of the knob extension 72 will strike the camming face 105 at the root of the detent finger 100 and wedge this finger out of the groove 80, thereby closing the poppet valve 52—54. This outward movement of the finger 100 and blade 84 is unrestrained by the plunger 110, because of the lost motion connection provided by the wide groove 108 and relatively narrow tab 106. If, therefore, the knob 70 is moved to closed position and then immediately reopened, no gas will flow even during the short period it takes to cool the thermostatic control wire 162.

From the above description of a preferred embodiment of our invention it will be seen that variations and modifications may be made in the device without departing from the spirit or scope of the invention and that therefore this invention is to be measured by the scope of the following claims. Having described our invention, what we claim as new and useful and desire to secure by Letters Patent of the United States is:

1. In a safety reset valve mechanism for connection to a source of fuel gas under pressure and adapted to supply fuel gas to two outlets, the combination comprising: means forming a body portion, a rotary valve in said body portion, manual means connected for rotating said rotary valve, said manual means being axially movable with respect to said rotary valve, said rotary valve having an inlet, a first outlet and a second outlet, said rotary valve being rotatable between a first position in which both said first and second outlets are obstructed, a second position in which said first outlet is open and said second outlet is obstructed, and a third position in which both of said outlets are open, a poppet valve for opening and closing said inlet, means for biasing said poppet valve to closed position, said manual means being adapted to open said poppet valve when axially moved in one direction, latching means for latching said poppet valve in open position, means coacting between said manual means and said latching means to set said latching means in latching position incident to the movement of said manual means from said first position to said second position when said manual means is axially moved in said one direction, stop means to prevent movement of said manual means from said second position to said third position until said manual means has been axially moved in a direction opposite to said one direction, and temperature sensitive means, said temperature sensitive means being adapted to move said latching means from latching position to unlatching position upon cooling of said temperature sensitive means.

2. In a safety reset valve mechanism for connection to a source of fuel gas under pressure and adapted to supply fuel gas to two outlets, the combination comprising: means forming a body portion, a rotary valve in said body portion, manual means connected for rotating said rotary valve, said manual means being axially movable with respect to said rotary valve, said rotary valve having an inlet, a first outlet and a second outlet, said rotary valve being rotatable between a first position in which both said first and second outlets are obstructed, a second position in which said first outlet is open and said second outlet is obstructed, and a third position in which both of said outlets are open, a second valve in series flow relationship to said inlet, means for biasing said second valve to closed position, said manual means being adapted to open said second valve when axially moved in one direction, latching means for latching said second valve in open position, means coacting between said manual means and said latching means to set said latching means in latching position incident to the movement of said manual means from said first position to said second position when said manual means is axially moved in said one direction, stop means to prevent movement of said manual means from said second position to said third position until said manual means has been axially moved in a direction opposite to said one direction, temperature sensitive means, a second latching means operated by said temperature sensitive means, a biased element tending to unlatch the first said latching means, said second latching means restraining said biased element when latched, and said temperature sensitive element acting to unlatch said second latching means when said temperature sensitive element reaches a certain predetermined temperature.

3. In a safety reset valve mechanism for connection to a source of fuel gas under pressure and adapted to supply fuel gas to two outlets, the combination comprising: means forming a body portion, a rotary valve in said body portion, manual means connected for rotating said rotary valve, said manual means being axially movable with respect to said rotary valve, said rotary valve having an inlet, a first outlet and a second outlet, said rotary valve being rotatable between a first position in which both said first and second outlets are obstructed, a second position in which said first outlet is open and said second outlet is obstructed, and a third position in which both of said outlets are open, a second valve in series flow relationship to said inlet, means for biasing said second valve to closed position, said manual means being adapted to open said second valve when axially moved in one direction, latching means for latching said second valve in open position, means coacting between said manual means and said latching means to set said latching means in latching position incident to the movement of said manual means from said first position to said second position when said manual means is axially moved in said one direction, stop means to prevent movement of said manual means from said second position to said third position until said manual means has been axially moved in a direction opposite to said one direction, temperature sensitive means, a second latching means operated by said temperature sensitive means, a biased element tending to unlatch the first said latching means, said second latching means restraining said biased element when in a central position, said temperature sensitive element acting to unlatch said second latching means in one direction from said central position when said temperature sensitive element reaches a certain predetermined temperature, and resilient means adapted to unlatch said second latching means in the opposite direction from said central position in the event of failure of said temperature sensitive element.

4. In a safety reset valve mechanism for connection to a source of fuel gas under pressure and adapted to supply fuel gas to an outlet, the combination comprising: means forming a body portion, a poppet valve in said body portion, a rotatable and axially movable manual means, means for biasing said poppet valve to closed position, said manual means being adapted to open said poppet valve when axially moved in one direction, latching means for latching said poppet valve in open position, means coacting between said manual means and said latching means to set said latching means in latching position incident to rotational movement of said manual means from a first position to a second position when said manual means is axially moved in said one direction, temperature sensitive means, a second latching means operated by said temperature sensitive means, a

biased element tending to unlatch the first said latching means, said second latching means restraining said biased element when in a central position, said temperature sensitive element acting to unlatch said second latching means in one direction from said central position when said temperature sensitive element reaches a certain predetermined temperature, and resilient means adapted to unlatch said second latching means in the opposite direction from said central position in the event of failure of said temperature sensitive element.

5. In a safety reset valve mechanism for connection to a source of fuel gas under pressure and adapted to supply fuel gas to an outlet, the combination comprising: means forming a body portion, a valve in said body portion, temperature sensitive means, latching means operated by said temperature sensitive means, a biased element to close said valve when released, said latching means restraining said biased element when in a central position, said temperature sensitive element acting to unlatch said latching means in one direction from said central position when said temperature sensitive element reaches a certain predetermined temperature, resilient means adapted to unlatch said latching means in the opposite direction from said central position in the event of failure of said temperature sensitive element, and manual means for opening said valve.

6. In a safety reset valve mechanism for connection to a source of fuel gas under pressure and adapted to supply fuel gas to two outlets, the combination comprising: means forming a body portion, a rotary valve in said body portion, manual means connected for rotating said rotary valve, said manual means being axially movable with respect to said rotary valve, said rotary valve having an inlet, a first outlet and a second outlet, said rotary valve being rotatable between a first position in which both said first and second outlets are obstructed, a second position in which said first outlet is open and said second outlet is obstructed, and a third position in which both of said outlets are open, a poppet valve for opening and closing said inlet, means for biasing said poppet valve to closed position, said manual means being adapted to open said poppet valve when axially moved in one direction, latching means for latching said poppet valve in open position, means coacting between said manual means and said latching means to set said latching means in latching position incident to the movement of said manual means from said first position to said second position when said manual means is axially moved in said one direction, stop means to prevent movement of said manual means from said second position to said third position until said manual means has been axially moved in a direction opposite to said one direction, temperature sensitive means, said temperature sensitive means being adapted to move said latching means from latching position to unlatching position at a certain temperature, and said manual means being adapted to move said latching means from latching position to unlatching position upon movement of said manual means to said first position.

7. In a safety reset valve mechanism for connection to a source of fuel gas under pressure and adapted to supply fuel gas to an outlet, the combination comprising: means forming a body portion, a valve in said body portion, temperature sensitive means, latching means operated by said temperature sensitive means, a biased element to close said valve when released, said latching means restraining said biased element when in a central position, said temperature sensitive element acting to unlatch said latching means in one direction from said central position when said temperature sensitive element reaches a certain predetermined temperature, resilient means adapted to unlatch said latching means in the opposite direction from said central positon in the event of failure of said temperature sensitive element, and manual means for opening said valve, retracting said biased element and conditioning said latching means to be moved to latching position by said temperature sensitive element when the last said element is heated to a temperature above said certain predetermined temperature.

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