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[21] Appl. No. **19,970**
[22] Filed **Mar. 16, 1970**
[45] Patented **Aug. 31, 1971**
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[56]

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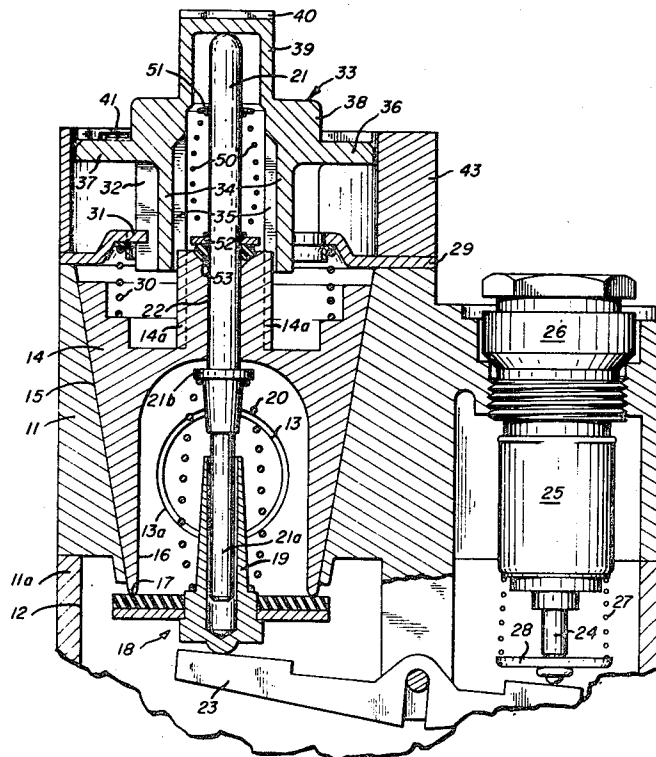
[54] **COMBINED MANUAL AND SAFETY VALVE**
7 Claims, 3 Drawing Figs.

[52] **U.S. Cl.**..... **137/66,**
137/636.4, 251/96

[51] **Int. Cl.**..... **F16k 35/02,**
F23n 5/10

[50] **Field of Search**..... **137/66,**
636.4; 251/96; 431/53, 54, 57, 80

ABSTRACT: A thermocouple-energized safety valve and manually operable control valve combination wherein the cover for the valve combination is formed with notches to cooperate with arms on a knob for actuating the control valve. The arms are designed to cooperate with the notched cover to permit axial movement of the knob only in a "pilot" position of the control valve to actuate the safety valve to its "open" position. Abutment means on one of the arms cooperates with an abutment on the cover to prevent accidental turning of the valve to its "off" position. The construction enables the cover and knob to be inexpensively molded out of plastic material.



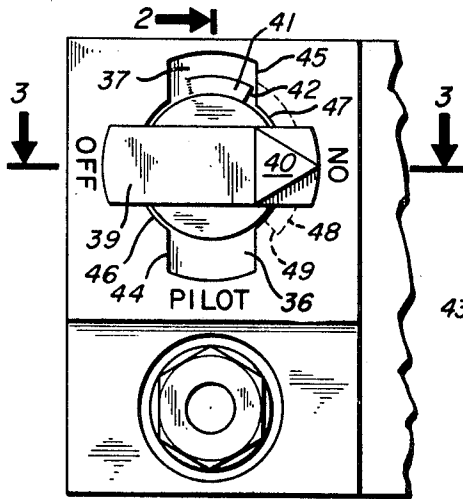


FIG. 1

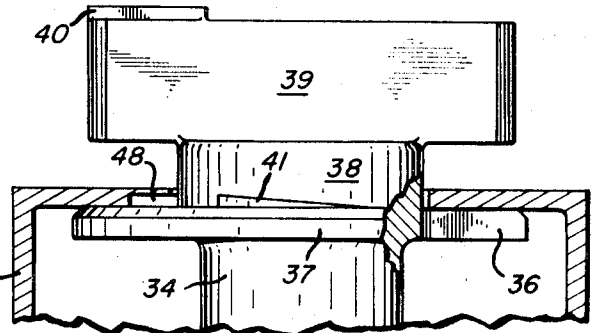


FIG. 3

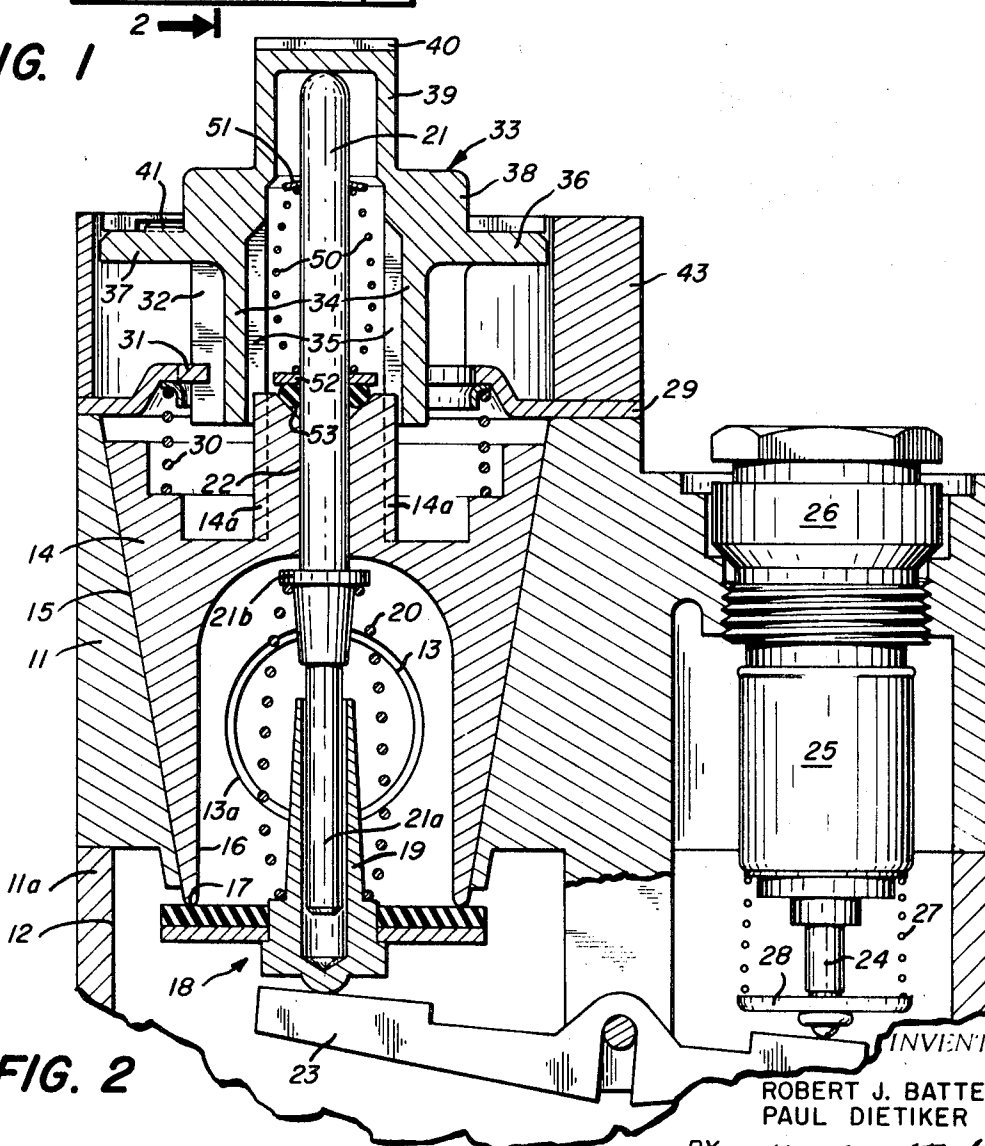


FIG. 2

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COMBINED MANUAL AND SAFETY VALVE

COMBINED MANUAL AND SAFETY VALVE

The invention relates to an improvement in the actuating and resetting mechanism for a conventional plug valve and safety valve combination of the type used to control gas flow to a furnace or the like. More specifically, the invention is directed to the interlock mechanism between a manual means for rotating the plug valve and resetting the safety valve and a cooperating structure in the form of a cover for the valves which is secured to the valve body. The safety valve is adapted to be held by means of conventional thermocouple-energized magnet responsive to the presence or absence of a pilot flame in the furnace.

FIG. 1 is a fragmentary plan view of a portion of the manifold valve incorporating the invention;

FIG. 2 is a fragmentary, cross-sectional view of the invention taken along line 2—2 of FIG. 1; and

FIG. 3 is a fragmentary, cross-sectional view taken along line 3—3 of FIG. 1.

Referring to FIG. 2 of the drawing, the reference numerals 11 and 11a generally designate the two-part manifold valve body, having an inlet chamber 12 and an outlet passageway 13 to other portions of the valve body. A plug valve 14, of conventional construction, rests in a conical bore 15 in the valve body. The plug valve has an inlet bore 16 terminating in a valve seat 17 and a transverse opening 13a through the sidewall thereof.

A safety valve 18 is positioned to cooperate with the valve seat 17 and has a hollow stem 19 extending upwardly into the plug valve. The means for holding the safety valve in its open position is a compression spring 20 that extends between the valve 18 and an abutment shoulder 21a on a reset stem 21 extending through and beyond a bore 22 into the upper end of the plug valve. The stem has a reduced diameter position 21a that extends into the stem 19 to guide it in its movement. The spring 20 is overcome and the valve 18 is normally held closed by means of a spring-biased, pivoted lever 23 extending from the valve 18 to abutting relationship with the lower end of an armature stem 24.

The stem 24 is connected to an armature (not shown) located in the housing 25 of a conventional electromagnet. The magnet is supported in a conventional electrical coupling member 26 screw threaded into the valve body. A conventional concentric lead type of the thermocouple is adapted to be threaded into the connector 26. A compression spring 27, stronger than the spring 20, extends between the housing 25 and a spring retainer cup 28 secured to the lower end of the armature stem 24. The magnet in the housing 25 is strong enough to hold the armature stem against the bias of spring 27, when the thermocouple connected to the magnet is heated by a pilot flame, but permits the spring 27 to actuate the lever and the safety valve to their closed positions when no flame is impinging upon the thermocouple.

The novelty lies in the interlock arrangement of the mechanism for actuating the reset stem 21 and the plug valve 14 to provide safety resetting of the safety valve and the controlling of the gas flow to a pilot burner only, both the pilot burner and the main burner or to neither burner. A spring retainer plate 29 is secured by means (not shown), such as screws, to the valve body 11 and compresses a coiled spring 30 against the upper end of the plug valve 14 to firmly hold the plug in gas-sealing relationship with the seat 15. An arcuate flange 31 projects inwardly from the inner edge of a hole in the spring retainer plate 29 to provide "off" and "on" stops for an abutment rib 32 on one side of a knob 33, to be presently described.

The knob 33, which is preferably molded from a plastic material, has a skirt portion 34 with grooves 35 therein for cooperation with ribs 14a on the plug valve to provide an axially slidable, but nonrotatable connection with the plug valve. The knob also has two radially extending arcuate flanges or

arms 36 and 37, an intermediate diameter portion 38 extending upwardly above the arms and a generally rectangular hand-engageable portion 39 extending above the portion 38. A pointer 40 on the portion 39 indicates the location of the control valve. The arm 37 has a stop 41 that has a vertical surface 42 and an inclined surface on the top thereof that slopes from the upper edge of the shoulder provided by the portion surface 42 down to the upper surface of the arm 37.

A cover 43, which preferably is molded from plastic material, has a cylindrical portion which receives the arms 36 and 37 and has diametrically opposed notches 44 and 45 (see FIG. 1) between diametrically opposed flanges 46 and 47. The notches are dimensioned such that the flanges or arms 36 and 37 cannot move therein but the knob portion 39 may be moved therein. The flange 47 has an arcuate groove 48 therein that terminates at an abutment shoulder 49 that cooperates with the shoulder or surface 42 of the stop 41 in the "pilot" position of the knob and valve. The other end of the groove 48 extends into the notch 45 and permits free rotary movement of the stop 41 from the notch 45 to the stop 49. To rotate the knob from the "pilot" position to the "off" position, it is necessary to depress the knob slightly in order to move the stop 41 below the mating stop 49 prior to rotating the knob to the "off" position. This prevents accidental turning of the knob from the "pilot" position to the "off" position when it is intended that the knob be turned to the "on" position, or accidentally turning the knob from the "on" position to the "off" position when it is intended to turn it only to the "pilot" position. The knob is normally biased outwardly from the valve body to hold the flanges 36 and 37 against the underside of the cover flanges 46 and 47 by means of a compression spring 50 extending from an abutment 51 on the stem 21 and an axially slidable washer 52 biasing a rubber O-ring 53 against the upper end of the valve 14, to provide a gas seal therebetween. The upper end of the stem 21 bears against the inner surface of the upper end of the knob 33 in performing this biasing function. It will be noted that the stem 21 is so dimensioned that the abutment 21b is held in spaced relationship with the inner end of the inlet cavity or bore of the plug valve but that it permits the removal of the cover and knob without permitting the stem 21 to be biased out of the plug valve, due to engagement of the abutment with the adjacent surface of the plug valve.

In the operation of the valve, to initiate a starting of a furnace, the knob 33 is rotated from the "off" position to the "pilot" position by mere rotary movement of the knob, as the cam surface of abutment 41 will deflect the knob inwardly a slight amount to enable it to pass the abutment 49 and reach the "pilot" position, the rectangular portion 39, which overlies the flange portions 46 and 47 in the "off" position, will now be in alignment with the notches 44 and 45 so that the knob may be depressed. Also in this position the plug valve is establishing connection between the inlet through grooves (not shown) in the outer beveled surface of the plug valve and to a pilot gas outlet passage (not shown), in a conventional manner so that inward movement of the knob and opening of the safety valve will permit gas flow to the pilot burner. By igniting the gas issuing from the pilot burner and holding the knob depressed sufficiently long enough to enable the thermocouple heated by the burner to energize the magnet, the knob may be returned to its outer position and the spring 20 will retain the safety valve in the "open" position. The knob may then be rotated to the "on" position wherein the outlet 13a of the plug valve will register not only with the pilot gas passage, but also with the main gas passage 13.

To turn the plug valve to a summer setting with only pilot gas flowing to the furnace, the knob may be merely rotated to the "pilot" position where it will be stopped by the abutment 42 engaging the abutment 49. To move it further to the "off" position, it is necessary to slightly depress the knob to clear the abutment 42 from abutment 49 and then rotate the knob and plug valve to the "off" position, cutting off all gas flow. Shortly after the pilot burner flame becomes extinguished, the

magnet will be deenergized and the safety valve will be closed by the spring 27.

The embodiments of the invention in which an exclusive property or right is claimed are defined as follows:

1. A manifold gas valve comprising a valve body having an inlet and an outlet for connection to a main burner and a first passageway therebetween, a rotary valve located in said first passageway, a second passageway in said body extending from said rotary valve to a pilot burner outlet, said rotary valve having a third passageway therethrough with a first end always registering with the inlet end of said first passageway and a second end selectively registerable with the outlet end of said first passageway and said second passageway in an "on" position or with said second passageway only in a "pilot" position or with neither of said first and second an in an "off" position, a safety valve positioned and biased to close said first end, means for holding said safety valve in a position away from said first end but incapable of moving said safety valve away from said first end, a plunger axially slidable through said rotary valve and arranged to move said safety valve away from said first end, a manually operable knob having an axially slidable and nonrotatable connection with said rotary valve and arranged to actuate said plunger, said knob having radially extending and axially spaced arms thereon, cover means positioned over said rotary valve and around said knob and having an arcuate flange that is located between said arms, said flange having a notch therein wide enough to permit the outermost arm to move therein when the knob is in the "pilot" position and said knob and plunger are moved to open said safety valve, said notch being too narrow to ever allow the in-

nermost arm to move therein, and stop means between said innermost arm and said flange and so arranged that the control knob may be rotated from the outlet "off" to the "pilot" position but requires axial movement prior to rotary movement of the knob to move in the opposite direction to the "off" position.

2. A manifold valve as defined in claim 1 wherein said stop means is beveled and is located on said innermost arm and extends into said notch when said valve is in the "pilot" position.

3. A manifold valve as defined in claim 2 wherein means is located to bias said plunger against said knob and the innermost arm toward said flange.

4. A manifold valve as defined in claim 1 wherein spring retainer means is coaxial with said plunger and has a marginal edge thereof between said valve body and said cover and a spring extends between said retainer means and said rotary valve.

5. A manifold valve as defined in claim 2 wherein said beveled stop means is on said innermost arm and extends into said notch only in the "pilot" position thereof.

6. A manifold valve as defined in claim 5 wherein spring means is positioned between said rotary valve and said knob and in engagement with said plunger so as to bias said plunger against said knob.

7. A manifold valve as defined in claim 6 wherein said plunger has an abutment therein normally spaced from said rotary valve but engageable therewith to prevent said plunger from separating from said rotary valve should said knob be removed from said valve body.

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