Dec. 19, 1939. F. MANSKY 2,183,855

SAFETY SHUT-OFF FOR MULTIPLE BURNERS

Filed Nov. 2, 1938

Fig. 1.

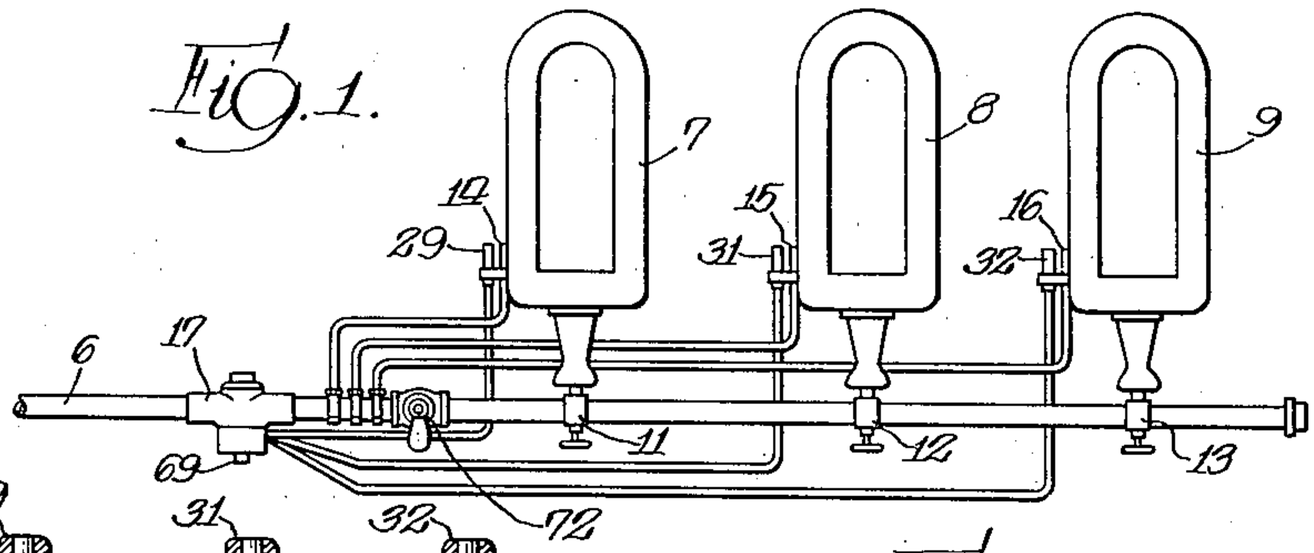

Fig. 2.

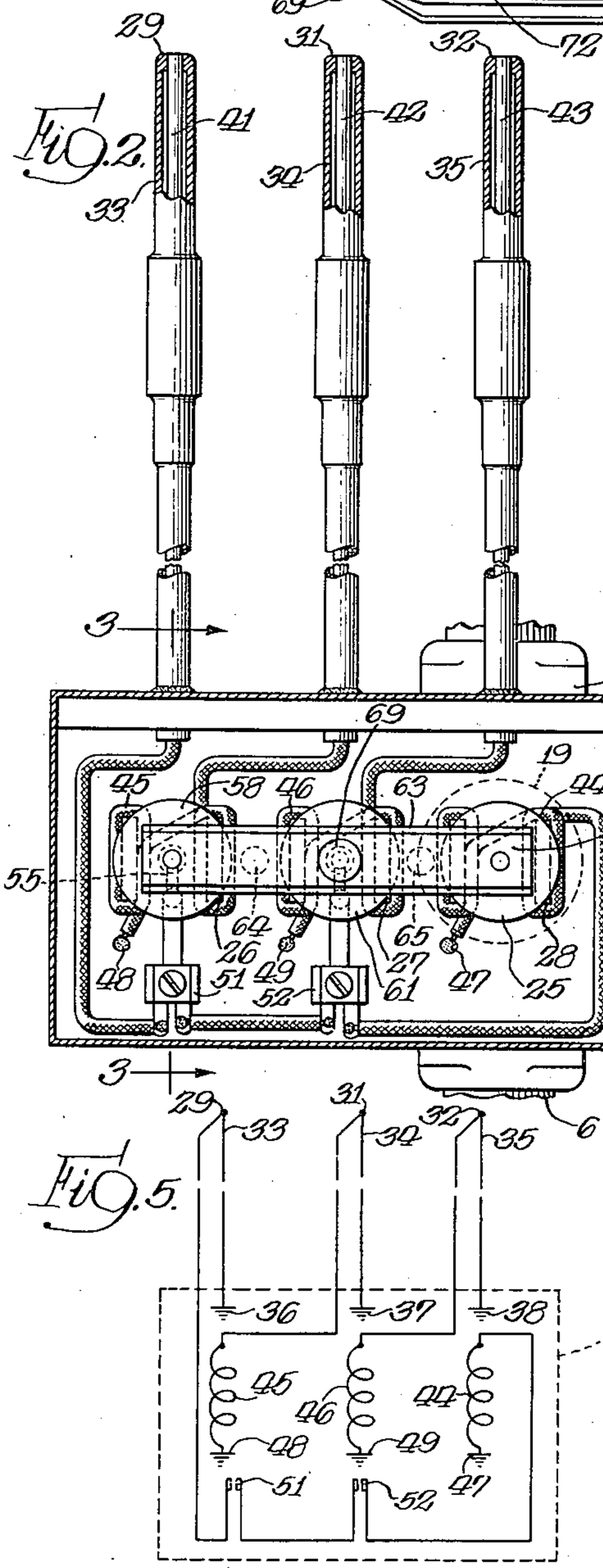

Fig. 3.

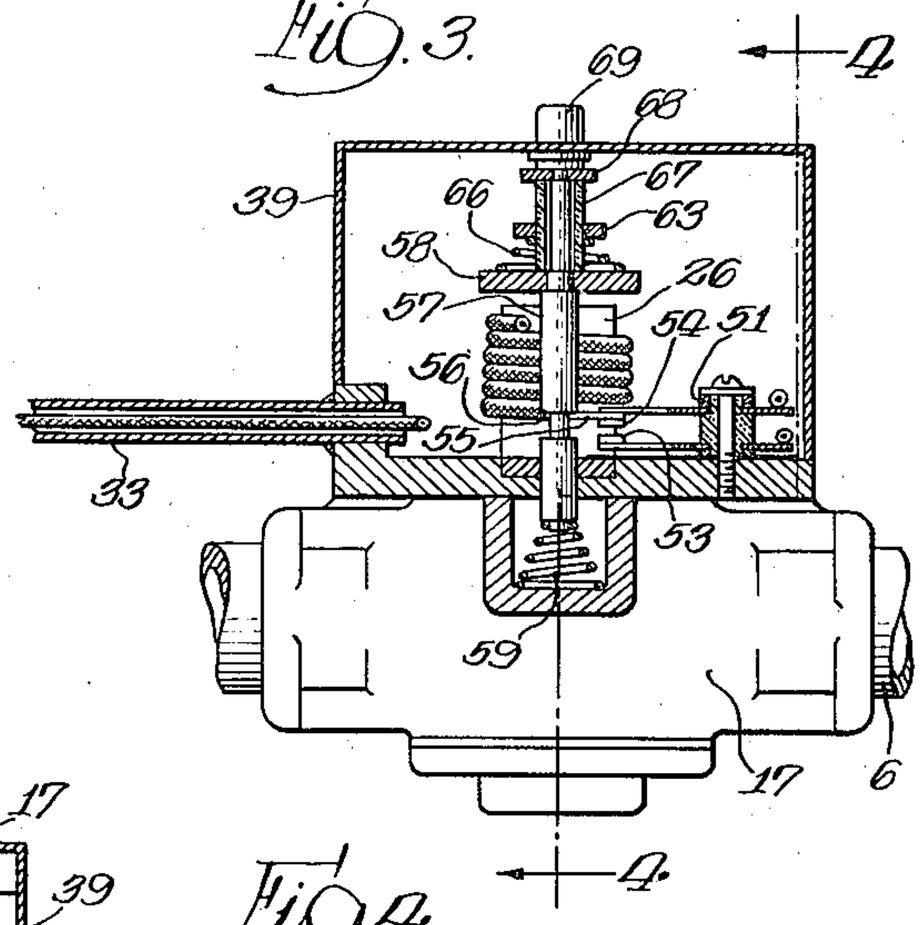

Fig. 4.

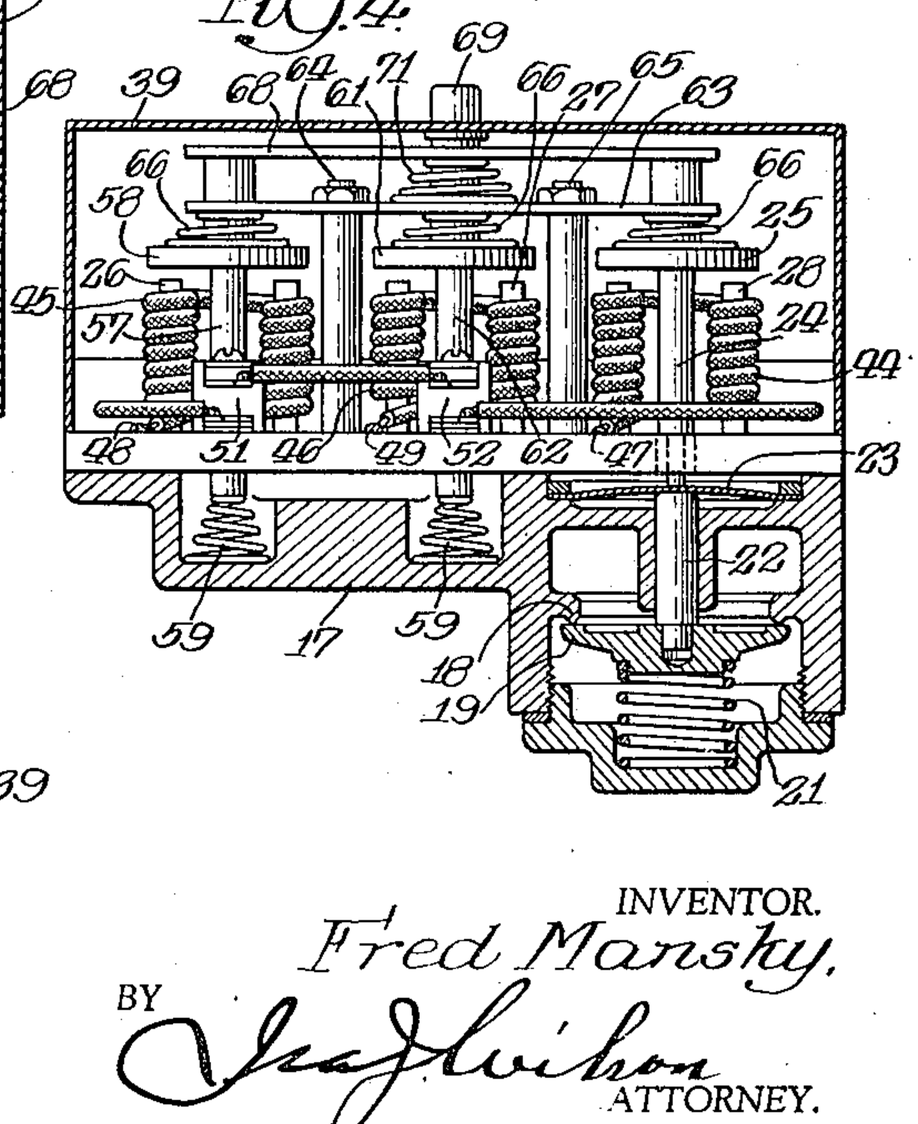

Fig. 5.

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SAFETY SHUT-OFF FOR MULTIPLE BURNERS

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4 Claims. (Cl. 158—117.1)

This invention relates to safety devices for gaseous fuel burners by which the fuel to the burners may be shut off upon extinguishment of the pilot flame, thereby obviating fuel wastage and the danger incident to escaping gas.

Some types of apparatus are equipped with multiple burners adapted to be operated singly or in unison. For instance, space heaters are used which are provided with a number of individual burners either manually or automatically controlled so that one, two, or more may be used in accordance with the existing requirements. So, likewise, gas stoves and ranges are equipped with several burners, one being the oven burner, another a broiler burner, and one or several top burners. The several burners in apparatus of this general character all receive their fuel supply from a common supply pipe.

Where a burner is adapted to be lighted from a continuous pilot flame, it is essential as a safety insurance against escaping gas that provision be made for shutting off the fuel supply to the burner in the event of extinguishment of the pilot flame. In the use of multiple burner units, such as above mentioned for illustrative purposes, an individual automatic shut-off for each burner would be prohibitive in cost. My present invention is designed, therefore, to provide a single shut-off valve for all the burners having automatic control provisions, whereby the valve will be closed upon the extinguishment of any one of the pilot flames.

Another purpose of the invention is to provide an apparatus for this purpose which can be economically constructed and which will be durable and reliable in operation.

As illustrative of the principles of my invention, I have shown on the accompanying drawing, somewhat schematically, a plurality of burners the fuel supply to which is controlled by a single shut-off valve which in turn is controlled by all of the pilots, so that extinguishment of any pilot will result in shutting off the fuel supply to all of the burners.

Referring to the drawing,

Fig. 1 is a schematic plan view of a hook-up embodying the principles of my invention;

Fig. 2 is an enlarged plan, partially in section, of the control apparatus;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view on the line 4—4 of Fig. 3; and

Fig. 5 is a diagram of the electric circuits.

Referring to the drawing more in detail, reference character 6 indicates a pipe for supplying gaseous fuel to a plurality of burners indicated 7, 8, and 9, respectively. The flow to the individual burners is regulated and controlled by the valves 11, 12, and 13, respectively. While the burners are here shown as being in proximity to each other, such, for instance, as in a multiple burner space heater, it should be understood that their location with respect to each other is of no moment so far as the principles of my invention are concerned, since they may be located in various positions on a stove or range, as above suggested, or disposed in any required relation and location.

Continuously burning pilots 14, 15, and 16 are located adjacent to the respective burners in position to ignite the burners, the supply pipes for the respective pilots being connected with the fuel supply pipe 6, in this instance rearwardly of the shut-off valve, indicated generally as 17, although the pilot supply pipes or tubes may be connected with the fuel supply ahead of the shut-off valve, if desired.

The casing of the shut-off valve, which is interposed in the fuel supply line 6, is interiorly provided with a seat 18 toward which a shut-off valve 19 is continuously urged by an expansion spring 21. The stem 22 of the shut-off valve engages the inner face of a sealing disc or diaphragm 23, the outer face of which is engaged by an operating rod or plunger 24 carrying the armature 25 of an electromagnet. Depression of the actuator 24 will open the valve 19 against the action of its spring 21.

The valve operating rod 24 and its armature comprise a part of a thermo-magnetic system for controlling the valve 19. This system, as illustrated, comprises a plurality of electromagnets 26, 27, and 28, the windings of which are incorporated in electric circuits including current generating thermo-couples by which the magnets are energized. The thermo-couples, indicated generally by reference characters 29, 31, and 32, are positioned in proximity to the respective pilots 14, 15, and 16 so as to be heated by the pilot flames, thereby generating weak electric currents in the manner peculiar to thermocouples to energize the respective electromagnets. The outer elements 33, 34, and 35 of the thermocouples are grounded at 36, 37, and 38, respectively, to the shell or case 39 carried by the valve casing 17 and within which the electromagnets and other mechanisms are housed. The inner elements 41, 42, and 43 of the respective thermocouples are connected to wires forming the coils

or windings 44, 45, and 46, respectively, of the magnets 28, 26, and 27.

It will be observed from Figs. 2 and 5 that the circuit including thermo-couple 29 which energizes magnet 28 is grounded to the casing at 47. The circuit including the thermo-couple 31 which energizes magnet 26 is grounded to the casing at 48, and the circuit including thermo-couple 32 which energizes magnet 27 is grounded to the casing at 49.

The circuit including thermo-couple 29, which influences magnet 28 to control the shut-off valve 19, includes a plurality of contact switches 51 and 52 which, as shown in Fig. 3, comprise a stationary contact element 53 and a yieldingly supported movable contact element 54 provided with an insulated extension or bar 55 disposed in the path of a shoulder 56 formed on the stem or rod 57 carrying the armature 58 of magnet 26. The stem 57 is urged into its upper position illustrated in Fig. 3 by an expansion spring 29, so as to permit separation of contact element 54 from element 53, thereby breaking the circuit. Switch 52 is similar in all respects to switch 51 above described, so that detailed description thereof is unnecessary. The armature 61 of magnet 27 is carried by a stem 62 similar to stem 57.

A guide bar 63 mounted upon posts 64 and 65 serves as a guide for the stems 57, 62, and 24 of the electromagnets and light expansion springs 66 interposed between the guide bar and the respective armatures 58, 61, and 25 lightly oppose the upward thrust of the springs 59 and 21. Insulated bushings 67 surround the stems where they pass through the guide bar 63. The upper ends of the stems are connected by a cross bar 68 so that they will move in unison and a button 69, or manually operable element of some character, projects through the casing wall in position to be depressed by the operator, thereby simultaneously depressing the three stems 57, 62, and 24. A light coil spring 71 is interposed between the guide bar 63 and the connecting bar 68.

The operation of the apparatus is substantially as follows:

Assuming that the shut-off valve 19 is closed, as shown in Fig. 4, to shut off the fuel supply to the burners and the pilots, the operator desiring to light the burners depresses the button 69, thereby forcing shut-off valve 19 away from its seat and closing contact switches 51 and 52. The hand shut-off valve 72 in the pipe 6 being closed, gas is now admitted to the pilots only, which may be lighted with a match or otherwise while the button 69 is held down either manually or by a suitable locking device. The flames from the pilots when lighted will heat the respective thermo-couples, thereby generating currents in the three circuits to energize the electromagnets sufficiently to cause them to hold their respective armatures in depressed condition to maintain switches 51 and 52 closed and the shut-off valve 19 open. Sufficient current will be generated to accomplish this result when the pilots have been burning for a short period. The button 69 may then be released and the manual valve 72 opened to supply fuel to the main burners which will be ignited by their respective pilots.

Should any of the pilot flames become extinguished, the magnet 28 will become deenergized to release its armature or keeper 25, whereupon the shut-off valve 19 will be closed by the spring 21. If, for instance, pilot 14 should become extinguished, thermo-couple 29 will cease to generate current, thereby deenergizing magnet 28. If pilot 15 should be the one to become extinguished, thermo-couple 31 will cease to generate current, thereby deenergizing magnet 26 to release keeper 58 which will permit the stem 57 to be raised by the spring 59 and contact 54 to be withdrawn from contact 53, thereby opening switch 51, breaking the circuit to coil 44, and consequently deenergizing magnet 28. Likewise, extinguishment of pilot 16 will cause a cessation of current production by thermo-couple 32, thereby deenergizing magnet 27 and opening switch 52 to break the current to magnet 28.

It should be apparent from the foregoing that I have provided an apparatus for automatically cutting off the fuel supply to a plurality of burners in the event of the extinguishment of the pilot for any of the burners. Safety against escape of dangerous gas from both the main burners and the pilot burners is thereby insured. It should be understood that in the hook-up disclosed, the operator, when he discovers that the fuel supply has been shut off, will, before actuating the button 69 to open the shut-off valve 19, close the manual shut-off valve 72 so as to prevent a flow of gas to the main burners before the pilots have been lighted.

The details of construction illustrated and described may obviously be varied within considerable limits without departing from the essence of the invention as defined in the following claims.

I claim:

1. The combination of a plurality of burners, a pilot in proximity to each burner, means for supplying fuel to said burners and pilots, a shut-off valve in the fuel supply means for shutting off the fuel supply to all of said burners and pilots, thermo-magnetic means including a thermo-couple in proximity to each pilot, an electromagnet for each thermo-couple and an independent magnet energizing circuit for each thermo-couple, means whereby said shut-off valve is controlled from one of said electro-magnets, and switches in the energizing circuit for said last mentioned magnet, each switch being controlled by a corresponding one of said other magnets.

2. A safety fuel shut-off device for a multiple burner unit comprising, a pilot for each burner, a fuel shut-off valve, a plurality of electromagnets, an armature for each magnet, one of said armatures being operatively connected with said shut-off valve, an independent energizing circuit for each magnet, each circuit including a current generating thermo-couple adapted to be influenced by the flame of its respective pilot, the shut-off valve controlling circuit including a plurality of switches controlled respectively by the other magnets whereby the valve controlling circuit will be disrupted upon extinguishment of any pilot flame, and means for moving all of said armatures toward their respective magnets to open said shut-off valve and simultaneously close said switches for running purposes.

3. The combination of a plurality of burners, a pilot adjacent each burner, a fuel supply pipe for said burners and pilots, a shut-off valve in said supply pipe, an electromagnet provided with an armature operatively connected with said shut-off valve for holding said shut-off valve in open position when said magnet is energized, an energizing circuit for said magnet including a thermo-couple positioned to be influenced by one of said pilots and a plurality of current disrupting switches, a plurality of electromagnets pro-

vided with armatures operatively connected respectively with said switches to hold said switches in closed position upon energization of said magnets, and energizing circuits for said plurality of magnets including thermo-couples respectively positioned in proximity to the remaining pilots so that extinguishment of any of said remaining pilots will release said shut-off valve for closure by permitting the opening of the corresponding one of said current disrupting switches and extinguishment of said first mentioned pilot will release said shut-off valve for closure by permitting deenergization of the thermo-couple included in the shut-off valve controlling circuit.

4. The combination of a plurality of burners, a pilot adjacent to each burner, means for supplying fuel to said burners and pilots, a fuel shut-off valve, an electromagnet provided with an armature operatively connected with said shut-off valve to hold said valve in open position when said magnet is energized, an energizing circuit for said magnet including a normally open circuit disrupting switch and a thermo-couple disposed in proximity to one of said pilots to be influenced thereby, an electromagnet provided with an armature operatively connected to said disrupting switch to hold said switch in closed position when said last mentioned magnet is energized, an energizing circuit for said last mentioned magnet, including a thermo-couple positioned to be influenced by another of said pilots, and manually operable means for simultaneously moving said armatures into position to be retained by their respective electromagnets and whereby said switch is maintained in closed position and said valve is maintained in open position.

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