

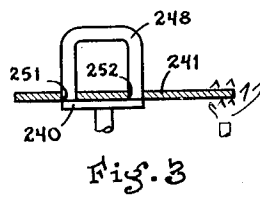
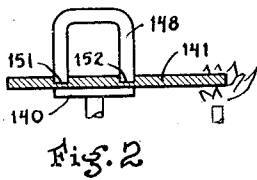
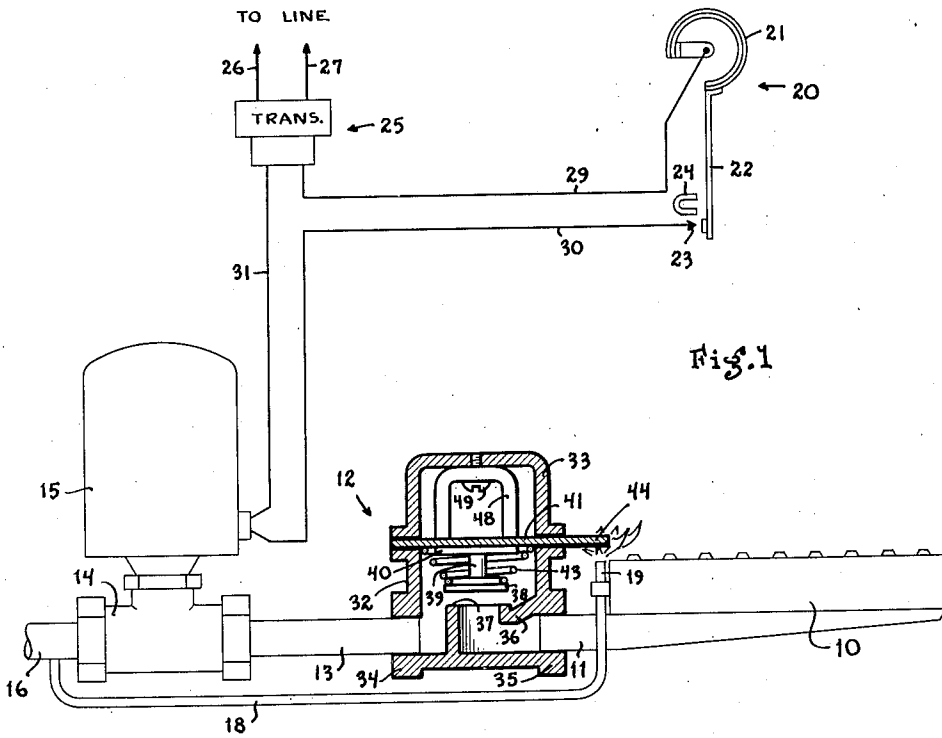
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SAFETY VALVE

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SAFETY VALVE

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The present invention relates to a safety valve, and more particularly to one designed to shut off flow of gas to a main burner upon extinguishment of a pilot burner.

It is conventional practice in the gas burning art to provide some device to shut off or prevent the flow of gas to the main burner when the pilot burner is extinguished. It has recently been proposed to use for this purpose an electromagnet for holding the main burner control device in one of two controlling positions in which some element associated with the magnetic circuit is formed of Curie point metal having a Curie point below the range of temperatures of a pilot flame. It is well known that certain metals possess the property of becoming non-magnetic at different predetermined temperatures. This is particularly true of various nickel-steel alloys. The temperature at which the metal becomes non-magnetic is known as the Curie point and such metals as Curie point metals. It will be obvious that if the operation of the magnetic circuit is based upon the element of Curie point metal being magnetic, then the heating of this element above its Curie point will change the position of the control device. Previous arrangements of this type have, however, had the disadvantage that a simple magnetic circuit was employed which would be effective only when the pilot was extinguished. In the normal condition, that is when the pilot is lighted, the magnetic circuit would be ineffective. The result is that in these prior art arrangements, the magnet is relied upon to move the control device to its safe or fuel preventing position and some biasing means is employed to move the device to its active or fuel admitting position. This type of arrangement has the disadvantage that it is dependent upon the continued operation of the magnet for movement of the device to its safe position. In other words, if the magnet at any time fails, the device will remain in its active position and thereby give a false indication of the existence of a pilot flame.

An object of the present invention is to provide an arrangement of the type above described wherein upon the member of Curie point metal being heated above its Curie point, the magnetic circuit is effective to maintain the control device in its active position and is rendered ineffective only upon the Curie point metal being cooled down below its Curie point.

A further object of the present invention is to provide such an arrangement in which the member of Curie point metal acts as a shunt

between the magnet and the armature associated with the control device.

A still further object of the present invention is to provide such an arrangement in which the magnet is fixed in position and in which the armature is directly connected to the control device, the member of Curie point metal being interposed between the magnet and the armature and acting as a shunt when below its Curie point.

A still further object of the present invention is to provide such an arrangement wherein the control device is in the form of a valve in the main gas line.

Other objects of the present invention will be apparent from a consideration of the accompanying specification, claims and drawing, of which:

Figure 1 is a view, partly schematic, showing a burner control system embodying the improved safety valve, this valve being shown in section, and in which

Figures 2 and 3 are views of portions of modified forms of the improved safety valve.

Referring to the drawing, a main gas burner is indicated by the reference numeral 10. This gas burner is supplied with gas by a gas pipe 11 which connects with the outlet side of the safety valve 12. The inlet side of the safety valve 12 is connected by a pipe 13 to the outlet side of a gas valve 14 having an electrical actuating mechanism 15. This electrical actuating mechanism is of the type which is designed to hold the valve open only as long as it is energized, the valve moving to closed position immediately upon de-energization of the actuating mechanism. Connected to the inlet side of the gas valve 14 is a further pipe 16 leading to any suitable source of gas supply (not shown). A pipe 18 is connected to pipe 16 and supplies gas to a pilot burner 19 located adjacent to main burner 10 so as to be capable of igniting gas issuing from this burner.

The energization of the electrical valve actuating mechanism 15 is controlled by a room thermostat 20. This thermostat is of conventional construction and comprises a bimetallic element 21 to which is secured a contact blade 22 adapted to engage a fixed contact 23. A magnet 24 is associated with the contact blade 22 to impart a snap action to the movement thereof. The bimetallic element 21 is so disposed that the blade 22 is moved toward the left upon a drop in temperature.

Power for operation of the electrical actuating mechanism is supplied by a step-down transformer 25, the line voltage side of which is con-

nected to line wires 26 and 27 leading to a suitable source of power (not shown).

The operation of the electrical actuating mechanism 15 is entirely conventional. Whenever the temperature drops sufficiently to cause engagement of switch blade 22 and contact 23, an energizing circuit is closed from the transformer 25 through conductor 29, bimetallic element 21, contact blade 22, contact 23, conductor 30, actuating mechanism 15, and conductor 31 back to the transformer. The establishment of this energizing circuit to actuating mechanism 15 causes valve 14 to be moved to open position to admit a flow of gas to burner 10 if the safety valve 12, the details of which will be presently described, is in valve open position. The gas flowing to main burner 10 will be ignited by the pilot burner 19 and the main burner 10 will continue in operation as long as the pilot burner 19 remains ignited and as long as thermostat 20 continues to call for heat. Upon thermostat 20 being satisfied, the electrical actuating mechanism 15 is deenergized to cause closure of valve 14 and to shut off the flow of gas to the main burner 10.

It will be obvious from the above described operation that it is imperative that the flow of gas to the main burner will be prevented if the pilot burner 19 is not ignited. The improved safety valve of the present invention is designed to accomplish this action with the utmost simplicity and independent of any external power supply. Referring to the drawing, the safety valve comprises a valve housing 32 and an electromagnet housing 33. The valve housing 32 is provided with an inlet 34 and outlet 35 and the usual transverse partition wall 36, this wall being apertured to provide a valve seat 37. A valve disk 38 is adapted to seat on the valve seat 37. This valve disk 38 is connected by means of a valve stem 39 to an armature disk 40. Extending between electromagnet housing 33 and valve housing 32 is a plate 41 of Curie point metal. This plate 41 of Curie point metal not only plays a part in the magnetic circuit, as will be presently described, but also forms a gas-tight barrier between the valve housing and the electromagnet housing so as to prevent the access of gas to the permanent magnet. If necessary, gaskets of heat resistant material may be placed on each side of the plate. A spring 43 is interposed between the plate 41 and the valve disk 38 and serves to bias valve disk 38 into engagement with valve seat 37.

The plate 41 has an extension 44 adapted to project into the path of the flame over pilot burner 19. It will be obvious that upon pilot burner 19 being ignited, the extension 44 will become heated. Due to its heat conductivity, the entire plate will become heated. The plate 41 is formed of a metal having a Curie point such that the pilot burner is capable of heating the plate above its Curie point.

Disposed in the electromagnet housing 33 is a permanent horseshoe magnet 48. This magnet is secured by a screw 49, or other suitable fastening means, to the upper wall of the electromagnet housing 33. The two legs of the permanent magnet are of such length that they engage the member 41 of Curie point metal when the electromagnet housing 33, the valve housing 32, and the plate 41 are clamped together in assembled relation.

It will be apparent that as long as the plate 41 is below its Curie point by reason of the pilot burner being extinguished, the flux from magnet 48 will tend to pass through the plate 41. The

result of this is that so much of the flux of magnet 48 is passed through the plate 41 that insufficient flux passes through armature 40 to counteract the effect of biasing spring 43. As a result, biasing spring 43 is able to move valve disk 38 into engagement with valve seat 37. Upon the pilot burner being ignited, however, so that member 41 is heated above its Curie point, this member becomes non-magnetic and does not appreciably affect the path of flux from magnet 48. In other words, practically all of the flux from magnet 48 tends to go through armature 40. Under these conditions, the magnet 48 attracts the armature 40, moving the armature and valve upwardly against the action of spring 43 until the elements assume the relative position shown in Figure 1. As long as the pilot burner remains ignited and the member 41 of Curie point metal remains heated above its Curie point, the elements will remain in this position. As soon, however, as the pilot burner is extinguished, element 41 again becomes magnetic and once more shunts the flux through magnet 48, making it impossible for magnet 48 to hold the armature 40 in the position shown.

It will be noted that the proposed arrangement is extremely simple in form and inherently tends in the event of the failure of any of the parts to go to valve closed position. The device does not depend upon the effect of a magnet for moving the valve to closed position. Furthermore, unlike certain prior art devices, the permanent magnet, which of necessity constitutes the bulkiest item of the unit, can be fixed.

In designing the form of Figure 1, it is necessary to very carefully select the thickness of the plate 41 to avoid introducing too great a gap in the circuit between the permanent magnet 48 and the armature 40 while still providing an adequate shunt. In Figure 2, the arrangement is modified to reduce the gap introduced by the plate of Curie point metal while still retaining to the fullest its shunting effect. Referring to this figure, the magnet is designated by the reference numeral 148 and the plate of Curie point metal by the reference numeral 141. It will be noted that recesses 151 and 152 are provided in the upper surface of the plate 141 and that the poles of magnet 148 project into these recesses. The advantage of this arrangement is that the gap introduced between the permanent magnet 148 and the armature 140 is reduced while the shunting ability of plate 141, when the plate is below its Curie point, is in no way reduced.

In Figure 3, the plate 241 corresponding to plate 41 of Figure 1 has been provided with two perforations 251 and 252 to receive the ends of the poles of magnet 248. In other words, this modification is exactly like Figure 2 except that the recesses extend entirely through the plate 241 so that the pole faces of magnet 248 are brought into direct engagement with the armature 240. In spite of this, the plate 241 is still capable of shunting the flux from magnet 248 whenever the plate 241 is below its Curie point.

It will be seen that I have provided an extremely simple safety device which inherently tends to assume the safe position upon failure of any of the parts. While the control device has been shown as a valve, it is obvious that a switch could be substituted. In such a case, the switch would be connected in the energizing circuit of actuating mechanism 15 so that valve 14 could not be opened if the pilot burner was extinguished. In general, while I have shown

certain specific embodiments of the invention for purposes of illustration, it is to be understood that the invention is limited only by the scope of the appended claims.

I claim as my invention:

1. A safety mechanism for a fluid fuel burner comprising a control device biased to a fuel flow preventing position, holding means comprising a magnet and armature for retaining the control device in a fuel flow permitting position against its bias, and a member of Curie point metal associated with said magnet and armature for shunting the flux from said magnet as long as said member is below its Curie point.

2. A safety mechanism for a fluid fuel burner comprising a control device biased to a fuel flow preventing position, holding means comprising a magnet and armature for retaining the control device in a fuel flow permitting position against its bias, and a member of Curie point metal interposed between said magnet and armature for shunting the flux from said magnet as long as said member is below its Curie point.

3. A safety mechanism for a fluid fuel burner comprising a control device biased to a fuel flow preventing position, holding means comprising a magnet and armature for retaining the control device in a fuel flow permitting position against its bias, and a member of Curie point metal associated with said magnet and armature for shunting the flux from said magnet as long as said member is below its Curie point, said member having a portion adapted to extend into the path of a pilot burner flame to be heated above its Curie point.

4. A safety mechanism for a fluid fuel burner comprising a valve biased to closed position, holding means comprising a magnet and armature for retaining the valve open against its bias, and a member of Curie point metal associated with said magnet and armature for shunting the flux from said magnet as long as said member is below its Curie point.

5. A safety mechanism for a fluid fuel burner comprising a control device biased to a fuel flow preventing position, holding means comprising a magnet and armature for retaining the control device in a fuel flow permitting position against its bias, and a member interposed between said magnet and armature for preventing said magnet from retaining said armature as long as said member is below a predetermined temperature.

6. A safety mechanism for a fluid fuel burner comprising a control device biased to a fuel flow preventing position, holding means comprising a horseshoe magnet and armature for retaining the control device in a fuel flow permitting position

against its bias, and a member of Curie point metal interposed between said magnet and armature and into which the poles of said magnet extend, said member being effective to shunt the flux from said magnet as long as said member is below its Curie point.

7. A safety valve for a fluid fuel burner comprising in combination a valve casing and a magnet casing, an armature in said valve casing operatively connected to a valve member, a magnet in said magnet casing, and a member of Curie point metal interposed between said magnet casing and said valve casing and constituting a gas-tight seal between the valve casing and the magnet casing, said member of Curie point metal acting to shunt the flux from said magnet as long as said member is below its Curie point.

8. A safety valve for a fluid fuel burner comprising in combination a valve casing and a magnet casing, an armature in said valve casing operatively connected to a valve member, a magnet in said magnet casing, and a member of Curie point metal interposed between said magnet casing and said valve casing and constituting a gas-tight seal between the valve casing and the magnet casing, said member of Curie point metal acting to shunt the flux from said magnet as long as said member is below its Curie point, and means associated with said member of Curie point adapted to extend beyond said valve and magnet casings into the path of a pilot flame to heat said member above its Curie point and permit said magnet to retain said armature.

9. A safety valve for a fluid fuel burner comprising in combination a valve casing and a magnet casing, an armature in said valve casing operatively connected to a valve member, a magnet in said magnet casing, and a member of Curie point metal interposed between said magnet casing and said valve casing, said member of Curie point metal acting to shunt the flux from said magnet as long as said member is below its Curie point.

10. A safety valve for a fluid fuel burner comprising in combination a valve casing and a magnet casing, an armature in said valve casing operatively connected to a valve member, a horseshoe magnet in said magnet casing and a member of Curie point metal interposed between said magnet casing and said valve casing, said member surrounding the poles of said magnet and constituting a gas-tight seal between the valve casing and the magnet casing and said member of metal acting to shunt flux from said magnet as long as said member is below its Curie point.

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