April 25, 1939. L. F. WHITNEY 2,155,880

THERMOSTATICALLY CONTROLLED VALVE

Filed July 20, 1937

Fig. 1.

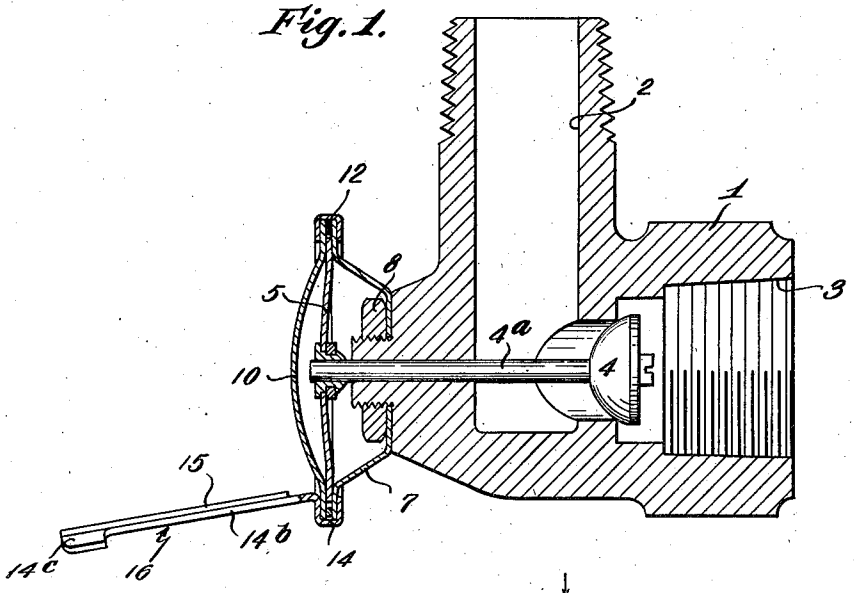


Fig. 3.

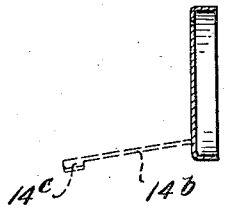


Fig. 4.

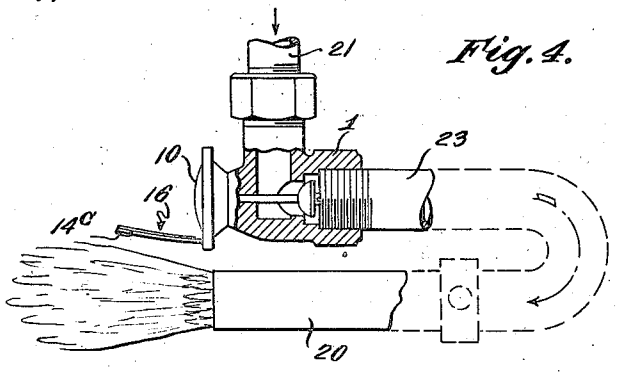


Fig. 2.

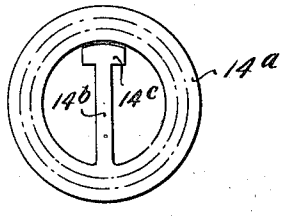
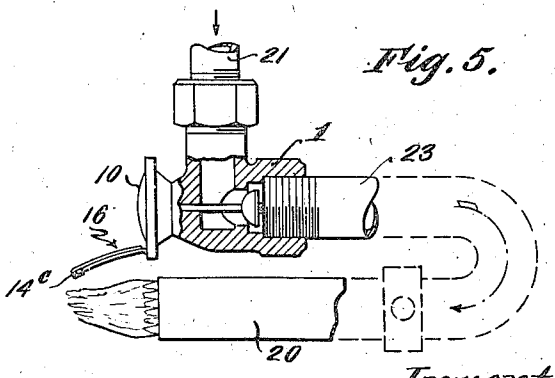


Fig. 5.



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THERMOSTATICALLY CONTROLLED VALVE

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Application July 20, 1937, Serial No. 154,538

7 Claims. (Cl. 158—117.1)

This invention relates to safety devices for burners and more particularly to such a device which is automatically operable to interrupt the supply of fuel to a burner such as a gas burner, should the flame become extinguished.

Heretofore thermostatic devices having an abrupt or snap action have been employed to shut off a gas controlling valve to interrupt the flow of gas to a burner. Such devices are often of the snap-disk type. It has proven difficult, however, to arrange such devices to operate satisfactorily, if the amount of gas normally being supplied to the burner varies widely and the size and shape of the flame consequently varies considerably. Devices of this character have generally been provided with heat conductors extending into the neighborhood of the flame. If, however, the flame became very small, there was a possibility that the device would act to close the controlling valve although the flame had not been extinguished, thus the supply of heat to the apparatus being warmed was needlessly interrupted and unnecessary attention upon the part of the user of the device was required. On the other hand, if the flame became very large and flared outwardly from the burner jet, such a heat conductor might be subject to rapid deterioration and would in any case tend to absorb a substantial amount of heat from the flame, thus cooling the latter and somewhat impairing the efficiency of the burner.

It is an object of the present invention to provide a heat conductor associated with an abrupt acting thermostatic device so that the conductor tends to maintain a more or less constant spacing from the flame of the gas burner despite variations in the size of that flame. To this end I prefer to provide a heat conductor in the form of a bimetallic element which is distortable in response to temperature changes so that the element may tend to distort away from a hot, relatively large flame and may tend to move inwardly toward a small flame. Preferably one of the metallic portions of such an element may be integral with a retaining ring which is associated with the abruptly acting thermostat, while the other metallic portion of the bimetallic element may be secured to the first-named portion by any suitable means.

In the accompanying drawing:

Fig. 1 is a central sectional view of a safety device constructed in accordance with this invention;

Fig. 2 is a plan view of a blank which may be employed in making a portion of such a device;

Fig. 3 is a central sectional view of such a blank in its partially formed state;

Fig. 4 is a side elevation of a burner assembly with which my safety device may be combined showing the condition of the parts when there is a relatively large flame issuing from the burner, parts being shown in section and in dotted lines; and

Fig. 5 is a similar view but showing the device when only a relatively small flame is issuing from the burner.

In accordance with the present invention, an abruptly acting thermostatic element may be arranged to control a valve in a fuel line, such as a gas pipe, and a heat conductor is arranged effectively to conduct heat to the thermostatic element whether the flame which issues from the gas burner supplied by the fuel line is relatively large or small.

Such a device may comprise a valve casing 1 with an inlet passage 2 and an outlet passage 3, a valve 4 being engageable with a suitable seat between these passages thus to prevent the flow of gas or the like when closed. The valve 4 is provided with a spindle 4a which is connected to the intermediate part of a bimetallic disk 5. This disk may be formed of two component disks welded or otherwise secured together, materials such as iron or brass which have different coefficients of expansion being employed, for example, for this purpose.

The disk 5 is normally somewhat dished so that the component part having the high coefficient of expansion is on the concave side, i. e., toward the valve 4. When the temperature of the disk is raised substantially, the disk therefore tends to flatten and suddenly snaps so that it is dished in the opposite direction, thus opening the valve. When the temperature of the disk thereafter is substantially reduced, the disk will snap back to its normal shape, thus closing the valve.

The edge of the disk 4 engages a cup-like member 7 which is held against the valve casing 1 by a retaining nut 8, and a cap member 10 overlies the edge of the disk, while a spacing washer 12 is disposed between the flanged edge of the cup member 7 and the corresponding edge of the cap member 10.

A suitable retaining ring 14 is disposed in clamping position about the flange of the cap member and the cup 7. This ring may be conveniently formed, as by a spinning operation, from somewhat ductile sheet metal. For example, the ring may be formed from a blank 14a (Fig. 2) including an annular portion and a dia-

metrically disposed part 14b having an enlarged end 14c spaced from the adjoining portion of the ring by a nominal clearance. When the ring is partially formed, it may have the shape shown in Fig. 3, being provided with a continuous annular flange affording a cylindrical surface concentric with the axis of the ring. Thereafter the edge of this flange may be formed over the marginal portion of the cup member 7, as shown in Fig. 1, and the part 14b may be bent outwardly at a substantial angle to the plane of the remainder of the ring. Thus the member 14b provides part of a suitable heat conducting element 16. This element may, however, be bimetallic, including not only the part 14b but also a metallic strip 15, the parts 14b and 15 having quite different coefficients of thermal expansion.

As shown, for example, the ring 14 and its integral extension 14b may be formed of metal having a relatively high coefficient of expansion such, for example, as brass, while the strip 15 may be formed of a metal having a substantially lower coefficient of expansion such, for example, as iron. The strip 15 may be secured to the part 14b by any suitable means, such as brazing, welding or riveting.

In use a device of this character may be associated with a gas burner 20 of any suitable type, the inlet passage 2 being connected to a gas supply line 21 and the outlet passage 3 communicating with a duct 23 which is connected to the burner 20. When it is desired to start a burner of this type in operation, the cap portion 10 of the device may be heated in any suitable way, as by a match, to cause the thermostatic disk to snap into a position wherein its convex portion is toward the valve 4, thus opening the valve and permitting gas to flow to the tip of the burner 20. Thereupon the heat from the flame at the burner tip is effective in causing the disk to retain this form and the valve to remain in its open position.

The member 16 is then effective in conducting heat to the ring 14 and thence to the disk 5, it being evident that the enlarged portion 14c of the bimetallic conductor 16 is particularly effective in absorbing heat radiated from the neighboring flame. Since, however, the heat conductor 16 is bimetallic, and readily distortable under heat, this member will tend to distort away from the flame as the size of the flame increases, this position of the parts being shown in Fig. 4. When, however, the quantity of gas being supplied to the burner is materially reduced, the bimetallic element tends to distort to the position indicated in Fig. 5, so that its outer end including the part 14c is maintained in proper juxtaposition to the flame and in a position, for example, which might result in direct contact with a large flame were the member 16 not distortable. It is thus evident that the member 16 is effective in absorbing heat from the flame and conducting the same to the thermostatic disk 5 despite wide variations in the size of the flame. Accordingly, even when there is only a small flame issuing from the jet 20 the conductor causes the thermostatic disk 5 to be warm enough to hold the valve 4 in open position, while, when there is a comparatively large, flared flame, the end of the conductor 16 is moved away from the flame, so that the metal thereof is not melted away and so that the flame is not substantially cooled by direct contact with the conductor.

It is evident, therefore, that the present invention affords a simple dependable safety device which is operative to prevent the flow of fuel to a burner which is cold, but which insures the maintenance of the fuel control valve in open position despite wide variations in the size of the flame, and that the device operates without danger of damage to the conductor when there is a large flame.

I claim:

1. A device of the type described comprising a valve casing, a valve movable into engagement with a seat in the casing, an abruptly acting thermostat for moving the valve into and out of engagement with the seat, and a heat conductor to conduct heat from an adjoining flame to the thermostat, said conductor including a part of the type tending to move away from the flame as the heat of the flame increases and tending to move toward the flame as the heat of the flame decreases.

2. A device of the type described comprising a valve casing, a valve movable into engagement with a seat in the casing, an abruptly acting thermostat for moving the valve into and out of engagement with the seat, and a heat conductor to conduct heat from an adjoining flame to the thermostat, said conductor being a bimetallic element which will distort away from a flame as the heat of the same increases.

3. A device of the type described comprising a valve casing, a valve movable into engagement with a seat in the casing, and an abruptly acting thermostat for moving the valve into and out of engagement with the seat, and a bimetallic heat conductor to conduct heat from an adjoining flame to the thermostat.

4. A device of the class described comprising a valve casing, a valve movable into engagement with a seat in said casing, a thermostatic disk connected to the valve to move the same into and out of engagement with said seat, a retaining ring secured about the periphery of said disk and an integral strip extending from said ring, said strip forming one element of a bimetallic heat conductor which may be distorted away from a comparatively hot flame and toward a comparatively small flame.

5. A device of the class described comprising a valve casing, a valve movable into engagement with a seat in said casing, a thermostatic disk connected to the valve to move the same into and out of engagement with the seat, a cup-like member secured to the valve casing and providing a peripheral flange engaging a marginal surface of the disk, a cap extending over the disk and having an edge portion engaging the opposite marginal surface of the disk, a spacing ring disposed concentrically about the disk between said flange and the edge portion of the cap, an annular clamping ring having flanges respectively engaging the flange of the cup-like member and the edge of the cap, and a bimetallic conductor comprising a strip integral with the clamping ring and a second strip having a different coefficient of thermal expansion which is secured to the first-named strip, said conductor being distortable in response to temperature changes so that it may be distorted away from a comparatively hot flame and toward a comparatively small flame.

6. The combination comprising a burner, a fuel supply line, a valve casing for receiving fuel from said line, a fuel duct extending from the casing to the burner, a valve in said casing engageable with a seat therein to prevent the flow

of fuel from said line to said duct, a thermostatic disk operatively connected to said valve to cause the same to engage the seat or move away from the same, and a heat conductor extending in generally parallel relation to the axis of a flame emitted from said burner, said conductor being a bimetallic element which distorts toward the flame when the same is comparatively small and distorts away from the flame when the same is comparatively large.

7. The combination comprising a burner, a fuel supply line, a valve casing for receiving fuel from said line, a fuel duct extending from the casing to the burner, a valve in said casing engageable with a seat therein to prevent the flow of fuel from said line to said duct, a thermostatic disk operatively connected to said valve to cause the same to engage the seat or move away from the same, a retaining ring disposed about said disk, and a heat conductor extending in generally parallel relation to the axis of a flame emitted from said burner, said conductor being a bimetallic element including a part integral with the ring, said conductor distorting toward the flame when the same is comparatively small and distorting away from the flame when the same is comparatively large.

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