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SAFETY PILOT

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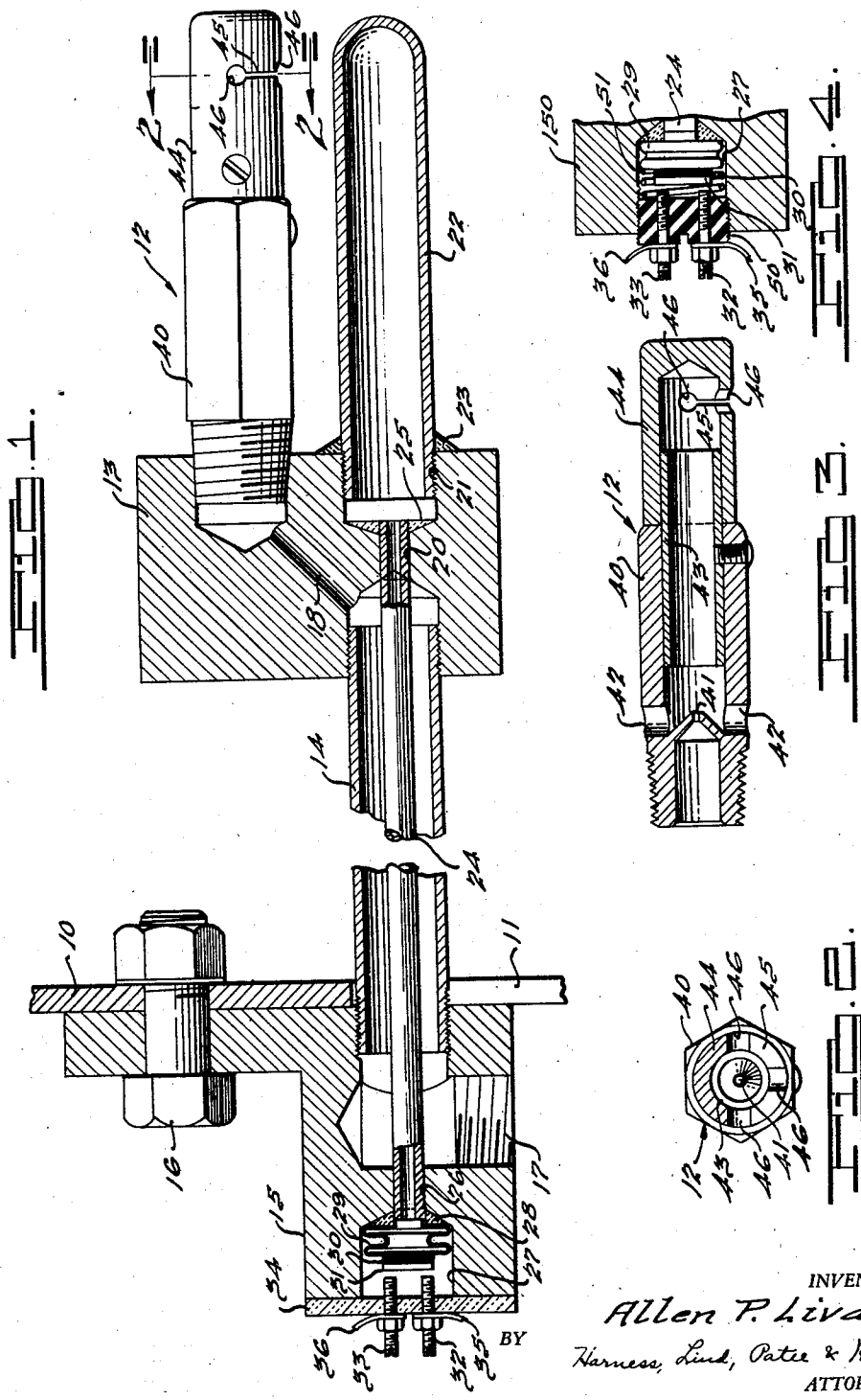

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SAFETY PILOT

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1 Claim. (Cl. 158—117.1)

My invention relates to pilot devices for fuel burning appliances, having particular reference to gas burning appliances although the invention is adaptable to pilot devices utilizing a gaseous fuel for igniting liquid fuel burning appliances.

An object of the present invention is to provide a safety pilot device which will react rapidly to the ignition of the pilot flame or to the extinguishing of the pilot flame, periods of reaction of the safety pilot device being well within limits imposed by such inspecting bodies as the American Gas Association and the Underwriters' Laboratories, Inc.

A primary object of the present invention is to provide a combination pilot burner and safety switch operator to replace the commonly used separate units, the entire combination of my invention being capable of fabrication at a total cost far less than the cost of fabrication of separate pilot devices and safety switch operators now known to me.

A further object of the present invention is to provide a combination pilot burner and safety switch operator which may be easily assembled with a heating appliance and quickly removed for inspection.

A further object of the present invention is to provide a combination pilot burner and safety switch operator containing only one moving element, whereby fatigue failures and mechanical failures are substantially eliminated.

A further object of the present invention is to provide a pilot burner and safety switch operator, wherein the cooling action of the gaseous fuel flowing through the pilot burner upon extinguishment of the pilot flame causes rapid reaction of the safety switch operator to close the fuel valve or other device controlled by the safety switch.

These and other objects and advantages of the present invention may be more fully understood by reference to the accompanying drawing and following specification wherein a preferred embodiment of the present invention is illustrated and described.

In the drawing,

Fig. 1 is a vertical, longitudinal section through a device of the present invention;

Fig. 2 is a vertical cross-section through a portion of a preferred form of pilot burner taken substantially along line 2—2 of Fig. 1;

Fig. 3 is a longitudinal section taken through the preferred pilot burner; and

Fig. 4 is a vertical, longitudinal section through a modification of a portion of the apparatus.

The drawing illustrates a portion of the wall 10 of a fuel burning appliance having an opening 11 therethrough through which the portion of the assembly to be enclosed within the casing may be inserted. The assembly comprises a pilot burner 12 mounted in a holder 13 adapted to be attached to the end of a fuel supply tube 14 projecting from a mounting block 15 fastened to the wall 10 by a bolt 16. The tube 14 communicates with a threaded opening 17 adapted to receive the end of a pipe leading to the source of fuel supply, and communicates at its other end with the interior of the pilot burner through a passage 18 drilled through the holder 13 at a diagonal to the axis of the tube 14 so that the pilot burner 12 may extend horizontally above the axis of the tube 14. An opening 20 is drilled through the holder 13 axially of the tube 14 and communicates with a threaded opening 21 extending into the opposite side of the holder 13 from that side to which the tube 14 is fastened. A capsule 22, having its open end threaded, is screwed into the opening 21 and sealed thereto as by means of tinning the threads or applying a fillet 23 of solder or the like. A length of fine tubing 24 having an internal diameter of the order of several thousandths of an inch and preferably having a very thin wall extends through the opening 20 and has its end sealed to the inner end of the opening 21 as by means of a fillet 25 of solder or the like. The free end of the tubing 24 extends through an opening 26 in the outer wall of the mounting block 15 into a bore 27, and is sealed thereto as by means of a fillet 28 of solder or the like. The outer end of the tubing 24 is also sealed to a small flexible metallic bellows 29 communicating with the bore of the tubing 24 and mounted in the bore 27. The end cap of bellows 29 carries an insulating plate 30 upon which is mounted a switch plate 31. The plate 31 is adapted to strike contact points 32 and 33 preferably threaded into an insulating cap 34 for adjustable movement lengthwise of the bore 27. The contacts 32 and 33 are fastened to wires 35 and 36, respectively, which lead to the fuel valve or other mechanism intended to be operated by the safety switch.

A preferred form of pilot burner is illustrated, but it should be evident to those skilled in the art that other forms may be utilized. The pilot burner comprises a body member 40 having a fuel injection orifice 41 surrounded by air inspirating ports 42. The body 40 carries a short

length of tubing 43 upon which is mounted the tip member 44 which is provided with a vertical slot 45 joining a plurality of ports 46, at least one of which is preferably directed so as to project a tongue of flame against a portion of the capsule 22.

The capsule 22, tubing 24, and bellows 29 provide a sealed enclosure within which is sealed an expansible fluid adapted upon being heated to extend the bellows 29 so as to cause the switch plate 31 to bridge the gap between contacts 32 and 33, and upon cooling to permit contraction of the bellows so as to open the switch circuit. Preferably the capsule 22 is formed of heat resisting steel and the interior space is filled with an inert gas such as nitrogen or the like. In order to facilitate manufacture, the interior surface of the capsule, particularly that portion adapted to be heated to a high degree by the pilot flame impinging thereon, is treated to be rust resistant, such as by "Parkerizing," or any similar process designed to provide a coating of metallic salts on the surface of the steel so as to prevent oxidation thereof. This eliminates the necessity for using an inert gas and the interior space may be filled with ordinary air at atmospheric pressure (or at higher or lower pressures if desired) or with air and a quantity of water to form steam. If facilities are available the interior space may be filled with absolutely dry air without treating the interior surface of the capsule since the presence of moisture is absolutely necessary for the formation of rust. Any expansible gas or liquid may be used provided that the quantity of fluid sealed within the interior space is not subject to reduction, such as by oxidation or other chemical reactions, or by absorption of the fluid into the metal walls.

A modification of the invention is disclosed in Fig. 4 wherein it is seen that the bore 27 in the mounting block 15 is threaded to receive a plug 50 of insulating material, such as hard rubber or the like, within which the contacts 32 and 33 are mounted. The plug 50 is adapted to be adjusted longitudinally of the bore 27 to compress to a greater or lesser extent a spring 51 bearing against the end of the plug and the end of the bellows 29. Equal adjustment of the two contacts may be accomplished by turning the plug 50, and alteration of the range of operation of the switch device is likewise accomplished by changing the degree of compression of the spring 51. A further advantage is that positive action of the bellows 29 in a collapsing direction is further assured.

It is to be noted that the tube 24 is enclosed within the tube 14 so that danger of burning or overheating the walls of the tubing is eliminated, and also so that the principal length of the tubing will be constantly surrounded by a stream of gas at a constantly cool temperature so as to eliminate variations in reaction time which might be caused by heating the walls of the tubing. It is also to be noted that the cooling action of the gas surrounding the tubing 24 and of the jet of gas projected against the capsule 22 when the pilot flame is extinguished is such as to hasten collapsing of the bellows 29 and opening of the safety switch circuit.

It should be apparent to those skilled in the art that modifications in arrangement and detail may be readily achieved. All such modifications as come within the scope of the following claim are to be considered a part of my invention.

I claim:

A safety pilot assembly for a fuel burning appliance comprising a holder formed with an aperture, a pilot burner mounted in said aperture and extending outwardly therefrom, a thermostatic element mounted in the holder in spaced relation to the pilot burner and adapted to be heated by flames generated in the burner, a fuel supply tube having one end connected to the holder, said holder being provided with a duct communicating with both said pilot burner and said supply tube, a length of fine tubing positioned within the supply tube and communicating at one end with the interior of the thermostatic element, a block member spaced from said holder and formed with one aperture receiving the other end of the supply tube and with a second aperture for receiving a main supply pipe, and an extensible pressure responsive element positioned in the block and connected with the opposite end of the length of fine tubing.

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