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SWITCH

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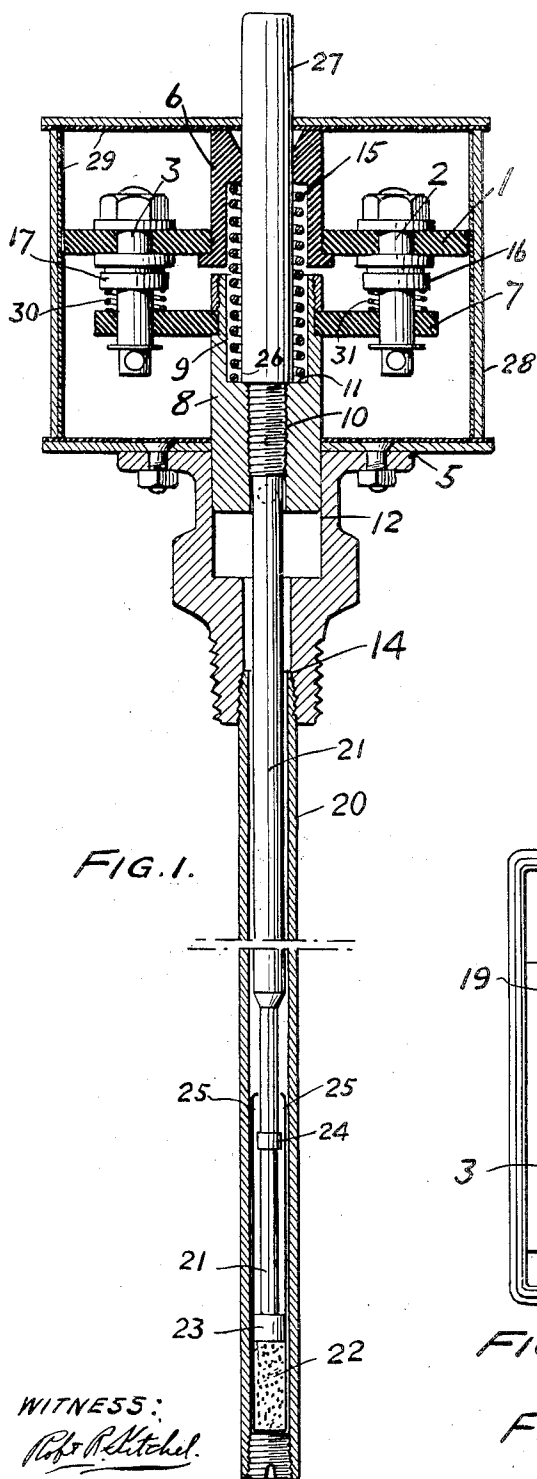


FIG. 1.

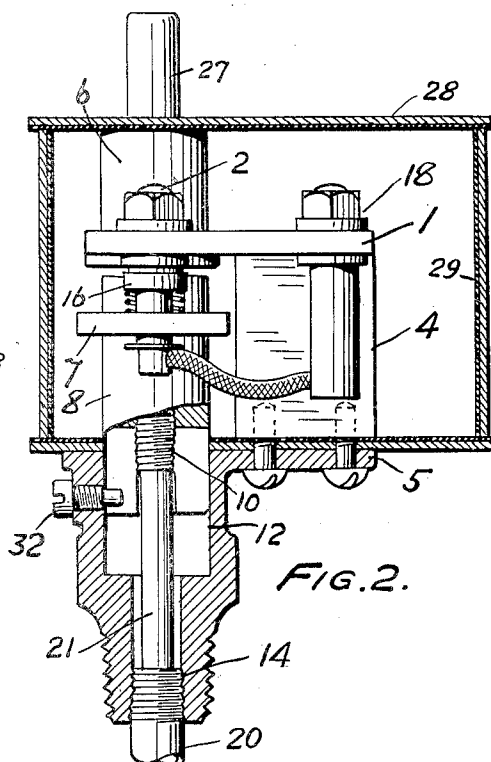


FIG. 2.

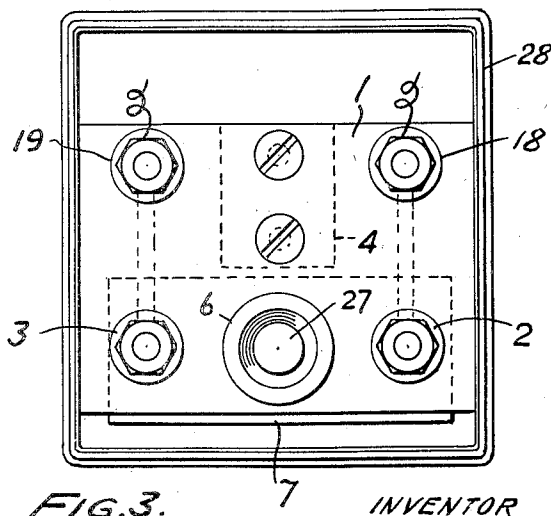


FIG. 3.

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SWITCH

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4 Claims. (Cl. 200—142)

Objects of the present invention are: to provide a cut-out or circuit breaker for the purpose indicated and which shall be simple in construction and efficient and reliable in operation; to prevent premature action of the switch due to slight softening of the fuse device and yet to insure prompt action of the cut-out when the fuse reaches the temperature at which it is intended to soften; to provide for ready removal of the fuse device without interfering with the parts of the cut-out or circuit and in such a way that when the fuse is removed the circuit to the heater is broken; and to provide a cut-out or circuit breaker adapted for universal application or use.

Other objects of the present invention will appear from the following description at the end of which the invention will be claimed.

Stated generally, the invention comprises a fixed contact member, a non-rotatable and movable contact member spring pressed to interrupt the circuit and provided with a tapped orifice; a well or tube for immersion in water heated by said circuit; a temperature responsive fuse device in the well; a rod arranged in the well and connected with the fuse device and having threaded engagement with the tapped orifice and extending outside of the circuit breaker and removable therefrom and from the well for the renewal of fuses while the circuit is open.

The invention also comprises the improvements to be presently described and finally claimed.

In the following description reference will be made to the accompanying drawing forming part hereof and in which:

Fig. 1 is a transverse sectional view of a cut-out or circuit breaker and embodying features of the invention;

Fig. 2 is a sectional view of the same taken at right angles to the section of Figure 1; and

Fig. 3 is a top or plan view with the cover removed.

Referring to the drawing, 1 indicates a fixed carrier of insulating material having a pair of fixed contacts 2 and 3. The carrier or block 1 is supported by a bracket 4 secured to the base 5. The contacts 2 and 3 are interposed in the line, or more accurately each to one wire of the line, which supplies current for heating the elements in the water heater or any fluid heating device not shown because too well understood to require illustration or description. 6 indicates a tubular socket connected with the carrier 1 and fixed in respect thereto. 7 is a movable carrier provided with a hub 8 having a tubular socket 9 and a tapped orifice 10. The socket 9 is provided at its

bottom with a shoulder 11. The hub is guided by a receptacle 12 provided for that purpose in the sleeve of the base 5. The base is also provided with a tapped opening 14 so that there is a sleeve structure. 15 is a spring arranged in the socket and tending to push the carrier 7 and hub 8 away from the carrier 1. The feather and groove connection 32 (Figure 2) permits endwise movement of the hub and opposes turning movement of the hub. The carrier 7 is provided with contacts 16 and 17 mounted upon springs and having substantially flat faces for engaging the flat faces of the contacts 2 and 3. The contacts 16 and 17 are connected with binding posts 18 and 19 which are connected with the line or source of current. 20 is a well or tube having a closed end and it depends from the base 5 for immersion into water which is heated by the circuit passing through the emergency cut-out or circuit breaker. 21 is a rod extending through the socket 6, the hub 8, through the spring 15, and through the base 5 and into the well or tube 20. The rod 21 is threaded for engagement with the tapped orifice 10 and in that way is connected with and disconnected from the hub 8 and parts carried thereby. 22 is a temperature responsive fuse arranged at the bottom of the well and it includes a piston 23 loose enough to permit of the passage of the material of the fuse when the latter is melted. The rod 21 is seated on the piston 23 and it is provided with a head 24 which in connection with the spring fingers 25 serves to attach the fuse device to the rod. The rod is enlarged as at 26 to cooperate with the bottom of the socket 9 as a stop and the end of the rod 27 extends outside of the housing 28 of the cut-off or circuit breaker. 29 is an insulating lining for the housing and the cover of the housing may be detachable for the purpose of installation and repairs.

The mode of operation of the circuit breaker or cut-out above described may be explained as follows: As illustrated in Figure 1 the circuit is closed and current from the line reaches the heating unit of the water heater through the contacts 2 and 16 and 3 and 17 so that both sides of the circuit are closed. The well or tube 20 is immersed in water heated by the heating unit. The contacts are held closed by the fuse 22, the piston 23, the rod 21 having screw threaded engagement with the hub 8 against the force of the springs 15, 30 and 31. When the water in which the tube or well 20 is immersed reaches a temperature which it is not desired to exceed and at which the fuse device softens or becomes fluid, the force of the spring 15 pushes the carrier 7

and parts connected therewith downward, and the material of the fuse device flows upward past the piston 23. This action takes place with a positive movement so that both sides of the line are broken cutting off current from the heating unit and preventing further heating of the water. In this connection it may be remarked that no hot water is wasted as is the case where use is made of a drain or spillway through a conventional relief valve and no current is wasted because the circuit is interrupted. If by any chance the fuse should soften a little below the temperature at which it is intended to fuse or if it should soften for any reason not sufficiently to pass the piston the rod 21 may be slightly depressed but the springs 30 and 31 interposed between the contacts 16 and 17 and the carrier 7 maintain the circuit. In this way premature opening of the circuit is prevented. To service or reset the device the exposed end 27 of the rod is rotated thus unscrewing it from the hub 8 so that the rod and the fuse can be pulled out of the device for the application of a new fuse, and while this is being done the circuit is broken and none of its wire need be disconnected nor any part of the device disturbed. After a new fuse device has been attached to the rod it is again inserted into the circuit breaker or cut-out and its thread made to engage with the thread of the hub 9 so that with the fuse resting on the bottom of the tube or well, the hub 8, carrier 7 and contacts 16 and 17 are lifted until the latter again engage or contact with the contacts 2 and 3. Contacts 16 and 17 are loosely mounted in carrier 7 so that they will always make up flat against contacts 2 and 3. This is to insure a good electrical contact between said contacts. It will be evident that the composition and character of the fuse controls the speed of action of the circuit breaking mechanism, so that by changing the same the speed of action can be increased, for example, for use with direct current, and decreased for use with alternating current.

It will be obvious to those skilled in the art to which the invention relates that modifications may be made in details of construction and arrangement and in matters of mere form without departing from the spirit of the invention which is not limited in respect to such matters or otherwise than as the prior art and the appended claims may require.

I claim:—

1. In a temperature responsive emergency circuit breaker or cut-out for electric fluid heaters, a fixed contact carrier having a pair of contacts, a non-rotatable movable carrier having a pair of contacts and spring pressed to separate said pairs of contacts, and provided with a tapped orifice, a well for immersion in fluid heated by

the heater and closed at its outer end, a temperature responsive fuse freely insertable in and removable from the well, and a rod arranged in the well and connected with the fuse for compression and having threaded engagement with the tapped orifice and extending outside of the circuit breaker and removable therefrom and from the well for the renewal of fuses while the circuit is open and insertable into the circuit breaker for closing the contacts.

2. A temperature responsive emergency circuit breaker for electric fluid heaters comprising, two pairs of contacts of which one pair is spring pressed and is arranged for linear motion in respect to the other, a well having a closed bottom and adapted for immersion in fluid heated by the heater, a rod having at one end a fuse device upon which it is spring pressed, said fuse device being responsive to temperature and seated at the bottom of the well, and the other end of said rod accessible from the exterior of the circuit breaker, and said rod having screw threaded connection with the spring pressed pair of contacts to put and hold them in closed position and to permit of withdrawal and insertion of the rod and fuse.

3. A temperature responsive emergency circuit breaker for electric fluid heaters, comprising a fixed carrier having a pair of contacts, a movable non-rotatable carrier spring pressed away from the fixed carrier and provided with a pair of contacts, a well having a closed end and aligned with the tapped orifice and adapted for immersion in fluid heated by the heater, and a rod having one of its ends accessible and its other end provided with a fuse device responsive to temperature and sealed on the bottom of the well, the intermediate portion of the rod being threaded for engagement with the tapped orifice.

4. A temperature responsive emergency circuit breaker for electric fluid heaters comprising, a housing, a fixed carrier supported by the housing and having a tubular socket and contacts, a movable carrier provided with contacts and with a hub having a tubular socket providing at its bottom a shoulder and a tapped orifice, a spring in said sockets, a sleeve attached to the base of the housing and in which the hub is guided, a feather and groove connection between the sleeve and hub, a well having a closed bottom and dependent from the sleeve for immersion in fluid heated by the heater, and a rod projecting from the housing and extending through said sockets and through the spring and through the sleeve and into the well and having a temperature responsive fuse at the bottom of the well, there being a shoulder on the rod which with the shoulder at the bottom of the socket provides a stop.

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