

Nov. 20, 1934.

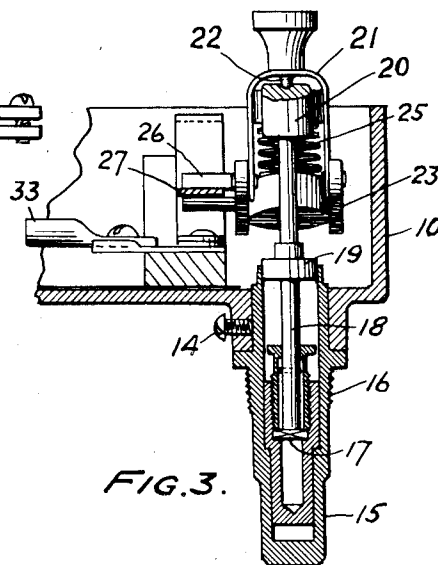
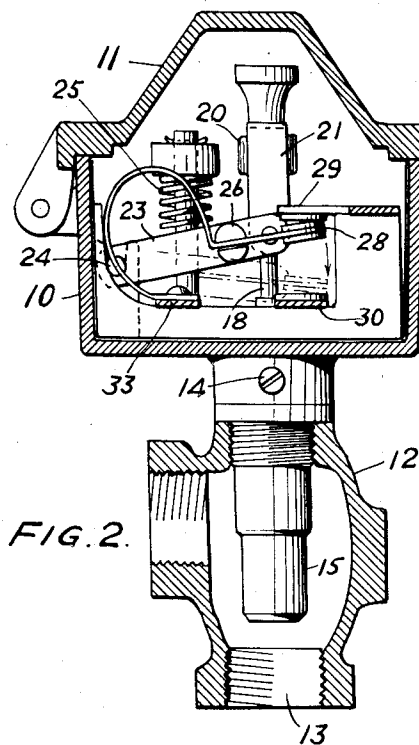
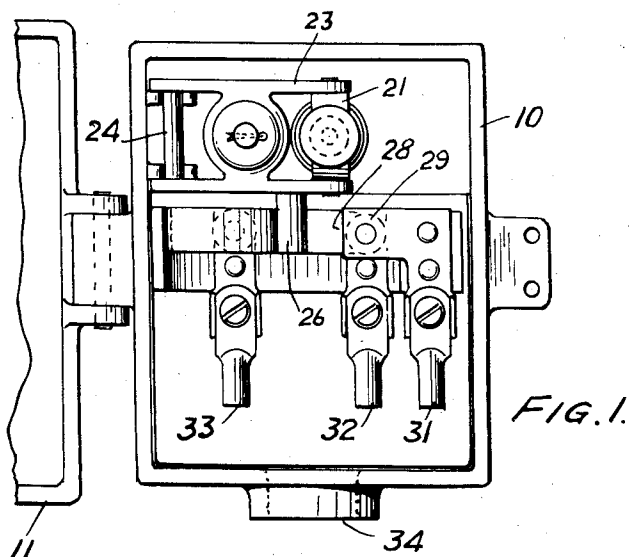
F. W. WERRING

1,981,484

FLUID TEMPERATURE LIMITING ELECTRIC CUT-OUT DEVICE

Filed Nov. 10, 1931

3 Sheets-Sheet 1



INVENTOR

WITNESS:

W. R. Mitchell

Francis W. Werring

BY

Augustus B. Stoughton
ATTORNEY.

Nov. 20, 1934.

F. W. WERRING

1,981,484

FLUID TEMPERATURE LIMITING ELECTRIC CUT-OUT DEVICE

Filed Nov. 10, 1931

3 Sheets-Sheet 2

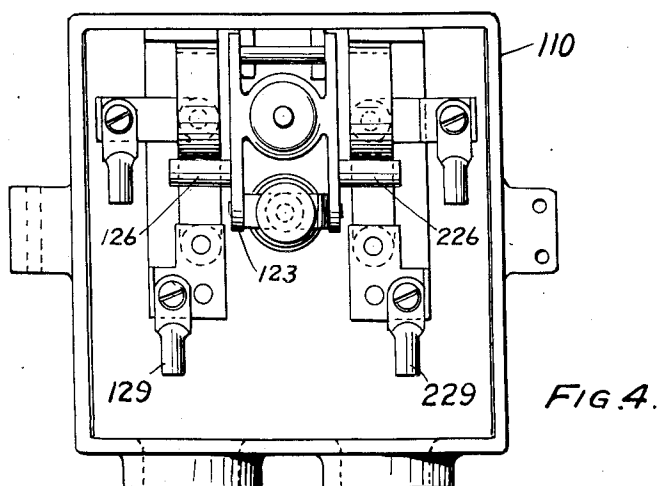


FIG. 4.

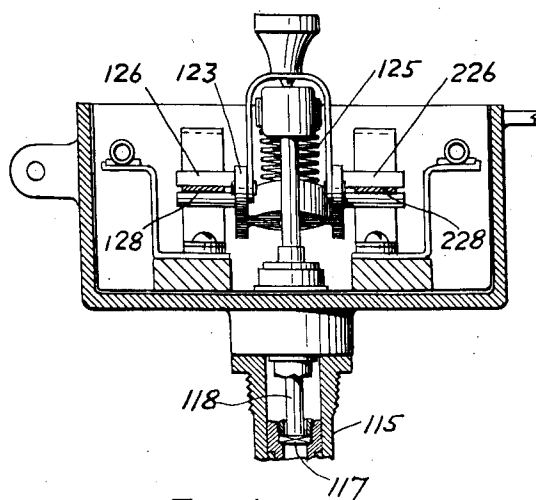


FIG. 5.

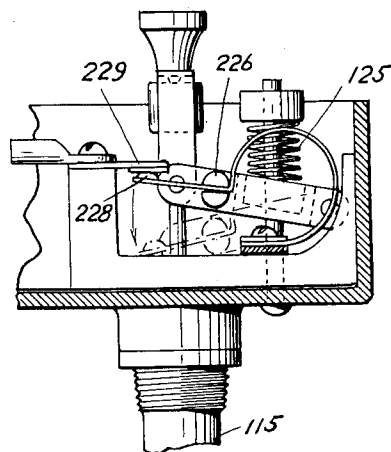


FIG. 6.

WITNESS:

Robert R. Litchell

INVENTOR

Francis W. Werring

BY

Augustus V. Stoughton
ATTORNEY.

Nov. 20, 1934.

F. W. WERRING

1,981,484

FLUID TEMPERATURE LIMITING ELECTRIC CUT-OUT DEVICE

Filed Nov. 10, 1931

3 Sheets-Sheet 3

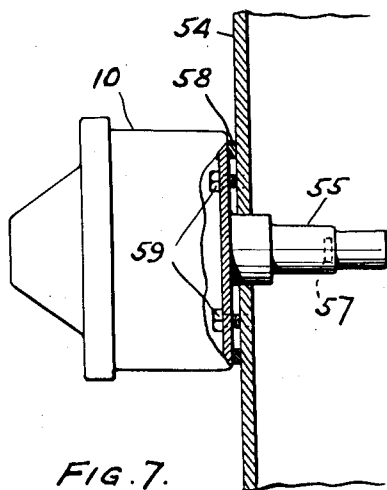


FIG. 7.

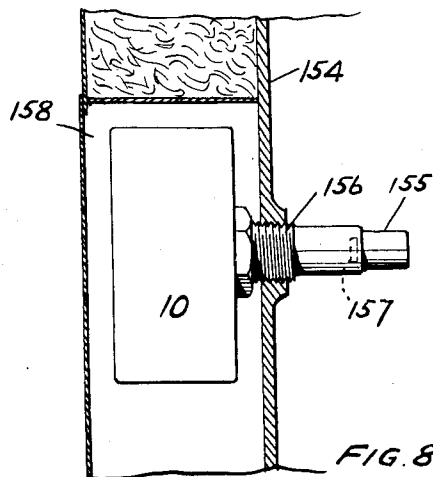


FIG. 8.

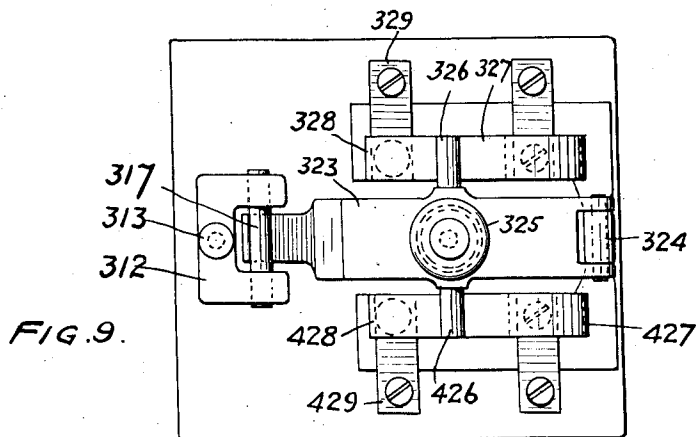


FIG. 9.

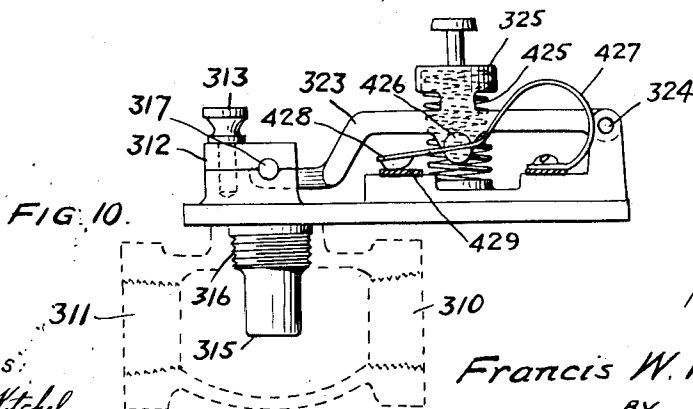


FIG. 10.

WITNESS:

W. R. Mitchell

INVENTOR

Francis W. Werring

BY

Augustus B. Loughborough
ATTORNEY.

UNITED STATES PATENT OFFICE

1,981,484

FLUID TEMPERATURE LIMITING ELECTRIC
CUT-OUT DEVICEFrancis W. Werring, Philadelphia, Pa., assignor
to Kitson Company, Philadelphia, Pa., a cor-
poration

Application November 10, 1931, Serial No. 574,150

4 Claims. (Cl. 200—142)

The subject of my invention is a safety device for water heaters operated by or with electricity which provides a means whereby upon excessive temperature of the fluid passing therethrough an electric switch is caused to operate. My device consists essentially of a fusible element, means for conducting heat to said fusible element, a member movable upon the melting of said fusible element, a stationary contact, a movable contact cooperating with said stationary contact, and means for stressing said movable contact and said member against said fusible element.

As a more specific modification my device may include a casing having a passage for fluid there-
through, an immersion tube of heat conductive material in said passage, a fusible element in said immersion tube, a member movable upon the melting of said fusible element, a stationary contact, a movable contact cooperating with said stationary contact, a detachable connection between said member and said movable contact, and means for stressing said movable contact and said member against said fusible element.

For a further exposition of my invention reference may be had to the annexed drawings and specification at the end whereof my invention will be specifically pointed out and claimed.

In the drawings,

Figure 1 is a plan view of my device with the cover lifted away.

Figure 2 is an elevation of my device with parts broken away.

Figure 3 is a side view of a detail of my device with parts broken away.

Figure 4 is a plan view of a modified form of my device.

Figure 5 is an elevation of the same modification with parts broken away.

Figure 6 is a detail view of a portion of the same modification with parts broken away.

Figure 7 is a side view of another modification with parts broken away.

Figure 8 is a side view of yet another modification with parts in cross section.

Figure 9 is a plan view of still another modification.

Figure 10 is a side elevation of the modification shown in Figure 9.

In the modification of my invention chosen for illustration in Figures 1, 2 and 3 of the drawings, my device is shown as consisting of a casing 10 which includes a hinged cover 11 attached thereto and a conduit 12 having a passage 13 which serves as a conduit for fluid through a portion of the casing. Conduit 12 may be detachably secured to

casing 10. Projecting from casing 10 into conduit 12 I provide an immersion tube 15 which may, if desired, be provided with external screw threads 16 which serve for the attachment of conduit 12. Immersion tube 15 serves as a means for conducting heat to fusible element 17 and is connected to casing 12 by screw 14 or other readily detachable means. Within the immersion tube 15 I provide a fusible element 17 shown in the form of a disk of metal having a low melting point. Resting upon disk 17 I provide a member 18 which has a guide 19 thereon carried in the upper part of immersion tube 15. Member 18 carries at its upper end a head 20, as is best seen in Figure 3, which may conveniently be made of insulating material.

Cooperating with head 20 is a yoke 21 carrying a projection 22 thereon which may be received in an indentation in the upper part of head 20. Yoke 21 is pivotally mounted on a pivotal arm 23 which is carried on a suitable pivot 24 in casing 10. Pivotal arm 23 is stressed by a spring 25 so that member 18 bears on fusible element 17.

At one side pivotal arm 23 carries fingers 26 which embrace a curved spring 27 which in turn carries a movable contact 28. Fingers 26 loosely engage spring 27 to provide for lost motion therebetween. Spring 27 is tensioned so that it places stress on member 18 through pivotal arm 23. Contact 28 is connected into circuit to cooperate with either upper stationary contact 29 or lower stationary contact 30. Electric lead wires are connected to stationary contacts 29 and 30 and movable contact 28 by means of connections 31, 32 and 33 respectively. Casing 10 is provided with an outlet 34 to permit the escape of the wires.

In practice my device may be connected so that the conduit 12 forms a portion of the inlet or outlet passage for water to a hot water heater. Should the water or any other fluid passing through the conduit 12 rise to an undesired temperature heat is quickly conducted through the immersion tube 15 which is made of a metal or other heat conductive material. Fusible element 17 melts or softens and permits member 18 to fall under the stresses of spring 25 and curved spring 27, thus moving pivoted arm 23 and with it movable contact 28 out of contact with stationary contact 29 and into contact with stationary contact 30. Pivoted arm 23 may conveniently be made of insulating material as is also head 20. If desired, one or the other of the stationary contacts 29 or 30 may be omitted so that the movable contact 28 serves to make or break but a single circuit.

In Figures 4, 5 and 6 I have disclosed a modified form of my device having a casing 110 having an immersion tube 115 connected thereto in any convenient manner. Immersion tube 115 may project into a conduit (not shown) similar to conduit 12 and carries therein a fusible element 117.

A member 118 bears on fusible element 117 and is stressed by a spring 125 and by curved springs 128 and 228 in a like manner described in connection with Figures 1, 2 and 3. Spring 125 bears upon a pivotal arm 123 which carries on each side fingers 126 and 226 which in turn embrace movable contacts 128 and 228. Movable contacts 128 and 228 engage in their upper position with stationary contacts 129 and 229 respectively but are shown as being disengaged from a stationary contact in their lower position although, if desired, such a stationary contact may be provided.

The operation of this modification is very similar to that of the above described modification. Heat from a fluid passing about immersion tube 115 is conducted to fusible element 117 which melts or softens so as to permit member 118 to punch or shear therethrough. This permits spring 125 to move pivotal arm 123 and to thereby move movable contacts 126 and 226.

In Figure 7 there is disclosed another modification of my device in which the immersion tube 55 containing the fusible element 57 extends directly into the water space of a water heater or boiler 54. The switch casing 10 contains switch elements similar to those already described and is attached to the boiler or water heater 54 by means of cap screws 59 or other fastening devices. A gasket 58 may be provided between the switch casing 10 and the water heater 54 if desired.

Yet another modification of my invention is disclosed in Figure 8 in which the immersion tube 155 extends directly into the tank of a water heater or boiler 154. The immersion tube 155 contains the fusible element 157 and is attached to a switch casing 10 which may contain switch elements similar to those already described. The immersion tube 155 has on its outer surface threads 156 similar to the threads 16 described in connection with Figures 1 to 3, inclusive. By means of these threads the immersion tube 55 may be retained in position in the wall of the water heater 154. The switch casing 10 may, if desired, be located in a chamber 158 in the wall of the water heater 154.

In Figures 9 and 10 there is described yet another modification of my device in which the switch is arranged to open upon the melting or fusing of the fusible element instead of closing. As shown in Figures 9 and 10 this modification consists of a fusible element 317 which is shown in the form of a pin but which may be a bar, a disk or any convenient form. Fusible element 317 may be received in jaws 312 which are secured together by a screw 313 or other convenient means to retain the fusible element therein. Connected to the jaws 312 or retained in the lower jaw is an immersion rod 315 similar to the immersion tube 15, described in connection with Figures 1 to 3, inclusive, except that it is solid instead of being hollow as is the immersion tube 15. The immersion rod 315, however, serves as a means for conducting heat to the fusible element 317. If desired the immersion rod 315 may have on its outer surface screw threads 316 which may conveniently serve for attaching a casing or fitting 311 which has a fluid passageway 310 through it. Threads 316 may serve to screw immersion

element 315 and the parts supported thereby in the manner disclosed in Figure 8. Cooperating with fusible element 317 is a pivotally mounted member 323 which is pivoted at 324 and which carries or has attached thereto a spring keeper 325 upon which a spring 425 bears. At one or both of its sides pivotal arm 323 carries fingers 326 and 426 which may respectively embrace curved springs 327 and 427. These springs are tensioned to add their stresses to that of spring 425. Upon pivotal arm 323 curved springs 327 and 427 carry at their outer ends movable contacts 328 and 428 respectively, these contacts being adapted to cooperate with stationary contacts 329 and 429 respectively. If desired one of the curved arms 327 or 427 and the movable contact 328 or 428 carried thereby may be omitted. If desired, the corresponding stationary contact 329 or 429 may be omitted or may be positioned above its cooperating movable contact so that upon movement of the movable contact, circuit will be closed instead of being opened. The operation of this modification is similar to that of the modifications already disclosed. Heat is conducted from the fluid, to which the immersion rod 315 is exposed, through immersion rod 315 to fusible element 317. Upon the application of sufficient heat the fusible element softens or melts and permits pivotal arm 323 to move under the stresses of springs 425, 327 and 427 or such of these springs as are used. Due to the movement of pivotal arm 323 movable contacts 328 and 428 are moved out of or into engagement with their cooperating stationary contacts 329 and 429. To reset the device screw 313 is loosened and another fusible element is inserted in the jaws 312.

I do not intend to be limited in the practice of my invention save as the scope of the prior art and of the attached claims may require.

I claim:

1. An electric switch adapted to be mounted on a conduit having a passage for fluid therethrough, a fusible element, a member stressed against said fusible element, a pivoted arm connected to said member, a curved arm of flexible material forming a movable switch contact connected to said pivoted arm, and a stationary switch contact cooperating with said movable contact.
2. An electric switch adapted to be mounted on a conduit having a passage for fluid therethrough, a fusible element, a member stressed against said fusible element, said member being formed as a rod bearing on said fusible element, a pivoted arm connected to said member, a spring stressing said pivoted arm and said member against said fusible element, a curved arm of flexible material forming a movable switch contact and connected to said pivoted arm, and a stationary contact cooperating with said movable switch contact.
3. An electric switch adapted to be mounted on conduit having a passage for fluid therethrough, a fusible element, a member stressed against said fusible element, said member being formed as a rod bearing on said fusible element, a pivoted arm connected to said member, a quick detachable connection between said member and said pivoted arm, a spring stressing said pivoted arm and said member against said fusible element, a curved arm of flexible material forming a movable switch contact and connected to said pivoted arm, and a stationary contact cooperating with said movable switch contact.
4. An electric switch comprising, in combination, stationary means for attachment to the

wires of an electric circuit, a movable switch contact connected to said means, a stationary switch contact co-operating with said movable contact, a fusible element, a member stressed against said fusible element and co-operating with said movable switch contact to actuate said movable switch contact when said fusible element melts or softens, and a quickly detachable connection between said movable switch contact and said member so that said member and said fusible element can be removed and said fusible element can be changed without disturbing said movable switch contact or said stationary means connected thereto.

FRANCIS W. WERRING.

10

85

15

90

20

95

25

100

30

105

35

110

40

115

45

120

50

125

55

130

60

135

65

140

70

145

75

150