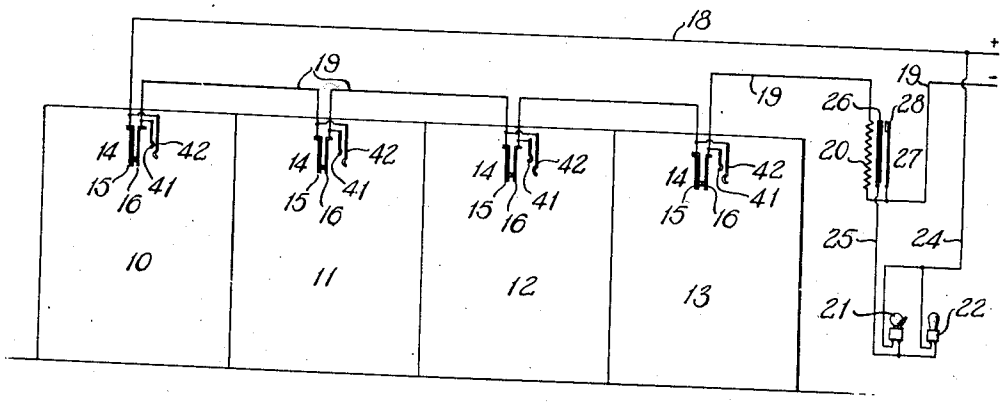
Oct. 11, 1938. S. E. ALLEN 2,132,918

TESTING MEANS FOR FIRE PROTECTION SYSTEMS

Filed Dec. 22, 1934

Fig. 1



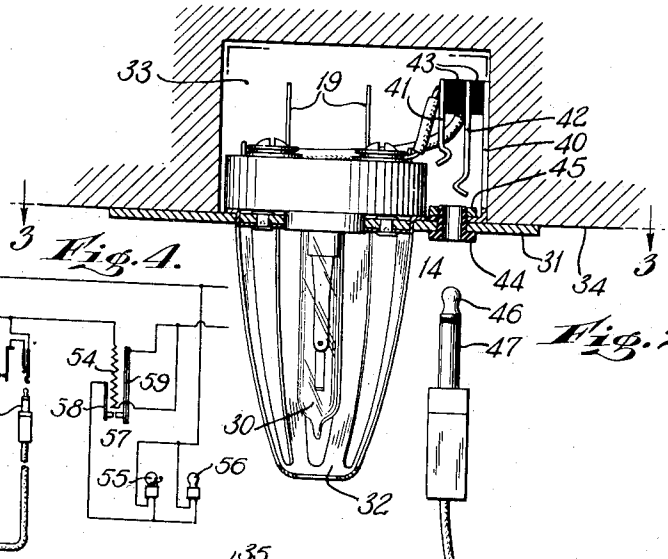


Fig. 4.

Fig. 2.

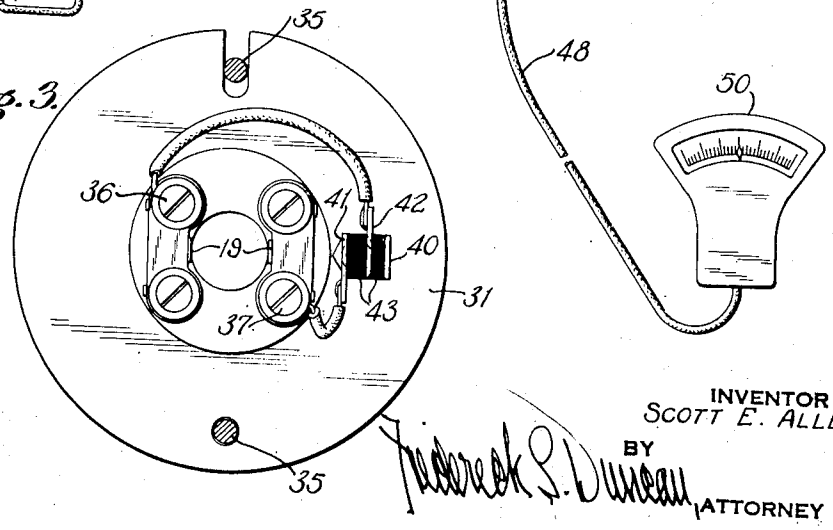


Fig. 3.

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TESTING MEANS FOR FIRE PROTECTION SYSTEMS

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Application December 22, 1934, Serial No. 758,823

6 Claims. (Cl. 200—138)

The present invention relates to automatic fire protection systems in which thermo-sensitive control units are employed and has for an object to provide means for testing such units without interfering with the operation of the system during such test. The present invention is more particularly adapted to fire alarm systems for protecting a plurality of chambers in each of which a thermostatic switch is provided, the switches individually controlling a common electric signal, such as an alarm bell, or, warning light, or, both.

In general there are two systems now in common use known respectively as the "closed" and the "open" systems. In the "closed" system, the thermostatic switches are connected in series in a control circuit and are normally closed, but an abnormal rise of temperature in any chamber will open the switch in said chamber and this will cause the signal to be electrically operated. In the "open" system, the thermostatic switches are arranged in parallel across the control system and each is normally open but is adapted to be closed by an abnormal rise of temperature in its immediate vicinity.

The present invention is applicable to either the "open" or the "closed" system. An object of the invention is to provide means for, in effect, cutting out any control unit without disturbing the control circuit to which it is connected, so that such unit may be tested, as by application of heat thereto, or in any other suitable way, to determine whether it is in proper working condition. By this arrangement a test may be conducted without operating the signal and giving a false alarm, and, at the same time, while any unit is being tested the rest of the units will be free to operate and give the alarm in case of a fire in their immediate vicinity.

With the above-named objects in view and others which will appear hereinafter I shall now describe a preferred embodiment of my invention and a modification thereof and thereafter shall point out the novelty and scope of the invention in the claims.

In the accompanying drawing:

Figure 1 is an electrical diagram of a closed electric alarm system embodying my invention;

Fig. 2 is a view in vertical section showing one of the thermal control units installed in said system;

Fig. 3 is a view in section taken substantially on the line 3—3 of Fig. 2, but showing the thermal unit in full; and

Fig. 4 is an electrical diagram of an open electric alarm system embodying my invention.

In Figure 1 a set of four chambers 10, 11, 12 and 13 is indicated, each chamber having a thermo-sensitive switch 14 at the ceiling of the chamber. Each switch unit comprises a pair of electric conducting members 15 and 16 respectively which have contact points normally engaging each other. The member 15 is a bi-metallic strip which is arranged to flex away from the member 16 when heated above a predetermined temperature so as to open the switch.

The thermal switches 14 are connected in series in a circuit 18, 19 which is supplied with electric current from a suitable source, not shown. Also included in series with the switches is a heating coil 20. A bell 21 and lamp 22 are connected in parallel across lines 18 and 19 by a conductor 24 leading to the line 18 and a conductor 25 leading to one pole 26 of a thermostatic switch 27, the other pole 28 of which is electrically connected to the line 19. The member 26 is a bi-metallic thermo-sensitive leaf lying adjacent the heating unit 20 and so arranged that as long as it is heated by said unit, it will be curved away from the member 28 and will thus maintain the switch 27 in "open" position. However, when any one of the switches 14 is opened the coil 20 will be deenergized, permitting the switch 27 to close and causing lamp 22 to light and bell 21 to be sounded.

The switch elements 15 and 16 of each switch unit 14, are enclosed in a glass bulb 30 suitably sealed in a base plate 31 and the bulb is protected by a cage 32 secured to the base plate. The switch unit 14 projects into a socket 33 formed in a wall or ceiling 34 of the compartment. This socket is covered by the base plate 31 which may be secured to the ceiling by screws 35. At the inner end of the switch unit are two binding screws 36 and 37 which provide for making electrical connection to the circuit 18, 19.

So far, I have described apparatus which is well known in the art and to which per se I make no claim. It will be obvious that with the apparatus as so far described, any one of the switches 14 may be tested to see whether the switch will open when subjected to heat, but when such a test is made the alarm bell 21 will be sounded and the lamp 22 will be lighted. This will give a false alarm unless the signal elements are disconnected from the circuit and in such case it may be difficult to determine whether the switch has actually opened because the elements 15 and 16, being enclosed in a bulb which in turn is

enclosed in a cage, cannot very readily be seen. Also during such testing period, if there should be a fire in one of the compartments, there would be no way of distinguishing between a real fire alarm and a false alarm.

To overcome these drawbacks, my invention provides each thermostatic switch 14 with means for connecting a testing instrument in shunt across the terminals of the switch. The testing instrument is of such low resistance that when the switch is tested and opened by thermal or other means, the circuit 18, 19 will not be materially affected and consequently the main switch 27 will not be closed. As shown in Figs. 2 and 3 a bracket 40 is secured to the inner face of the base plate 31 and carries a pair of spring contact plates 41 and 42 which are electrically insulated from the bracket and from each other by means of suitable insulation 43. One of these plates is electrically connected to the binding post 36 and the other to the binding post 37. These two plates constitute a jack to receive a plug connected to the testing instrument. To admit the plug, a grommet 44 of insulating material is inserted through the base plate 31 and is secured in place by means of a nut 45. The plug is of usual construction comprising a tip 46 and a body 47 electrically insulated from each other and forming terminals of a flexible circuit indicated generally by the reference numeral 48 and extending to an ammeter 50. The operation of this device, when a unit is to be tested, is as follows: The plug 46, 47 is inserted into the jack thereby connecting the ammeter across the terminals of the members 15 and 16. The circuit 18, 19 is then completed through both the ammeter and the switch 14 under test in parallel. Heat may now be applied to the switch 14 so as to cause the switch to open. When this takes place there will be no interruption of current passing through the heating coil 21 and consequently the main switch 27 will not be closed. The resistance of the ammeter is so low that it will not materially affect the flow of current through the circuit 18, 19, but it is sensitive enough to show an increase of current flow when the switch 14 opens. In this way, it is possible to cut out any switch 14 for testing purposes without sounding a false alarm and to determine readily whether the thermo-sensitive switch is in proper operating condition, and while such test is taking place the system as a whole will be ready to respond to any abnormal rise of temperature in any of the other chambers.

The construction shown diagrammatically in Fig. 4 differs from that shown in Fig. 1 in the fact that the thermosensitive switches are adapted for an open system. As shown in Fig. 4 the main control circuit comprises conductors 51 and 52 which are connected to a suitable source of current supply not shown. Thermo-sensitive switches 53 are connected in parallel across the lines 51 and 52. Switches 53 differ from switches 14 in the fact that they are normally open but are adapted to close under the influence of heat. In the line 52 there is a heating unit 54 which is normally deenergized. An alarm bell 55 and a lamp 56 are connected across lines 51 and 52. However, such connection is normally electrically interrupted by a main switch 57 comprising a pair of contact members 58 and 59 respectively. The member 59 is a bi-metallic thermo-sensitive leaf which lies adjacent the heating unit 54. In operation, whenever one of the switches 53 is closed by an abnormal rise of heat, the unit 54 will be heated and, acting on the member 59, will close the switch 57, sounding the alarm 55 and lighting the signal 56.

The system, as so far described, is well known in the art. My improvements consist in providing a jack in the bridging circuit connecting each switch 53 across lines 51 and 52. This jack comprises a pair of spring contact plates 60 and 61, respectively, which are normally in contact, but they are adapted to be spread apart by a plug 62 which connects members 60 and 61 to the opposite terminals of a volt meter 64. This volt meter has a high resistance so that when it is cut into the bridging line of any one of the switches 53 not enough current will pass through to heat the unit 54 to a temperature at which it will cause the main switch 57 to close. With this high resistance connected into the bridging line, it will be evident that the switch 53 under test may be closed without operating the main switch 57. Thus, it is possible to test each of the switches 53 and if when heat is applied to the switch the indicator of the volt meter shows any voltage this will indicate that the switch has been closed and hence that it is functioning properly.

While I have described two embodiments of my invention, it will be understood that these are to be taken as illustrative and not limitative and that I reserve the right to make various changes in form, construction and arrangement of parts without departing from the spirit and scope of my invention as defined in the following claims.

I claim:

1. A thermostatic control switch for a fire protection circuit, said switch comprising a base plate, a pair of switch elements normally in electrical contact carried by said base plate and projecting from the outer side thereof, one of said elements being adapted to cause a separation of the elements when subjected to a predetermined temperature, a bracket secured to the base plate at the inner side thereof, a pair of contact members carried by the bracket and insulated from each other and the bracket, and means electrically connecting said elements to said contacting members respectively, said base plate being formed with an aperture alined with said members.

2. A thermostatic control switch for a fire protection electric circuit, said switch comprising a base plate adapted to be applied to a recessed support, a pair of switch elements carried by said plate and operable at a predetermined temperature to effect an electrical change in said circuit, a bracket secured to the base plate at the inner side thereof and adapted to project into said recess, a pair of contact members carried by the bracket, and means connecting said members into said circuit, said base plate being formed with an aperture alined with said members.

3. A thermostatic control switch for a fire protection circuit, said switch comprising a base plate adapted to be applied to a recessed support, a pair of switch elements carried by said plate and operable at a predetermined temperature to open said circuit, a bracket secured to the base plate at the inner side thereof and adapted to project into said recess, a pair of normally separated contact members carried by the bracket, and means connecting said members in parallel with said elements, said base plate being formed with an aperture alined with said members.

4. A thermostatic control switch for a fire protection circuit, said switch comprising a base

plate adapted to be applied to a recessed support, a pair of switch elements carried by said plate and operable at a predetermined temperature to close said circuit, a bracket secured to the base plate at the inner side thereof and adapted to project into said recess, a pair of normally contacting members carried by the bracket, and means connecting said members in series with said elements, said base plate being formed with an aperture alined with said members.

5. A thermostatic control switch for a fire protection circuit, said switch comprising a base plate, a pair of switch elements carried by said plate and projecting from the outer side thereof and operable at a predetermined temperature to close said circuit, a bracket secured to the base plate at the inner side thereof, a pair of normally contacting members carried by the bracket, and means connecting said members in series with said elements, said base plate being formed with an aperture alined with said members.

6. A thermostatic control switch for a fire protection electric circuit, said switch comprising a base plate, a pair of switch elements carried by said plate and operable at a predetermined temperature to effect an electrical change in said circuit, a bracket secured to the base plate at the inner side thereof, a pair of contact members carried by the bracket, and means connecting said members into said circuit, said base plate being formed with an aperture alined with said members.

SCOTT E. ALLEN.