

R. Y. HUGHES & L. J. HOFFMANN.  
 AUTOMATIC FIRE DETECTOR.  
 APPLICATION FILED JULY 30, 1909.

Patented Jan. 31, 1911.

982,822.

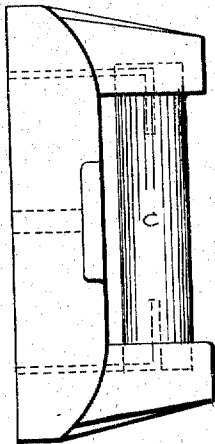


FIG. 1.

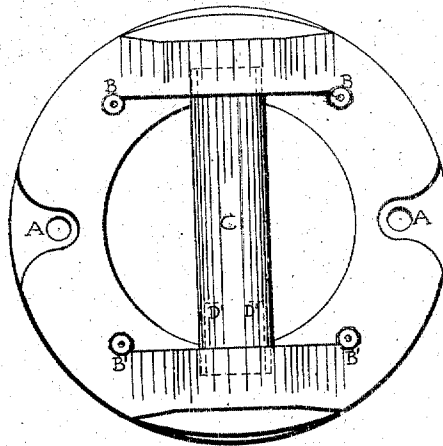


FIG. 2.

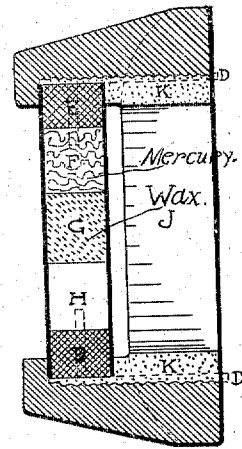


FIG. 3.

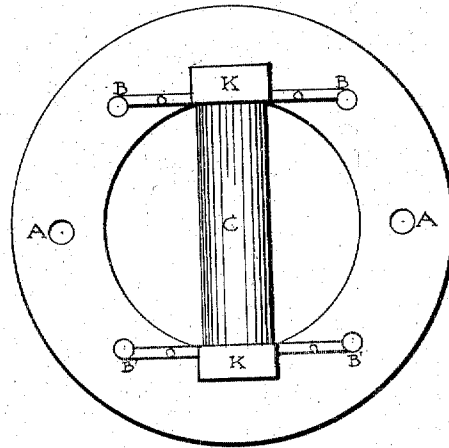


FIG. 4.

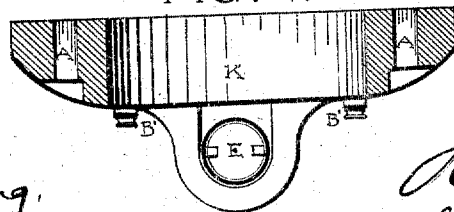


FIG. 5.

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# UNITED STATES PATENT OFFICE.

ROY Y. HUGHES AND LOUIS J. HOFFMANN, OF ABERDEEN, SOUTH DAKOTA.

## AUTOMATIC FIRE-DETECTOR.

982,822.

Specification of Letters Patent.

Patented Jan. 31, 1911.

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*To all whom it may concern:*

Be it known that we, ROY Y. HUGHES and LOUIS J. HOFFMANN, citizens of the United States, residing at Aberdeen, in the county of Brown and State of South Dakota, have jointly invented a new and useful Automatic Fire-Detector, of which the following is a specification.

This invention has reference to improvements in fire detectors of the automatic type and its object is to provide a detector sensitive to a moderate increase in heat to cause the production of an alarm, but which after having caused an alarm is again ready for service by simply inverting the device, the structure being otherwise of the self restoring order.

The invention will be best understood from a consideration of the following description taken in connection with the accompanying drawings forming a part of this specification, in which drawings:

Figure 1 is a side elevation of the device. Fig. 2 is a face view thereof. Fig. 3 is a front to rear section axial to the thermo-sensitive device. Fig. 4 is a rear elevation of the device. Fig. 5 is a section at right angles to that of Fig. 3.

Referring to the drawings there is shown a basic member of any suitable material preferably insulating and refractory of which porcelain may be taken as an example, and this basic member is preferably in the form of a ring with diametrically disposed screw holes A equidistant from the axis of generation of the ring so that the device may be readily secured in position and by removing the screws be reversed and replaced with ease.

At diametrically opposite points the basic member is formed with projecting brackets in which are formed grooves K extending from near the front of the brackets to the rear of the basic member. These grooves are designed to receive the ends of a tube C which tube is made of insulating material and preferably of glass although this is not mandatory. The ends of the tube are sealed with masses E of suitable sealing material and within the tube there is lodged a mass F of mercury and a plug G of readily fusible material. The quantity of mercury and the mass of fusible material are so related one to the other and to the internal capacity of the tube between the sealing plugs or masses E that when the mercury is against

one of the terminal masses E the plug G will occupy substantially the middle portion of the tube and between this plug of fusible material and the other member E of the tube there is a space H of substantially the same capacity as the volume of mercury and this space is filled with air.

Entering the tube through the sealing masses E at each end are pairs of terminals D and D' respectively. The sealing in masses E are of insulating material and the terminals D and D' may therefore extend into these masses and beyond the same for a short distance into the interior of the tube without being otherwise insulated at these points.

The tube C is held in place in the support by plaster of Paris or any suitable means for the purpose, the walls of the passages K being suitably corrugated or roughened to facilitate the lodgment and retention of the plaster of Paris filling. The conductors D and D' may be carried across the back of the support and there connected to separated binding posts B and B' which binding posts may be located on the front face of the support so as to be readily accessible at all times.

The plug G may be made of wax or other like material having a low melting point and such material is of course of low specific gravity as compared with mercury, but when cold this mass will readily sustain the mercury lodged on top thereof.

If it be assumed that the terminals of the alarm circuit are connected to the binding posts B, then the terminals D connected to these binding posts are under normal conditions immersed in the mercury mass F and consequently the circuit is closed at these terminals by the mass of mercury. Under these circumstances the alarm circuit may operate on closed circuit, that is it is normally inactive on closed circuit and becomes active when the circuit is broken, this being a known type of alarm circuit.

Should there arise a degree of heat sufficient to melt the plug G, which condition would arise in case of a fire in the neighborhood of the device, then the weight of the mercury mass F will cause the latter to fall to the bottom of the tube displacing both the wax G and the air within the space H. The wax G will however float on the mercury mass F with the air formerly occupying the space H now occupying the space vacated by the mercury mass F so that the mercury

and air are reversed in position while the wax mass G still retains the intermediate position. When the heat has been reduced sufficiently then the wax mass G will cool and harden thus again separating the air space H from the mercury mass F although in reversed position to that first considered. Now by removing the screws holding the support in place the said support may be reversed and by removing the circuit terminals from the binding posts B and attaching them to the binding posts B' the device is again in operative condition.

If it be desired to use the device on an alarm system normally inactive on open circuit, then the alarm circuit is initially coupled to the binding posts B', the terminals D then being inactive. When the wax G melts and the mercury falls to the terminals D', then the circuit is closed between these terminals by the mercury mass and the alarm circuit becomes active to give a signal.

The device is therefore adaptable without change to either an open or closed circuit alarm system and when used on a closed circuit alarm system any disturbance of the device sufficient to cause the movement of the mercury mass away from the upper set of terminals will cause the production of an alarm and of course any rupture of the circuit will also cause an alarm whatever be the cause of the rupturing of the circuit.

The circular opening J in the support provides for extensive circulation of air about the tube C so that in case of fire the heated air will find ready access to all parts of the tube C and the wax mass G will become quickly affected and melt.

What is claimed is:--

1. A thermo-responsive circuit controller comprising an elongated member having at

each end a pair of adjacent circuit terminals and within the elongated member a mass of mercury and a fusible plug, said mercury mass and plug occupying less than the internal capacity of the elongated member. 45

2. In a thermo-responsive circuit controller, a tubular member sealed at each end and there containing a pair of adjacent circuit terminals extending to the interior of the member, and a mass of mercury and of easily fusible material within the tubular member and of less mass together than the internal capacity of said tubular member. 50 55

3. A thermo-responsive circuit controller comprising a suitable reversible support, and a tubular member carried thereby and provided at each end with a pair of adjacent circuit terminals entering the interior of the tubular member, and within the tubular member there being a mass of mercury and of easily fusible material, the total mass of the two materials being less than the internal capacity of the tubular member. 60 65

4. A thermo-responsive circuit controller comprising a suitable reversible support provided near each end with a pair of binding posts, and a tubular member carried by the support, said tubular member having sealed in each end a pair of circuit terminals respectively connected to the binding posts at the same end of the support, said tubular member containing a mass of mercury and a mass of easily fusible material, the total mass of the mercury and fusible material being less than the internal capacity of the tubular member. 70 75

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