

May 31, 1949.

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2,471,410

BREAKABLE PLATE SWITCH CONTROLLING MECHANISM

Filed March 27, 1946.

2 Sheets-Sheet 1

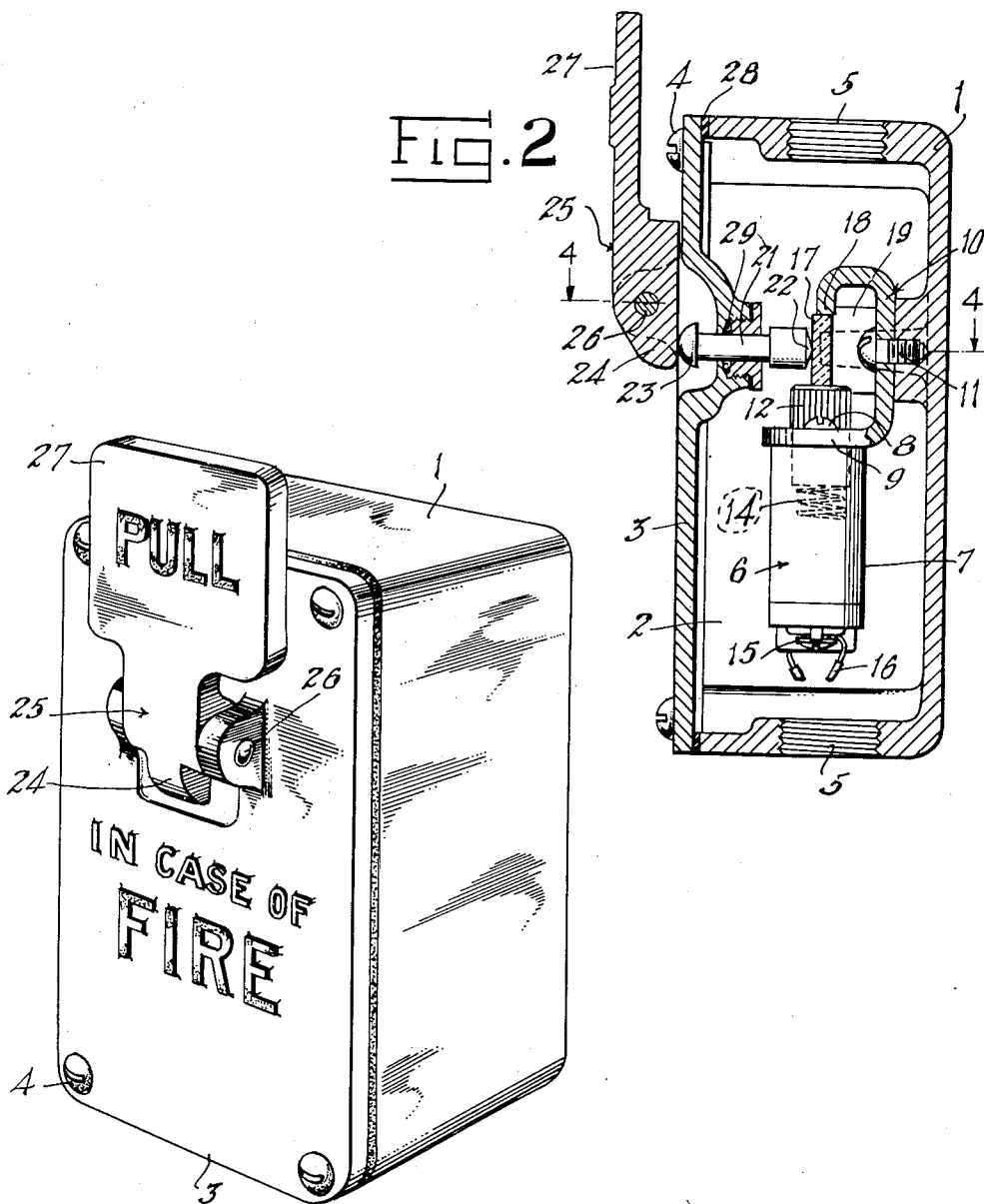


Fig. 1

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Fig. 3

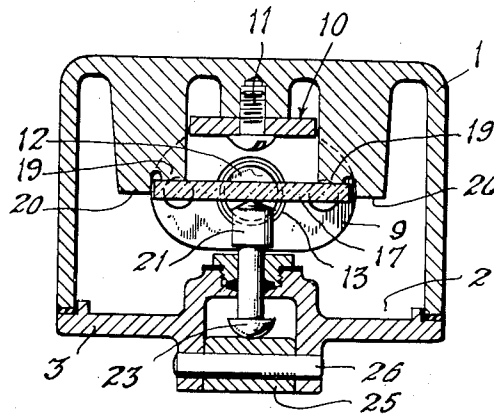
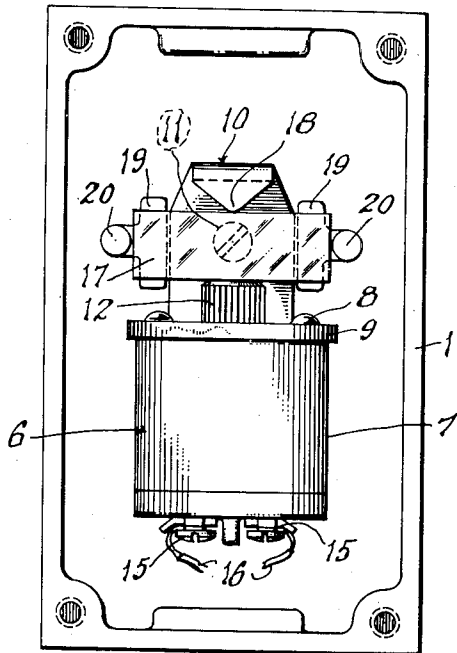


Fig. 4

Fig. 6

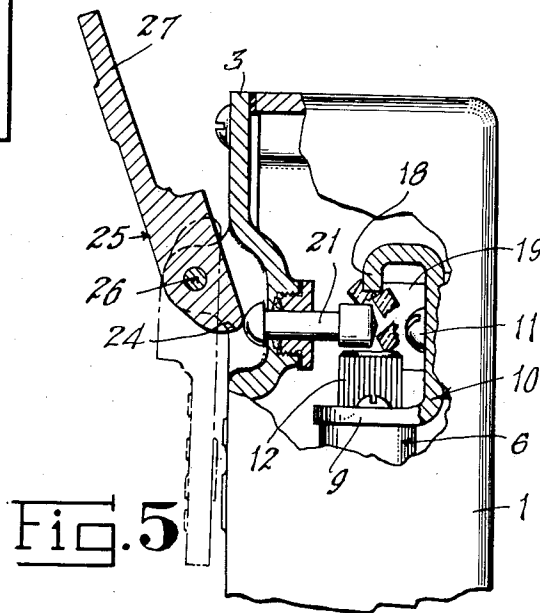
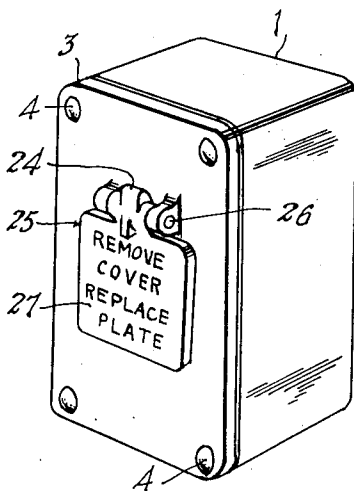


Fig. 5

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BREAKABLE PLATE SWITCH CONTROLLING MECHANISM

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4 Claims. (Cl. 177—372)

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This invention relates in general to mechanism for controlling the operation of electric switches and more particularly to switch boxes such as are used in signalling systems, for example, fire alarm systems. The mechanism is of the type which includes a breakable member interposed between a movable switch operating mechanism and a relatively fixed abutment, and means, usually manually operated, for breaking said breakable member at will to release the switch operating mechanism to cause operation of the switch.

The prime object of the invention is to provide a switch controlling mechanism of this character which shall include a novel and improved combination and arrangement of switch-operating mechanism, a breakable member, and means for breaking said breakable member, whereby the mechanism shall be simple and inexpensive in construction and reliable in operation.

In many known apparatus of this general type it is possible for the fragments of the breakable member after the member has been broken, to become jammed in parts of the apparatus so as to interfere with proper operation of the switch and to make it difficult to restore the mechanism to normally operative condition. Therefore, another object of my invention is to provide a switch controlling mechanism of the character described which shall include novel and improved features of construction whereby the means for breaking the breakable member shall have the effect of pushing the fragments of said member into an out of the way position during the breaking operation, so as to ensure against hindrance by such fragments to proper operation of the switch and restoration of the mechanism to normal condition.

Another object is to provide such a switch controlling mechanism which shall be so constructed that the breakable member can be easily and quickly broken with a minimum of effort by the operator and the broken member can be easily and quickly replaced with a minimum of care by relatively unskilled persons.

A further object is to provide in such mechanism, a novel and improved construction of the parts whereby the means for breaking the breakable member shall serve in a novel and improved manner as one of the elements for holding the breakable member in normal position.

Other objects, advantages and results of the invention will be brought out by the following description in conjunction with the accompanying drawings, in which

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Figure 1 is a perspective view of a switch controlling mechanism constructed in accordance with my invention embodied in a fire alarm switch box;

Figure 2 is a central vertical longitudinal sectional view through the fire alarm switch box shown in Figure 1, showing the parts in normal positions;

Figure 3 is a front elevational view of the switch box with the cover plate removed;

Figure 4 is a horizontal sectional view, on the line 4—4 of Figure 2;

Figure 5 is a fragmentary view similar to Figure 2 showing the operation of breaking the breakable member to permit operation of the switch, and

Figure 6 is a front perspective view on a reduced scale showing the actuating lever in its inoperative position that is assumed after the breakable member has been broken.

Specifically describing the illustrated embodiment of the invention, the switch controlling mechanism includes a suitable support which is shown as comprising a box 1 having a front opening 2 which is normally closed by a cover 3 which is separably secured to the box by screws 4. The box has suitable openings 5 for connection to wire conduits or the like so that electrical wires or cables may be led into the box for connection to a switch mechanism 6.

This switch mechanism may be of any suitable construction and may be mounted on the support or box in any suitable manner, but as shown it comprises a casing 7 which is secured at one end by screws 8 to the horizontal arm 9 of a bracket 10 which is secured by a screw 11 to the bottom or back wall of the box 1. The switch has a plunger 12 which extends freely through a hole 13 in the bracket arm 9 and is normally pressed outwardly of the casing 7 by a spring 14 schematically illustrated in Figure 2. The plunger controls movable contact members which cooperate with fixed contact members that are connected to binding posts 15, whereby upon movement of the plunger 12 outwardly to a certain limit, the circuit of the signalling system in which the switch mechanism is connected by wires 16, is closed, or in some way altered to cause actuation of visual or audible signals that are positioned at any suitable remote points.

Normally the plunger 12 is pushed inwardly of the switch casing 7 so that said signals are inactive, and the plunger is held in this position by a breakable member 17 which is interposed

edgewise between the plunger and a relatively fixed abutment 18 on the bracket 10. As shown, the breakable member 17 is approximately rectangular in plan view and has one side thereof disposed in abutting contact with spaced rests or anvil lugs 19 that are mounted in any suitable manner on the support but are shown as cast integrally with the bottom or back wall of the box 1. One of these rests 19 is disposed at each of opposite sides of the plunger 12. To prevent endwise displacement of the plate 17, a protuberance 20 is provided on each of the rests 19 to be abutted by one end of the plate. With this construction, it will be observed that movement of the plate in its own plane vertically is prevented by the plunger and abutment 18, while horizontal movement of the plate is prevented by the protuberances 20. Movement of the plate out of its plane in one direction at an angle to said plane is limited by the rests 19, while movement of the plate out of its plane in the other direction is limited by the means for breaking the plate.

This means is shown as comprising a plunger 21 which is slidably mounted in the cover 3 and has one end normally in abutting contact with the side of the breakable plate opposite the rests 19 and at a point between said rests so that upon movement of said plunger toward the rests, the plate will be cracked. Preferably the end of the plunger that contacts with the plate has a conical surface 22 to facilitate breaking of the plate and to serve as a deflector for directing fragments of the broken plate laterally away from the plunger 12. The other end of the plunger projects outwardly of the cover and has a head 23 which is normally engaged by one arm 24 of a manually operated lever 25 which is pivotally mounted at 26 on the front or top of the cover 3 and has its other end in the form of a combined handle and indicator 27. The parts are so proportioned and related that gravitational action on the upper end 27 of the lever 25 presses the plunger 21 inwardly into contact with the breakable plate so as to hold the latter against movement away from the rests 19, and at the same time the resistance to such movement by the breakable plate holds the lever in upright position, as shown in Figure 2.

The parts are shown in their normal position in Figure 2 where the switch mechanism is held in the position to maintain the signals inactive. When it is desired to operate the signals, the operator grasps the handle 27 of the lever 25 and exerts a downward and outward pull thereon, and this operation presses the plunger 21 hard against the breakable plate 17 so as to impose cracking strains thereon sufficient to break it, as shown in Figure 5. When the plate 17 is broken, the plunger is released for operation by the spring 14 so as to change the signal circuit and cause operation of the signals. The fragments of the breakable plate 17 are pushed out of the way of the switch plunger 12, as shown in Figure 5, and are enclosed by the box so as to prevent flying fragments from injuring the operator.

It will be observed that when the breakable plate 17 is intact, said plate is related to the plunger 21 and the lever 25, so that the lever is held in its normal, operative, uppermost position, as shown in Figure 2 of the drawings, but when the plate 17 is broken by a forceful pull downwardly on the lever, the lever will thereafter fall by gravitational action into the posi-

tion shown by dot and dash lines in Figure 5, and the plate 17 must be replaced to hold the lever in its normal operative position.

Also, to restore the switch controlling mechanism to its normal position, the new breakable plate 17 must be interposed between the switch plunger and the abutment 18. In order to do this, the cover plate 3 must be removed for access to the plate-supporting rests 19 and switch plunger 12, and after the new breakable plate has been placed in its normal position, the lever 25 is swung upwardly and the actuating plunger 21 is pressed outwardly, after which the cover is replaced with the plunger in abutting contact with the breakable member.

The breakable member may be formed of any suitable material, for example glass, but preferably comprises Lavite or some frangible plastic material which will not be subject to excess shattering.

In order to exclude water from the box 1, a gasket 28 is provided between the cover and the box, and a packing gland 29 is provided in the cover around the actuating plunger 21.

As will be understood by those skilled in the art, various changes in the details of construction of the mechanism may be made and the mechanism may be utilized for various switch controlling purposes, within the spirit and scope of the invention.

What I claim is:

1. A control mechanism comprising a housing forming an enclosure for electric switch means, resilient means normally urging the switch from one circuit affecting position to another, holding means to restrain the operation of the switch, breakable means supported by the housing and wholly positioned therein and enclosed thereby, the breakable means operatively connected to the holding means to restrain the operation of the switch, and a breaking member carried in an apertured wall of the housing, the breaking member having an actuating portion extending outwardly from the housing and a breaking portion wholly enclosed within the housing to be actuated to rupture the breakable member, the housing preventing the escape of flying particles of the breakable member upon its rupture.

2. A control mechanism comprising a housing, the housing enclosing an electric switch, resilient means normally urging the switch from one circuit affecting position to another, a plunger to restrain the operation of the electric switch, an inwardly projecting extension of the housing positioned adjacent the plunger, a breakable member wholly positioned and enclosed by the housing and interposed between the extension and the plunger to hold the plunger inwardly, a breaking member slidably carried in an apertured wall of the housing having a breaking portion wholly enclosed within the housing, and a pivoted member positioned outside of the housing and adapted to be actuated to urge the slidable breaking member inwardly to rupture the breakable member to release the plunger to permit the operation of the switch, the housing preventing the escape of flying particles of the breakable member upon its rupture.

3. A control mechanism comprising a housing having enclosed therein, an electric switch, resilient means normally urging the switch from one circuit affecting position to another, a breakable plate, two relatively movable elements each in abutting contact with one of opposite edges of said breakable plate and held apart by said plate,

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the relatively movable elements when held in spaced relationship holding the switch in one position against the urging of the resilient member, a breaking member carried by an apertured wall of the housing, and a pivoted member supported on the outside of the housing wall and having a portion thereof operatively engaged with an end of the breaking member so that upon the swinging of the pivoted member the breaking member is urged against the breakable member to rupture it to permit the relatively movable members to release the switch.

4. A control mechanism comprising a housing having enclosed therein, an electric switch, resilient means normally urging the switch from one circuit affecting position to another, a plunger to restrain the operation of the switch and normally urged upwardly by said resilient means, abutting means positioned above the plunger, a breakable member interposed between the plunger and the abutting means to hold the plunger downwardly, a member slidably carried in an aperture through a wall of the housing, and pivoted means

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positioned on the outer side of the wall of the housing, the slidable member having its center portion of reduced section to retain it in position in the apertured wall, one end of the slidable member arranged to abut the breakable member and its other end arranged to be moved inwardly by action of the pivoted member so that the breakable member may be ruptured to release the plunger to permit the operation of the switch by the resilient means.

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