

Feb. 16, 1937.

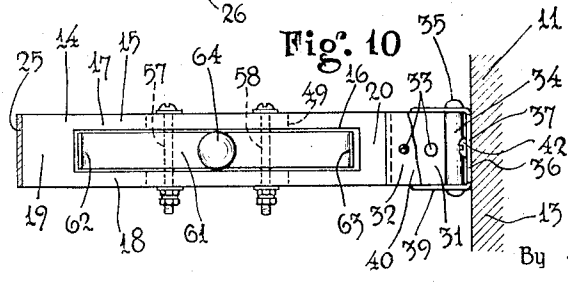
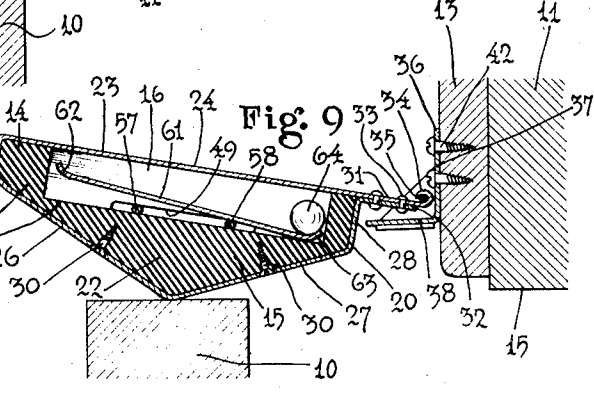
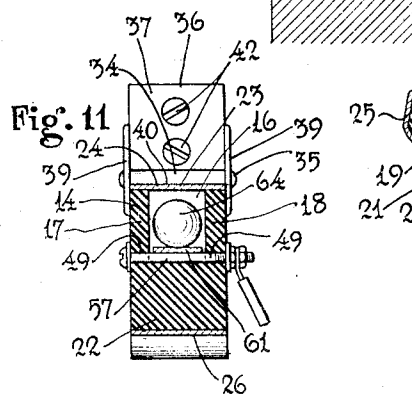
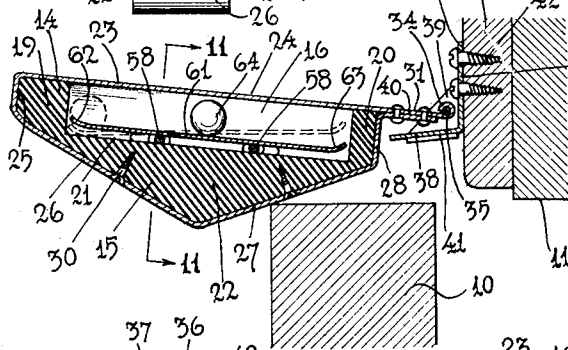
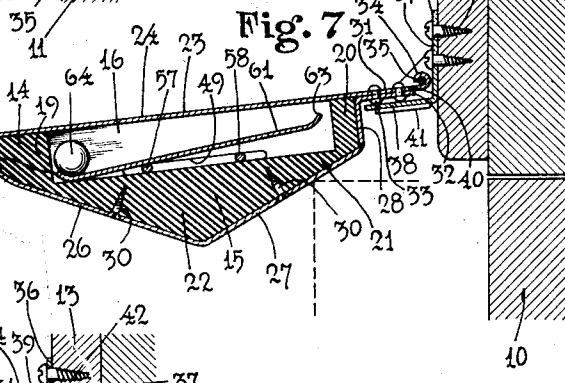
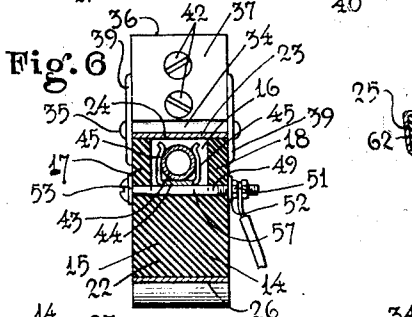
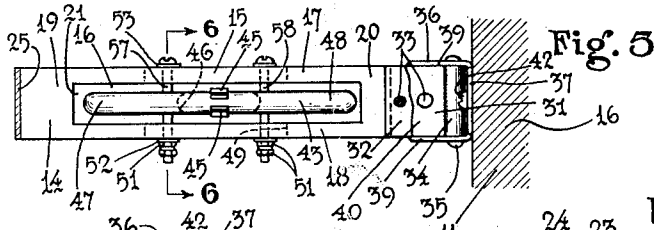
W. R. PRICE

2,070,683

ELECTRIC SWITCH

Filed June 10, 1935

2 Sheets-Sheet 2



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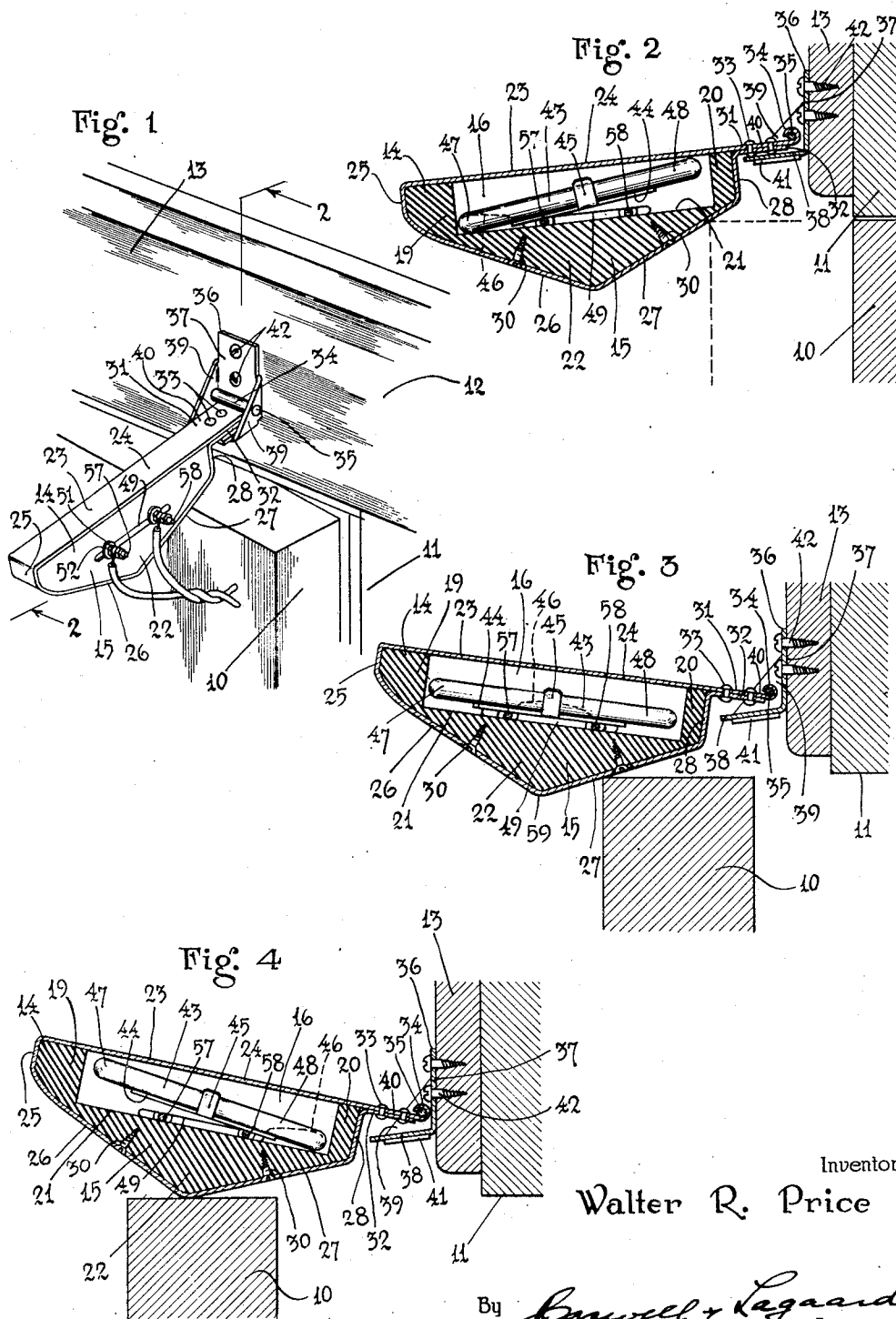
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2,070,683

ELECTRIC SWITCH

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2 Sheets-Sheet 1



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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Walter R. Price, Minneapolis, Minn.

Application June 10, 1935, Serial No. 25,927

4 Claims. (Serial No. 200—54)

My invention relates to electric switches and has for an object to provide a switch by means of which timed operation of the switch can be procured.

Another object of the invention resides in providing a switch in which the timing can be readily varied.

Another object of the invention resides in providing a switch which cannot be intentionally or accidentally stalled in closing position.

A still further object of the invention resides in providing a switch of the nature described utilizing a runway having a gravitating body traveling along the same for procuring the timing of the switch.

Another object of the invention resides in providing a switch having twin fulcrums and in supporting said runway in a manner to teeter on said fulcrums.

A feature of the invention resides in constructing the switch so as to cause operation of the switch means thereof when the runway is carried by both of the fulcrums.

Another object of the invention resides in utilizing the fulcrums as contacts and in providing a connector member either carried by the runway or forming a part thereof for connecting said contacts together when the runway is supported by both of the fulcrums.

Another object of the invention resides in the specific actuating mechanism for operating the switch.

A feature of the invention resides in the construction for guiding the runway for teetering movement with respect to the fulcrums.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings:

Fig. 1 is a perspective view of a portion of a door and door casing illustrating an embodiment of my invention applied thereto.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 2 showing the parts in altered position.

Fig. 4 is a view similar to Figs. 2 and 3 showing the parts in still other positions.

Fig. 5 is a plan view of the structure shown in Fig. 3 with a part of the cover removed.

Fig. 6 is a cross sectional view taken on line 6—6 of Fig. 5.

Fig. 7 is a view similar to Fig. 2 showing a modification of the invention.

Fig. 8 is a view similar to Fig. 3 of the structure shown in Fig. 7.

Fig. 9 is a view similar to Fig. 4 of the structure shown in Fig. 7.

Fig. 10 is a plan sectional view similar to Fig. 5 of the form of the invention shown in Fig. 7.

Fig. 11 is a cross sectional view taken on line 11—11 of Fig. 8.

My invention embodies an electric switch 10 which may be used for a number of different purposes. In order to illustrate the application of the invention the switch has been shown as applied to a door casing for the purpose of controlling a circuit having a bell or lamp indicating the opening and closing of the door and the construction thereof has been designed to adapt it to this particular use.

In Fig. 1 a portion of a swinging door 10 has been shown which is movable into and out of a door frame 11. The door frame 11 includes a casing 12 provided with a header 13 at the uppermost portion of the same. The invention proper is attached to the header 13 as will be presently described in detail.

My invention proper comprises a mounting indicated in its entirety by the reference numeral 14. This mounting consists of a body 15 constructed of a block of insulating material such as wood, fibre, or any of the phenol formaldehyde products, such as are now well known in the art. This body is formed with a longitudinally extending channel 16 therein opening through the uppermost portion of said block. The channel 16 is bounded by side walls 17 and 18 and end walls 19 and 20 and a bottom 21 which are all integral with and form a part of the body 15. The lowermost portion 22 of the body is V-shaped as shown in Figs. 2, 3 and 4 for a purpose which will be presently described.

The body 15 of mounting 14 has attached to it a band 23 of metal which is formed with a reach 24 extending across the upper portion of said body and serving as a cover for closing the channel 16. The said band is constructed with other reaches 25, 26, 27 and 28 which cover the end wall 19, the V-shaped portion 22 and the end wall 20 of said body. The extreme ends 31 and 32 of this band are riveted together by means of rivets 33 and said portions are constructed to form a hinge leaf. This hinge leaf terminates at its end in an eye 34. Eye 34 has a pintle 35 extending through it by means of which the mounting 14 is pivoted to permit of rocking or tilting of the same as will be here-

inafter more fully described. The band 23 is secured to the body 15 by means of wood screws 30 which extend through the reaches 26 and 27 of said band and are screwed into the portion 22 of said body.

The mounting 14 is attached to a bracket 36 which is constructed with a leg 37 overlying the outer surface of the header 13 of casing 12 and with another leg 38 extending outwardly therefrom. Leg 37 is attached to said header 13 by means of screws 42 which extend through said leg and are screwed directly into the casing proper. Integral with the leg 37 are two braces 39 which are constructed with ears 41 overlying the leg 38. These ears hold the structure in position. Pintle 35 extends through the two braces 39 and serves to pivot the mounting 14 with respect to bracket 36. The leg 38 serves as a stop which engages hinge leaf 40 and limits the downward movement of the mounting 14 which is shown in its lowermost position in Fig. 2.

Within the channel 16 is disposed a glass tube 43 which is attached to a connector bar 44 by means of spring clips 45 integral therewith. The clips 45 grip the said tube as shown in Fig. 6 and hold the said tube rigidly secured to the connector 44. The tube 43 contains a body of mercury 46 which is adapted to gravitate from one end 47 of the tube to the other end 48 thereof and vice versa, depending upon the direction of inclination of the tube.

The tube 43 is supported in a manner to teeter within the channel 16 on two fulcrums 57 and 58 which are constructed as bolts. These bolts extend through slots 49 in the side walls 17 and 18 of the mounting 14 and are held in position with respect to said slots by means of nuts 51 and washers 52 and 53 mounted on said bolts. The fulcrums 57 and 58 overlie the bottom 21 of the channel 16 and may be slid along said slots and occupy any relative position with respect thereto. The connector 44 rests upon either or both of the fulcrums 57 and 58 depending upon the direction of inclination of the channel 16 and the position of the mercury within the tube 43.

The two reaches 26 and 27 of the band 23 provide two cam surfaces which are adapted to engage the upper corners of the door 10 when the same is moved either into opening or closing position as the case may be and function to cause the tilting of the mounting 14.

The operation of the device is as follows: When the door is closed as shown in Fig. 2, mounting 14 is tilted so that the wall 19 thereof is lowermost. In this position the body 46 of mercury is disposed in the end 47 of tube 43 and the connector bar 44 rests on fulcrum 57 only. The relative positions of the parts are shown in Fig. 2. When the door is opened the upper corner of the same engages the reach 27 of band 23 which, as previously stated, acts as a cam and movement of the door to the position shown in Fig. 3 causes the mounting 14 to swing upwardly. When the said mounting is in horizontal position, tube 43 still remains inclined with the end 47 thereof at the lowermost portion of the tube. Not until the mounting reaches the position shown in Fig. 3 will the tube 43 become horizontal. When the tube 43 first reaches horizontal position, the same occupies the same relative position with respect to mounting 14 as it had in the position shown in Fig. 2. When in such position the mercury commences to flow from the end 47 thereof to the end 48. As soon as the mercury passes fulcrum 57, tube 43 teeters on said fulcrum so that the end

48 thereof drops. This continues until bar 44 engages fulcrum 58. At the intermediate position of the tube shown in full lines in Fig. 3, the connector bar 44 rests on both of the fulcrums 57 and 58. While this occurs a circuit is completed through the said fulcrums which serve as contacts and the bell or other signal connected to said contacts is energized. As soon as the mercury passes fulcrum 58 the tube shifts and teeters on fulcrum 58 instead of fulcrum 57, being lifted from the fulcrum 57. When this occurs, the circuit is again broken and the tube 43 with the mercury therein then remains in the relative position with respect to mounting 14, shown in Fig. 4. Further movement of the door raises the mounting 14 upwardly until the hump 59 of the band 23 rests on the upper edge of the door, as shown in Fig. 4. Such added movement of the door and mounting does not alter the position of the tube 43 with respect to the mounting and the circuit still remains open. When the door is opened still further the mounting 14 commences to swing downwardly. When a position is reached which is the reverse of that shown in Fig. 3 the tube 45 again becomes level, the mercury in the end 48 thereof commences to flow toward the end 47 and the tube 43 again alternately teeters on fulcrums 58 and 57 closing the circuit through the contacts formed thereby. When the mercury passes fulcrum 57, the tube teeters solely on fulcrum 57 and raises from fulcrum 58 thereby breaking the circuit through the two contacts. It will thus be seen that the circuit is opened and closed twice during the opening of the door. When the door is closed the movements of the mounting are reversed and the switch is again successively closed twice the same as when the door is opened.

If the length of time that the signal is to be operated and the circuit closed is desired to be varied, the same may be accomplished by loosening the nuts 51 and shifting the fulcrums 57 and 58 within the slots 49 and thereafter tightening the said nuts.

In the installation of the invention as shown in Fig. 3, the switch has been arranged to give two signals upon the opening or closing of the door. It can be readily comprehended, however, that the switch may be arranged to normally assume the position shown in Fig. 4, when the door is closed and to reach the position shown in Fig. 2, when the door is opened. In such case a single signal is given for each movement of the door. This result can be accomplished by attaching a bracket to the door at the level of the upper portion of the door which engages the hump 59 when the door is closed and which leaves the said hump when the door is opened.

In Figs. 7 to 11 I have shown a modification of the invention in which a metal ball is used in place of the body of mercury for procuring operation of the runway. The mounting and support therefor being identical with that shown in Figs. 1 to 6, will not be described again and the same reference numerals will be used to indicate the corresponding parts.

In this form of the invention a connector bar 61 is used in place of the tube 43. This connector bar 61 is constructed of a length substantially equal to the distance between the end walls 19 and 20 and of a width substantially equal to the distance between the side walls 17 and 18 and is provided with upturned ends 62 and 63. A metal ball 64 is used in place of the body of mercury 46 and rides upon the connector bar 61

which in this particular form of the invention serves both as runway and connector bar.

When the door is closed and the parts of the switch are as shown in Fig. 7, ball 64 rests against the upturned end 62 of connector bar 61. When the door is moved to the position shown in Fig. 8, ball 64 rolls along the connector bar or the runway 61 and causes the said connector bar to engage both fulcrums 57 and 58, thereby closing the circuit. The ball thereafter continues to roll until it engages the upturned end 63. As soon as the ball passes fulcrum 58 the connector bar 61 teeters on fulcrum 58 and raises from fulcrum 57, thereby opening the circuit. The parts are then disposed in the same relative positions as shown in Fig. 9 in which the mounting has been illustrated in extreme uppermost position.

My invention is extremely advantageous in that a simple and practical device is provided, whereby a definite predetermined operation of the switch can be had regardless of the manner of operating the actuating member therefor. When the switch is used in conjunction with a door, the switch can be made to operate a signal for a predetermined length of time and the signals then terminated regardless of how the door is operated and whether or not the door is left fully open or partly open. With my invention two signals are given with either the opening or closing of the door so that the attendant can ascertain whether or not the door is merely ajar or is open to a greater extent, and whether or not the door has been partly closed or has been entirely closed. There are no intricate or complicated parts to get out of order and the device may be constructed at a reasonable cost.

Changes in the specific form of my invention, as herein disclosed, may be made within the scope of what is claimed without departing from the spirit of my invention.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. An electric switch comprising a mounting constructed of insulating material and provided with side and end walls and a bottom to form a channel therein, said side walls having registering slots therein disposed immediately above the bottom of said channel, two bolts extending through said slots and overlying the bottom of said channel and forming spaced twin fulcrums, a member adapted to teeter on said fulcrums, switch means adapted to be operated by said

member when said member is carried by both of said fulcrums, means for causing said member to teeter, and means for holding said bolts in adjusted position within said slots.

2. An electric switch comprising a mounting constructed of insulating material and provided with side and end walls and a bottom to form a channel therein, said side walls having registering slots therein disposed immediately above the bottom of said channel, two bolts extending through said slots and overlying the bottom of said channel and forming spaced twin fulcrums, a runway disposed within said channel and provided with contact means adapted to teeter on said fulcrums and to close a circuit through said fulcrums when said runway is carried by both of said fulcrums, and a weighted body adapted to gravitate from one end of said runway to the other for causing said runway to teeter.

3. In an electric switch, a mounting supported for tilting movements to and fro in a vertical plane, two relatively adjustable fulcrums carried by said mounting, a runway adapted to teeter on said fulcrums, said runway having contact means to close a circuit through said fulcrums when the runway is supported by both fulcrums, and a weighted body adapted upon the tilting of said mounting, to gravitate from one end of said runway and continue to the other end thereof for causing the runway to teeter, first on one fulcrum to a position supported by both, and then teeter further on the second fulcrum, whereby the circuit through the fulcrums is momentarily closed, the interval of closing of such circuit depending upon the relative adjustment of said fulcrums.

4. In an electric switch, a mounting supported for tilting movements to and fro in a vertical plane, two fulcrums carried by said mounting, a runway adapted to teeter on said fulcrums, said runway having contact means to close a circuit through said fulcrums when the runway is supported by both fulcrums, and a weighted body adapted, upon the tilting of said mounting, to gravitate from one end of said runway to the other end thereof for causing the runway to teeter, first on one fulcrum to a position carried by both, and then by reason of the continuing travel of said body under its own momentum to teeter further on the second fulcrum, whereby the circuit through the fulcrums is closed but momentarily.

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