

May 1, 1923.

A. P. BALL ET AL

1,453,696

ELECTRICAL SWITCH

Filed Oct. 24, 1917

2 Sheets-Sheet 1

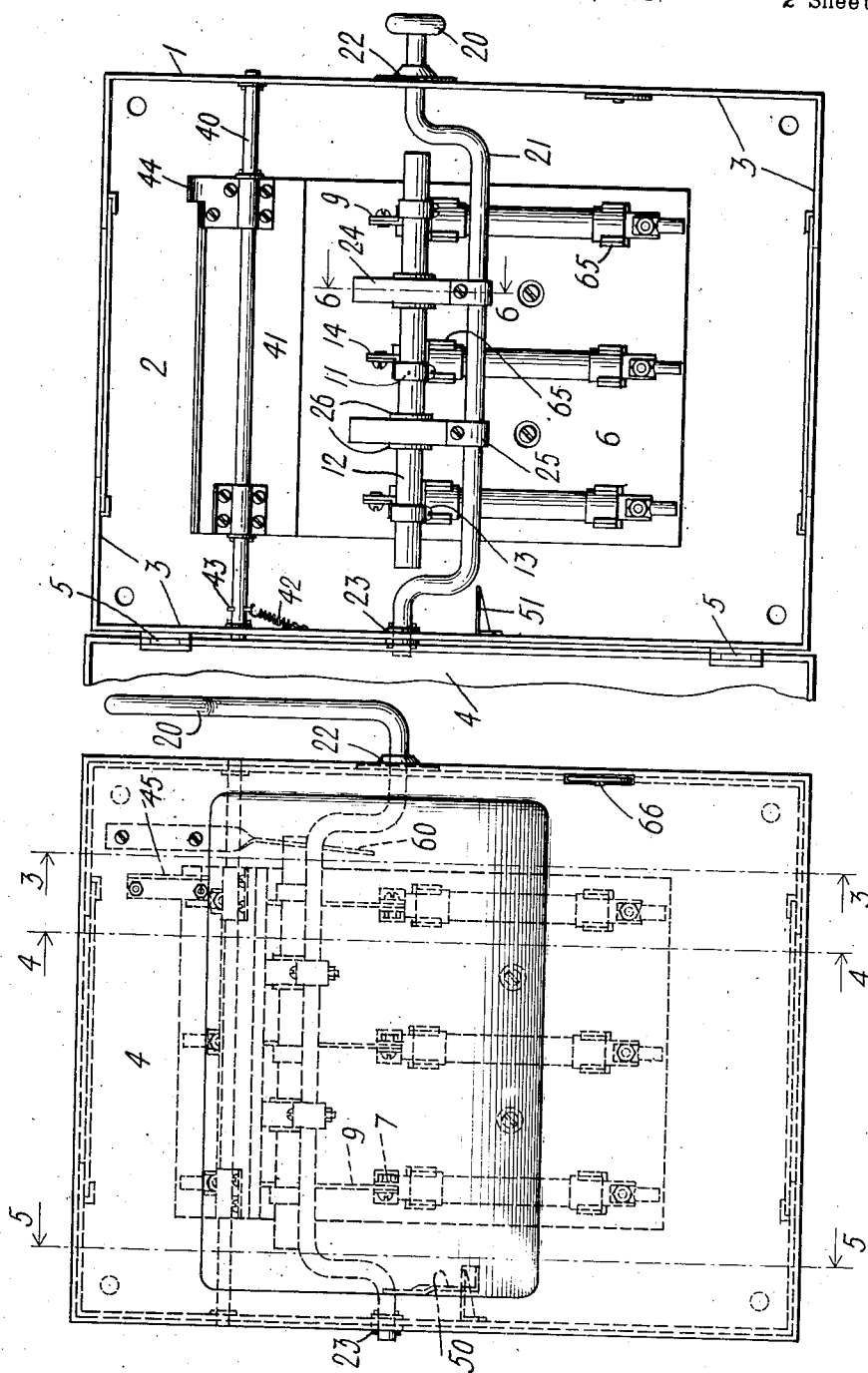


FIG. 2

FIG. 1

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2 Sheets-Sheet 2

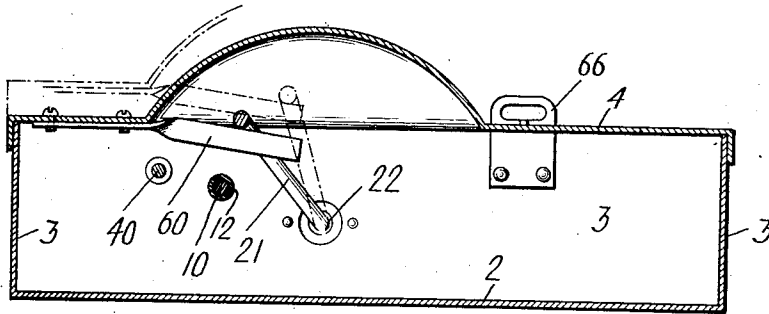


FIG. 3

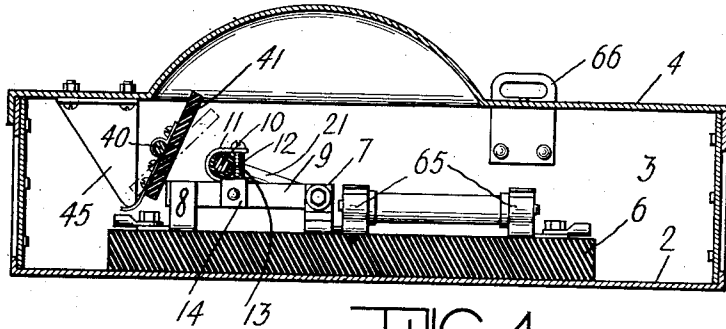


FIG. 4

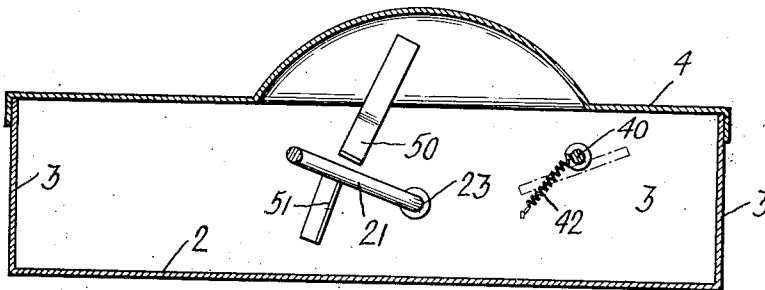


FIG. 5

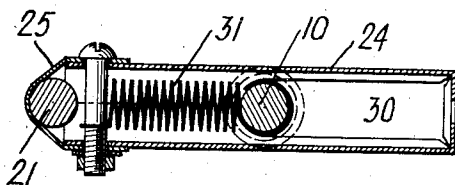


FIG. 6

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Patented May 1, 1923.

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# UNITED STATES PATENT OFFICE.

ALBERT P. BALL, OF ROYAL OAK, AND FREDRICK ZENKER, OF HIGHLAND PARK, MICHIGAN, ASSIGNORS TO SQUARE D COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

## ELECTRICAL SWITCH.

Application filed October 24, 1917. Serial No. 198,297.

*To all whom it may concern:*

Be it known that we, ALBERT P. BALL, a citizen of the United States, residing at Royal Oak, in the county of Oakland and State of Michigan, and FREDRICK ZENKER, a subject of the Emperor of Germany, residing at Highland Park, county of Wayne, and State of Michigan, have invented certain new and useful Improvements in Electrical Switches, of which the following, taken in connection with the accompanying drawings, is a full, clear, and concise description thereof.

This invention relates to enclosed or armored switches and with regard to certain more specific features thereof to armored switches of the quick break type employing means for controlling the relative position of the switch parts to accommodate various requirements of the service.

One of the objects of the invention is to provide a switch of the character above referred to which shall be simple in construction, durable and inexpensive.

Another object of the invention is to provide means of reliable and efficient character for insuring a proper sequence of switch operations.

Still another object lies in the provision of means insuring safety from fire, protection from water, dirt, oil, and so forth, without sacrificing the features of simplicity and compactness.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists of the various features of construction, combination of elements and arrangements of parts which will be exemplified by the construction hereinafter set forth and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings wherein is shown one of various possible embodiments of the invention:

Figure 1 is a plan view of an armored switch comprising features of the invention, the view being taken with the switch parts closed as in normal service operation.

Fig. 2 is a view with the hinged cover

of the casing opened to more clearly indicate the interior structure.

Fig. 3 is a view taken on the line 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1, looking in the direction of the arrows.

Fig. 5 is a view taken on the line 5—5 of Fig. 1, looking in the direction of the arrows; and

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 2.

Referring now more particularly to the drawings wherein similar reference characters refer to similar parts throughout the several views, there is indicated at 1 a metal casing comprising the rectangular base portion 2, upper, lower and side walls 3, and a movable cover portion 4 hinged to the casing, as indicated at 5. Secured to the base portion 2 is an auxiliary base or supporting member 6 of insulating material upon which are mounted two sets 7 and 8 of fixed contacts, each set consisting of three spaced clip contacts. The contacts of set 7 all serve as pivotal supports for a set of movable contacts 9, which in the embodiment shown, are of knife blade construction and are pivoted in some suitable manner to the contacts of set 7. Intermediate the ends of the knife blades they are joined to each other by a tie-rod 10 which extends transversely of the switch and is connected to each blade respectively by means of a U-shaped connector 11 which straddles an insulating bushing 12 of the tie-rod and is secured in position by means of a screw 13 which passes through the open ends of the U. One side of the U is formed with an ear 14 adapted to abut the side of the knife blade and is secured thereto in any suitable manner. An operating handle for these movable contacts is indicated at 20, being formed from a portion of an operating crank rod 21, which latter is journaled in opposite sides of the casing at 22 and 23, respectively. The connection between the operating crank rod 21 and the tie-rod 10 is by means of stamped metal hollow spring housings 24 which are arranged with their ends loosely connected to

the operating crank 21 by means of sheet metal straps 25 which fit around the crank rod and are screwed to the sheet metal spring housings 24. In order to hold these connections against transverse disalignment the insulation bushings 12 are terminated at intervals and washers 26 of insulating material are fit on over the tie-rod 10 at either side of the sheet metal housings 24. As indicated clearly in Fig. 6, these housings are cut away on opposite sides at 30 in order to permit a limited range of relative movement between the operating crank 21 and the tie-rod and associated movable contacts.

A contractile spring 31 has one end secured to the screw which fastens the end straps 25 to the housing 24, and the other end of this spring is coiled around the tie-rod 10 between the washers 26. The tendency of this spring is to urge the tie-rod and the crank rod toward each other and as far as permitted by the opening 30 in the housing 24. The purposes of this construction will be later set forth.

Pivotaly mounted within the casing by means of a suitable connection with a rod 40 journaled in the side walls is a baffle plate 41. A coil spring 42 connected at one end to a pin 43 on the rod 40 and having its other end connected to a side wall of the casing, tends to urge this baffle plate into a position above the fixed contacts 8, whereupon it will lie between these fixed contacts and the movable contacts 9 and provide an obstruction preventing the closing of the switch. The baffle plate 41 has formed thereon on a projection 44 on the opposite side of its pivotal point from the spring connection at 43, whereby upon the closing of the cover 4 an actuating member 45 engages with this projection and moves the baffle plate against the action of the spring 42 into an inoperative or unobstructing position. It will be obvious from the foregoing that the switch may not be unintentionally or unwittingly closed while the hinged cover is open. The setting of the baffle plate in position to permit closing of the switch is dependent upon the hinged cover being moved to its fully closed position.

It is sometimes desirable that the switch be locked in open position even when the cover 4 is closed and sealed. To accomplish this a stop 50 is provided on the cover 4 and when desired to so control the switch parts that they may not be changed when the cover is closed or sealed, the operating handle is moved to bring the crank rod 21 to what may be termed its extreme open position, as indicated in Fig. 5 of the drawings. In this position it is brought back against a stop 51 which prevents further movement in the direction of opening and then when the cover is brought to closed position the stop 50 lies in the path of travel

of the operating crank toward closed position, as a result of which the operating crank and its handle are locked against substantial movement in either direction.

As set forth it is a further object of the invention to provide simple and otherwise improved means to prevent the hinged cover being opened until after the switch has been opened. This is accomplished by means of an inclined stop 60 which rests below the operating crank 21 in closed switch position and with the cover closed. Should an attempt be made to swing the cover open on its hinges without first opening the switch such action will be resisted by the combined action of the springs 31 and the friction of the spring clips of the contacts 8 and their co-operating knife blades. In the embodiment shown, however, if sufficient force were used the movable cover might be swung on its hinges to open position, but in doing so the inclined stop 60 would then serve as a switch operating arm which would cam the crank lever 21 to a position of disengagement between the movable contacts and the fixed contacts 8.

The insulating base block 6 also has mounted thereon suitable fuse clips 65 in which are supported the usual circuit protecting fuses.

Summarizing the operation: The switch handle is normally maintained in the position shown clearly in Fig. 2 of the drawings. That is, a position about midway between the stop 51 and the baffle plate 41. The operator may first swing the hinged cover to closed position where it will be latched by means of a spring clasp 66. Thereafter the switch handle 20 may be rocked upwardly until the knife blade contacts have engaged with the clips 8. It will be noted that at this time the baffle plate 41 is in its inoperative position due to the fact that the actuating member 45 has engaged with the projection 44 in the closing of the cover. Should an operator attempt at this time to open the cover such action would be resisted by the stop 60, or, if persisted in, the switch would be opened before the cover. If desired to lock the switch in open position the handle 20 is rocked until the crank 21 abuts the stop 51 and thereupon the cover 4 is closed and latched and the stop 50 prevents any substantial movement of the movable switch parts toward switch closing position.

The cheapness, simplicity and effectiveness of the quick break mechanism should be particularly noted in that the housing is of sheet metal stamping and the connection between the housing and the strap 25 permits relative rotative movement between the operating crank 21 and the housing. Operation of the handle 20 to open the switch permits initial movement of the handle, the operating crank and the housings without

directly effecting the opening of the switch contacts until considerable increased tension has been put upon the springs 31. Continued movement of the handle, of course, effects the disengagement of the contacts under the increased spring tension mentioned resulting in a clean and instantaneous break.

As many changes could be made in the above construction and as many apparently widely different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter set forth in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed:

1. In a device of the character described, in combination, a casing having a movable cover, a switch contained in said casing and comprising fixed and movable contacts, a handle outside the casing having operating connections with said movable contacts, a baffle plate pivotally mounted within said casing and spring urged toward a position to obstruct closure of the switch, means operative upon closure of the cover to move said baffle plate out of obstructing position, and means independent of said baffle plate for locking said operating connections in open switch position with the cover closed.

2. In a device of the character described, in combination, a casing having a movable cover, a switch contained in said casing and comprising fixed and movable contacts, a handle outside the casing having operating connections with said movable contacts, a baffle plate pivotally mounted within said casing and spring urged toward a position to obstruct closure of the switch, means operative upon closure of the cover to move said baffle plate out of obstructing position, and means resisting the opening of said cover when the switch is closed and until the latter has been opened.

3. In a device of the character described, in combination, a casing having a movable cover, a switch contained in said casing and comprising fixed and movable contacts, a handle outside the casing having operating connections with said movable contacts, a baffle plate pivotally mounted within said casing and spring urged toward a position to obstruct closure of the switch, means operative upon closure of the cover to move said baffle plate out of obstructing position, and means comprising a stop carried on said cover for resisting the opening of said cover when the switch is closed and until the latter has been opened.

4. In an electric switch, in combination, a casing having a hinged cover, a switch contained in said casing and comprising fixed and movable contacts, operating means whereby said movable contacts may be

moved into and out of engagement with said fixed contacts, means comprising a stop adapted to resist opening of the cover until after the switch has been opened, a baffle plate adapted to cover the fixed contacts when the switch is open, and means comprising a stop adapted to prevent closure of the switch when the cover is closed, both said means being on said cover and inaccessible when the cover is closed, substantially as described.

5. In a device of the character described, in combination, a casing having a hinged cover, a switch contained in said casing and comprising fixed and movable contacts, operating means whereby said movable contacts may be moved into and out of engagement with said fixed contacts, means comprising a stop adapted to resist opening of the cover until after the switch has been opened, means comprising a stop adapted to prevent closure of the switch when the cover is closed, and means adapted to prevent closure of the switch when the cover is open; said last means comprising a biased stop within the casing and a projection from the cover adapted to move the biased stop to inoperative position upon closing the cover.

6. In a device of the character described, in combination, a casing having a hinged cover, a switch contained in said casing and comprising fixed and movable contacts, operating means whereby said movable contacts may be moved into and out of engagement with said fixed contacts, said operating means comprising an operating crank means comprising a stop carried by said cover and adapted to co-operate with said operating means to resist opening of the cover until after the switch has been opened, and means comprising a stop carried by said cover adapted to prevent closure of the switch when the cover is closed, said first mentioned means being also adapted to open the switch on forcing the cover open.

7. In a device of the character described, in combination, a casing having a hinged cover and switch contained in said casing and comprising fixed and movable contacts, operating means, comprising an operating crank whereby said movable contacts may be moved into and out of engagement with said fixed contacts, means to lock the operating crank in the extreme open position, and means on the cover for throwing the movable contacts out of engagement with the fixed contacts, said means comprising an oblique stop adapted to co-operate with the operating crank.

8. In a device of the character described, in combination, a casing having a hinged cover and switch contained in said casing and comprising fixed and movable contacts,

operating means, whereby said movable contacts may be moved into and out of engagement with said fixed contacts, lock-off means, comprising an angular piece of metal 5 fast to said cover, one portion of which is adapted to clear the operating means during normal operation of the switch, the other portion of which is adapted on one side to lock the operating means in the extreme open position, and means on the cover for 10 throwing the movable contacts out of engagement with the fixed contacts, said means comprising an oblique stop adapted to co-operate with the operating means.

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