

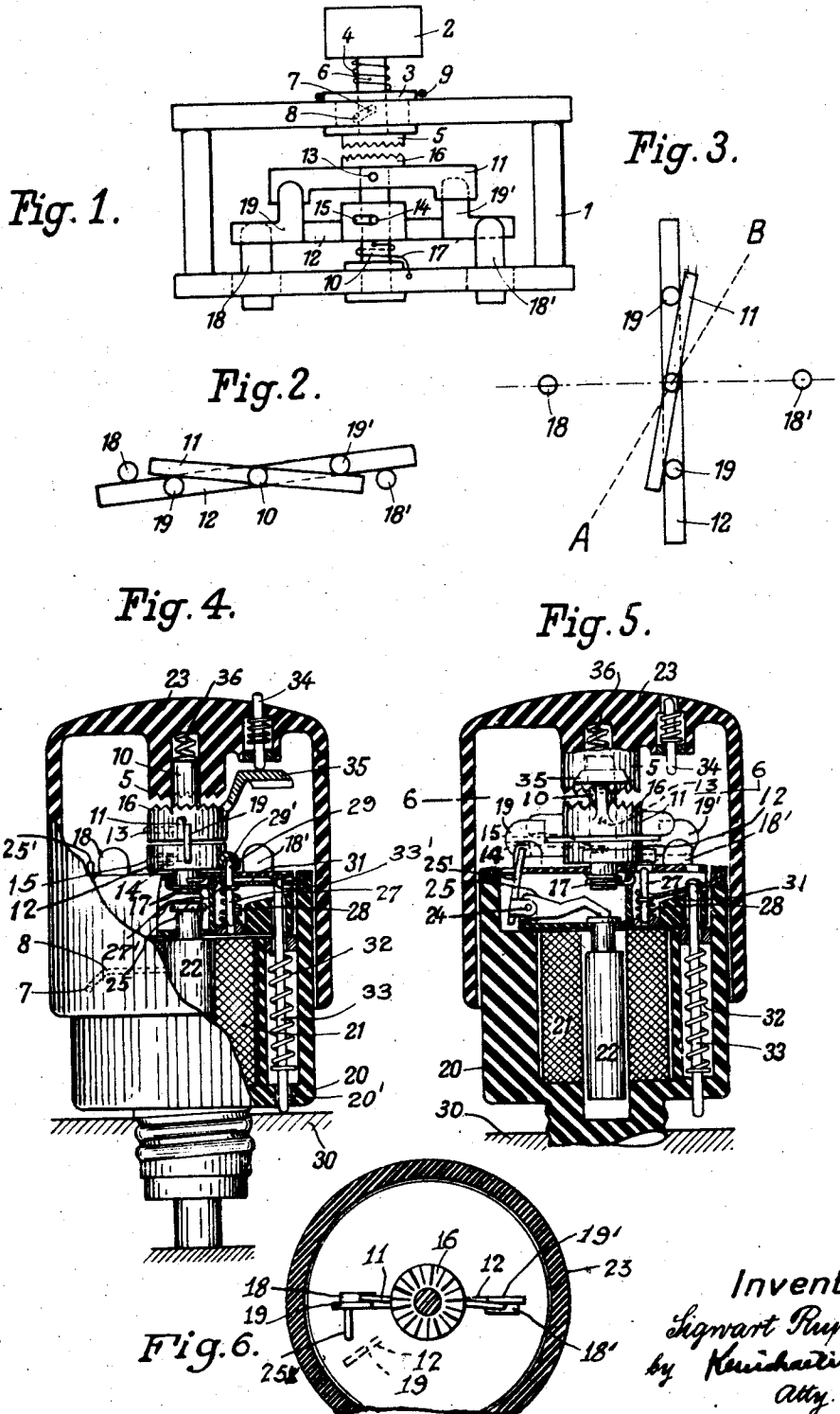
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ELECTRIC SWITCH

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ELECTRIC SWITCH

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My invention refers to electric switches and more especially to an automatic installation switch which may assume the form of a safety plug adapted to replace the well known safety fuses hitherto known. It is an object of my invention to provide a device of this kind which is more reliable in working and simpler in structure and design than similar devices hitherto used.

The switch according to the present invention is provided with a handle having the form of a rotary cap, press-button or the like. In contradistinction, however, to other switches hitherto devised, two bridge contact pieces are provided which are movable relative to each other and also relative to the handle, and which are actuated by means of the handle, one of these contact pieces, on being rotated in one direction, being arranged to carry the other contact piece along, this latter contact piece, on the handle being released, returning with a jerk and thereby closing the circuit.

It will be understood that the two contact pieces are movable with respect to each other, and also to the handle, and this "free release" prevents holding the switch in its cut-in position by retaining the handle. The casing protects the parts of the free release mechanism so that tampering is impossible.

Another feature of the switch according to the present invention consists therein that the handle (rotary cap or the like) is coupled with the spindle of the switch only when the switch is being set, and is disengaged automatically from the spindle on being released. Preferably, this is effected by a clutch connected with the protecting cap of the apparatus. The cap is displaced axially for throwing in the clutch and is returned to its initial position automatically as soon as the handle is released.

In order to compel the user to remove the plug before setting it anew whenever it has been operated by an overload, locking means may be provided, which lock the operative contact piece in the operative position and which are thrown out automatically when the plug is withdrawn.

In the drawings affixed to this specification

and forming part thereof a switch embodying my invention is illustrated by way of example.

In the drawings

Fig. 1 is a diagram showing the several parts of the switch in a purely diagrammatic manner.

Figs. 2 and 3 are similar views of the two contact pieces illustrating various positions of the same.

Fig. 4 is an elevation, partly in axial section, of a plug switch according to this invention as actually constructed, and

Fig. 5 is a similar view showing the parts in a different position.

Fig. 6 is a section on the line 6—6 in Fig. 5.

Referring first to Figs. 1—3, 1 is the switch frame surrounded by a casing (not shown), and 2 is the handle which is rotatably mounted in the sleeve 3, which can be rotated also. 4 is a spring which permanently tends to force the handle 2 upwards. 5 is a serrated sleeve keyed onto the spindle 6 of the handle 2. 7 is a pin mounted on the spindle 6 and projecting into a cam slot 8 of the sleeve 3. 9 is a spring tending to permanently turn the sleeve 3 into the position shown in Fig. 1.

10 is the switch spindle proper and 11 and 12 are the two bridge contact pieces which are movable relative to each other, the contact piece 11 being fixed to spindle 10 by means of a pin 13, while the contact piece 12 is loose on the spindle 10 but can be carried along by a pin 14 fixed on the spindle 10 and projecting into a slot 15 provided in the hub of the contact piece 12. At the top end of spindle 10 is mounted a serrated sleeve 16 facing the serrated sleeve 5. A spring 17 has one end fixed to the frame 1, the other end to the spindle 10. 18, 18' are stationary contacts, which are preferably slightly resilient. 19, 19' are the contact-breaking pieces mounted on the lower bridge contact piece 12.

The operation of this device is the following:

Fig. 3 shows the bridge contact pieces 11 and 12 in the position where the circuit is open. If it is desired to throw in the switch, the handle 2 is rotated clockwise and in con-

sequence of the pin 7 projecting into the cam slot 8 of the sleeve 3, the sleeve being held by its spring 9, the handle is axially displaced together with spindle 3 and serrated sleeve 5 so as to cause the two serrated sleeves 5 and 16 to interlock, whereby the handle 2 is coupled with the switch spindle 10. On the handle 2 being rotated further, the pin 7 having reached the end of slot 8 will now carry along the sleeve 3, against the spring 9. On the rotation of the handle 2 being continued, at first only the top contact piece 11 is carried along, and only after this contact piece has reached the dotted line A—B in Fig. 3, pin 14 will act towards carrying along also the bottom bridge contact piece 12. As soon as this latter contact piece has applied itself with its contacts 19 and 19' against the stationary contacts 18, 18', it is retained in this active position by automatic means which will be described with reference to Figs. 4 to 6. The circuit, however, is not yet closed, as the bridge 11 is not yet engaged with the contacts 19, 19' of the bridge 12. This will be understood from Fig. 3. As has been explained above, the bridge 11 is rotated clockwise into the position A, B and thus it comes away from the contacts 19, 19' of the bridge 12. Therefore the circuit is not yet closed when the bridge 12 is engaged with the contacts 18 and 18'. The handle 2 is now released, the springs 4 and 9 rotate it anticlockwise and at the same time it is returned to its initial position, Fig. 1, by axial displacement. The serrations of the sleeves 5 and 6 are disengaged and the spring 17 returns the bridge 11 with a jerk into the position in which it is in contact with the contact pieces 19, 19' on the bridge 12. Whenever the switch is under an overload the retaining means is moved into inactive position by suitable means which may be the armature of an electromagnet, and the spring 17 returns the two bridges 11 and 12 into the inactive position illustrated in Fig. 3.

The arrangement of parts which was shown diagrammatically in Figs. 1 to 3, is illustrated more in detail in Figs. 4 to 6 as applied to a plug switch of the usual type. The springs 4, 9 and 17 have been omitted for the sake of clearness. 20 is the casing of the switch which is inserted in a socket 30 with its threaded end, 21 is an electromagnet coil in the casing, and 22 is the armature referred to above for moving the retaining means into inactive position. 23 is a protective cap which at the same time performs the functions of the handle 2 of the switch, Fig. 1, and is provided with a central hollow boss to rotate and to slide on the spindle 10. The central hollow boss is provided with serrations 5. A spring 36 which is inserted in the bore of the boss receiving the spindle 10, tends to move the cap 23 away from the casing 20. The upper bridge 11

which is serrated at its upper end 16, is keyed on the spindle 10 and the lower bridge 12 is free to rotate about the spindle.

The stationary contacts 18 and 18' are fixed on the casing 20. The slot 8 and the pin 7 are illustrated in dotted lines in Fig. 4, the slot 8 here being a camway in the inside of the cap or handle 23, and the pin 7 being fixed in the casing 20. The camway 8 has a short inclined reach and a longer parallel reach. It will appear that by rotating the cap 23, when the pin 7 is at the lower end of the inclined reach of the camway 8, as shown in Fig. 4, the serrations 5 and 16 will engage while the spring 23' is compressed, the parts being held in position by the engagement of the pin 7 in the parallel reach of the camway 8.

Fig. 4 shows the bridges 11 and 12 in the position corresponding to Fig. 3, in which the bridge 12 is disengaged from the contacts 18 and 18' and the bridge 11 is engaged with the contacts 19, 19' on the bridge 12.

Means are provided for retaining the bridge 12 in engagement with the contacts 18, 18'. 25, 25' is a bell-crank lever which is fulcrumed about a pin 24 in the casing 20. The arm 25 of the bell-crank lever normally rests on the upper end 26 of the armature 22 so that the arm 25' projects into the path of the bridge 12 near the contact 19 as best seen in Fig. 6. The arm 25' is provided with an inclined face so that the bridge 12 when moving from the position illustrated in dotted lines in Fig. 6 into the position illustrated in full lines, depresses the arm 25' which, after the bridge 12 has moved past it, returns under the action of the weight of the arm 25 and retains the bridge 12 in the position in which it engages the contacts 18 and 18' as shown in Figs. 2, 5 and 6. When an overload occurs the armature 22 is attracted upwards by the coil 21, raising the arm 25 and moving the arm 25' out of engagement with the bridge 12 so that the bridge can be moved away from the contacts 18, 18'.

The switch must not be thrown in while in the socket 30. Throwing-in of the switch is prevented by a bar 33 which is fitted to slide in the casing 20, a spring 32 tending to move the bar out of the casing and into the position illustrated in Fig. 5 when released by the socket 30. When the switch has been screwed into its socket as shown in Fig. 4, the bar 33 is in its retracted position. 31 is a lever which is fulcrumed in the wall of the casing 20, the bar 33 being inserted in a hole in the lever and adapted to engage it by a head 33' at its upper end. 27 is a pin which is fitted to slide in the casing against the action of a spring 28, 27' is a collar on the pin 27 which engages the spring 28 from below and in turn is engaged by the lever 31 from above, and 29 is a notch in a lug 29' on the bridge 12 which is adapted to be en-

tered by the pin 27 when the bridge 12 is not engaged with the contact 18, 18' as shown in Fig. 4. In this manner, operation of the switch is prevented while the bar 33 is restrained by the socket 30 but when the switch is screwed out of the socket, as shown in Fig. 5, the spring 32 is able to pull down the bar 33 and, through the medium of the lever 31, to withdraw the pin 29 from the lug 29', releasing the bridge 12 and permitting the parts to be moved into active position.

In order to render the position of the bridges visible from the outside, an arm 35 is secured to, or formed integral with, the upper bridge 11 which cooperates with a pin 34. When the parts are in the position illustrated in Figs. 3 and 4, that is, when the bridge 12 is not engaged with the contacts 18, 18', the arm 35 forces the end of the pin from the handle 23 but when the pin is released by the arm 35 as shown in Fig. 5 it is retracted into the casing by a spring.

In order to render the position of the bridge contact pieces visible from the outside, a spring-actuated pin 34 is mounted in the cap 23, this pin projecting from the cap on being acted upon by a cam lever 35 mounted on the upper bridge contact piece 11, when the parts are in the thrown-out position. The outwardly projecting portion of this pin can be colored or covered with a radiating coating.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

I claim:—

1. Switch comprising a rotatable handle, two bridge contact pieces rotatable relative to said handle and to each other, means whereby one contact piece on being rotated in one direction, carries the other contact piece along and means for automatically rotating said one contact piece in the other direction, when said handle is released.

2. Switch comprising a plug, a handle rotatably mounted on said plug, two bridge contact pieces rotatable relative to said handle and to each other, means whereby one contact piece on being rotated in one direction, carries the other contact piece along and means for automatically rotating said one contact piece in the other direction, when said handle is released.

3. Switch comprising a rotatable handle, two bridge contact pieces rotatable relative to said handle and to each other, means whereby one contact piece on being rotated in one direction, carries the other contact piece along, means for automatically rotating said one contact piece in the other direction, when said handle is released and means for automatically disengaging said handle from said contact piece.

4. Switch comprising a plug, a hood-shaped handle mounted on said plug, two bridge contact pieces rotatable relative to said handle and to each other, means whereby one contact piece on being rotated in one direction, carries the other contact piece along and means for automatically rotating said one contact piece in the other direction, when said handle is released.

5. Switch comprising a rotatable handle, two bridge contact pieces rotatable relative to said handle and to each other, means whereby one contact piece on being rotated in one direction, carries the other contact piece along, means for automatically rotating said one contact piece in the other direction when said handle is released and means for automatically locking said first contact piece.

6. Switch comprising a rotatable handle, two bridge contact pieces rotatable relative to said handle and to each other, means whereby one contact piece on being rotated in one direction, carries the other contact piece along and means for automatically rotating said one contact piece in the other direction, when said handle is released, means for automatically locking said first contact piece and means for automatically unlocking same when removing said switch.

7. Switch comprising a plug, a handle rotatably mounted on said plug, two bridge contact pieces rotatable relative to said handle and to each other, means whereby one contact piece on being rotated in one direction, carries the other contact piece along, means for automatically rotating said one contact piece in the other direction, when said handle is released, means for automatically locking said first contact piece and means displaceable in said plug for arresting said locking means.

In testimony whereof I affix my signature.

SIGWART RUPPEL.