March 5, 1940. E. S. BOYNTON 2,192,296

CIRCUIT CLOSING DEVICE

Filed March 11, 1937

Fig. 1.

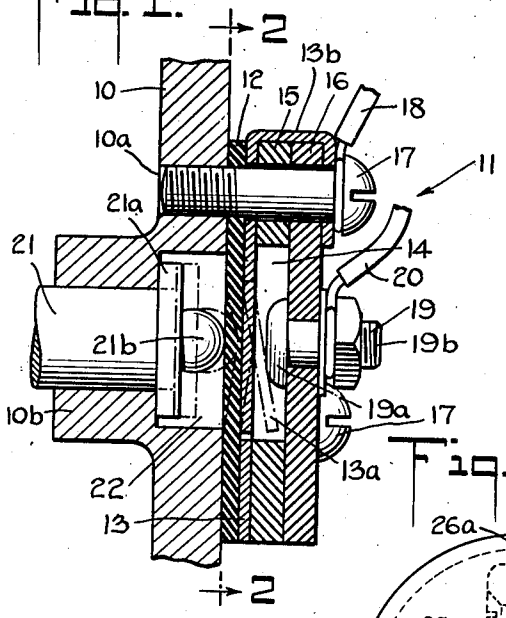



Fig. 2.

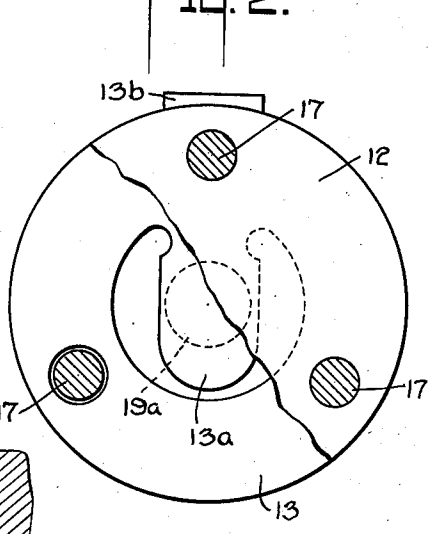



Fig. 3.

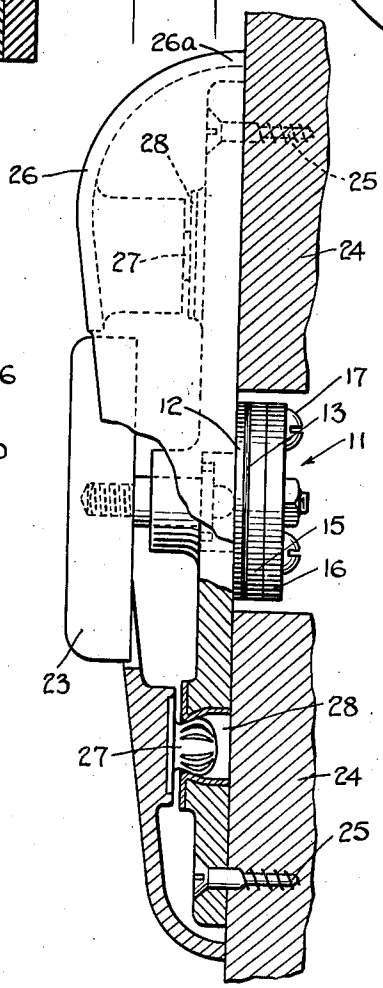



Fig. 4.

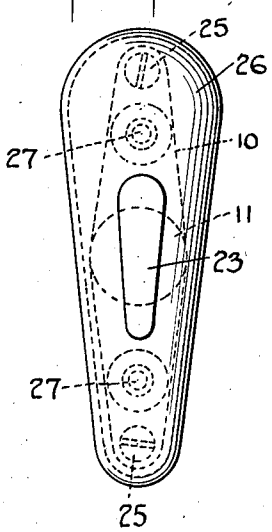
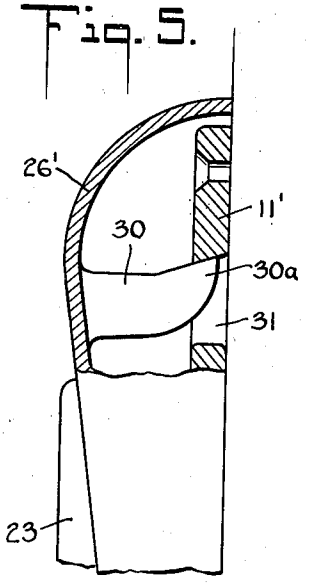



Fig. 5.




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# UNITED STATES PATENT OFFICE

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## CIRCUIT CLOSING DEVICE

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Application March 11, 1937, Serial No. 130,264

3 Claims. (Cl. 200—159)

My invention relates to devices for closing electrical circuits, and more particularly to types of such devices known commonly as push buttons.

An outstanding feature of the invention is the provision of a switch unit containing contact members enclosed in a weather sealed insulated chamber. Means are provided for actuating the members to contact position without disturbing the tightness of the sealed chamber. Devices, pursuant to the invention, are characterized by ease of installation, ease of disassembly, and inexpensiveness of manufacture. They may have ornamental exteriors unbroken by exposed fastening means, and capable of conforming to the structure to which the device is attached.

The above features make embodiments of my invention especially useful under condition of exposure to weather of all kinds, and especially desirable as "door-bells."

In attaining the advantages of my invention, I provide a switch unit having a stationary contact member and a movable contact member spaced apart within an insulated, weather sealed inclosure. Contact between the stated members, without invading the tightness of the sealed chamber, is afforded by a push rod having an end operative against a flexible diaphragm forming a part of the sealed chamber and disposed in proximity to the movable contact member. Pressure on the push rod will displace the flexible diaphragm, and, therewith, will displace the movable contact member to contact position.

The switch unit may be mounted on a base plate, and connection of the movable contact member with a source of electric current may be had through an element securing the switch unit to the base plate.

The push rod is preferably slidably mounted in the base plate, and has, at its free end, a button for exposure through an aperture of a housing, the housing functioning with the base plate to complete the device. The housing desirably has an ornamental exterior configuration and is attached to the base plate in a manner affording ready removal together with concealment of the securing means.

Preferably the base plate fits inside the free edges of the housing, the securement being had by one or more snap fasteners whose component elements are affixed, respectively to the base plate and to the inside of the housing. The edges of the housing will then be free for providing a substantially conforming fit against the structure to which the base plate is attached.

In the drawing which illustrates a preferred embodiment of my invention—

Fig. 1 represents a vertical section taken centrally of a preferred embodiment of my device, completely illustrated in Figs. 3 and 4, with housing removed and showing only a portion of the base support and push rod.

Fig. 2 represents a section taken on line 2—2, Fig. 1.

Fig. 3 illustrates in elevation, on a scale slightly reduced over that of Fig. 1, the complete device, the exterior housing and base support being shown partly in section to reveal the special fastening means employed.

Fig. 4 represents, on a much reduced scale, a front elevation of the complete device.

Fig. 5 represents in section a fragmentary detail of a modification of the fastening means securing the ornamental housing to the base support.

Referring to the drawing, and particularly to Figs. 1 through 4 thereof; 10 designates a base plate carrying an electrical switch unit, indicated generally at 11.

The switch unit comprises a movable contact element and a stationary contact element disposed within an insulated enclosure sealed against weather conditions.

The enclosure is preferably formed by placing a circular sheet or diaphragm 12 of flexible, water-proof material, such as soft rubber, in face to face relation with a similarly configurated thin plate 13 of electrical conducting material, an internal chamber 14 being provided by an annulus 15 of suitable insulating material disposed in face to face relation with the plate 13, and the enclosure being completed by a disc 16 of suitable insulating material applied in face to face relation with the annulus 15. The layers of the enclosing structure, thus provided, may be bonded to one another by a suitable water-proof adhesive such as shellac. The structure thus formed may be secured to the base plate 10 by means of a plurality of machine screws 17, respectively extending through the layers of the structure and each received by a threaded recess, as at 10a, in the base plate 10.

The plate 13 is advantageously a metal stamping having a central, resilient tongue member 13a providing the movable contact element. The so provided movable contact element is thus resiliently and electro-conductively secured to the body proper of the plate. Connection with a source of electric current may be had by reason of a snug fit of the plate 13 around one of the

machine screws 17 serving as a binding post for a lead conductor 18, or by reason of an integral tab extension as at 13b, see Fig. 1, extending around the outside of the layers 15 and 16 of insulating material, for intimate contact with the end of the lead conductor 18.

The stationary contact element may be provided by an element 19 of bolt formation having a head 19a disposed inside the chamber 14 for service as the contact portion, and having a shank 19b extending outside the unit for service as a binding post for receiving the other lead conductor 20 of the electric circuit.

A push rod 21 is slidably mounted in a hub portion 10b of the base plate 10, and has one end terminating in a chamber 22 formed in the base plate at a location opposite the movable contact element 13a of the switch unit. The stated end of the push rod is provided with a flange 21a for function as a stop member for limiting the movement of the push rod outwardly of the chamber 22. Also, conveniently provided at the stated end of the push rod is a pressure member 21b directed substantially centrally of the movable contact element 13a.

The other end of the push rod carries actuating means. In the present case, the illustrations being directed to an ornamental push button assembly used advantageously in conjunction with a door-bell, the actuating means takes the form of a push button 23.

Pressure exerted on the push button 23 will, through the medium of pressure member 21b, distend the flexible diaphragm 12 inwardly, thereby displacing the tongue member, i. e., movable contact element 13a, into contact position with the stationary contact element 19a, all as illustrated by broken lines in Fig. 1, thus completing the electrical circuit. When the pressure on the push button 23 is removed, the natural resilience of the tongue member 13a will break contact and return the push rod 21 to its normal position, as illustrated by the full lines of Fig. 1.

Weather sealing of the switch unit 11, and intimate contact of the movable contact member with the lead conductor 18 are maintained and enhanced by the pressure normally exerted by the machine screws 17 in supporting the switch unit on the base plate. Thus a three-fold function is accomplished by this structural characteristic of the present invention.

The base plate 10 may be secured to supporting structure 24 by any suitable means such as the screws 25.

Since the push button assembly is exposed to view and usually is a part of the decorative hardware of a building, an ornamental housing 26 is provided for completely enclosing the base plate. The securement is preferably such as to afford ready removal and replacement of the housing, concealment of the securing means, and a conforming fit with the supporting structure 24.

In accomplishing the same, I provide the base plate 10 of smaller dimension than the area bounded by the free edges 26a of the housing so that such edges will remain independent of the base plate when the push button is completely assembled. I further provide snap fasteners having their component male and female elements affixed, respectively, to the interior of the housing 26 and to the opposite surface of the plate 10. In the illustrated embodiment, see Figs. 3 and 4, there are two snap fasteners spaced apart along the length of the structure and substantially centrally of the width. The male elements 27, 27 are affixed to the inside of the housing 26 for cooperation with the female elements 28, 28 formed at appropriate locations in the body of the base plate 10. The snap fasteners provide a yielding securement between the housing 26 and the base plate 10 affording conformation of the free edges 26a of the housing with the surface of the structure 24, independently of the position of the base plate thereon.

In Fig. 5 is shown a modification of the securing means. A lug 30 having an upwardly inclined terminus 30a cooperates with the downwardly inclined top wall of a recess 31 provided in the base plate 10; all as a substitute for one of the snap fasteners. The lower end of the housing 26' may be secured by a snap fastener similar to those illustrated in Figs. 3 and 4.

Whereas this invention has been illustrated and described with respect to only one embodiment thereof, it should be clearly understood that many changes may be made in the specific construction disclosed without departing from the spirit of the invention as herein set forth and broadly stated in the following claims.

I claim:

1. In a circuit closing device, a switch unit mounted on a support, the switch unit comprising a flexible insulating diaphragm disposed in face to face relation with an electrical conducting plate which has a resilient member integral therewith and working from a substantially central perforation in the plate for service as a movable contact member; an enclosed chamber formed proximate the resilient member by insulating walls meeting that portion of the free face of the plate which surrounds the resilient member; threaded electrical conducting elements extending through the insulating walls, through the plate, and through the flexible diaphragm, making electrical connection with the plate and securing the switch unit to the support, the exterior end of one of said conducting elements being adapted for electrical connection, a stationary contact element extending into the chamber from the exterior through the insulation, the end within the chamber serving as the contact member and the exterior end being adapted for electrical connection; and means carried by said support for displacing the flexible diaphragm inwardly of the chamber and for therewith forcing the resilient member into contact with the stationary contact element.

2. In a circuit closing device, a switch unit comprising a completely enclosed, electrically insulated chamber having one wall formed by an outer flexible diaphragm of insulating material disposed in face to face relation with an inner plate of electrically conducting material, the said plate being perforate at a location proximate the chamber and having a tongue formed integral therewith and disposed within said perforation, said tongue being displaceable from said perforation for service as a movable contact element; a stationary contact element extending into the chamber from the exterior of and through the insulation of the enclosing structure, the contact end being disposed in opposition to the said tongue of the plate and the end which extends outside of the enclosing structure being adapted for electrical connection; means associated with said switch unit for engaging supporting structure and for therewith tightly clamping the walls of the enclosing struc-

ture, inclusive of the plate and the flexible diaphragm, together, said means making electrical contact with said plate and being adapted for electrical connection.

3. In a circuit closing device, a switch unit mounted on a support, the switch unit comprising an imperforate flexible insulating diaphragm; an electrical conducting plate disposed in face to face relation with said diaphragm, said plate having a perforation formed substantially centrally thereof; a member disposed within said perforation and resiliently and electro-conductively secured to said plate for service as a contact, movable from said perforation; insulating walls surrounding said central perforation and forming an enclosed chamber thereat; means tightly clamping said flexible diaphragm, said plate, and said insulating walls to one another and to said support, said means making electrical contact with said plate and being adapted for electrical connection; a stationary contact element extending through insulation defining said chamber and communicating with said chamber at a location opposite and spaced apart from the movable contact member of the plate, said stationary contact element being adapted for electrical connection; and means for displacing said flexible diaphragm inwardly of said chamber and, therewith, the movable contact member of the plate into contact with said stationary contact element.

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