Aug. 11, 1936. A. C. GAYNOR 2,050,698

ELECTRIC SWITCH

Filed July 3, 1934

Fig. 1

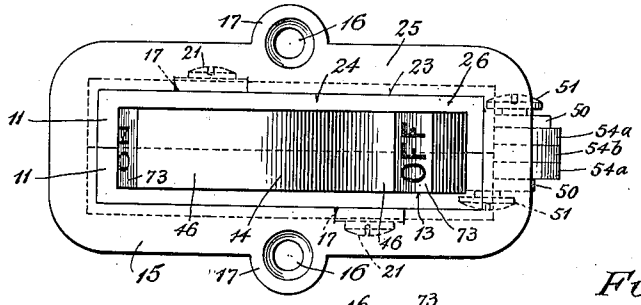


Fig. 8

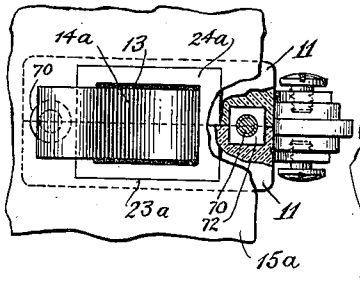


Fig. 2

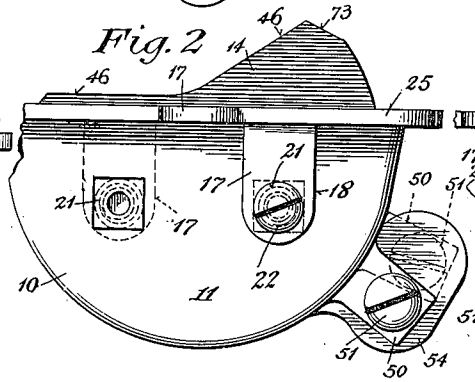


Fig. 3

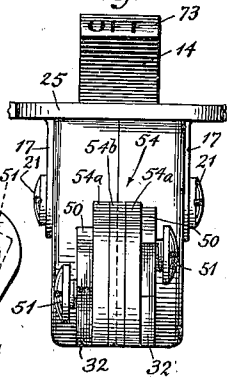


Fig. 7

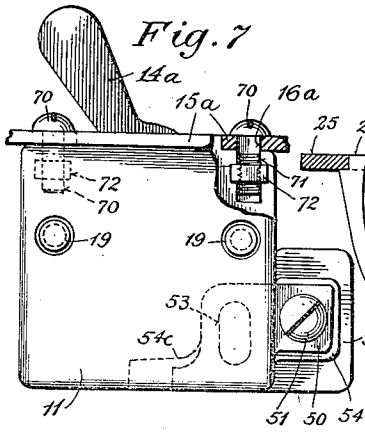


Fig. 4

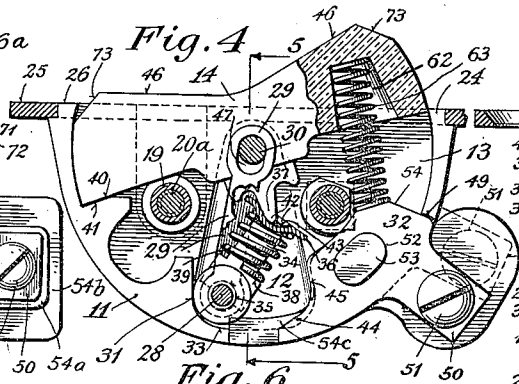


Fig. 5

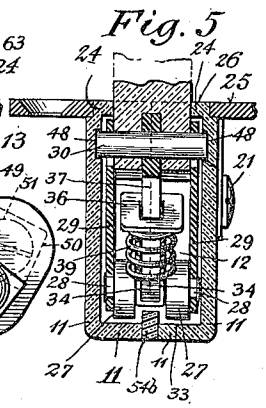
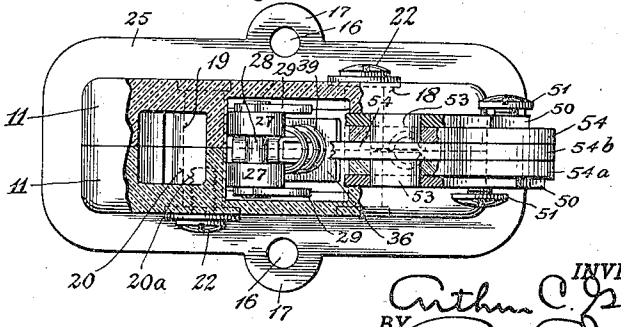


Fig. 6



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ELECTRIC SWITCH

Arthur C. Gaynor, Stratford, Conn.

Application July 3, 1934, Serial No. 733,597

3 Claims. (Cl. 200—168)

This invention relates to electric switches, and, more particularly, to the snap or quick-acting types.

This invention is an improvement on my invention described and claimed in my copending application Serial No. 403,437, filed October 30, 1929, now Patent No. 1,969,263.

An object of this invention is to provide improved means for mounting the switch body on an escutcheon or carrying body.

Another object is to provide means for preventing flashing over or arcing between the contacts and the contact-engaging rollers when the latter leave the contacts in breaking a circuit carrying a heavy current.

Another object of this invention is to provide improved means for indicating the "on" and "off" conditions of the switch.

Other objects and advantages will hereinafter appear.

In the accompanying drawing—

Figure 1 is a top plan view of one form of the switch of the present invention.

Fig. 2 is a side elevation of the switch shown in Fig. 1.

Fig. 3 is an end view of the switch shown in Fig. 1.

Fig. 4 is a longitudinal section of the switch shown in Fig. 1.

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 4.

Fig. 6 is a bottom view, partly broken away, showing the switch illustrated in Figs. 1 to 5, inclusive.

Fig. 7 is a side view of another form of switch of the present invention, the corner being broken away to show the means for fastening the body to the supporting plate.

Fig. 8 is a plan view of the supporting plate through which the switch extends, portions of the plate and switch body being broken away to show the mounting means.

As shown in the accompanying drawing, the switch of the present invention comprises an insulating body 10 divided longitudinally into two parts or insulating blocks 11, which may be semi-circular in form and fit together as shown in Figs. 2 and 4 or square as shown in Figs. 7 and 8. The meeting faces of the blocks 11 are recessed to provide a chamber 12 in which the switch mechanism is located, and this recess extends to the exterior of the body where it forms a longitudinal slot 13 extending from close to one end of the body to close to the other end and through which a bar-like handle 14, Figs. 1 to 6, lever 14*a*, Figs. 7 and 8, extends for manual engagement to actuate the switch mechanism. The handle or lever fills the slot 13 leaving only sufficient clearance between itself and the walls of the slot for free oscillation.

In the form of the invention shown in Figs. 1 to 6, the body is adapted to be supported by a yoke 15 having screw-receiving holes 16 by means of which the switch may be mounted on a supporting structure and having depending ears 17 adapted to embrace the sides of the body 10. The yoke has two depending ears 17, one at each side of the body and lying in recesses 18 on the sides of the body.

In Figs. 7 and 8 the switch is mounted on a body 15*a* having holes 16*a* for receiving fastening screws.

The two insulating blocks 11 constituting the body may be secured together and then be secured to the ears 17 of the supporting yoke.

Accordingly, each block 11 is provided with a screw receiving metal insert in the form of a hollow rivet 19 aligned with a hole 20 in the other block 11, through which the insert projects. The threaded holes 20*a* in the inserts 19 are adapted to align with similar holes 21 in the yoke ears 17 so that after the two blocks 11 are fitted together, and the rivets are peened or spun over, the yoke ears may be slid down through the recesses 18 until the holes 21 in the yoke ears align with the holes 20, whereupon headed screws 22 may be inserted and adjusted in the inserts 19 in the opposite blocks 11. By this simple means, the blocks are held together and the yoke is secured to the blocks.

The yoke 15 is provided with an elongated aperture 23 through which the handle 14 may be operated. In order that the handle need not have sliding contact with the walls of the aperture in the yoke and yet to provide a flush surface at the top of the switch, the perimeter of the straight edge of the body is provided with a shoulder 24 adapted to fit within the aperture 23 of the yoke, permitting the surface 25 of the yoke to be flush with the surface 26 of the body.

Preferably, the aperture 23 in the yoke is made to snugly fit over the shouldered portion 24 of the body to firmly embrace the blocks 11 constituting the body and prevent any tendency of the blocks to spread apart at the straight edge through which the operating handle 14 extends. Likewise in the square switch body shown in Figs. 7 and 8, the shouldered portion 24*a* snugly fits an aperture 23*a* in the body 15*a*.

The switch mechanism of the present inven-

tion is of the toggle type and comprises a contact-bridging member 27 in the form of a roller having an axle 28 carried by links 29 mounted on an axle 30 to swing from one position of rest where the roller engages abutments 31 on the body (see Fig. 4) to another position of rest where the roller engages a pair of contacts 32 to close a circuit including said contacts. The links 29 are so designed that the contact-bridging roller 27 does not engage the adjacent surface 33 of the body but swings clear of it.

The switch mechanism also includes a pair of arms 34 forming a U-shaped frame whose lower end has a socket 35 engaging the contact-bridging roller's axle 28 and carrying at its upper end a slidable head 36 adapted to be engaged by an operating arm 37 carried by the handle 14 which, it should be noted, is fulcrumed on the axle 30 which also carries the links 29. Interposed between the sliding head 36 and shoulders 38 on the arms 34 is a coil spring 39 which tends to hold the switch mechanism and the operating handle 14 in either of two positions of rest, the spring urging the operating arm 37 upwardly and causing the lower edge 40 on the handle to engage a stop 41 on the body.

When the handle is rocked, the operating arm 37 thereon presses the sliding head 36 downwardly compressing the spring 39. While doing so, due to a knife edge 42 on the operating arm 37 engaging a depression 43 in the sliding head 36, the arm 34 is rocked about its mounting on the roller axle 28, and thus the upper end of the spring is carried beyond a line drawn through the axle 30 for the handle and the axle 28 for the contact-bridging roller 27. When this occurs, the spring may again expand and in doing so moves the end of the arm 34 engaging the roller 27 away from the stop 31 toward the contacts 32, or vice versa, according to the previous condition of the switch, and at the same time completes the rocking movement of the handle until one of the stops 41 is engaged by one of the ends 40 of the handle. During this movement, the roller 27 is guided solely by the links 29.

In moving from the off position to the on position, the roller strikes inclined surfaces 44 of the contacts 32 and rises until it strikes vertical surfaces 45 of the contacts. This is permitted by providing looseness as by a slot 47 between the links 29 on their axle 30, and as a result of this movement, the spring 39 may act to resiliently press the roller into the depression formed by the sloping surfaces 44 and the vertical surfaces 45 of the contacts, and thus insures good electrical engagement between the bridging-roller 27 and the contacts.

In the illustrated embodiment of this invention, the handle 14 shown in Figs. 1 to 6, inclusive, comprises a bar having two contiguous surfaces 46 angularly disposed with relation to each other for manual engagement to operate the switch. The angle between the surfaces 46 is such that in each position of rest of the switch one of the surfaces 46 is substantially parallel with the straight edge of the body and the supporting yoke, the other surface 46 sloping upwardly from a medial point and being always the next surface to be operated to change the condition of the switch.

As shown herein, the operating arm 37 for the handle may be a metal piece inserted in the handle during the molding thereof, but the handle itself is made of insulating material so that a person operating it will not receive an electrical shock in doing so, for it should be noted that the other moving parts of the switch are metallic and are in electrical engagement with the contact-bridging roller 27.

The axle 30 for the handle is mounted directly in the blocks 11, and thus the provision of a separate supporting frame in the body for the axle is avoided. The bearing for the axle 30 is constituted by sockets 48 in the blocks in which the axle fits. These sockets are closed at the outside of the blocks so that no electrical contact may be made therewith. Moreover, by providing the sockets 48 instead of holes, end thrust on the axle is absorbed by the body and consequently the axle need not be fastened to the handle or other parts but may be merely a pin having a sliding fit therewith.

The recesses 12 and the meeting faces of the blocks 11 also open to the exterior at the edge of the body and there provide a slot 49 in which the contacts 32 may be located so that ears 50 on the contacts may be located at the exterior of the body where they are provided with wire-attaching screws 51. The contacts 32, which are formed of flat pieces, are adapted to be mounted on the blocks 11 and secured firmly in place without the use of tools and so that when the blocks 11 are secured together the contacts 32 cannot be moved or removed. To accomplish this, each of the contacts 32 is provided with an aperture 52 adapted to fit over and be supported by a similarly shaped lug 53 on one of the blocks 11 when the blocks are apart, and the apertures 52 and lugs 53 are non-cylindrical so as to prevent turning movement of the contact when supported on the lug. When the blocks 11 are assembled, the contacts lie parallel with each other and with the walls of the body.

The contacts 32 are insulated from each other and are held in position against sidewise movement in the slot 49 by insulation 54. In the form of the invention herein shown, the insulation 54 consists of three strips 54*a* and 54*b* of fibre or other insulating material placed face to face. Each strip 54*a* has an aperture adapted to align with the apertures 52 in the contacts and to fit the lugs 53 on the side blocks 11 of the switch. The middle strip 54*b* is so located as to fit over both lugs 53 when the blocks 11 of the body are brought together.

In assembling the switch, a contact 32 and one of the insulating strips 54*a* is placed on each lug 53. Then the middle strip 54*b* is placed on one of the lugs 53 so that when the two halves of the body of the switch are brought together, the lugs on both blocks 11 will project into the aperture in the middle strip 54*b*, and in this way the blocks are aligned relative to each other and are held against endwise and turning movements even before the blocks are otherwise fastened together.

The insulation 54 and contacts 32 completely fill the slot 49 through which they extend and their lower portions are shaped to conform substantially to the contour of the body. The strips 54*a* and 54*b* extend outwardly beyond the body and are located between the ears 50 of the contacts so as to electrically isolate the ears. Each block 54 has a hole through which the wire attaching screw 51 extends.

According to the present invention, the strip 54*b*, in addition to serving to align the two halves of the body, projects into the chamber 12 where it forms a wall 54*c* located between the contact-

engaging disks 27. This wall or barrier prevents arcing across the contacts when the rollers 27 leave the contacts, and thus increases the capacity of the switch to handle heavy currents.

Thus, while the inclined surfaces 44 and the vertical surfaces 45 of the contacts project beyond the adjacent surfaces of the insulating strips 54a, the lower end of the inclined surface 44 is below the upper edge of the barrier wall 54c at the place where the rollers 27 leave the ends of the contacts.

Frequently, it is desired to have the switch normally biased to the one position, say "off" position, so that it is necessary to manually hold the switch in "on" position. This is accomplished, in the form of the invention herein shown, by providing the handle 14 with depressions or sockets 62 for receiving one end of a returning spring 63, the other end of which may rest on the top of the insulating block 54, as shown in Fig. 4, or on the stop 41 if the spring is placed in the other side of the handle. With this simple arrangement, to convert the switch from one which may be left in either position of rest to one which is normally biased to one position, it is merely necessary to insert the spring 63 in the desired socket 62 when the switch is assembled, and should it at any time be desired to reconvert the switch, it is merely necessary to remove the screws 22, separate the parts 11, and remove the spring 62 or place it in the other socket.

The switch shown in Figs. 7 and 8 differs from the one shown in Figs. 1 to 6, inclusive, by being square and having a different form of handle or lever. It also differs in the way in which the switch body is fastened to the mounting body 15a. In this case, instead of having the ears 17 on the mounting body, the latter is provided with the holes 16a for fastening screws 70. These screws extend through a hole 71 in the switch body, each half of the switch body having a semicylindrical hole so that when the halves are put together, a complete cylindrical hole is formed. Between its ends, this hole has a square enlargement for receiving a nut 72 into which the screw 70 is threaded. The nuts 72 are placed in the chambers designed to receive them when the two halves of the switch are being assembled.

In order to indicate "on" and "off" positions of the switch, in the form of the invention shown in Figs. 1 to 6, inclusive, at each end the switch lever 14 is truncated so as to provide a flat surface 73 on which the words "on" and "off" appear. These indications on the portion of the switch 14 which project are clearly visible and may easily be read while the indications on the depressed portion are partly concealed within the casing and are at such an angle as not to be readily noticeable.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

Having thus described the invention, what is claimed as new and for which it is desired to obtain Letters Patent, is:—

1. In an electric switch, an insulating body comprising two insulating blocks having their meeting faces extending longitudinally of the body, said meeting faces being recessed to form a switch chamber and said recess including a slot opening at one edge of the body having a wide portion and a narrow central extension; a switch mechanism in said chamber including a contact-bridging member; two parallel contacts located in said slot in the body extending into said recess for engagement with said contact-bridging member and extending to the exterior of the body for wire engagement, said contacts being provided with elongated apertures; a lug on each of said blocks adapted to engage with the aperture of one of the contacts to support the latter on the block against turning movement; an apertured insulating plate on each lug and overlying each contact and located in the wider portion of said slot; and a third insulating plate having an aperture to receive both of said lugs lying between said other insulating plates and extending into the narrower portion of said slot, said insulating plates jointly completely filling said slot.

2. In an electric switch, an insulating body comprising two insulating blocks having their meeting faces extending longitudinally of the body, said meeting faces being recessed to form a switch chamber and said recess including a slot opening at one edge of the body; a switch mechanism in said chamber having a pair of spaced contact-bridging rollers; two parallel contacts located in said slot in the body extending into said recess for engagement with said rollers and extending to the exterior of the body for wire engagement, said contacts being provided with elongated apertures; a lug on each of said blocks adapted to engage with the aperture of one of the contacts to support the latter on the block against turning movement; an apertured insulating plate on each lug and overlying each contact; and a third insulating plate having an aperture to receive both of said lugs and lying between said other insulating plates, said insulating plates completely filling said slot, and said third insulating plate extending beyond the end of the contacts and upwardly into the space between said rollers.

3. In an electric switch, an insulating body comprising two insulating blocks having their meeting faces extending longitudinally of the body, said meeting faces being recessed to form a switch chamber and said recess including a slot opening at one edge of the body, a wide portion, and a continuing substantially narrower portion; a switch mechanism in said chamber having a pair of spaced contact-bridging rollers; two parallel contacts located in said slot in the body extending into said recess for engagement with said rollers and extending to the exterior of the body for wire engagement, said contacts being provided with elongated apertures; a lug on each of said blocks adapted to engage with the aperture of one of the contacts to support the latter on the block against turning movement; and insulating means between said contacts and with the contacts completely filling the wide portion of said slot, said insulating means being apertured to receive the lugs on the blocks whereby the insulating means is supported on the blocks against turning movement, said insulating means including a plate extending beyond the contacts and upwardly into the space between said rollers and completely filling the narrower portion of the slot.

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