March 17, 1931. B. E. GETCHELL 1,796,449

ELECTRIC SWITCH

Filed Feb. 28, 1930

Fig. 1.

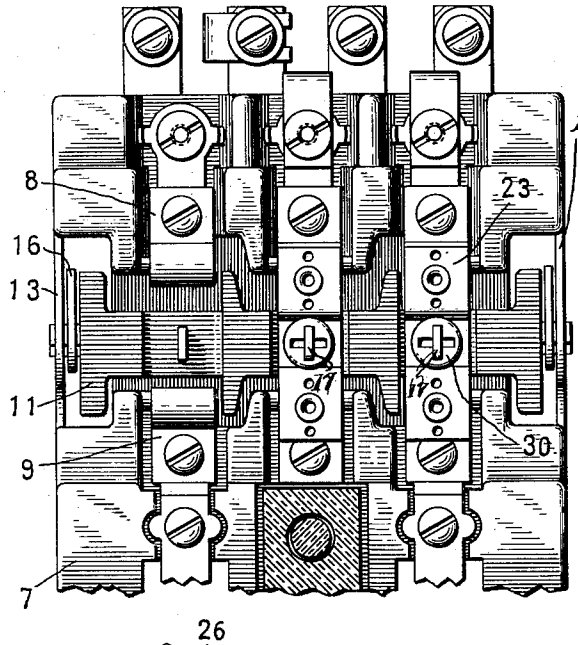


Fig. 2.

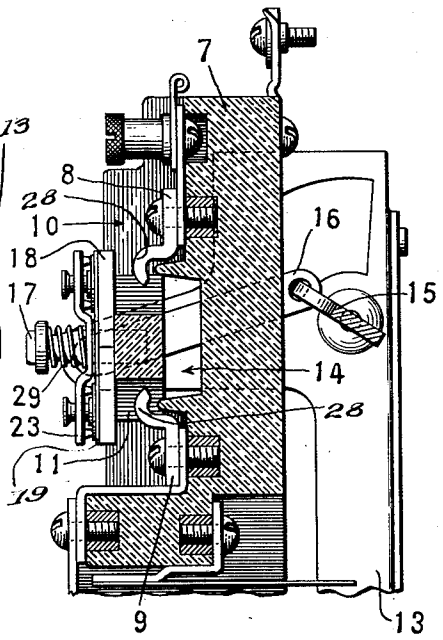


Fig. 3.

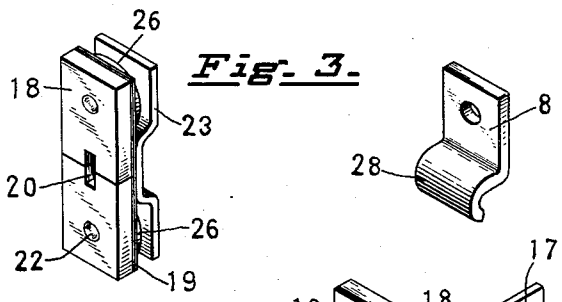


Fig. 4.

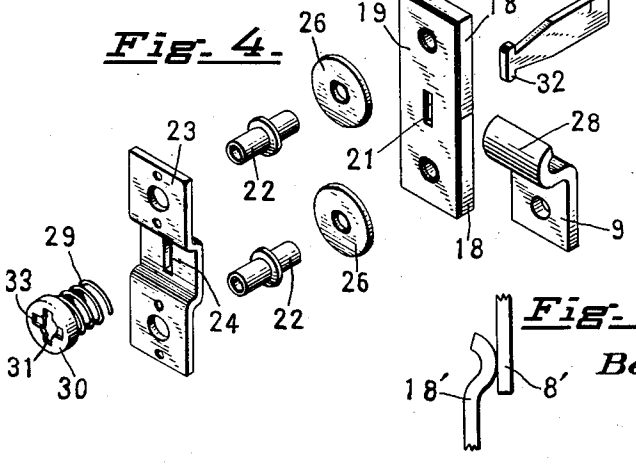


Fig. 5.

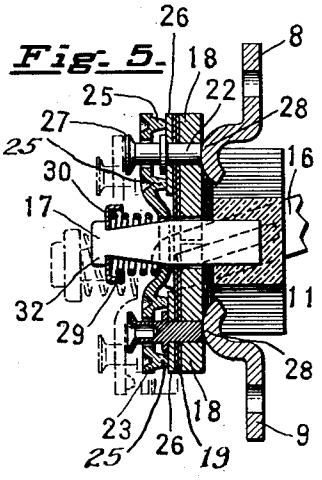


Fig. 6.

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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Application filed February 28, 1930. Serial No. 432,107.

My invention relates particularly to the circuit breaking contacts of a switch, their construction and mode of operation.

My main object is to provide a construction which will have long life and which is reliable under all circumstances.

Another object is to provide a construction which can be readily manufactured, assembled and repaired.

Another object is to provide a construction which will reduce arcing to the minimum.

The form of construction illustrated in the drawings is especially adapted to what are commonly known as motor starting switches. Such switches are sometimes operated by hand and sometimes automatically. My former Patents No. 1,714,085 and No. 1,714,086 show and describe complete constructions utilizing contact mechanisms embodying one form of invention. I have shown herein the improvements embodied in a switch of that character, but it should be understood that the invention is only limited to the scope of the claims hereinafter set forth.

In its preferred form the mechanism comprises an insulating base having pairs of spaced stationary switch contacts, each pair of contacts having a bridging switch member movable toward and way from the stationary contacts and preferably at an angle other than a right angle so as to produce the effect of a sliding or wiping contact.

This movable switch member is carried by an insulating bar which is guided in the direction desired. The movable contact member is made up of two main parts or blocks which are resiliently connected and detachably secured to the insulating carrier. The movable contact member is also provided with a detachable abutment part which permits the contacting portion to move relatively and thus enables it to adjust itself to the stationary contacts. Both the switch member and the abutment member are detachably held in place on a stud by means of a spring and a cap both of which are readily applied to the stud or removed as occasion may require.

Fig. 1 is a front view of a fragment of the switch with contacts embodying the improvements of my invention.

Fig. 2 is a vertical sectional view of the same showing one of the sets of contacts in open circuit position.

Fig. 3 is a perspective view of the movable contact member and its abutment plate.

Fig. 4 is an exploded perspective view of the parts of the movable switch contact member and its supporting stud.

Fig. 5 is a fragmentary vertical sectional view showing the parts of the switch in the closed circuit position.

Fig. 6 is a detail edge view of a modification of contacts.

In the usual type of switch there is an insulating base 7 carrying the various conducting parts. In the particular form shown the switch is intended for a three-wire system and consequently has three switch units. It will be only necessary to describe one. Each unit has two spaced stationary upper and lower contact members 8 and 9 suitably secured to the insulating base and preferably in the channel 10. The insulating carrier 11 is mounted between the adjacent ends of the contacts 8 and 9 and is movable toward and away from the base. This carrier preferably has projections which are guided in side plates 13 at the angle desired. The base is preferably provided with a recess 14 to accommodate the carrier 11. The contact carrier is operated in this instance through the medium of a rocker 15 and a link 16, power being applied in any suitable manner to open or to close the circuits.

The carrier has a projecting stud 17 on which is supported the various parts of the movable switch member. The movable contact consists of two blocks or plates 18 connected by one or more layers of flexible metal strip 19 at the back so as to permit considerable freedom of movement of the two plates 18 with respect to each other. The plates 18 are provided with slots 20 to guide them on the stud 17 and the strips 19 are provided with a passage 21 thru which the stud extends. Rivets or pins 22 are secured to opposite ends of the movable switch contacts and extend through openings in the abut-

ment plate 23. The latter is also preferably provided with a passage 24 accommodating the stud 17.

The opposite ends of the abutment 23 are provided with pairs of projections 25 on which the contact plates 18 are adapted to tilt from side to side so that each block or plate 18 may adjust itself to its correlated stationary contact and independently of the other block. Washer 26 may be interposed at the back of the plate 18. The other ends of the pins 22 may be upset at 27 to hold the abutment plate 23 loosely in place with respect to the contact plates 18—18.

The switch contacts 8 and 9 are preferably provided with raised portions 28 which are curved so as to provide convex bearing surfaces for the contact plates 18. This shape of contact has been found to afford especial resistance to arcing. The contraction of the arc by the convex surfaces of the contacts automatically snuffs out the arc so that even under quite severe conditions it has practically no destructive or harmful effect.

The plates 18 and 23 are provided with a resilient abutment in the form of a spring 29 which fits over the end of stud 17 and presses against the central part of the abutment plate 23. This spring is held in place by a cup-like washer member 30 having a slot 31 to receive and engage a T-shaped head 32 of the stud 17. This cup 30 also has two recesses 33 adapted to receive the ends of the head 32 when the cup is rotated a partial turn and in which position the cup is retained by the pressure of the spring 29. By this means the parts of the movable contact member are secured in assembled relation and may be very readily removed without the use of any tools and may be replaced in the reverse manner.

When the switch is closed the movable contact member is drawn toward the stationary contacts until they engage the same. The continued closing movement causes the movable member to slide along on the convex contact surfaces of the stationary contacts until the final closed circuit position of the switch is reached, in which position the movable contact member is held in any suitable manner against the pressure of the spring 29. When the switch is released the spring 29 pulls carrier 11 outward until it engages contact 18, and as this outward movement is continued either by spring or gravity the contact 18 moves away from contacts 8 and 9 and the circuit is opened.

The invention as herein set forth contemplates simultaneous double-break action contacts which provides a perfect contact of an extremely high interrupting capacity. The contacts are self-alining and self-cleaning. The movable contacts are readily removable without the use of any tools and the stationary contacts may also be readily removed from the front of the base by releasing one screw for each contact.

When the switch is released the spring 29 pulls the carrier outwardly until it engages the contacts 18—18 and, as the outward move- is continued, either by spring or gravity, the contacts 18—18 move away from the contacts 8—9 and the circuit is opened.

Due to the combination of the angular movement and the special self-adjusting contact construction the contact closing movement produces a sliding or wiping action under pressure so as to keep the contact surfaces perfectly clean and free from oxidization.

This particular form of contacts and the method of operating the same have been found to reduce the arc to something like 1/20 of that produced by the usual single-break switch.

When the parts are accurately constructed the movable contact member and the abutment plate are both directly guided on the stud 17. The pins or studs 22, however, also serve as guides to hold the movable contact members and the abutment plate in alignment so that if either the movable contact or the abutment is properly guided on the stud 17 both members will be guided directly or indirectly by reason of the pins or studs 22 and their connection with the two members.

While the drawings show and the foregoing specifications describe the movable contacts as being flat and the stationary contacts as being provided with arcuate contacting points or tips, it is obvious that if so desired, this arrangement may be reversed so that the movable contacts 18′ are arcuate and the stationary contacts 8′ are flat as shown in Fig. 6, or, in some instances, it may be desirable to combine one flat and one arcuate movable contact with one flat and one arcuate stationary contact and it is further obvious that these various arrangements may be provided without departing from the spirit of the invention.

This application is a continuation in part of my former application 242,560, filed December 27, 1927.

I claim:

1. A double break switch including an insulating base, a pair of spaced-apart contacts having convex surfaces, a movable switch member comprising an insulating carrier mounted to move between the stationary contacts, a pair of flexibly connected contact plates, an abutment plate carrying a tilting support for the contact plates, a stud projecting from the carrier to said contact plates and abutment plate, a spring mounted on said stud and a detachable cap for securing said spring on said stud.

2. A double break switch including two stationary contacts having convex contact

surfaces, a carrier movable between said contacts, a guide stud extending from said carrier, an abutment plate guided on said stud, two flexibly connected switch members having pins extending through said abutment plate, a spring on said stud pressing against said plate, and a detachable cup washer securing said spring in place on said stud.

3. In a double break switch, two stationary contacts, a carrier between them having a projecting guide stud, two contact plates each having a slot to receive an edge of said stud, an independently movable abutment plate on said stud coacting with said contact plates and a spring coacting with said abutment plate.

4. In a double break switch, an insulating carrier, a flat stud projecting therefrom, a switch member movable on said stud, said stud having a T-shaped head, a spring on said stud and a cup-like washer for detachably securing said switch member on said stud, said washer having a slot for receiving the head of said stud and two recesses to receive the edges of the head when the washer is rotated.

5. In a double break switch, a pair of stationary contacts and a pair of connected movable contacts, one contact of each pair being convex at the contacting point, and an abutment plate having projecting points engaging the backs of the movable contacts to permit tilting.

6. A double break switch including stationary contacts, movable contacts adapted to coact therewith, a carrier bar between the stationary contacts, a stud projecting from the carrier bar, said movable contacts having slots for guiding them on said stud, a flexible conductor connecting the movable contacts, pins riveted to the movable contacts, an abutment plate guided on said pins and a spring mounted on said stud and coacting with said abutment plate.

7. In a double break switch, a pair of stationary contacts, movable contacts coacting therewith, a stud for guiding the movable contacts, a flexible conductor connecting the movable contacts, a pin extending through each movable contact and having a shoulder, a washer on each pin interposed between its shoulder and the adjacent portion of the conductor and an abutment plate guided on said pins and having projecting points engaging said washers.

8. An electric switch construction including circuit closing means comprising a pair of spaced stationary contacts each having projections extending across its contact-making end, a pair of movable contact blocks, a flexible connection for said blocks, a relatively rigid backing member for said blocks and said connector and spring means for maintaining said backing means in engagement with the said connector, the said backing member being provided with pointed projections for engaging the central portion of said connector to permit of the independent tilting movement of said connector and of said contact blocks.

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