July 1, 1930. C. D. AINSWORTH 1,768,536

ELECTRIC SWITCH

Filed June 27, 1925

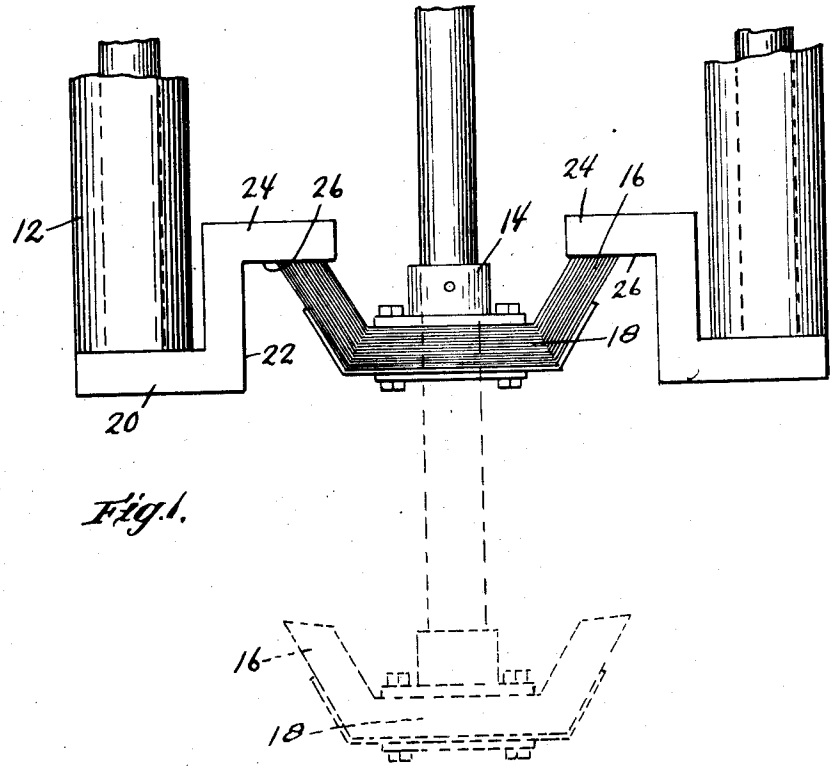


Fig. 1.

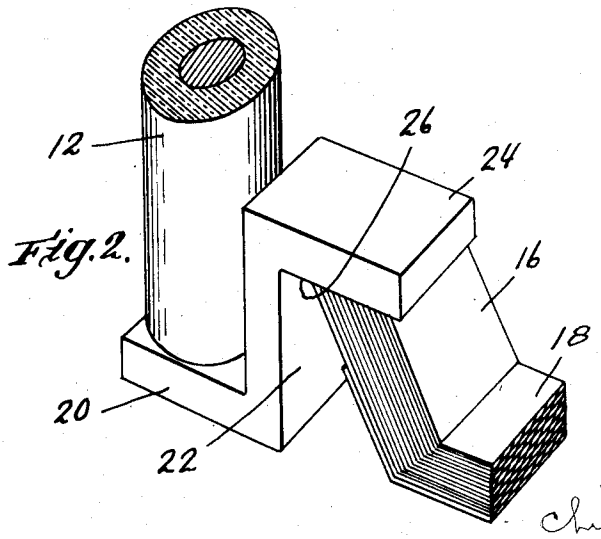


Fig. 2.

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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Application filed June 27, 1925. Serial No. 40,061.

This invention relates to electric switches and has for an object the provision of means to improve the contact between the fixed and movable current-carrying members of the switch under heavy load conditions.

A further object is generally to improve the construction and operation of electric switches.

The figure represents a construction and arrangement of the stationary and movable current carrying members of an electric switch embodying the invention.

The magnetic field of a sinuous current-carrying conductor tends to straighten the conductor. This principle is utilized in the present invention to improve the contact between the stationary and movable members of an electric switch.

The invention is here shown as applied to a down-break electric switch. The switch is provided with stationary switch members which include conducting studs 10 enclosed in insulating bushings 12. The movable switch member includes the laminated or brush member 14 which is movable in a vertical direction below the stationary switch members to control the circuit through the switch. The brush member is formed or provided with the outwardly and upwardly inclined and yielding toe-portions 16 and the connecting and separating intermediate, or body, portion 18. Said toe-portions are adapted electrically to engage contact members carried by the stationary switch members, and bear with considerable pressure against said stationary contact members. With the usual type of switch, and with the above described type of brush member, the magnetic effect of the current traversing the switch is to urge the toe-portions of the brush member away from engagement with the contact members or, at least, to reduce the contact pressure therebetween, whereby to reduce the ability of the switch to conduct current without overheating at the contact junction.

In accordance with this invention means are provided to reduce the tendency toward lowered contact pressure when the switch is traversed by a heavy current, or to improve the contact between the stationary and movable switch members. To this end the stationary switch members are provided with more or less Z-shaped contact members each of which comprises an approximate horizontal section 20 attached to and electrically connected with the switch stud 10, an intermediate section 22 which extends approximately vertically upwards alongside the stud and its insulator, and an approximately horizontal terminal or contact section 24 which extends laterally away from the upper end of the intermediate section. The contact sections 24 of the two fixed contact members are directed inwardly toward each other and the brush member is adapted to engage the under or contact faces 26 thereof and lie between the intermediate sections. Preferably, the height of said intermediate sections 22 is about equal to or greater than the height of the brush member. Preferably, also, the length of the terminal sections 24 is substantial, or comparable with the length of the toe-portions 16 of the brush-member.

When a current traverses the contact-structure above described, the magnetic effect of the current acting on the toe and intermediate portions 16 and 18 of the brush member is to straighten the brush member, or to move the toe-portions 16 away from contact with the stationary contact members. The magnetic reaction on the toe-portions by the terminal-sections 24 of the fixed contact members, however, tends to oppose the aforesaid tendency, or to force the toe-portions more strongly against the contact-sections. The magnetic reaction between the toe-portions and the vertical or intermediate sections 22 of the fixed contact members also opposes the reaction in the brush member, or tends to force the toe-portions more strongly against the terminal-sections of the fixed contact members. To obtain the above described advantages, the angle subtended between the contact face 26 and the toe-portion 16 of the brush member, between the brush member and the vertical section 22 should be greater than 90°, as is here shown.

It may also be considered that the members 22 and 24 of the fixed contact member, and the toe-portion 16 of the brush member, con-

stitute an inverted U-shaped conductor which tends to become straightened due to the magnetic reaction of the current on the components thereof, and, as the toe-portion is the only movable or yielding member of the conductor, the toe-portion is urged against the terminal section 24 of the fixed contact member.

As thus arranged, the effect of the magnetic reaction on the toe-portions of the brush by the current in the fixed contact-members is to minimize the opposing reactions in the brush-sections, whereby to improve the contact pressure between the brush and fixed contact members under load, or even to increase the contact pressure over and above that created by the switch operating mechanism.

It is obvious that the shape and arrangement of the fixed contact members and the brush member, or their equivalents, can be modified without departing from the spirit of the invention.

I claim:

1. An electric switch having a depending stationary switch stud, a yielding switch member movable mainly below said stationary switch stud, and a contact member carried by and at the bottom of said stationary switch stud having a contact-section for said movable switch member, and an intermediate current-conducting section which is extended upwardly alongside said depending stud and also alongside the movable switch member in its switch-closed position and is arranged to conduct current in a direction to oppose magnetically the yielding of said movable switch member.

2. An electric switch including a conducting stud a fixed contact member carried by said stud having an upwardly-directed current-conducting section and an outwardly-directed contact-section, and a yielding movable switch member having an upwardly directed contact portion overlying and inclined toward said current-conducting section and adapted to engage said contact-section.

3. A down-break electric switch including a pair of depending spaced stationary switch studs having at their bottom ends terminal contact members provided with upwardly extended current-conducting sections which lie along said studs and contact-sections extended laterally toward each other from the upper ends of the aforesaid sections, and a brush member arranged to lie between and alongside said current-conducting sections and engage said contact-sections in the closed condition of the switch.

4. A down-break electric switch including a pair of depending spaced stationary switch studs having at their bottom ends terminal contact members provided with upwardly-extended current conducting sections and contact-sections which lie along said studs extended laterally toward each other from the upper ends of the aforesaid sections, and a brush member having upwardly and outwardly extended yielding contact-portions arranged to lie between and alongside said current-conducting sections and engage said contact-sections in the closed condition of the switch.

5. A down-break electric switch having a depending switch stud terminated in a fixed contact member which is provided with an approximately horizontal contact face, a movable switch member having an upwardly-extended contact portion adapted to engage said contact face and yield in one direction, and a conductor extended upwardly along said contact-portion and also along said stud arranged to oppose magnetically the yielding of said movable switch member.

6. A down-break electric switch having a depending switch stud, a contact member connected with the lower end of said stud and having an intermediate-section extended upwardly along said stud and also having a contact-section extended approximately horizontally from the upper end of said intermediate section, and a movable switch member having an upwardly-directed yielding contact-portion which is arranged to lie adjacent said intermediate section and engage said contact-section when the switch is closed, and yield in the direction of said intermediate section.

7. A down-break electric switch having a depending switch stud, a contact member connected with the lower end of said stud and having an intermediate-section extended upwardly along said stud and also having a contact-section extended approximately horizontally from the upper end of said intermediate section, and a movable switch member having an upwardly-directed yielding contact-portion which is arranged to lie adjacent said intermediate section and engage said contact-section when the switch is closed, said yielding contact-portion being inclined toward said intermediate-section.

8. An electric switch having a movable contact member, a fixed stud, a contact member at the end of the stud having a conducting section extended upwardly above the end and alongside the movable contact member and having at its upper end a laterally extended contact section which overlies the end of the movable contact member and has a contact face which makes an angle with the movable contact member which is greater than 90° on the side of the movable contact member toward said upstanding conducting section.

9. An electric switch having spaced contact members, a downwardly movable bridging member, conducting members connected with said contact members and extended downwardly on opposite sides of said bridging member, and studs connected to the bot-

tom ends of said conducting members and extended upwardly above said bridging member on the sides of said conducting members opposite said bridging member.

10. A heavy current down-break electric switch including a pair of generally-vertical switch studs, contact members connected electrically with the bottom ends of the studs, and a laminated bridging member located between the studs under the contact members having upturned ends which engage the contact members and connect the studs electrically, said studs and bridging member constituting a generally U-shaped current path through the switch the magnetic field of which acts upon the bridging member to flex the upturned ends thereof away from engagement with said contact members, and means to prevent such action including conductors which connect said contact members with the ends of the switch studs and which extend alongside the upturned ends of said bridging member and between said ends and said studs and cooperate with said upturned ends to provide a magnetic field which acts upon said upturned ends in a direction that is opposed to the direction of action of the magnetic field of the U-shaped current path of the switch.

In testimony whereof, I have signed my name to this specification.

CHESTER D. AINSWORTH.

CERTIFICATE OF CORRECTION.

Patent No. 1,768,536. Granted July 1, 1930, to

CHESTER D. AINSWORTH.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 64, claim 4, strike out the words "which lie along said studs" and insert the same to follow "sections" in line 63; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of October, A. D. 1930.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)

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