June 10, 1930. G. O. WILMS 1,763,027

ELECTRIC SWITCH

Filed March 22, 1929 2 Sheets-Sheet 1

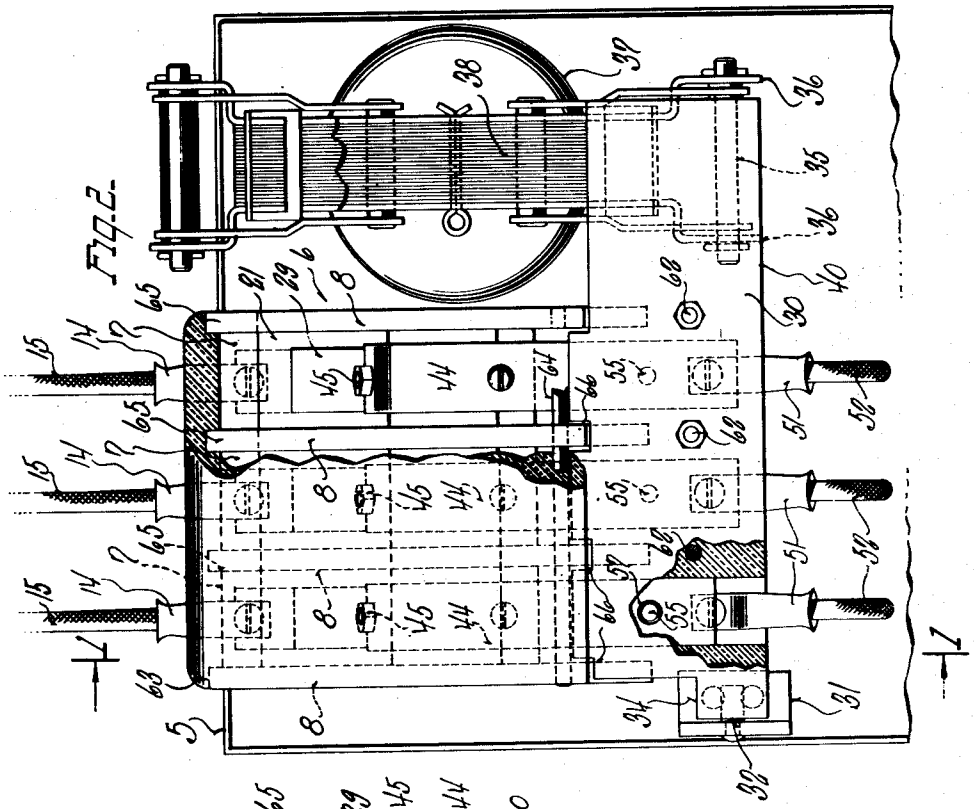


Fig. 2

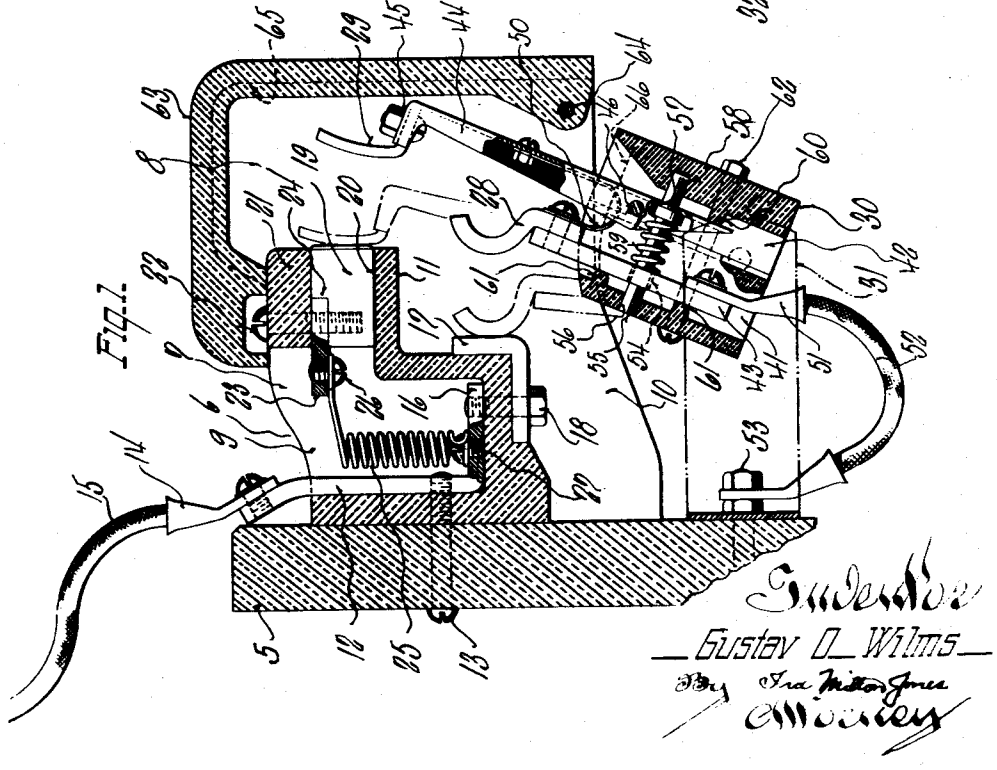


Fig. 1

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Fig. 3

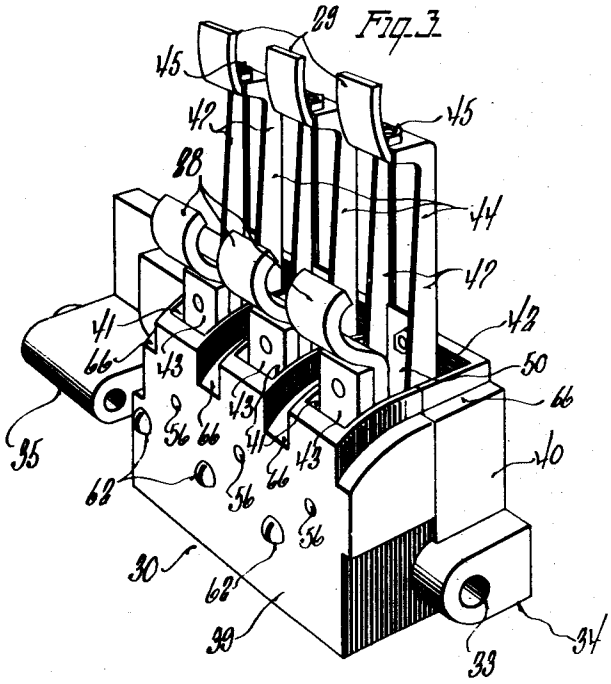
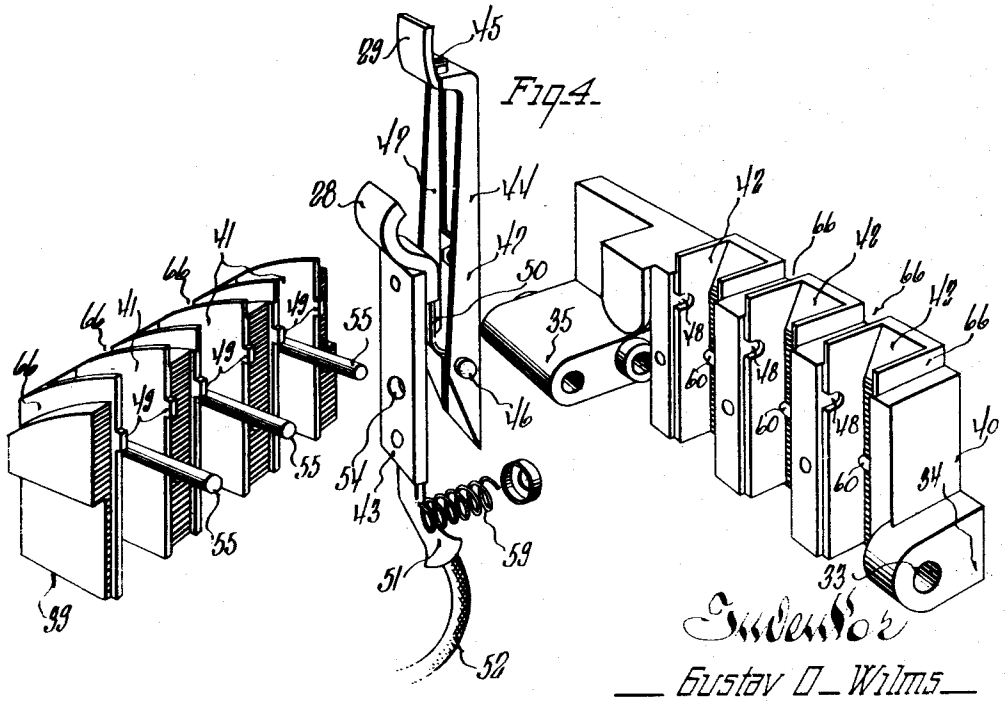


Fig. 4



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UNITED STATES PATENT OFFICE

GUSTAV O. WILMS, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HARRY L. BRADLEY AND LYNDE BRADLEY, BOTH OF MILWAUKEE, WISCONSIN

ELECTRIC SWITCH

Application filed March 22, 1929. Serial No. 349,130.

This invention relates to certain new and useful improvements in electric switches of the character described in my copending application Serial No. 320,866, and refers more particularly to the construction of the movable switch member.

It is an object of this invention to improve the construction of the movable unit of switches of this character, and to provide means which eliminates the usual lining up of the several switch members.

Another object of this invention resides in the provision of a movable unit for switches of the character described in which a single spring is provided for each set of switch members to normally yieldably maintain the same in a predetermined position and provide the necessary yielding pressure to insure a good electrical contact between the switch members and their respective contacts.

And a further object of this invention resides in the provision of a switch device of the character described in which the contacts and movable switch members are mounted within pockets to reduce the possibility of creepage to a minimum.

And a still further object of this invention resides in the provision of a novel construction for the movable switch unit wherein the actuating member is formed in two complementary sections recessed at their meeting faces to form pockets when engaged, and in which the movable switch members are mounted, being maintained in proper assembled position upon securing of the sections together.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a sectional view through a switch structure embodying my invention, with parts in elevation, said view being taken through Figure 2 on the plane of the line 1—1;

Figure 2 is a view taken through Figure 1 on the plane of the line 2—2 and showing the movable unit in closed or contact making position;

Figure 3 is a perspective view of the movable switch unit shown detached from the switch structure, and

Figure 4 is a perspective view of the movable switch unit with its actuating member sections separated to illustrate their construction.

Referring now more particularly to the accompanying drawings, in which like numerals designate like parts throughout the several views, the numeral 5 represents a base or panel of suitable insulating material upon which the switch structure is mounted. The switch illustrated is of the three-pole type and comprises a mounting member 6 formed of insulating material and divided into three compartments 7 by partitions 8, the outer ones forming the sides of the mounting member. The compartments 7 are divided into pockets 9 and 10 by an irregularly shaped wall 11.

Substantially L shaped members 12 are secured in the upper recesses or pockets 9 by screws 13 or the like extending through the panel 5 and the mounting member 6 and threaded in the members 12 to simultaneously fix the mounting member to the panel and secure the members 12 in position. Each member 12 has its upper end provided with a terminal 14 with which a line conductor 15 is connected.

The lower or short legs 16 of the members 12, which rest on the bottoms of their respective pockets 9, are electrically connected with substantially angularly shaped stationary contacts 17, by cap screws 18, extending through the horizontal arms of the contacts 17 and through the bottom of the recesses 9,

formed by the adjacent portion of the irregularly shaped wall 11, to be threaded in the arms 16 of the members 12.

Mounted outwardly and above the stationary contacts 17 are stationary contacts 19, which are preferably received in apertures 20 formed in a projecting portion 21 of the wall 11 where they are secured by screws 22 extending through apertures in the portion 21 and threaded in the contacts 19. The screws 22 also pass through members 23 received in stepped portions 24 formed in the stationary contacts 19 and extended inwardly of the inner ends of the contacts to be electrically connected with the stationary contacts 17 through resistance coils 25. One end of each resistance coil 25 is connected with the extending member 23 by a screw 26 or the like and the other ends are connected with the arms 16 of the members 12 and thus with the stationary contacts 17, by screws 27.

Cooperating with the stationary contacts 17 and 19, and disposed within the lower pockets or recesses 11, are movable switch members 28 and 29, respectively, which are carried by a pivotally mounted actuating member 30 adapted to engage and disengage the switch members with their contacts.

The mounting for the actuating member 30 is substantially as shown and described in a second copending application Serial No. 295,693 and includes a supporting member 31 carrying a pivot stud 32 at its outer end which is freely rotatable in a recess 33 formed in a boss 34 extended from one end of the actuating member. The other end of the actuating member is provided with an inwardly extended arm 35 which is pivotally mounted between ears or lugs 36 extended from the core frame of a magnet 37, in an axial line with the pivot 32. The outer end of the arm 35 has links connected with it, which are connected with an armature 38 adapted to be attracted to the magnet 37 to move the actuating member 30 to engage the switch members with the stationary contacts.

The movable actuating member 30 consists of two complementary sections 39 and 40 formed of insulating material and having recesses 41 and 42, respectively, in their meeting faces to provide pockets which align with the recesses or pockets 10 formed in the mounting member, and in which the supporting arms 43 and 44 of the switch members 28 and 29, respectively, are positioned. The arms 44 of the switch members 29 are preferably stamped from bendable metal and have their outer ends directed at an angle with their major portion to which the switch members proper are secured, as at 45. A pivot pin 46 extends through the sides 47 of the arms 44 to be received in notches 48 formed in the walls of the recesses 42 of the section 40 where they are secured by projections 49 formed on the section 39 when the sections are secured together.

The arms 43 of the switches 28 are electrically connected with the arms 44 through flexible members 50 and have terminals 51 fixed to their lower ends, with which flexible conductors 52 are electrically connected to electrically connect the movable switches 28 and 29 with terminal screws 53 carried by the panel 5 and to which suitable connections are adapted to be secured.

The arms 43 of the switch members 28 are medially apertured, as at 54, through which pins 55 having a force fit in apertures 56 formed in the section 39 extend. The pins 55 also extend through apertures 57 in the arms 44 of the switches 29 inwardly of their pivotal mounting 46, and into recesses 58 formed in the other section 40. Expansive springs 59 mounted on the pins 55 are confined between the arms 43 and 44 to maintain them separated and engaged with suitable stops, the arms 44 being urged about their pivot pins 46 to engage their lowermost ends with stops comprising beads 60 extended into the recesses 42 of the section 40, and the arms 43 being urged to engage similar beads 61 extended into the recesses 41 of the section 39 above and below the pins 55.

In this manner the spring 59 yieldably maintains the switch arms 43 and 44 engaged with their respective stops and permits their movement independent of each other as the actuating member 30 is moved to engage the switch members 28 and 29 with their respective contacts.

By constructing the movable switch unit in sections as described, the manufacture thereof is greatly facilitated as no lining up of the movable switch members is required and as it is only necessary to mount the switch arms 43 and 44 on the pins 55 with their springs 49 properly confined therebetween, and then to engage the section 40 with the section 39 which immediately secures both switch arms in their proper positions, bolts 62 being extended through the assembled sections 39 and 40 to secure the same together.

As is more specifically defined in the first mentioned copending application, above referred to, energization of the magnet 37 moves the actuating member 30 to first engage its contacts 29 with the stationary contacts 19 to connect the load, which may be a motor or the like, with the line conductors 15 through the resistance elements 25. Further closing movement of the actuating member shunts the resistance coils 25 out of the circuit and connects the load directly across the line by the engagement of the switch members 28 with their respective contacts 17.

As the switch members 29 are engaged with their contacts 19 and the actuating member continues its closing movement, the arms 44

pivot about their pins 46 moving their inner ends toward the arms 43 and compress the springs 59. This added pressure insures a perfect contact between the switch members 29 and the contacts 19, and as the switch members 28 are engaged with their respective contacts 17, the springs 59 are further compressed by the rocking of the arms 43 about the lowermost projections 61. In opening, the switch members 29 are first disengaged from their respective contacts and the current to the load then flows through the resistance coils 25 before the final opening of the switch so that excessive arcing is prevented.

A cover or hood 63 pivoted to the partitions 8, as at 64, closes the pockets or recesses 10 and thus totally encloses both the stationary contacts and the movable switch members to insure maximum protection against arcing and to reduce the possibility of creepage. The cover or hood is formed with grooves 64 in which the edges of the partitions 8 are received to provide a tight fit therebetween, and the top faces of the sections 39 and 40, which together comprise the member 30, are grooved, as at 66, in alignment with the partitions 8 to likewise provide a tight fit therebetween so that when the switch is closed the recesses or pockets 10 form unbroken continuations of the pockets defined by the recesses 41 and 42 of the actuating member sections.

From the foregoing description, taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art to which an invention of the character described appertains, that I provide a novel construction for the movable switch unit of devices of the character described which simplifies the manufacture and especially the assembly of such devices and in which the necessity of costly lining up of the switch members is obviated by the spring which yieldably maintains the switch members in a predetermined position.

What I claim as my invention is:

1. In a switch of the character described, a member having a pocket, switch members, means movably mounting the switch members in the pocket, and common means yieldably urging the switch members to a predetermined position.

2. In a switch of the character described, a member having a pocket, switch members, means mounting the switch members in the pocket whereby they are independently movable to different positions, and common means yieldably maintaining the switch members in predetermined positions.

3. In a switch of the character described, a member comprising complementary sections having their adjacent faces recessed to provide a pocket, switch members independently movably mounted in the pocket, means for securing the member sections together, and means whereby the securing of the sections together maintains the switch members against detachment.

4. In a device of the character described, a member having a pocket, switch members having a part disposed within the pocket, means pivotally mounting one switch member within the pocket, a pin carried by the first mentioned member and extending through the switch members to maintain the switch member, not pivotally mounted, against detachment within the pocket, and spring means mounted on the pin between the switch members for yieldably holding the switch members in a predetermined position.

5. In a device of the character described, a movably mounted member having a pocket, a pair of switch members carried by the member and having a portion disposed within the pocket, means pivotally mounting one switch member, a pin carried by the movably mounted member and extending through both switch members, spring means mounted on the pin and confined between the switch members for yieldably maintaining them in a predetermined position, and stop means formed on the movably mounted member and against which the second mentioned switch member is urged by the spring means.

6. In a device of the character described, an actuating member comprising two complementary sections having their adjacent faces recessed to provide a pocket, one of the sections having notches in the walls of its recess, a switch member, a pivot pin carried by the switch member adapted to be received in the said notches to pivotally mount the switch member with a portion thereof disposed within the pocket, and said pivot pin being secured in the notch by the other of the actuating member sections.

7. In a switch device of the character described, a supporting member having spaced pockets, stationary contacts mounted in said pockets, switch members engageable with the stationary contacts, a movable member carrying said switch members for movement to and from engagement with the contacts and having pockets, means for mounting the movable member whereby its pockets align with those of the supporting member, and means independently movably mounting the switch members in the movable member pockets whereby one switch member of each pocket is engaged with its respective contact prior to the engagement of the other switch member with its respective contact.

8. In a device of the character described, an actuating member comprising complementary sections having their adjacent faces recessed to provide a pocket when engaged with each other, a pair of switch members carried by the actuating member and having a portion disposed within the pocket, means pivotally mounting one switch member in the re-

cess of one actuating member section, a stop carried by said section, spaced stop members carried by the other section, a pin carried by one section and passing through the pivoted switch member at a point between its pivotal mounting and its stop member and through the other switch member at a point between its stop members, and spring means mounted on the pin and confined between the switch members whereby the switch members are yieldably urged to engagement with their respective stop members and permitted movement independent of each other.

9. In a switch device of the character described, a mounting member having spaced walls defining pockets, contacts mounted in said pockets, switch members engageable with the contacts, an actuating member carrying said switch members and movable to engage and disengage the switch members with the contacts, said actuating member having pockets in which a portion of the switch members is disposed, and a hood member carried by the mounting member and substantially closing the mounting member pockets whereby the contacts and switch members are entirely enclosed and separated from each other.

10. In a switch of the character described, movable switch members, a member carrying the switch members, means pivotally mounting one of said switch members from the member, a rod extending through the switch members and carried by the member, the rod securing the second switch member against detachment from the member, and a spring confined between the switch members normally maintaining them in spaced relation and permitting independent movement thereof.

11. In a switch of the character described, stationary contacts offset with respect to each other, movable switch members adapted to be engaged with the stationary contacts, a member carrying the switch members, one of the switch members engaging its stationary contact prior to the other, means for applying pressure to said first switch member as it is engaged with its stationary contact, and means whereby said pressure applying means applies pressure to the second switch member upon engagement thereof with its stationary contact, the pressure on the first switch member increasing as the second is engaged with its stationary contact.

12. In a switch device of the character described, stationary contacts, switch members engageable with the stationary contacts, means whereby one switch member engages its contact before the other, means for applying pressure onto the first engaged switch member upon engagement with its stationary contact to insure a good electrical connection therebetween, and means whereby the engagement of the second switch member with its contact increases said pressure.

13. In a switch device of the character described, stationary contacts, movable switch members engageable with the contacts, means whereby one switch member engages its contact before the other, means yieldably maintaining the switch members separated and providing contact pressure as the first switch member engages its contact, and means whereby said pressure is increased upon engagement of the second switch member with its stationary contact.

14. In a switch device of the character described, stationary contacts, movable switch members engageable with the contacts, means whereby one switch member engages its contact before the other, and common means for applying contact pressure to both switch members upon engagement with their stationary contacts, said pressure increasing with the engagement of the second switch member with its contact.

In testimony whereof I have hereunto affixed my signature.

GUSTAV O. WILMS.