

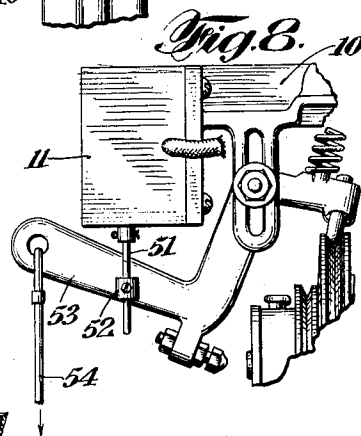
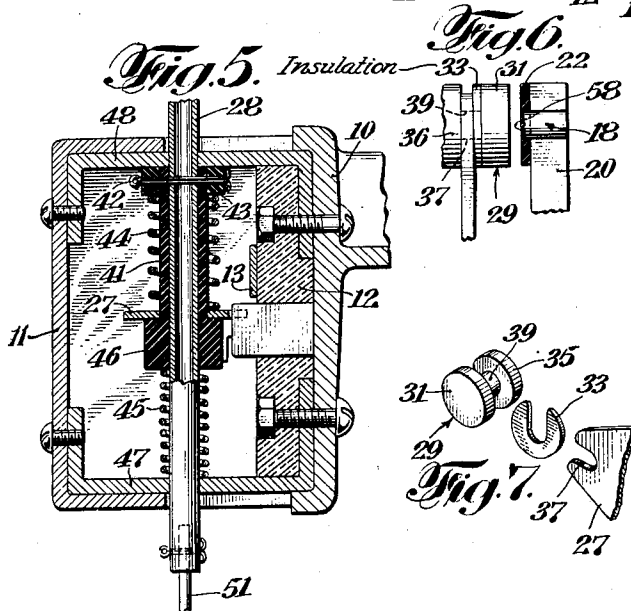
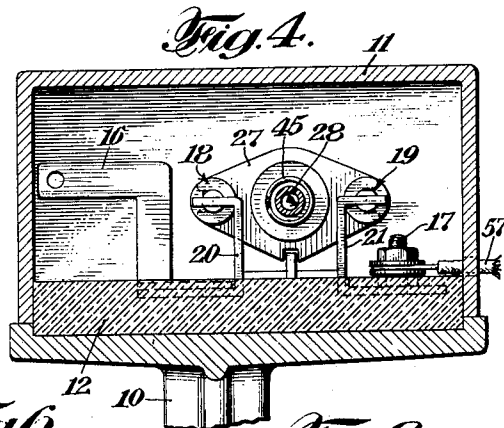
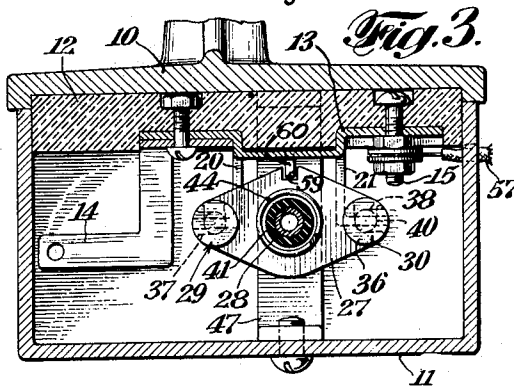
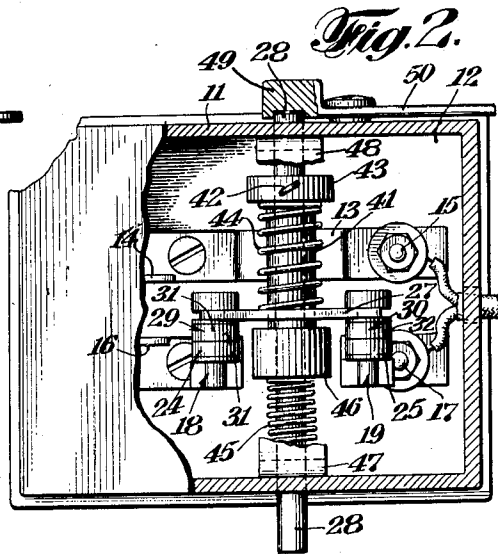
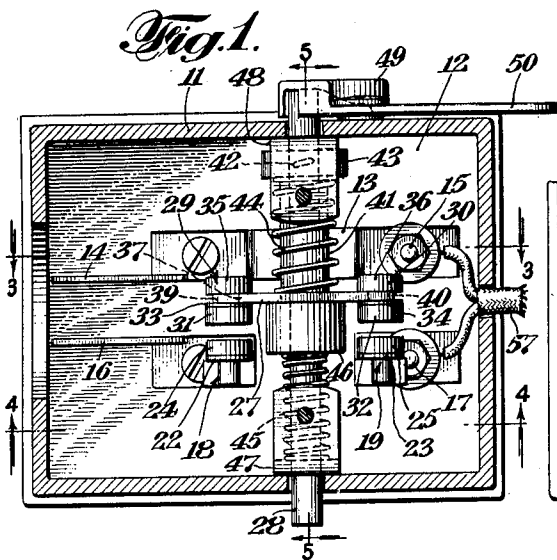
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S. M. FRIEDMAN

1,925,585

ELECTRIC SWITCH

Filed April 30, 1931



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1,925,585

ELECTRIC SWITCH

Samuel M. Friedman, Brooklyn, N. Y.

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7 Claims. (Cl. 200—163)

This invention relates to switches of the type adapted for use with electrically operated machines, and is of particular adaptability to intermittently operated devices such as the transmission mechanism described in my application
 5 filed July 3, 1930, Serial No. 465,571.

One of the most common troubles experienced with switches is the burning out of the contacts due to sparking therebetween. This
 10 results, after a period of operation, in smaller contact areas, excessive sparking and sputtering, overheating of the contact points with its consequent dangers, and complete failure of
 15 contacting. When such a condition is discovered, it generally becomes necessary either to procure a new switch, or to have a skilled mechanic repair it. It is hence one of the objects
 20 of my invention to overcome this defect by providing for the replacement, in a quick and secure manner, of the contacts in a switch of this class without the aid of an electrical expert, and prolonging the period between
 25 replacements by the use of reversible contacts.

It frequently happens that the burning out of the contacts continues progressively to such
 30 a point as to affect adjacent parts. This condition may not be discovered until serious harm has been done, as the switch may still continue to function even in a damaged condition. It is another object of my invention to prevent
 35 such an occurrence by causing a break in the circuit when the contacts are badly eaten away, thereby giving immediate notice of this condition.

It is a further object of my invention to provide against short-circuiting by the use of simple and inexpensive insulating means; and it
 40 is still another object to obtain positive and complete contacting between complementary elements at all times, and to effect self-adjustment for the constantly increasing gaps between these elements.

It is still a further object of this invention to enable adjustments to be made for either
 45 continuous and uninterrupted contacting, or intermittent operation by outside actuating means.

Other objects, features and advantages will appear from the accompanying drawing, and the
 50 description hereinafter given.

Referring to the drawing,

Figure 1 is a front sectional view taken through the casing containing the switch, the
 55 contacting elements being shown disengaged.

Figure 2 is a fragmentary section similar to

Figure 1, but showing the relation of the parts with the contacts in engagement.

Figure 3 is a sectional plan, looking down, and taken along line 3—3 of Figure 1.

Figure 4 is a sectional plan, looking up, and
 60 taken along line 4—4 of Figure 1.

Figure 5 is a side sectional view along line 5—5 of Figure 1.

Figure 6 is a fragmentary view of complementary contacting elements, illustrating how
 65 the circuit is broken by a gap formed in front of a worn out contact.

Figure 7 is a detached view of a contact element, insulating washer, and a fragment of the
 70 supporting bracket.

Figure 8 is a fragment of an elevation of the switch assembly and the supporting bracket,
 75 showing a lever adapted to actuate the switch.

In the drawing, the supporting bracket 10 carries the switch casing 11 which is mounted
 80 over the insulating wall 12. Attached to this wall is the metallic conducting strip 13, which is electrically connected to the prong element 14 and the binding post 15. The prong element 16 and the binding post 17 are independently at-
 85 tached to wall 12, and are hence normally insulated from each other. The contact elements 18 and 19 are supported by the arms 20 and 21 respectively, the shank portions of said elements being bifurcated for frictional engagement with
 90 the bent over portions of said arms. The insulating washers 22 and 23 fit over the shanks of said contact elements, thereby separating the said arms 20 and 21 from the expanded con-
 95 tacting portions or heads 24 and 25 of the said contact elements.

The bracket 27, which is slidably mounted over sleeve 41 on switch rod 28, carries the reversible contact elements 29 and 30, each of which has two contacting heads connected by a
 95 reduced portion therebetween which fits into and frictionally engages a recess at the end of the bracket. The active contacting heads 31 and 32 are separated from the said bracket by the insulating washers 33 and 34 respectively,
 100 the heads 35 and 36 being reserved for use when the others are worn out. The recesses 37 and 38 (37 shown on Fig. 7) are of such a width as to frictionally hold the shanks or reduced
 105 portions 39 and 40 of the reversible contact elements (only 39 shown in Fig. 7) in place.

Mounted over the switch rod 28 is the sleeve 41, made of insulating material, the cotter pin 42 holding the sleeve and the superimposed collar 43 fixed to said rod. The helical spring 110

44 positioned between the said collar and the bracket 27 is normally—when the contacts are disengaged—not in tension; and the helical spring 45, positioned between the expanded portion 46 of said sleeve and the bar 47 is normally in tension to keep the contacting elements disengaged.

The switch rod 28 extends, at the top, through openings in the bar 48 and casing 11, and at the bottom through openings in the bar 47 and casing 11. Pivotaly mounted at the top of the casing is the hand operable cam 49, the lever 50 being attached thereto for manual manipulation. The cam face consists of a sloped surface positioned at an angle to the longitudinal axis of said switch rod, the upper end of said rod being always held in abutment with said surface by the action of the spring 45. To the lower end of said rod is pivotally attached the link 51 which is adjustably secured to the lug 52 on the lever 53. A treadle, not shown on the drawing, is attached to said lever by the link 54.

As already stated, the contacting elements are normally in disengagement, due to the action of the spring 45. In this position, the top of the switch rod 28 is in contact with the raised portion 55 of the cam surface. To bring the contacts together, the lever 50 is turned, causing the downwardly sloping surface of the cam face to force the rod 28 down against the action of the helical springs, until the lower portion 56 of the cam surface contacts with the rod, as shown in Fig. 2. When this position is reached, the heads 31 and 32 of the contacting elements on bracket 27 are brought into engagement with the corresponding heads 24 and 25, respectively,—causing a closing of the circuit between the prong 16 and the binding post 17. As the prong 14 and the binding post 15 are already electrically connected, a closed circuit will be formed between the source of current supply and the wires in cable 57,—it being understood that the said prongs 14 and 16 are plugged into an appropriate outlet.

It should be noted that the inclination of the cam surface is great enough to impart the desired movement to the switch rod, yet sufficiently small to permit it to be frictionally held in its projected position without the danger of slipping back. It should also be observed that the rise of the cam is greater than the normal distance between the separated contact points, so as to produce a relatively great tensioning of spring 44, and hence a move positive, and yet a yieldably adjustable contacting; and also to allow for a wearing away of the contact elements.

The cam 49 is generally to be employed when a continuous and non-interrupted contacting is desired. Once the lever is moved to its operating position, the contact elements will be in constant engagement until the lever 50 is released. When intermittent operation is desired, however, the cam 49 is moved to its inoperative position, as shown in Figure 1. Any downward movement of a treadle attached to link 54 will cause a corresponding downward movement of the switch rod 28, and a consequent engagement of the contacting elements. Such an arrangement is of particular applicability to sewing machines, which must frequently be operated intermittently.

Should continuous sparking in the gap between contacting elements cause an erosion of any of these elements, they can readily be re-

placed or reversed, as the case may be. The elements 18 and 19 can readily be slipped off, and new ones substituted in their places. In the case of contact elements 29 and 30, should the contacting heads 31 and 32 become too badly worn for efficient use, they can be reversed so that the heads 35 and 36 become the active contacting elements. In this manner, very little time is lost in repairing contact points,—and at very little cost.

If the expanded portion or contacting head of the contact elements are entirely worn away by sparking and general usage, the insulating washers adjacent thereto will cause a break in the current, so that the machine controlled by the switch will fail to operate,—thereby giving the operator notice of its eroded condition. By referring to Figure 6, it will be noticed that the complete wearing away of the head of contact element 18 has resulted in the formation of the space 58 between the washer 22 and the contacting surface of the element 29, so that the circuit is now broken. Without this washer, there would be no break in the circuit, as there would still be a contacting between element 29 and the arm 20. This would result in an erosion of the said arm, and in a similar manner, of the bracket 27,—so that when the condition is finally discovered, comparatively costly replacements would have to be made.

To provide against a rotary movement of the rod 28 and bracket 27, a recess 59 is cut into the said bracket adapted to receive the guide 60. In this way, the only possible movement of the rod is longitudinally in the direction of its axis, thereby assuring the proper relative positioning of co-acting contact elements.

This invention is not limited to the specific form herein disclosed, as other and different mechanical forms may be embodied therein, within the scope of the appended claims.

What I claim is:

1. In an electric switch, a casing, two holes in opposite sides of said casing, a switch rod within said casing and having its extremities extending out through said holes, the said rod being movable in the direction of its longitudinal axis, means to hold the said rod against rotation, a bracket mounted on said switch rod and insulated therefrom, a pair of contact elements detachably secured to said bracket and electrically connected thereby, a pair of arms insulated from each other and fixed to said casing, a second pair of contact elements detachably secured to said arms and positioned adjacent said first-mentioned pair of elements, yieldable means operable upon said rod so as to normally keep said pairs of contact elements disengaged, means operable upon one end of said rod to yieldably move the rod to bring said pairs of contacts into engagement with one another, means to hold said rod in its projected position, and means operable upon the other end of said rod and against the action of said first-mentioned yieldable means to bring the adjacent contact elements into abutment with one another.

2. In an electric switch, a casing, two holes in opposite sides of said casing, a switch rod within said casing and having its extremities extending through said holes, the said rod being movable in the direction of its longitudinal axis, means to hold said rod against rotation, a sleeve of insulating material mounted over said rod, a collar surmounting said sleeve and affixed

thereto and to said rod, said sleeve having thereon an expanded portion, a bracket mounted upon said sleeve and adjacent said expanded portion, a helical spring mounted on said sleeve and positioned between said cottar and said bracket, a second helical spring mounted on said sleeve and positioned between a side of said casing and said sleeve, a pair of contact elements detachably secured to said bracket and electrically connected thereby, a pair of stationary contact elements insulated from each other and adjacent said first-mentioned pair, the said second helical spring being adapted to normally keep said adjacent contact elements out of engagement, and means operable upon either end of said rod to yieldably bring said adjacent elements into contact with one another.

3. In an electric switch, a contact element, a support for said element made of conducting material and having an open-ended recess therein; said element containing integral therewith an expanded portion adapted for engagement with an adjacent contact element, and an integral reduced portion adapted for frictional detachable engagement with the walls of said recess; and a flat insulating member mounted over and carried by said reduced portion and positioned between and contiguous to said expanded portion and said support.

4. In an electric switch, a reversible contact element, a support for said element made of a conducting material and having an open-ended recess therein, and an insulating member; the said element comprising integral therewith two contacting portions connected by a gripping portion frictionally and detachably secured to the walls of said recess, either of said contacting portions being adapted for engagement with an adjacent contact element; the said insulating member being mounted over and carried by said gripping portion and being positioned between and contiguous to said support and an end surface of one of said contacting portions.

5. In an electric switch, a reversible contact element, a bracket for supporting said element and made of conducting material, and an insulating member; the said element comprising integrally therewith two enlarged contacting portions connected by a reduced portion; the said bracket having therein an open-ended recess

adapted to receive and frictionally engage said reduced portion to detachably hold said element in place; either of said contacting portions being adapted for engagement with an adjacent contact element; the said insulating member being mounted over and carried by said reduced portion and being positioned between and contiguous to said bracket and an end surface of one of said contacting portions.

6. In an electric switch, a switch rod, a bracket slidably mounted thereover and insulated therefrom, a pair of contact elements detachably secured to said bracket and electrically connected thereby, a stationary pair of contact elements adjacent said first pair, a cam operable upon said rod to cause a movement thereof in the direction of its longitudinal axis so as to carry said first-mentioned elements into abutment with said stationary elements, said cam having its operating surface inclined at an angle to said longitudinal axis and frictionally engageable with one end of said rod, the maximum rise of said cam being greater than the normal gap between said contact elements when disengaged, yieldable means operative upon said bracket and co-acting with said cam to hold said elements in their projected contacting position, and means for manipulating said cam.

7. In an electric switch, a switch rod, a bracket mounted thereon and insulated therefrom, a pair of contact elements detachably secured to said bracket and electrically connected thereby, a pair of arms insulated from each other, a second pair of contact elements detachably secured to said arms and positioned adjacent said first-mentioned pair of elements, each of said first pair of elements containing integral therewith an expanded portion and an integral reduced portion, the expanded portion containing a contacting surface and the reduced portion being frictionally engageable with said bracket, yieldable means operable upon said rod and adapted to normally hold it in a position where said pairs of contact elements are in disengagement, and means operable upon said rod to yieldably bring said pairs of contact elements into engagement with one another.

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