





# UNITED STATES PATENT OFFICE

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## ELECTRICAL SWITCH

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1

This invention relates to electrical switches and the object of the invention is to provide a new and improved switch mechanism capable of operating accurately and consistently, and which will provide a positive "snap" action in both the contact-making and contact-breaking operations. A further object is to provide a switch which will be automatically re-set in the "open" condition after closure thereof.

Whilst the switch according to the invention is capable of application to a time recording device of the kind referred to in co-pending application Ser. No. 177,301, filed August 2, 1950, and will hereinafter be described as employed in such a device, the invention is not limited in its application to such devices but may equally well be employed in the operation of many other kinds of mechanisms in which the use of a switch of the above described characteristics is desirable or necessary.

According to the invention a switch mechanism is provided wherein a fixed contact carrying member has pivotally mounted thereon a movable contact carrying member urged by resilient means to engage the movable contact with the fixed contact but normally restrained against such movement by engagement with a pivotal sear the tripping of said sear by an independent actuating member effecting engagement of the movable contact with the fixed contact under the action of said spring and completing an electrical circuit effecting movement of an operating member to disengage said movable contact and re-engage said sear therewith.

Reference will now be made to the accompanying drawings which illustrate a preferred form of construction of the switch mechanism according to the invention mounted in a time recording apparatus of the kind described in the aforesaid co-pending application, and in which—

Figure 1 is a side elevation of the switch mechanism in its normal, inoperative position,

Figure 2 is a view similar to Figure 1 showing the switch in its closed, operative position, and

Figure 3 is a view similar to Figure 2 showing the condition of the switch mechanism immediately prior to its return to the position shown in Figure 1.

Like parts of the apparatus shown in the accompanying drawings and described herein and shown and described in the specification and drawings of the aforesaid prior patent application will bear like reference numerals.

The switch mechanism is mounted in a side plate 1 of the aforesaid time recorder and is

2

mounted on a substantially triangular plate 90 secured to the side plate by bolts 91, the plate 90 being formed with a flange 92 extending inwardly therefrom. An insulating plate 93 is secured on said flange 92 and a terminal 94 and a contact holder 95 are mounted on said plate 93 so as to be insulated therefrom and each other. The contact holder 95 has mounted therein a carbon contact 96.

Pivotally mounted on a spindle 97 secured in the lower portion of the plate 90 is a movable contact carrying member 98 formed as a substantially inverted T-shaped plate the upper arm 99 of which is formed with a flange 100 on which is mounted an insulating plate 99A in which is mounted a contact holder 95A carrying a carbon contact 96A. A tension spring 101 secured at one end to the upper portion of the arm 99 and at its other end to the flange 92, urges the contact holder 95A and the contact 96A carried therein, into engagement with the fixed contact 96 and contact holder 95. The lower part of the movable contact carrying member 98 comprises two oppositely extending arms 102, 103, the former of which has a flange 104 bent inwardly from the lower edge thereof whilst the latter has a flange 105 bent outwardly, that is towards the side plate 1, from the upper edge thereof.

Also pivotally mounted on a spindle 106 secured to the plate 90 is a sear lever 107 extending downwardly therefrom and formed at its end with a sear 108 adapted to engage under the flange 104 on the pivotal contact carrying member 98, said lever 107 being urged in a direction to effect engagement of said sear and said flange by means of a tension spring 109 secured at one end to said sear lever 107 and at the other end to a flange 110 bent inwardly from the central portion of the arm 99.

The arm 103 has mounted therein a pin 111 extending therefrom towards the side plate 1.

The contact holder 95A is connected with the terminal 94 by means of a flexible wire 112.

Pivotally mounted in the side plate 1 is a shaft 113 on which is secured a short link 114 the free end of which carries a spindle 115 on which is pivotally mounted intermediate its ends an actuating lever 116. One end of the lever 116 is formed with a flange 117 extending laterally therefrom and adapted to bear against the under side of the flange 104. The other end of the lever 116 has secured thereto one end of a tension spring 118 secured at its other end to a pin 119 mounted in the side plate 1, the lever 116 being

thereby pivoted in a direction to engage the flange 117 with flange 104.

Also secured on the shaft 113 is a ladder lever 120 a portion only of which is shown in Figure 1 the said ladder lever being formed with a number of steps 121 on which a card inserted into the time recorder for stamping is adapted to bear.

Mounted in the upper part of the side plate 1 is a shaft 122 on which is mounted a short link 123 pivotally mounted at its free end on a pin 124 extending laterally from the upper end of an operating lever 125 formed with a slot 126 in which freely engages a guide pin 127 secured to the side plate 1. The lower end of the lever 125 is pivotally mounted to a link 128 secured on the armature 129 of an electro-magnet 130 secured to the said side plate 1. The armature 129 is pivotally mounted on a shaft 131. The said lever 125 is urged in an upward direction by means of a spring 132 secured at one end to a pin 133 extending laterally from the lever 125 and at its other end to a pin 134 mounted in the side plate 1. The lever 125 is also formed with a further pin 135 extending laterally therefrom and adapted to abut the upper surface of the flange 105 of the pivotal contact carrying member 98.

The operation of the switch mechanism is as follows:

It will be assumed that the parts are in the position shown in Figure 1. On the insertion of a card into the machine for stamping, the lower edge of the card bears on one of the steps 121 of the ladder lever 120, the latter being adjustable by a suitable means (not shown) so as to present a different step for abutment by a card, in accordance with the passage of fixed intervals of time. Downward movement of the card on engagement with a step 121 causes pivotal movement of said ladder lever 120 to impart rotation to the shaft 113, the link 114 secured thereon being likewise pivoted through a corresponding angular movement.

As a result of the aforesaid angular movement imparted to link 114 the lever 116 pivotally mounted on said link is moved to the left, as viewed in Figure 1 and the flange 117 formed at the end of said link trips the sear 108 out of engagement with flange 104 on the arm 102 of the pivotal contact carrying member.

On release by the sear 108 the pivotal contact carrying member rotates anti-clockwise about its pivot 97 bringing the contact 96A into engagement with contact 96 of the fixed contact carrying member. The making of this contact completes an electrical circuit (not shown) which energises the electro-magnet 130, the armature 129 being thereby rotated about its pivot 131 and carrying with it the link 128. The pivotal movement of the link 128 causes downward movement of the operating lever 125 pivotally attached thereto, bringing the pin 135 on said lever into abutment with the upper face of flange 105 during such downward movement and thereby causing the pivotal contact carrying member to rotate clockwise and disengage contact 96A from contact 96 (see Figure 3). During the clockwise rotation of the pivotal contact carrying member 98 the pin 111 on the arm 103 thereof abuts the lever 116 and depresses the latter, bringing the flange 117 out of engagement with flange 104 on the arm 102 of said contact carrying member and thus permitting the sear 108 on lever 107 to move to a position ready for re-engagement with the said flange 104 to restrain the pivotal contact carrying member 98 against movement in a di-

rection to close the contacts of the switch, that is, against anti-clockwise rotation.

When the card inserted into the machine is removed therefrom the ladder lever 120 returns to its normal position, under the action of spring 118, rotating clockwise and thereby bringing the lever 116 from a position in which the flange 117 lies under the sear 108 (Figure 3) to a position in which it abuts the under surface of flange 104, the parts now being in the position shown in Figure 1 and ready for a further operation.

I claim:

1. A switch mechanism comprising a fixed contact carrying member, a pivot thereon, a movable contact carrying member pivotally mounted on said pivot and consisting of an upper arm carrying a contact and a pair of lower arms projecting respectively from opposite sides of the pivotal axis of the movable contact carrying member, resilient means urging the movable contact carrying member to engage the contact thereon with the fixed contact, a pivoted sear having means urging it toward engagement with the lower arm at one side of the pivotal axis of the movable contact member to normally restrain the latter member from engaging the movable contact with the fixed contact, an actuating member positioned to act on the sear to trip it and thereby cause engagement of the movable contact with the fixed contact under the influence of said resilient means, and an operating member engageable with the lower arm of the movable contact carrying member at the opposite side of its pivotal axis and operative to rock the movable contact carrying member into position to disengage the movable contact from the fixed contact and for re-engagement of the sear with the movable contact carrying member to hold the movable contact in open circuit position.

2. A switch mechanism according to claim 1 wherein said actuating member consists of a pivoted lever normally urged into engagement with said movable contact carrying member so as to retain the latter in its disengaged or "open" condition but adapted to be moved to disengage said sear from the respective lower arm of the movable contact member and free the latter for engagement with said fixed contact carrying member under the action of said resilient means.

3. A switch mechanism according to claim 1 wherein the lower arm of said movable contact carrying member which is engageable by said operating member is formed with an abutment adapted, on movement of said operating member to open said contacts, to pivot said actuating member clear of said lower arm on said movable contact carrying member to permit re-engagement of said sear therewith.

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