June 9, 1942. C. E. GARY 2,285,577

SWITCH

Filed Sept. 21, 1938

Fig. 1.

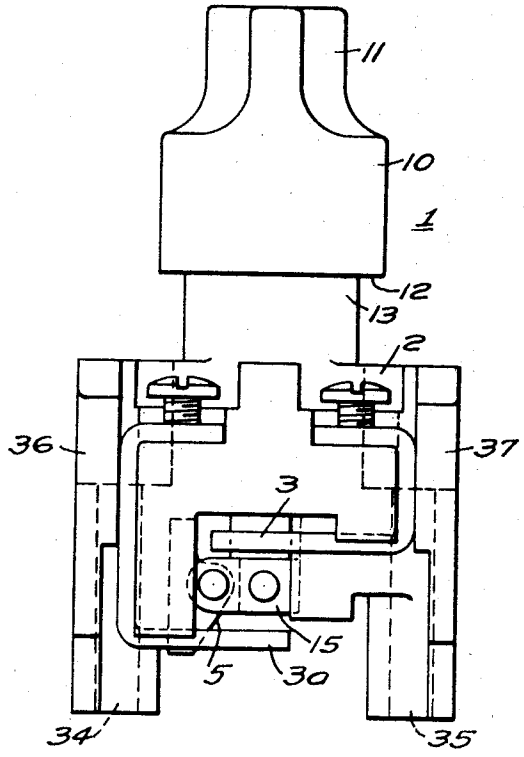


Fig. 2.

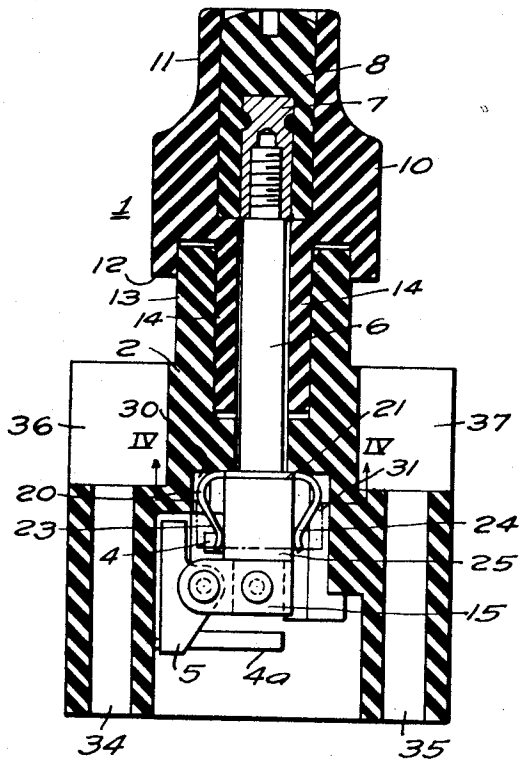


Fig. 3.

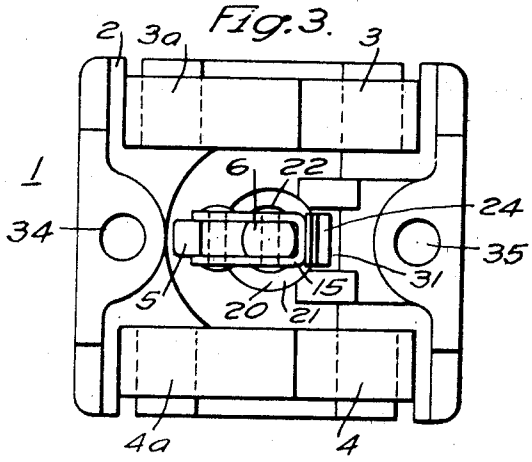


Fig. 4.

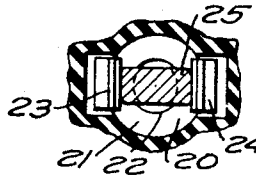


Fig. 6.

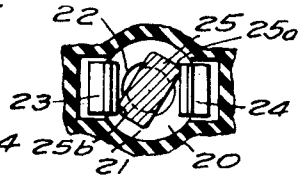


Fig. 5.

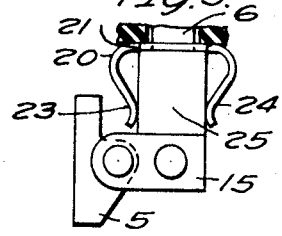


Fig. 7.

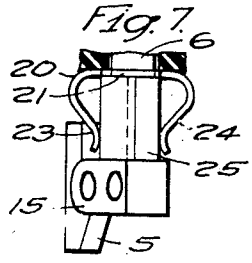
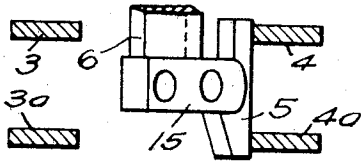


Fig. 8.



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SWITCH

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Application September 21, 1938, Serial No. 230,937

8 Claims. (Cl. 200—6)

This invention relates to switches.

Among the objects of my invention is the provision of a switch of simple construction, which shall be easy to assemble, and which shall be economical to manufacture; and to provide a novel type of spring biasing action to maintain the switch in open or in closed position.

A further object of my invention is to provide a transfer switch for controlling either of two circuits that shall have a simple construction in which the switch shall be positively biased to its open neutral position and positively biased to either of its closed positions.

In a switch of one form embodying my invention, two stationary contacts are provided to be bridged by a movable bridging contact. The bridging contact is mounted upon a rotatable post, and it is biased either to the open position or to the closed position by the action of an external pressure spring that presses radially inwardly against a rectangular element that is secured to the post in transverse position. In the neutral position, the spring engages the shorter surfaces of the rectangular section, and the pressure forces are opposed and symmetrically in alignment relative to the plane of the center line of the post. When the post is turned to move the bridging member against the stationary contacts, the rectangular element is correspondingly turned through an angle that is sufficient to move the trailing corner edges of the rectangle beyond the center line plane. The spring then presses against both trailing corners of the rectangle in such manner as to establish a force couple that biases the bridging member into positive engagement with the stationary contacts.

One form of switch, constructed in accordance with the principles of my invention, is shown in the accompanying drawing, in which:

Figure 1 is a side view of the switch;

Fig. 2 is a longitudinal sectional view of the switch of Fig. 1;

Fig. 3 is a bottom plan view of the switch of Fig. 1;

Fig. 4 is a schematic top view, with parts in section along line IV—IV of Fig. 2, of the force controlling rectangle and the spring in neutral position;

Fig. 5 is a side view of the rectangle and spring of Fig. 4;

Fig. 6 is a view similar to Fig. 4 showing the rectangle and spring in operated position;

Fig. 7 is a side view of the elements of Fig. 6; and

Fig. 8 is a schematic view illustrating the manner in which the bridging contact engages one set of stationary contacts.

As shown in the drawing, the switch 1 consists of a main molded base 2 on which are supported one pair of contacts 3 and 3a for one circuit, and a second pair of contacts 4 and 4a for a second circuit. A bridging contact member 5 serves to complete the circuit between either set of contacts.

In order to operate the bridging contact 5, a stem or post 6 is provided, the upper end of which is threaded and fitted into a metallic insert 7 in a head screw 8 that fits into a recess in the upper end of an operating and rotating button 10. The rotating button 10 is provided with an operating portion 11, and an apron 12 that fits over a projection 13 of the body 2. The operating button 10 is also provided with a depending extension 14 having a central opening of non-circular section, preferably square, to receive the square shank of the operating post 6 for the bridging contact 5.

The contact member 5 is pivotally supported on a bracket 15, that is fixedly secured to the lower end of the operating post 6, to permit the bridging contact to readily adjust itself to the stationary contacts to compensate for any variations in the dimensions or location of the stationary contacts, and thus obviate any necessity for extreme accuracy of manufacture or assembly.

In order to position the bridging contact with a positive action against the stationary contacts, a biasing spring 20 is provided. The spring 20 embodies a central portion 21 of annular shape with an opening 22 through which the post may extend, the opening being just big enough to permit rotation of the annular portion 21 on the post 6. Two flat fingers 23 and 24 are provided as diametrically opposed extensions from the central annular portion 21, and those two fingers 23 and 24 extend laterally and downwardly from the central annular section 21, so that the entire spring unit is of substantially U-shape when viewed from the side. The two side fingers 23 and 24 are slightly re-entrant and the entire unit is made of highly resilient spring steel so that the fingers may exert a substantial pressure against an element of appropriate size between them.

In order to cooperate with the spring 20, a rectangular enlargement 25 is provided as an integral part on the operating post 6, to fit between the two fingers 23 and 24 of the spring 20. The rectangular element 25 is normally arranged with its longer dimension in line with the pres-

sure fingers 23 and 24 (Fig. 4), and is mounted symmetrically with the axis of the post 6, so that normally the pressures from the flat spring fingers 23 and 24 will oppose each other as distributed forces against the end surfaces of the rectangular element parallel to the longitudinal axis of the rectangular section 25. The flat spring fingers thus impress their pressure biasing forces against areas of the element 25 to hold the bridging contact in its neutral position against casual displacement when the bridging contact is in such neutral position.

When the rectangular element 25 is rotated through the angle necessary to move the bridging element 5 against the stationary contacts, the spring fingers 23 and 24 will momentarily be separated an additional amount necessary to permit the diagonal of the rectangular element to move itself between the two spring fingers 23 and 24, and the rectangular element will then continue to move past such position until it occupies the position shown in Fig. 6, where the spring fingers are closer together. The diagonal of the rectangular element is then overcenter and out of alignment with the center line through the springs, and the trailing corner edges 25*a* and 25*b* of the rectangular element are on opposite sides of the center line through the springs, and are engaged by the respective spring fingers 23 and 24 with line contact, at which the pressure force of the spring fingers are concentrated.

The two springs 23 and 24 where they engage the trailing corner edges 25*a* and 25*b* of the rectangular element, now impose a couple of concentrated forces tending to turn the rectangular element in the same direction in which it has been moved from its neutral position, and thus impress a biasing force to maintain the bridging contact 5 in positive engagement with the pair of stationary contact members 3 and 3*a*, or 4 and 4*a*, depending upon which direction the bridging contact has been moved. Since the arrangement is symmetrical, the same condition holds whether the rectangular control element 25 is rotated in one direction or the other, from its neutral position. Rotation of bridging contact member 5 relative its supporting bracket 15 is obviously limited in extent by the adjacent arcuate wall of base member 2 (Fig. 3).

Figs. 6 and 7 illustrate, further, how the rectangular element 25 is engaged by the spring fingers 23 and 24, when the rectangular element is rotated with the operating shaft or post to move the bridging element 5 to engage either pair of the stationary contact members.

In Fig. 8, I have illustrated in simple form the manner in which the bridging contact 5 engages one pair of stationary contacts 4 and 4*a* to complete the circuit between them.

In order to retain the biasing spring 20 in position where it will function, the molded base 2 is provided with two side slots 30 and 31 within which the outer curved portion of the spring fingers 23 and 24 will fit, and loosely position themselves, to prevent rotation of the spring as a unit in response to the oscillating movements of the rectangular element 25 by the control shaft 6.

When the unit is assembled, the spring is merely dropped into its position, and the post is extended through the opening 22 in the spring to a position where the outer end of the post may be locked by the head nut 8. Thereafter, when the button 10 is rotated to oscillate the post 6 and the pivoted bridging contact 5, the spring 20 will remain in relatively fixed position against rotation, while the fingers 23 and 24 will be free to move in response to the minimum or maximum space required between them according to the position of the rectangular element 25.

The base 2 is provided with two bolt holes 34 and 35 in the side walls to permit the base to be secured to a suitable base. Access to the bolt holes is available through channeled slots 36 and 37 that are depressed sufficiently below the top of the base to remove the hazard of short circuiting between any of the contacts and the fastening bolts.

By means of the simple rectangular element on the operating post, in cooperation with the biasing spring, a positive pressure may be maintained between the bridging contact and the stationary contacts. The construction is simple and economical and serves as an effective toggle in neutral position, as well as in either operating position.

My invention is not limited to any specific details that are illustrated since these may be variously modified without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim as my invention:

1. A switch comprising a stationary contact, a movable contact, a rotatable member supporting the movable contact and movable therewith through a predetermined angle to engage the stationary contact, a rectangular element mounted on and transversely of the rotatable element, a pair of leaf springs rotatably mounted on said member and disposed to engage and press against opposite surfaces of the rectangular element in its position corresponding to the normal disengaged position of the rectangular element, and means for holding the leaf springs against rotary motion in response to movement of the rectangular element.

2. A switch comprising stationary contact members, a bridging contact member, a rotatable shaft to oscillate the bridging contact into engagement with the stationary contacts, an element on the shaft presenting a flat pressure surface, and pressure means presenting a pressure area against the pressure surface, said means including an annular ring freely encircling the shaft and resilient fingers extending outwardly from the ring and extending radially inward to engage the element on the shaft on opposite surfaces thereof and means for restraining said last-mentioned means against movement upon rotation of said shaft.

3. A switch comprising a base having a pair of stationary contacts secured thereon, a movable contact to engage the stationary contacts, a rotary shaft to operate the movable contact, and means loosely supported by the shaft and engageable with cam surfaces on said shaft to bias the shaft against movement from neutral position, and to bias the shaft to contact engaging position after a predetermined movement from neutral position and means for restraining said last-mentioned means against movement with said shaft.

4. A switch comprising a base having a pair of stationary contacts secured thereon, a movable contact to engage the stationary contacts, a rotary shaft to operate the movable contact, an element secured to the shaft to present at least one flat surface parallel to a plane tangential to the shaft, and a spring to exert a biasing pressure against said element, said spring consisting of a body portion in the form of an annular ring fitted loosely around the shaft, and a

finger strip extending outwardly from the ring and looped back to engage the surface, or an edge of the surface of the element on the shaft and means integrally connected with said base for restraining said spring against rotation upon rotation of said shaft.

5. A switch comprising a base having a pair of stationary contacts secured thereon, a movable contact to engage the stationary contacts, a rotary shaft to operate the movable contact, an element secured to the shaft to present at least one flat surface parallel to a plane tangential to the shaft, and a spring to exert a biasing pressure against said element, said spring consisting of a body portion in the form of an annular ring fitted loosely around the shaft, and two diametrically opposite finger strips extending outwardly from the ring and bent back toward the shaft to engage the element secured thereto, the two bent finger strips seating loosely in slotted recesses in the base to enjoy free adjustability while being restrained against rotation.

6. A switch comprising a base having a pair of stationary contacts secured thereon, a movable contact to engage the stationary contacts, a rotary shaft to operate the movable contact, a rectangularly shaped element secured to said shaft with its plane at right angles to the axis of said shaft, and a spring consisting of a body portion in the form of an annular ring fitted loosely around the shaft and having two diametrically opposite finger strips extending from the ring and bent back toward the shaft to engage opposite surfaces of said rectangularly shaped element, the two bent finger strips seating loosely in slotted recesses in the base to enjoy free adjustability while being restrained against rotation.

7. A switch comprising two stationary spaced pairs of spaced contacts, a bridging contact, a rotatable member pivotally supporting the bridging contact on an axis at an angle to the axis of said rotatable member and in a plane extending between the stationary contacts of each pair, said rotatable member being movable through a predetermined angle to engage the bridging contact with either pair of stationary contacts, an element having adjacent angularly related surfaces mounted on and transversely of the rotatable element, a leaf spring disposed to engage and press against one surface of said element in its position corresponding to the normal disengaged position of said contacts intermediate said pairs of contacts, said element being positioned on said member relative to said bridging contact so that engagement with one of said pairs of contacts occurs upon movement of said member from said normal position prior to full engagement of said spring with an adjacent surface of said element, whereby said leaf spring is effective to force said bridging contact into engagement with either pair of stationary contacts in a normal engaged position of the contacts, irrespective of any disalignment of said contacts.

8. A switch comprising a base having a stationary contact secured thereon, a movable contact to engage said stationary contact, a rotary shaft to operate said movable contact, an element secured to said shaft to present at least one flat surface parallel to a plane tangential to the shaft, and a spring to exert a biasing pressure against said element, said spring consisting of a body portion in the form of an annular ring fitted loosely around said shaft, and a finger strip extending outwardly from the ring and looped back to engage the surface, or an edge of the surface of said element on said shaft, and means integrally connected with said base for restraining said spring against rotation upon rotation of said shaft.

CLARENCE E. GARY.