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R. H. BENTLEY

2,336,389

SLOW MAKE AND BREAK SWITCH

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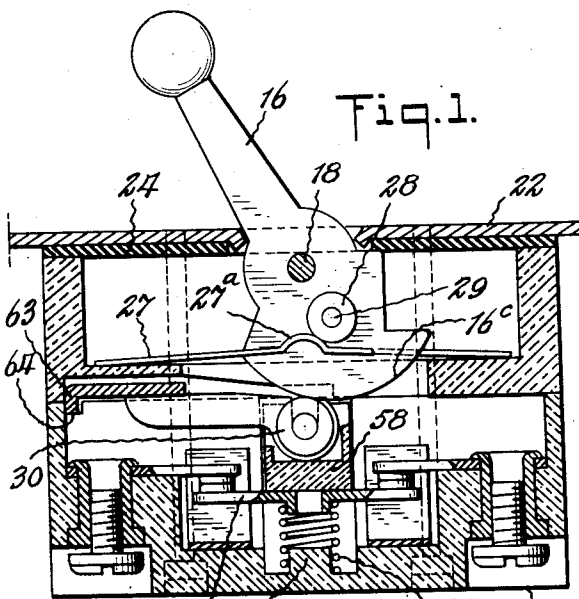


Fig. 1.

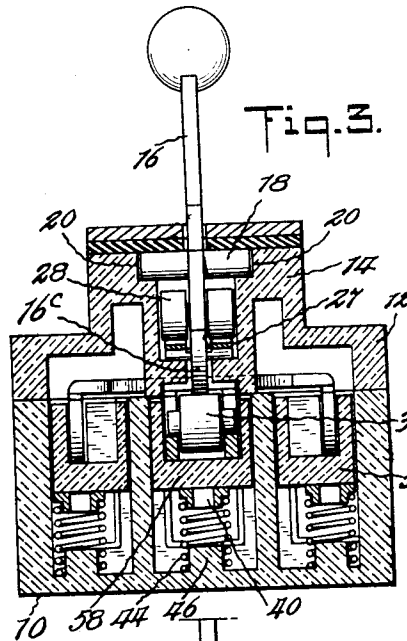


Fig. 3.

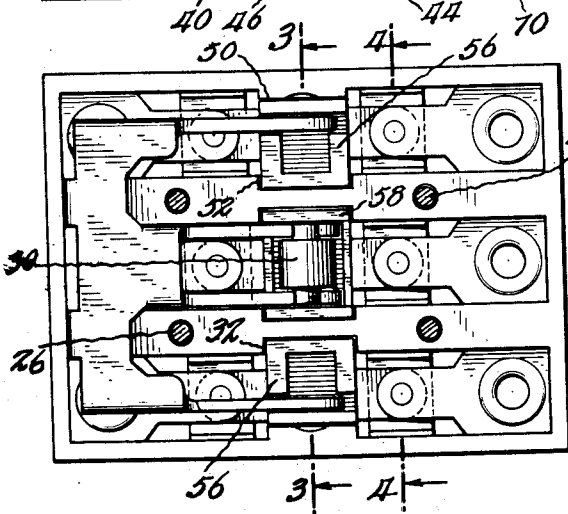


Fig. 2.

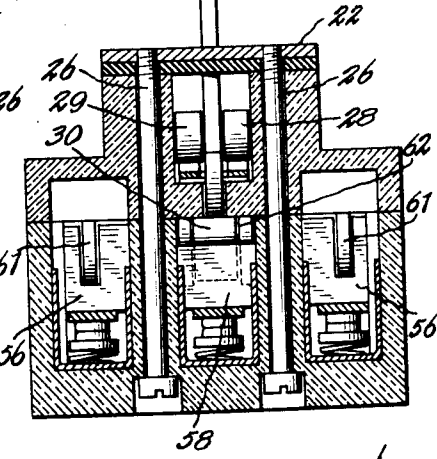


Fig. 4.

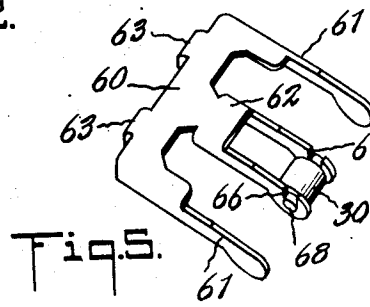


Fig. 5.

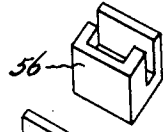


Fig. 6.

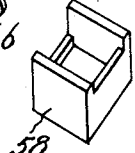


Fig. 7.

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UNITED STATES PATENT OFFICE

2,336,389

SLOW MAKE AND BREAK SWITCH

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6 Claims. (Cl. 200—16)

This invention relates to improvements in electric switches, and more particularly to improvements in slow make and break switches for alternating current circuits.

It is an object of this invention to provide a switch of the above type in small size but of relatively large current controlling capacity.

Another object of the invention is to provide an improved form of multi-pole switch of the above type provided with means to ensure the joint opening of the circuit in all poles as the switch is operated.

Another object of the invention is to simplify and improve the form of multi-pole switches of the above type.

Other objects and advantages of the invention will become apparent as it is described in connection with the accompanying drawing.

In the drawing—

Fig. 1 is a longitudinal elevational mid-section view of a switch embodying the invention.

Fig. 2 is a plan view of the switch with the cover and parts carried thereby removed.

Fig. 3 is a transverse section view of the switch of Fig. 1 with the section taken along line 3—3.

Fig. 4 is a transverse section view of the switch illustrated in Fig. 1, with the section being taken along line 4—4 of Fig. 2.

Fig. 5 is a perspective view of the contact operating yoke or bracket member.

Fig. 6 is a perspective view of one of the insulating plungers used for the outside poles of the switch invention shown in the preceding Figs. 1-4.

Fig. 7 is a perspective view of the insulating plunger member used on the middle pole of the switch invention shown in the preceding Figs. 1-4.

Referring to the drawing, the switch mechanism is mounted in a rectangular base 10 of molded insulating material and is covered by a rectangular cover 12, also of molded insulating material and provided with a central elevation or rib 14 running longitudinally. The elevated portion of the cover 14 is hollowed out from the top for the reception of actuating mechanism comprising a stamped sheet metal lever 16 which pivots about an axle pin 18 passing through a bearing aperture in the central portion of the operating lever and seating in bearing recesses 20 hollowed out of the top surface of the elevated portion 14. The axle pin is held in these bearing recesses by an insulating liner plate 24 and a switch mounting strap 22, which lie above the top surface of the elevated portion 14 and are secured thereto by bolts 26 passing through the

base and cover and taking into threaded apertures in the supporting strap or plate 22.

The inner end of the operating member 16 is enlarged to provide an arcuate cam surface 16c for engagement with an anti-friction roller 30 associated with the contact moving yoke of the switch, as hereinafter more fully described.

For the purpose of maintaining the operating lever 16 in switch "on" and "off" positions, a bowed leaf spring member 27 having an arcuate hump 27a in the center thereof is seated in the bottom of the recess within the elevated portion 14 of the cover. This leaf spring is slotted centrally to provide for passage therethrough of the cam portion of the operating member 16. The operating member is provided with anti-friction rollers 28 mounted upon an axle pin 29 extending through the inner end of the operating member 16 in such position as to cause the anti-friction roller to be engaged with the arcuate hump 27a of the leaf spring, as illustrated in Fig. 1, when the operating member is in switch "on" and switch "off" position and to be held in such positions by the force of the leaf spring member.

The current carrying parts are all located in the base 10. Each pole of the device has its contacts located in a separate cavity or chamber running longitudinally of the base. Fixed contacts are preferably mounted upon ledges at opposite ends of their respective chambers. The fixed contacts, preferably stamped from sheet metal with contact buttons mounted on one end thereof facing downwardly, are secured in place by hollow rivets passing through the ends of the base so as to afford wire terminal connection means, which receive terminal screws in the usual manner. For bridging the pairs of fixed contacts of each pole, a separate bridging member, such as 40, is provided for each pole. Conventionally the bridging member is provided with contact buttons on each end to engage with contact buttons of the fixed contacts. Preferably the bridging member will have a hollow boss formed in the central portion thereof to afford a seat or guide for a compression spring 44 which rests upon the floor of the base about a boss 46 formed in the floor, whereby the spring continually urges the movable contact upwardly into circuit closing position.

In the central portion of each of the separate contact chambers there is provided an offset recess, such as 50 and 52, the walls of which provide guide means for insulating plungers, such as 56 and 58. The plungers 56 for the outside poles are identical and have rectangular pris-

matic form, as shown in Fig. 6, while the plunger for the inside pole has rectangular prismatic form as shown in Fig. 7. It is desirable to have the plunger for the inner pole of different form from the plungers for the outside poles, by reason of the improved type of operating mechanism I have devised. The plungers are operated by a yoke or bracket member 60 stamped from sheet metal and having side arms 61 and a bifurcated center arm 62. The ends of these arms are rounded into cam surfaces so as to reduce friction as these arms engage with the plungers in the several contact chambers. Referring particularly to Fig. 2, it will be noted that the operating yoke 60 is positioned so as to cause the arms to extend toward the center of the base from the transverse portion of the frame which is located at one end of the base. To provide for rocking the operating yoke, a pair of lugs 63 are symmetrically bent down from the plane of the end edge of the transverse portion of the frame and have their ends seated in recesses 64, adjacent the end wall of the base 10. The arms 61 engage in slots on the upper surface of the plungers 56 and the ends of the bifurcated arm 62 engage in a recess in the top of plunger 58 for the purpose of depressing the plungers as the arms are depressed or pivot downwardly about the points of pivotal engagement of the lugs 63 in recesses 64.

In order to move the yoke 60 with minimum resistance as the operating lever 16 is manipulated, the central arm 62 of the yoke has the end portions of its bifurcations provided with bearing slots 66 receiving the axle 58 of the anti-friction roller 30, which is engaged by the cam surface 16c of the operating lever.

From the foregoing, it will now be readily understood that as the operating member 16 is rocked about its pivot 18, the cam surface 16c engaging with and pressing upon the anti-friction roller 30 will cause the operating yoke or bracket 60 to be rocked downwardly about the pivot lugs 63. This downward rocking movement of the bracket causes the plungers 56 and 58 to descend by reason of the engagement of the arms 61 and 62 of the yoke with these plungers. Since the flat bottoms of the plungers rest upon the flat upper surface of the bridging contacts of the switch, these contacts are caused to descend with the plungers and disengage from the fixed contacts, whereby the switch is moved to open-circuit position. The provision of the yoke 60 in the device ensures the opening of the contacts in all of the poles simultaneously. This is an improvement upon certain prior devices, wherein the contacts of one pole would open while those of another would often remain engaged due to the faulty operation or defective design of the contact opening mechanism.

Variations within the scope of my invention may occur to those skilled in the art.

I claim:

1. In an electric switch, an insulating base having a plurality of cavities, a set of cooperating fixed and movable contacts in each cavity, a separate insulating plunger engaging each movable contact, a yoke member pivotally mounted about a fixed pivot and having portions engaging said plungers to simultaneously move said contacts, and means to move said yoke to cause said contacts to separate.

2. In an electric switch, an insulating base having therein a plurality of longitudinal unbroken walls forming a plurality of separate cavities extending lengthwise of said base, a separate set of cooperating fixed and movable contacts in each cavity, spring means normally urging said contacts into engagement, an individual insulating plunger in each cavity and guided in movement by the walls of the cavity for moving the movable contact, a rigid yoke member having a pivotal bearing at one end of said base and having portions extending lengthwise of the base into engagement with said plungers for moving them jointly, a cover for said base, and manual operating means extending through said cover into operating engagement with said yoke member.

3. In an electric switch, an insulating base having therein a plurality of longitudinal unbroken walls forming a plurality of separate cavities extending lengthwise of said base, a separate set of cooperating fixed and movable contacts in each cavity, spring means normally urging said contacts into engagement, an individual insulating plunger in each cavity and guided in movement by the walls of the cavity for moving the movable contact, a rigid yoke member having a pivotal bearing at one end of said base and having portions extending lengthwise of the base into engagement with said plungers for moving them jointly, anti-friction means on said yoke member, a cover for said base, and operating means extending through said cover and engaging said anti-friction means for moving said yoke with minimum friction.

4. In an electric switch, an insulating base having a plurality of cavities, a set of cooperating fixed and movable contacts in each cavity, a separate insulating plunger engaging each movable contact, a yoke member pivotally mounted about a fixed pivot and having portions engaging said plungers to simultaneously move said contacts, a cover, operating means extending through the cover to move said yoke and cause said contacts to separate, and anti-friction means between said operating means and yoke to reduce friction.

5. In an electric switch, an insulating base having a plurality of cavities, a set of cooperating fixed and movable contacts in each cavity, a separate insulating plunger engaging with each movable contact and guided by the base for rectilinear movement, a yoke member pivotally engaging in bearing means near one end of said base and having arms engaging said plungers, and operating means for moving said yoke member to pivot it and move said plungers and contacts.

6. In an electric switch, an insulating base having a plurality of cavities, a set of cooperating fixed and movable contacts in each cavity, a separate insulating plunger engaging with each movable contact and guided in movement by the base, a yoke member pivotally engaging bearing means near one end of said base and having arms engaging said plungers, one of said arms having an anti-friction roller mounted thereon, and an operating lever having a cam surface engaging said roller for pivoting said yoke member to move said plungers and contacts.

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