Sept. 22, 1959 W. L. CHERRY, JR 2,905,781

GANG TYPE SNAP-ACTION SWITCH

Filed Sept. 24, 1956

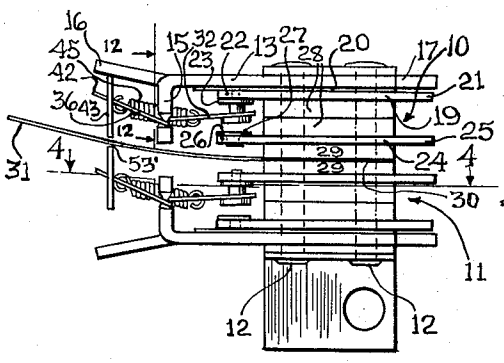


Fig. 1.

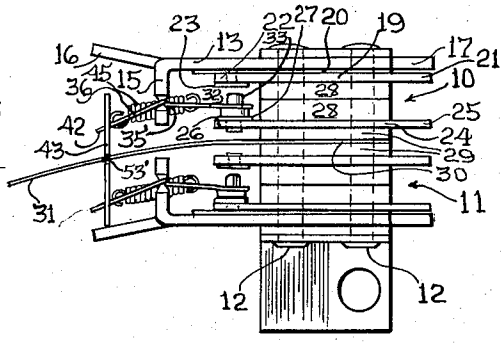


Fig. 2.

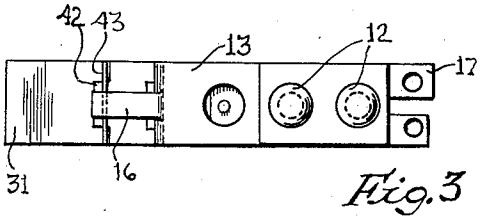


Fig. 3

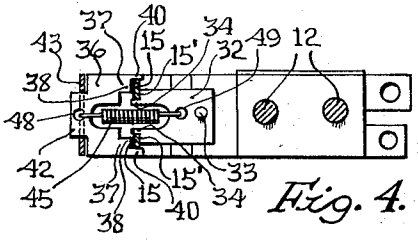


Fig. 4.

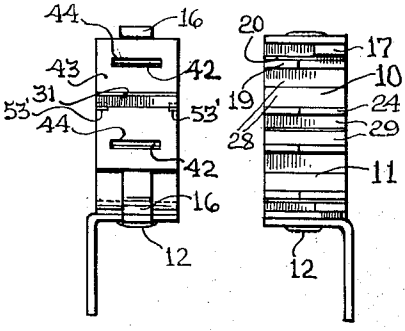


Fig. 5.

Fig. 6.

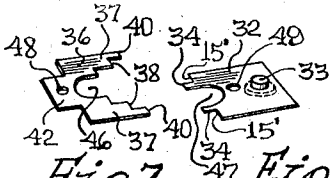


Fig. 7.



Fig. 8.

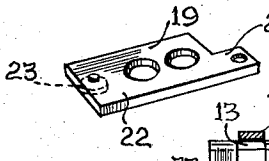


Fig. 9.

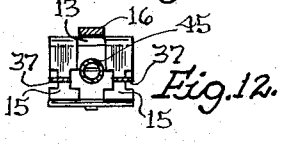


Fig. 12.

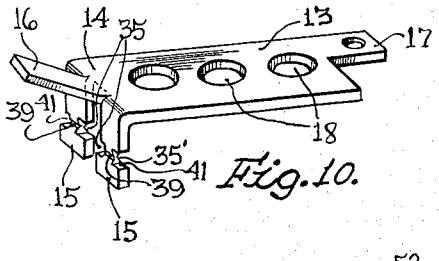


Fig. 10.

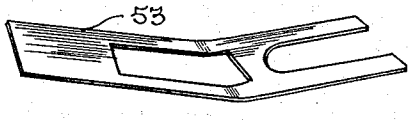


Fig. 13.

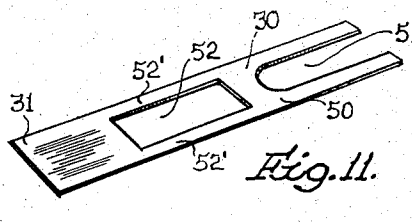


Fig. 11.

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United States Patent Office 2,905,781 Patented Sept. 22, 1959

2,905,781

GANG TYPE SNAP-ACTION SWITCH

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Application September 24, 1956, Serial No. 611,503

9 Claims. (Cl. 200—67)

This invention relates to certain new and useful improvements in a gang type snap action switch and has for its principal object the provision of an improved construction of this character which will be economical in manufacture and highly efficient in use.

Among the several salient objects of this invention is the provision of a pair of similarly constructed snap-action switches arranged in intimate parallel relation with respect to each other and having therebetween an actuator common to each for simultaneously pivoting the switch blades of such switches in timed relation with respect to each other.

Another and equally important object of this invention is the provision of a gang type snap-action switch comprising two similarly constructed snap-action switches arranged in gang relation with respect to each other and in which the parts of one switch are of the same size, form and design as the parts of the other switch, with the result that when the switches are arranged in intimate parallel relation with respect to each other, the parts of one switch will be in true alignment with those of the other, whereby to assure proper and accurate assembly of the two switches with respect to each other to produce simultaneously timed relation of the switches by an actuator arranged between such switches and common to each.

Another and equally important object of this invention is to provide in a gang type snap-action switch an arrangement which will assure equal operating force on either side of the long axis of the actuator for simultaneously and in timed relation pivoting the switch blades into and from engagement with stationary contacts.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

Fig. 1 is a side elevational view of a gang snap-action switch embodying my invention;

Fig. 2 is a side elevational view similar to Fig. 1 but showing the parts thereof in different position;

Fig. 3 is a top plan view of the switch shown in Fig. 1;

Fig. 4 is a sectional detail view taken substantially on line 4—4 of Fig. 1;

Fig. 5 is an end elevational view of the switch shown in Fig. 1 as appears from the left-hand side thereof;

Fig. 6 is an end view of the switch shown in Fig. 1 as appears from the right side thereof;

Fig. 7 is a perspective view of an actuating link embodied in the invention;

Fig. 8 is a perspective view of a switch blade embodied in the invention;

Fig. 9 is a perspective view of a contact plate embodied in the invention;

Fig. 10 is a perspective view of a bracket embodied in the invention;

Fig. 11 is a perspective view of an actuator embodied in the invention;

Fig. 12 is a fragmentary sectional detail view taken substantially on line 12—12 of Fig. 1;

Fig. 13 is a perspective view of a switch actuator similar to that shown in Fig. 11 but showing an actuator which has been pre-bent to effect automatic reset operation of the switch blades.

I prefer to accomplish the many objects of this invention by a form of construction such as shown in the drawings and hereinafter described. In this connection, my improved gang type snap-action switch comprises two switch units 10 and 11 arranged in opposed relation with respect to each other in stacked or block formation and secured in such formation by means of rivets 12 or the like. As each snap-action switch unit is of similar construction, the description of one will be equally applicable to the other.

As shown in the drawings, a substantially elongated rigid bracket is indicated at 13. This bracket has one end portion 14 bifurcated in the direction of its length to provide parallel spaced apart supporting fingers 15 extending substantially at right angles with respect to the bracket 13 and between which extends an outwardly bent plate 16. The opposite end of the bracket 13 provides a terminal 17 to which is attached by means of solder or the like a circuit wire (not shown). Formed in the bracket 13 are spaced openings 18 of a diameter larger than the diameter of the rivets 12 and through which such rivets are projected and spaced from the bracket 13.

Adjacent the bracket 13 is a contact plate 19 separated from the bracket 13 by an insulation strip 20. The contact plate 19 at one end portion provides a terminal 21 to which a circuit wire (not shown) is secured. The opposite end portion 22 of the contact plate 19 is provided with a contact head 23.

Extending in parallel relation with respect to the contact plate 19 is a similarly formed contact plate 24 having a terminal 25, similar to the terminal 21, and carrying at its opposite end portion 26 a contact head 27 in opposed relation with respect to the contact head 23. The contact plate 19 is spaced from the contact plate 24 by insulating blocks 28. The switch unit 11 is similarly constructed and parts thereof which are similar to the parts of the switch unit 10 are designated by the same reference numerals.

The two switch units are arranged in opposed relation with respect to each other as shown in Fig. 1 and are separated by means of insulating plates 29 between which plates is arranged the end portion 30 of an elongated flexible actuator 31. The contact plates 19 and 24 of the switch unit 10, as well as of the switch unit 11, and the insulating blocks of each unit, are provided with openings which are arranged in alignment for the passage of the rivets 12, the openings in the contact plates being substantially greater in diameter than the diameter of the rivets so as to avoid contact with the latter.

In each switch unit there is incorporated a switch blade 32 which is of relatively flat material and provided at one end portion with a contact 33 which is adapted for alternate engagement with the adjacent contacts 23 and 27 of the contact plates 19 and 24, respectively.

The switch blade 32 extends inwardly with respect to the depending fingers 15 and has at its end portion opposite the contact carrying end portion, parallel projections 34 which project into notches 35 in the fingers 15 with the heel 15' of the blade 32 engaging in V-shaped notches 35'.

Extending from the opposite side or in an outward direction from the supporting fingers 15 is a link 36 of elongated formation and providing fingers 37 stepped to provide a heel 38 for engagement in V-shaped notches

39 formed transversely in the outer sides of the fingers 15, the ends 40 of which fingers 37 project into notches 41 formed in the opposite outer side edges of the fingers 15 as best shown in Figs. 4 and 10 and, like the projections 34, restrain the link 36 from lateral displacement from the fingers 15.

The outer end portion of the link 36 provides a tongue 42.

Connecting the link 36 of each of the switch units 10 and 11 together for simultaneous timed operation is a coupling plate 43. This plate provides parallelly extending spaced elongated slots 44 into which project the tongues 42 of the links 36. Each of these slots 44 is of a dimension greater than the thickness of the tongue 42 to permit the links 36 to pivot freely relative to the coupling plate 43.

To complete the invention, each of the switch units 10 and 11 includes a tension member 45 in the form of a coil spring arranged within open slots 46 and 47 formed respectively in the link 36 and the switch blade 32, with one end portion connected to the link 36 adjacent its outer end portion as at 48 and its opposite end portion connected to the switch blade 32 as at 49.

The connecting plate or coupling plate 43 moves in a direction longitudinally with respect to its length and has its movement in such direction limited by stop fingers provided by the outwardly bent plates 16 which are formed integrally with the brackets 13.

The inner end portion 50 of the actuator 31 which is disposed between the insulating plates 29 is provided wtih an open slot 51 to provide clearances with respect to the rivets 12 so that there will be no contact between the rivets 12 and the actuator 31. To increase the flexibility of the actuator 31, the medial portion thereof is provided with an opening 52. By forming the opening 52 in the actuator 31, there are provided relatively narrow edge portions 52' which engage in the notches 53' formed in the opposite side edges of the coupling plate 43 (Fig. 5).

The gang snap-action switch above described is of the type that requires exertion of a force on the outer end portion of the actuator to flex it in either direction on opposite sides of its long axis. It will be apparent that as soon as the outer end portion of the actuator passes or crosses the plane of the long axis theerof, the stored energy in the springs 45 will cause a simultaneous movement of the switch blades due to the fact that the switch blades of the switches are both ready to trip.

As the switch blades 32 are connected together and to the actuator, it is clearly obvious that they will move in snap-like action simultaneously and that the tension springs 45 insure that degree of pressure between the engaging contact heads as is necessary for a positive contact, one which will not be disturbed or broken, even momentarily, by reason of vibration, shock or the like.

Assembling of the switch units in opposed relation with respect to each other is made expedient by reason of the fact that the parts making up each unit are of similar form, size and shape, with the result that proper spacing of the contacts and central location of the actuator is assured.

In Fig. 13, I have shown an actuator which in all respects is substantially similar to the actuator 31 shown in Fig. 11. Consequently, similar parts will be designated by similar reference numerals. In connection with the actuator shown in Fig. 13, such actuator has been pre-bent to take the form there shown, with the result that when the actuator 53 shown in Fig. 13 is substituted for the actuator 31 shown in Fig. 11, the former is self-returning to its normal or starting position. In other words, such actuator 53 (Fig. 13) is not reset as is the actuator 30 (Fig. 11).

From the foregoing description, it will be seen that the several objects of my invention are accomplished by a gang type snap-action switch which is of simple construction, comprising the minimum number of parts, and one which may be manufactured at an economical cost.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A gang type snap action switch comprising similar switch units arranged in parallel relation with respect to each other and each having similarly formed brackets with corresponding ends provided with a pair of spaced apart supporting fingers extending in a direction toward each other, an actuator common to and arranged between each of said units, each of said units embodying a snap-action system including an actuating link pivotally supported by said fingers and extending in a direction from one side thereof, and a coupling member carried by said actuator in a spaced apart parallel relation to said fingers and having operative connection with said actuating links for simultaneously operating each of said snap action systems.

2. The device defined by claim 1 in which the coupling member extends substantially at right angles with respect to said actuator from opposite sides thereof.

3. The device defined by claim 1 characterized by the inclusion of integral extensions on the brackets in the path of movement of the coupling member to provide stops therefor to limit the distance of movement of the coupling member under the action of the actuator.

4. The device defined by claim 1 in which the coupling member extends substantially at right angles with respect to said actuator from opposite sides thereof, and further characterized by the inclusion of integral extensions on the brackets in the path of movement of the coupling member to provide stops therefor to limit the distance of movement of the coupling member under the action of the actuator.

5. The device defined by claim 1 characterized by the inclusion in each of the snap-action systems of a switch blade pivotally supported by and extending from the fingers in a direction opposite to that of the actuating links and each coupled to its adjacent actuating link by a tension member.

6. The device defined by claim 1 in which the coupling member extends substantially at right angles with respect to said actuator from opposite sides thereof, and further characterized by the inclusion in each of the snap-action systems of a switch blade pivotally supported by and extending from the fingers in a direction opposite to that of the actuating link and each coupled to its adjacent actuating link by a tension member.

7. The device defined by claim 1 characterized by the inclusion of integral extensions on the brackets in the path of movement of the coupling member to provide stops therefor to limit the distance of movement of the coupling member under the action of the actuator, and further characterized by the inclusion in each of the snap-action systems of a switch blade pivotally supported by and extending from the fingers in a direction opposite to that of the actuating links and each coupled to its adjacent actuating link by a tension member.

8. The device defined by claim 1 in which said actuator is pre-bent in a direction from the plane of its longitudinal axis and parallel to each of the actuating links of each of said units for the purposes described.

9. A gang type snap-action switch comprising similar switch units arranged in parallel relation with respect to each other and each having similarly formed brackets with corresponding ends provided with a pair of spaced apart supporting fingers extending in a direction toward

each other, each of said fingers adjacent opposed ends thereof having side notches formed in their longitudinal edge portions and V-shaped notches formed transversely in the side face thereof, each of said units embodying a snap-action system including an actuating link pivotally connected to certain side notches and V-shaped notches of said fingers and extending in a direction from one side thereof, a switch blade connected to certain other side notches and certain other V-shaped notches of said fingers and extending in an opposite direction with respect to said actuating link, an actuator common to and arranged between each of said units and extending in a substantially parallel direction with respect to said actuating link and said switch blade, and a coupling member carried by said actuator and extending laterally from each side thereof in a spaced apart parallel relation to said fingers and

having operative connection with said actuating link for simultaneously operating each of said snap-action systems.

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