Aug. 7, 1956 W. L. CHERRY, JR 2,758,171

MULTIPLE POLE DOUBLE-THROW SIMULTANEOUS-ACTION SNAP-ACTION SWITCHES

Filed Feb. 2, 1955

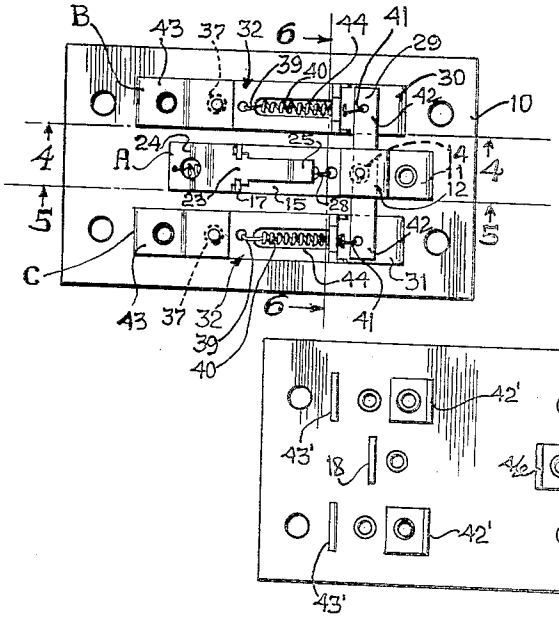



Fig. 1.




Fig. 2.

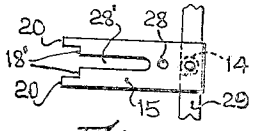



Fig. 3.

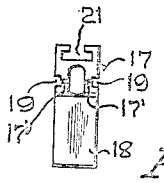



Fig. 3a

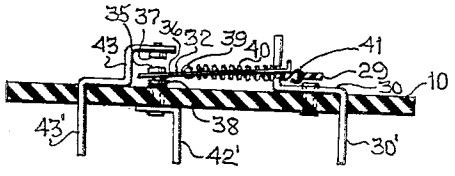



Fig. 4.

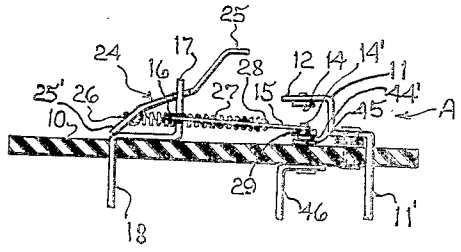



Fig. 5.

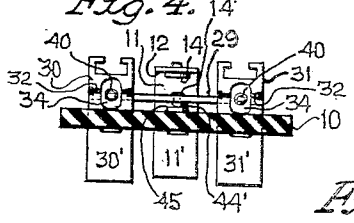



Fig. 6.

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United States Patent Office

2,758,171

Patented Aug. 7, 1956



2,758,171

# MULTIPLE POLE DOUBLE-THROW SIMULTANEOUS-ACTION SNAP-ACTION SWITCHES

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Application February 2, 1955, Serial No. 485,695

7 Claims. (Cl. 200—67)

This invention relates to certain new and useful improvements in multiple pole double-throw simultaneous-action snap-action switches and has for its principal object the provision of an improved construction of this character which will be highly efficient in use and economical in manufacture.

The type of switch to which this invention relates is intended to be used in an electric circuit in which, for example, the circuit may be converted from a parallel to a series circuit by the simple actuation of an actuator. Viewed from this aspect of the invention and when limiting the same to a particular type of circuit, it is an object to provide a switch which may be used for different circuit combinations and one in which the operation is simultaneous with respect to the disengagement of confronting 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 plan view of the switch embodying my invention;

Fig. 2 is a bottom plan view of the switch shown in Fig. 1;

Fig. 3 is a plan view of a switch blade embodied in the invention;

Fig. 3*a* is an end elevational view of a supporting bracket for the blade shown in Fig. 3;

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

Fig. 5 is a sectional detail view taken substantially on line 5—5 of Fig. 1;

Fig. 6 is a sectional detail view taken substantially on line 6—6 of Fig. 1.

The preferred embodiment of my improved and simplified multiple pole double-throw simultaneous-action switch includes a mounting plate 10 of suitable non-conductive material and of such form as will best serve the purpose. On this mounting plate 10 is supported an intermediate switch A and side switches B and C on opposite long sides of the intermediate switch and extending in parallel relation with respect to each other and with respect to the intermediate switch. The intermediate switch A includes a bracket 11 having a horizontal end portion 12 overlying the plate 10 and disposed in spaced parallel relation with respect thereto and carrying a contact member 14. The bracket 11 provides a terminal 11' which projects through the plate 10 and to which the end of a circuit wire may be secured.

The intermediate switch A includes a switch blade 15. This switch blade 15 is formed of spring material and has one end portion 16 pivotally connected to a bracket 17 (Fig. 5) fixedly carried by the plate 10 and provided with a terminal 18 extending through the plate 10 and to which terminal a circuit wire may be connected. The free end



of the switch blade 15 operates beneath the end portion 12 of the bracket 11 and carries a contact member 14' adapted for engagement with the contact 14 carried by the bracket 11.

The bracket 17 in its opposite side vertical edges is provided with notches 19 within which are received the fingers 20 of the switch blade 15. Such bracket provides a supporting seat 17' for the blade 15, such seat being in the form of a V groove into which the edge portion 18' of the blade is seated. By such an arrangement the actuator is rockably supported upon the bracket 17. The bracket 17 at its free end portion has a T-shaped slot 21 formed therein for reception of an intermediate reduced portion 23 of an actuator 24. By this arrangement the actuator 24 is pivotally connected to the bracket 17.

The end portion 25 of this actuator 24 extending from one side of the bracket 17, is adapted to be engaged by an operating member (not shown) such as a cam, push button, or the like. The opposite end portion of the actuator extending from the opposite side of the bracket 17 has secured thereto as at 26 one end portion of a tension spring 27. The opposite end portion of such spring 27 is secured as at 28 to the blade 15 adjacent the free end portion thereof. The blade 15 has an open slot 23' formed therein to accommodate the spring 27 when the blade is biased by the pull of the spring 27. The blade 15 at its free end portion carries an actuating bar 29 of non-conductive material. The opposite end portions of this actuating bar 29 extend laterally from the opposite sides of the switch blade 15.

To the plate 10 on opposite sides of the bracket are secured brackets 30 and 31 of the side switches B and C, respectively. Each of these brackets has a terminal 30' and 31', respectively, extending through the plate 10 and to which circuit wires are adapted to be attached. The brackets 30 and 31 of the side switches B and C, respectively, are each similar in construction to the bracket 17 of the intermediate switch A. Each pivotally support a switch blade 32 in the same manner as the switch blade 15 is supported from its bracket 17. Each bracket 30 and 31 has an opening 34 formed therein.

The free end of each of the switch blades 32 on opposite sides thereof carry contacts 35 and 36 adapted for engagement with contacts 37 and 38. The contact 37 is carried by a bracket 43 secured to the plate 10 and providing a terminal 43' to which a circuit wire may be attached. The contact 38 is connected with a terminal 42' which extends through the plate 10 and to which a circuit wire may be attached.

To each of the blades 32 adjacent their free end portions is connected as at 39, one end portion of a tension coil 40. The opposite corresponding ends of the coil springs 40 project through the openings 34 and are connected as at 41 to the outer end portions 42 of the actuating bar 29 (Fig. 1). Open slots 44 are formed in each switch blade 32 to accommodate its respective spring when such blade is biased by such spring across the long axis thereof. The switch blade 15 at its free end portion carries a contact member 44' normally in contact with a contact 45 having a terminal 46 secured to the plate 10 and to which a circuit wire is connected.

The actuator 24 has an end portion 25' opposite the end portion 25 which normally engages the plate 10, to limit the movement of the actuator by the action of the spring 27 in an anticlockwise direction.

By the provision of the multiple of terminals, a number of different electric circuits may be devised in which my improved and simplified switch can be incorporated.

The springs normally bias the switch blades 32 in the same direction across the long axis thereof in a direction opposite to that of the switch blade 15. In so doing, the contacts 36 are in engagement with their confronting con-

tacts 38 while the contact 44' is in contact with its confronting contact 45.

When pressure is applied to the end portion 25 of the actuator 24, it will be rocked about its pivot connection with the bracket 17 in a direction to tension the spring 27 of the switch "A." The tension spring 27 as it crosses the point of pivotal connection between the blade 15 and the bracket 17, will exert a pull on the blade 15, compressing the latter against the bracket 17, with the result that the blade 15 will flex with snap action, bringing the contact 14' into engagement with the contact 14.

Simultaneously with this action, the actuator bar 29 which moves with the switch blade 15, will tension the springs 40 with the result that such springs under tension will exert a pull on the blades 32 and flex the same in snap action to bring the contacts 35 into engagement with the contacts 37. The simultaneous action of the three switch blades is effected by the rocking of a single actuator.

A switch embodying the features of my invention will be highly efficient in use and economical in manufacture. Such a construction provides a multiple pole double-throw simultaneous-action switch which is relatively small and one which may be incorporated in electric circuits of various designs and requirements.

My switch will also be useful in converting a series circuit into a parallel circuit.

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 multiple pole double-throw simultaneous-action switch comprising an intermediate switch and switches on opposite sides of said intermediate switch and extending in parallel relation with respect to each other and with respect to said intermediate switch, each of said switches comprising a switch blade having a free end portion, the blade of the side switches having the free end portion thereof reversely positioned with respect to the free end portion of the intermediate switch, an actuating bar of non-conductive material carried by the free end portion of the blade of the intermediate switch, spring biasing means for biasing each of said blades, the spring means of the switch blades of the side switches having corresponding end portions connected to the free ends of the blades of said side switches and opposite ends connected to the opposite end portions of said actuating bar, and an actuator for the switch blade of the intermediate switch, the spring biasing means of the blade for the intermediate switch having one end portion connected to said actuator and its opposite end portion connected to the free end of such blade.

2. A multiple pole double-throw simultaneous-action switch comprising an intermediate switch and switches on opposite sides of said intermediate switch and extending in parallel relation with respect to each other and with respect to said intermediate switch, each of said switches comprising a switch blade having a free end portion, the blade of the side switches having the free end portion thereof reversely positioned with respect to the free end portion of the intermediate switch, an actuating bar of non-conductive material carried by the free end portion of the blade for the intermediate switch, spring biasing means for biasing each of said blades, the spring means of the switch blades of the side switches having corresponding end portions connected to the free ends of the blades of said sides switches and opposite ends connected to the opposite end portions of said actuating bar, and an actuator for the switch blade of the intermediate switch, the spring biasing means of the blade for the intermediate switch having one end portion connected to said actuator and its opposite end portion connected to the free end of such blade, each of said switches having a plurality of terminals for connection with the ends of circuit wires.



3. A multiple pole double-throw simultaneous-action switch comprising an intermediate switch and switches on opposite sides of said intermediate switch and extending in parallel relation with respect to each other and with respect to said intermediate switch, each of said switches comprising a switch blade having a free end portion, the blade of the side switches having the free end portion thereof reversely positioned with respect to the free end portion of the intermediate switch, an actuating bar of non-conductive material carried by the free end portion of the blade of the intermediate switch and having its opposite end portions extending laterally from the opposite side edges of the blade of the intermediate switch, spring biasing means for biasing each of said blades, the spring means of the switch blades of the side switches having corresponding end portions connected to the free ends of the blades of said side switches and opposite ends connected to the opposite end portions of said actuating bar, and an actuator for the switch blade of the intermediate switch, the spring biasing means of the blade for the intermediate switch having one end portion connected to said actuator and its opposite end portion connected to the free end of such blade.

4. A multiple pole double-throw simultaneous-action switch comprising an intermediate switch and switches on opposite sides of said intermediate switch and extending in parallel relation with respect to each other and with respect to said intermediate switch, each of said switches comprising a switch blade having a free end portion, the blade of the side switches having the free end portion thereof reversely positioned with respect to the free end portion of the intermediate switch, an actuating bar of non-conductive material carried by the free end portion of the blade for the intermediate switch and having its opposite end portions extending laterally from the opposite side edges of the blade of the intermediate switch, spring biasing means for biasing each of said blades, the spring means of the switch blades of the side switches having corresponding end portions connected to the free ends of the blades of said side switches and opposite ends connected to the opposite end portions of said actuating bar, and an actuator for the switch blade of the intermediate switch, the spring biasing means of the blade for the intermediate switch having one end portion connected to said actuator and its opposite end portion connected to the free end of such blade, each of said switches having a plurality of terminals for connection with the ends of circuit wires.

5. A multiple pole double-throw simultaneous-action switch comprising an intermediate switch and switches on opposite sides of said intermediate switch and extending in parallel relation with respect to each other and with respect to said intermediate switch, each of said switches comprising a switch blade having a free end portion, the blade of the side switches having the free end portion thereof reversely positioned with respect to the free end portion of the intermediate switch, an actuating bar of non-conductive material carried by the free end portion of the blade for the intermediate switch, spring biasing means for biasing each of said blades, the spring means of the switch blades of the side switches having corresponding end portions connected to the free ends of the blades of said side switches and opposite ends connected to the opposite end portions of said actuating bar, and an actuator for the switch blade of the intermediate switch, the spring biasing means of the blade for the intermediate switch having one end portion connected to said actuator and its opposite end portion connected to the free end of such blade, each of said switches having a plurality of terminals for connection with the ends of circuit wires, certain of said terminals

having portions overlying the free end portions of the switch blades of said intermediate switch and said side switches and extending in parallel relation with respect thereto and provided with contact members adapted for engagement by the free end portions of said switch blades.

6. A multiple pole double-throw simultaneous-action switch comprising an intermediate switch and switches on opposite sides of said intermediate switch and extending in parallel relation with respect to each other and with respect to said intermediate switch, each of said switches comprising a switch blade having a free end portion, the blade of the side switches having the free end portion thereof reversely positioned with respect to the free end portion of the intermediate switch and having its opposite end portions extending laterally from the opposite side edges of the blade of the intermediate switch, spring biasing means for biasing each of said blades, the spring means of the switch blades of the side switches having corresponding end portions connected to the free ends of the blades of said side switches and opposite ends connected to the opposite end portions of said actuating bar, and an actuator for the switch blade of the intermediate switch, the spring biasing means of the blade for the intermediate switch having one end portion connected to said actuator and its opposite end portion connected to the free end of such blade, certain of said terminals having portions overlying the free end portions of the switch blades of said intermediate and side switches and extending in parallel relation with respect thereto and provided with contact members adapted for engagement by the free end portions of said switch blades.

7. A multiple pole double-throw simultaneous-action switch comprising an intermediate switch and switches on opposite sides of said intermediate switch and extending in parallel relation with respect to each other and with respect to said intermediate switch, each of said switches comprising a switch blade having a free end portion, the blade of the side switches having the free end portion thereof reversely positioned with respect to the free end portion of the intermediate switch, an actuating bar of non-conductive material carried by the free end portion of the blade for the intermediate switch and having its opposite end portions extending laterally from the opposite side edges of the blade of the intermediate switch, spring biasing means for biasing each of said blades, the spring means of the switch blades of the side switches having corresponding end portions connected to the free ends of the blades of said side switches and opposite ends connected to the opposite end portions of said actuating bar, and an actuator for the switch blade of the intermediate switch, the spring biasing means of the blade for the intermediate switch having one end portion connected to said actuator and its opposite end portion connected to the free end of such blade, each of said switches having a plurality of terminals for connection with the ends of circuit wires, certain of said terminals having portions overlying the free end portions of the switch blades of said intermediate and side switches and extending in parallel relation with respect thereto and provided with contact members adapted for engagement by the free end portions of said switch blades.



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