March 1, 1949. J. C. CLARK 2,463,357

SNAP SWITCH

Filed Dec. 2, 1946

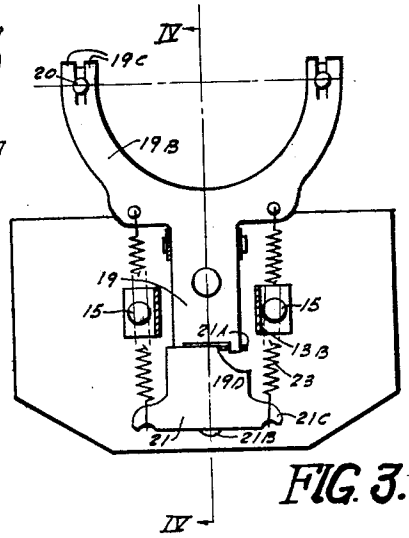


FIG. 3.

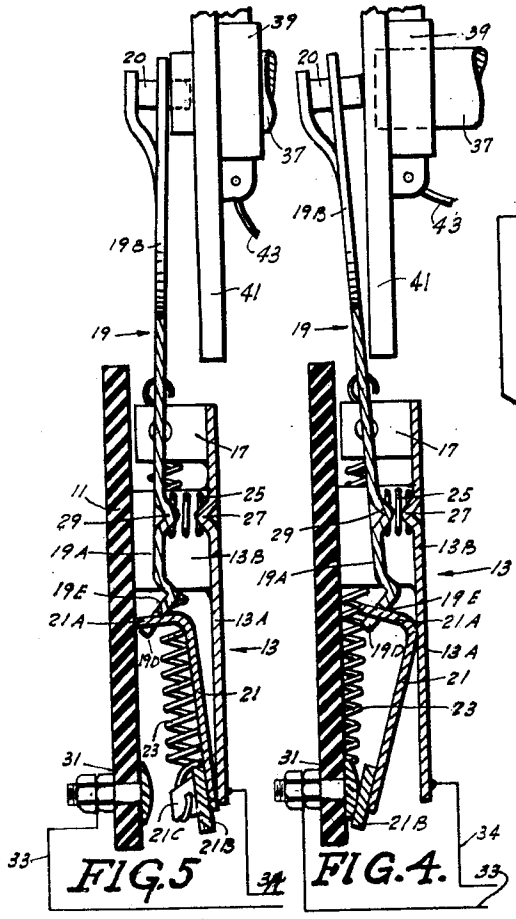


FIG. 5. FIG. 4.

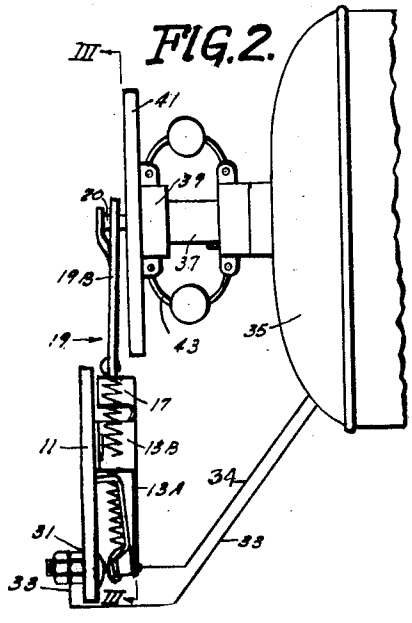


FIG. 2.

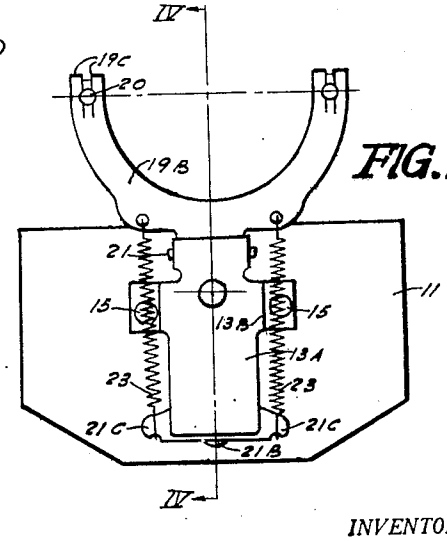


FIG. 1.

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SNAP SWITCH

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6 Claims. (Cl. 200—67)

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This invention relates to electric switches and particularly to switches in which contact is made or broken by snap action which tends to minimize arcing.

The objects of the invention are:

To provide a simple and effective switch capable of mass production in which both closure and opening of the switch are effected in positive manner by substantially instantaneous contacting and breaking movements of the contacts;

To provide a switch in which closure is made and maintained by applied pressure and breaking action is automatic upon release of such pressure;

To provide a switch in which closure is made by applied pressure and snap action and is maintained by continuation of pressure, and breaking action is automatically effected upon release of pressure and by snap action.

The means by which the foregoing and other objects are accomplished and the manner of their accomplishment will be readily understood from the following specification upon reference to the accompanying drawings, in which:

Fig. 1 is an elevational view of the face of the switch.

Fig. 2 is a corresponding side elevation showing the switch operatively positioned with relation to a governor controlled collar as of an electric motor, a portion of a foreground spring being broken away to minimize confusion.

Fig. 3 is an elevational face view corresponding to Fig. 1, with the housing cut away on the line III—III of Fig. 2.

Fig. 4 is an enlarged sectional elevation on the line IV—IV of Figs. 1 and 3, with the switch closed; and

Fig. 5 is a corresponding view with the switch open.

Referring now to the drawings in which the various parts are indicated by numerals:

The switch comprises a base 11 of dielectric material on which is mounted a metal housing 13, which includes a cover portion or cover 13A, substantially parallel with and spaced from the base. The housing has side portions 13B, intermediate the length of the cover, which extend from side edges of the cover into engagement with the base 11, and are flanged and secured to the base as by rivets 15. The cover extends longitudinally from the side portions 13B in opposite directions and adjacent one end is narrowed and has ears 17 extending also toward the base. The ears are apertured to provide bearings for a trip plate or trip 19, which is of width to lie closely, but

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without binding, between the ears 17 and has laterally projecting lugs 21 extending through the apertures of the ears and cooperating therewith to oscillatably mount the trip.

One end 19A of the trip thus oscillatably mounted lies between the base 11 and the cover 13A, and the opposite end extends as an arcuate fork 19B beyond the housing. Preferably the legs of the fork carry buttons 20, as of felt or leather, which will not scratch or grate when in contact with moving metal or other hard surfaces and which are held in place by clamping the prongs 19C of the forks 19B laterally against the mid portion of the buttons.

The end 19A of the trip is cut out to provide projections 19D and is crimped to present between these projections an edge 19E of the nature of a knife edge, rather than an edge of the full thickness of the plate.

Also mounted between the base 11 and housing plate 13A, is a floating member 21 having a flange 21A, of substantially less depth than the housing, the flange extending toward the base 11, and forming a seat for the knife edge 19E, the flange having holes which loosely receive the projections 19D and hingedly retain knife edge positioning of the end of the trip with relation to the flange. Oppositely from its flange end the floating member carries a contact 21B and side ears 21C, which ears are deflected from the plane of the members in the same direction that the flange 21A extends. Tension springs 23 engaged with these ears and anchored into the fork 19B of the trip hold the flange 21A of the contact plate against the knife edge 19E of the trip, the base 11 and housing plate 13A limiting floating movement of the contact plate.

Interposed between the trip and the cover is a compression coil spring 25 which is positioned by bosses 27 and 29 formed by indenting the opposite surfaces of the cover and trip respectively.

Mounted on the base is a contact 31 which faces and is positioned to be contacted by the contact 21B of the floating member 21. Circuit wires 33—34 are secured respectively to the base contact 21 and to the housing 13, the circuit being completed through the metal of the housing, the floating member 21, and the member contact 21B and the base contact 31, when the switch is closed and broken when the contacts 21B and 31 are separated.

The switch is primarily intended for use in a starter-booster circuit for an electric motor 35. When so used the circuit wires 33—34 lead to

the motor, the fork 19B of the switch is mounted to embrace the shaft 37 of the motor, usually near the end of the shaft, and the motor is equipped as with a ball type governor control which includes a collar 39 shiftable along the motor shaft and having a disc portion 41 of diameter to make face contact with the buttons 20 of the switch. The collar and disc are held in extended position, and in operating engagement with the buttons 20, as by governor arms 43 which are extended, as in Fig. 4, when the motor is idle. These arms are shortened in usual manner by centrifugal action as the motor speeds up after starting and retract the disc 41 as the motor reaches running speed and need of the booster-current ceases.

In idle position of the motor and governor, Fig. 4, the pressure of the disc 41 on the buttons 20 holds the outer end of the trip 19 shifted toward the base side of the switch, and the inner end shifted toward the cover side, compressing the spring 25 and holding the inner end of the floating member 21 against proximity to the cover side of the switch.

In this position the tension springs 23 hold the contact 21B on the outer end of the floating member against the contact 31 on the base and the circuit is completed through the leads 33 and 34 to booster windings within the motor, which form no part of this invention and are not here shown.

As the motor starts up the governor arms 43 are shortened in usual manner by centrifugal action, the spring 25 causing the buttons 20 to follow the disc 41 as it is retracted, the tension springs 23 hold the floating member and base contacts together until the motor reaches running speed, at which time the inner end of the trip and the inner end of the floating member are oppositely shifted past the line of pull of the tension springs 23 and these springs act to snap the contacts apart and open the switch. The springs 23 hold the switch in open position until such time as the motor slows down or stops and pressure of the governor arms again shift the disc 41 into contact with the buttons and such contact shifts the inner end of the trip and the inner end of the floating member toward the housing cover 13A and past the line of pull of the tension springs and these tension springs again snap the switch contacts closed and hold them so closed until governor action reopens them.

It will be understood that much of the construction detail may be varied without departing from the inventive concept of this invention, and it will be understood that I do not intend to limit myself to such detail except as in claims wherein it is set out.

I claim:

1. A switch including a base of dielectric material having a contact mounted thereon, a metal housing rigidly secured to said base, said housing including a cover portion spaced from and substantially parallel with said base, and side portions extending toward said base; a floating member between said cover and said base adjacent the outer end of said housing, said member having at its outer end a contact complementary to said base contact and ears extending laterally beyond said housing and deflected toward said base; and having a flange portion across its inner end extending toward said base, the deflection of said ears and the depth of said flange being substantially less than the depth of said housing, a trip disposed in part within said housing and having intermediate its length transversely extending lugs pivotally engaging the opposite sides of said housing, said trip extending into abutting relation with said member flange and having portions hingedly interengaging therewith restraining displacement relatively thereto, said trip oppositely extending beyond said housing for extraneous actuation; and a compression spring disposed between said cover and said trip urging said trip and the flange end of said floating member toward said base, and tension springs anchored to said trip beyond said lugs, extending along opposite sides of said housing and respectively engaged with said floating-member ears, holding said member flange and said trip in abutting contact, and snapping the contact end of said floating member toward make or break of switch contact as the inner end of said trip is shifted respectively toward said housing cover by extraneous pressure on said trip, or away from said cover by said compression spring on release of such pressure.

2. A switch including a base of dielectric material having a contact mounted thereon, a sheet metal housing rigidly secured to said base; said housing including a cover portion spaced from and substantially parallel with said base, and side flange portions extending toward said base; a plate-like floating member between said cover and said base adjacent the outer end of said housing, said member having at its outer end a contact complementary to said base contact, and ears extending laterally beyond said housing and deflected toward said base, and having a flange portion across its inner end extending toward said base, the deflection of said ears and the depth of said flange being substantially less than the depth of said housing, a plate-like trip disposed within said housing and having intermediate its length transversely extending lug portions pivotally mounted in the opposite sides of said housing, said trip extending into abutting relation with said member flange, said flange being apertured to receive, and said trip having leg portions engaged in said apertures to restrain relative displacement of said trip and flange, said trip oppositely extending beyond said housing for extraneous actuation and being arcuately forked therebeyond; and a compression spring disposed between said cover and said trip adjacent said floating member urging said trip and the flange end of said floating member toward said base; tension springs anchored to said trip fork, extending along opposite sides of said housing and respectively engaged with said floating-member ears, holding said member-flange and said trip in abutting contact, and snapping the contact end of said floating member toward make or break of switch contact, as the inner end of said trip is shifted respectively toward said housing cover by extraneous pressure on said trip, or away from said cover by said compression spring on release of such pressure.

3. A switch including a base of dielectric material having a contact mounted thereon, a metal housing rigidly secured to said base, said housing including a cover portion spaced from and substantially parallel with said base, and side portions extending toward said base; a floating member between said cover and said base adjacent the outer end of said housing, said member having at its outer end, a contact complemen-

tary to said base contact and ears extending laterally beyond said housing and deflected toward said base, and having a flange portion across its inner end extending toward said base, the deflection of said ears and the depth of said flange being substantially less than the depth of said housing, a trip disposed in part within said housing, a trip disposed in part within said housing and having intermediate its length transversely extending lugs pivotally engaging the opposite sides of said housing, said trip extending toward and having a knife-like edge abutted against said member flange and having portions hingedly interengaging therewith restraining displacement relatively thereto, said trip oppositely extending beyond said housing for extraneous actuation; a compression spring, disposed between said cover and said trip adjacent said floating member, urging said trip and the flange end of said floating member toward said base; and tension springs anchored to said trip beyond said lugs, extending along opposite sides of said housing and respectively engaged with said floating-member ears, holding said member flange and said trip in abutting contact, and snapping the contact end of said floating member toward make or break switch contact as the inner end of said trip is shifted respectively toward said housing cover by extraneous pressure on said trip, or away from said cover by said compression spring on release of such pressure.

4. A snap switch including a base of dielectric material having at one end a contact, a floating member having at its outer end, a contact, facing said base contact and complementary thereto, and laterally extending ears deflected toward said base and, at its inner end, a transverse flange portion of substantially less depth than said housing; a trip having its inner end abutting against the inner end of said floating member, and means engaging said member-end against longitudinal displacement, said trip extending longitudinally away from said floating member; a housing, secured to said base, and including side portions, and a cover portion over said floating member and adjacent portion of said trip, limiting movements of said floating member and the inner end of said trip away from said base, said trip having laterally extending pivot portions intermediate its length oscillatably engaging said housing side portions, and having an outer portion extending beyond said cover and adapted for extraneous actuation; tension springs engaged respectively to said floating member ears and anchored to said trip beyond said pivot portions, said tension springs holding said trip and floating member in end engagement and snapping the contact end of said floating member toward make or break of switch contact as the inner end of said trip is shifted toward said housing cover by extraneous pressure on said trip.

5. A snap switch including a base of dielectric material having at one end a contact, a floating member having at its outer end, a contact, facing said base contact and complementary thereto, and laterally extending ears, and at its inner ends a transverse flange portion of substantially less depth than said housing and both extending

toward said housing; a trip having its inner end abutting against said flange and engaged therewith against displacement, said trip extending longitudinally away from said floating member; a housing secured to said base, including side portions and a cover portion over said floating member and the adjacent portion of said trip, limiting movement of said floating member and the inner end of said trip away from said base, said trip having laterally extending pivot portions intermediate its length oscillatably engaging said housing side portions, and having an outer portion extending beyond said cover and adapted for extraneous actuation; a compression spring disposed between said cover and said trip adjacent said floating member, and tension springs engaged respectively to said floating member ears, extending beyond said trip pivots and anchored to said trip therebeyond, said tension springs holding said trip and floating member in knife edge engagement and snapping the contact end of said floating member toward make or break of switch contact as the inner end of said trip is shifted toward said housing cover by extraneous pressure on said trip, or away from said cover by said compression spring and on release of said pressure.

6. A snap switch including a pair of complementary contacts; a housing including a base carrying and insulating one of said contacts, and a cover spaced therefrom; a floating member carrying at its outer end the other of said contacts and at its inner end a transverse flange portion of substantially less depth than said housing, a trip member having pivot means intermediate its length, and an inner end abutting the flanged inner end of said floating member and extending longitudinally away therefrom, said housing enclosing said floating member and the abutting end of said trip and oscillatably journalling said trip pivot-means, said housing limiting separating movement of said contacts and movement of the inner end of said floating member and the abutting end of said trip, tension means engaged with the outer end of said floating member and with said trip beyond said pivot means from said member, holding said trip and floating member in abutting relation, and a compression spring interposed between said housing cover and said trip urging said trip and the trip abutting end of said member toward said base, said trip extending beyond said housing for extraneous actuation to oppositely shift its inner end of said trip and the abutting member-end against pressure of said spring.

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