

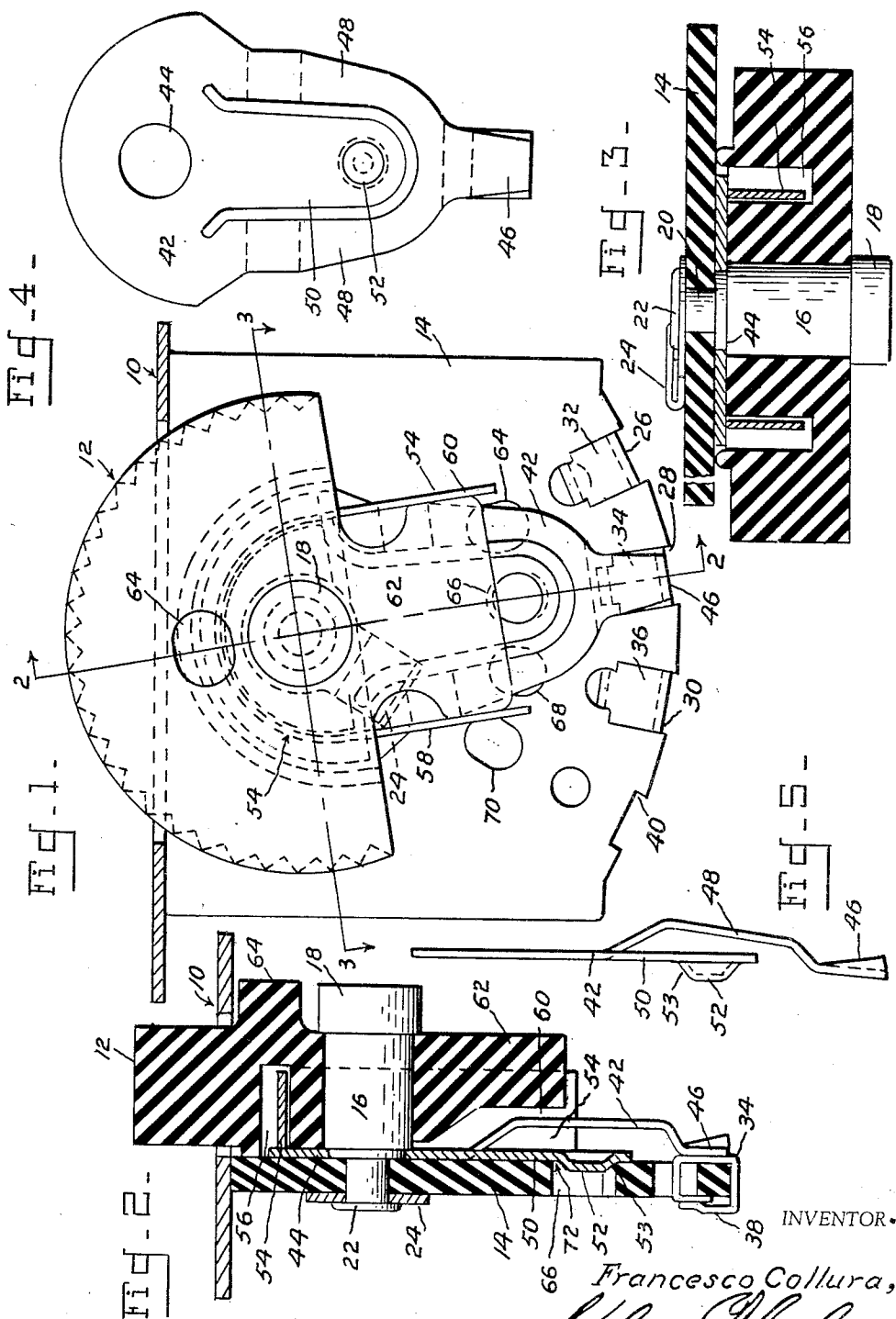
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ELECTRIC SWITCH ASSEMBLY

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ELECTRIC SWITCH ASSEMBLY

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The present invention relates to improvements in rotary type snap acting electric switches of the kind adapted selectively to bridge a common contact and one of a plurality of contacts for closing a selected switch circuit. The present application is a continuation-in-part of my co-pending application Serial No. 271,120, filed February 12, 1952.

Such switches are adaptable for a variety of different uses and they are particularly desirable for use in connection with electric multi-speed motors for household appliances such as food mixers and the like wherein a minimum of space is provided for receiving the switch and wherein a quick making and breaking of an electric circuit is desired with avoidance of arcing between the electric contacts.

The invention, accordingly, has among its objects the provision of an electric switch including a movable contact arm constructed and arranged quickly and abruptly to shift in a positive stepping action from one contact position to another in either direction as a control knob is operated and which is compactly designed to occupy a minimum amount of space.

Other general objects of the invention are to provide an electric switch which is sturdy and durable in construction, reliable and efficient in operation and relatively simple and inexpensive to manufacture and assemble.

More specific objects of the invention are to provide an electric switch having a novel spring connecting means between the control knob and the movable contact arm whereby the energy applied to the spring means upon rotation of the knob is abruptly released to impart a quick snap action shifting movement of the contact arm from one position to another.

Another specific object of the invention is to provide novel detent means for maintaining the movable contact arm in selected position and which is adapted to restrain movement of the contact arm until sufficient energy is stored in the spring connecting means thereupon suddenly to release the arm for snap shifting with the avoidance of arcing.

Other and further objects and advantages of the invention will be apparent from the accompanying drawings wherein a preferred embodiment of the principles of the invention has been selected for exemplification.

In the drawings:

Fig. 1 is a front elevational view of an electric switch assembly constructed in accordance with the present invention;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a plan view of the combined detent and contact arm shown in Figs. 1—3; and

Fig. 5 is a side elevational view of Fig. 4.

Referring more particularly to the drawings wherein like numerals refer to like parts, the electric switch assembly shown is adapted for mounting in a recess for ex-

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ample in the handle of an electrical appliance and to this end a cover plate 10 is provided through which a peripheral portion of control knob 12 projects and from which switch base plate of insulating material 14 depends.

Switch control knob 12 is rotatably supported on the stub shaft 16 which has an enlarged retaining end 18 and a reduced opposed end 20 which projects through the switch plate 14 and is secured thereto by the upset end 22.

A central or common terminal 24 is anchored to the base plate 14 by the turned end 22 of the shaft 16 and at the lower end of the base 14, as shown, are a plurality of spaced notches 26, 28 and 30 for receiving fixed contacts 32, 34 and 36, respectively, each of which is in the form of a strip of conducting material bent and passed through the adjacent apertures to provide fixed terminals 38 at the rear face of the base plate. It will be apparent that the contacts 32, 34 and 36 may be, respectively, for "high," "medium" and "low" positions of the switch. A further end notch 40 is left free of a contact member to provide an "off" position for the switch.

For bridging the common contact 24 and any one of the fixed contacts 32, 34 and 36 a detent and contact arm 42 of resilient electrically conducting material has an end thereof apertured as at 44 for securement to the shaft 16 which provides an axis about which the arm 42 tends to rotate. The opposed end of the arm 42 terminates in a wiping contact surface 46 having flared side edges to facilitate passage across the contacts 32, 34 and 36. As best shown, in Figs. 4 and 5 the contact end 46 is included in the peripheral portion 48 which is struck outwardly of the arm 42 to provide a spring member normally urging the contact 46 toward engagement with the base plate 14 and the fixed contacts 32, 34 and 36. The central or intermediate portion 50 of the arm 42 is provided with an integral depending detent member 52 having plane sidewalls 53 as will be hereinafter more fully explained. The angle of deflection between the outer portion 42 and the inner portion 50 of the arm 42 is preferably capable of adjustment to maintain the desired degree of pressure on the moving contact 46 and the detent 52 for efficient operation of the switch.

The control knob 12 and the movable contact arm 42 are connected through the medium of a yoke or U-shaped spring member 54. As shown best in Figs. 2 and 3, a radially disposed body portion 56 of the knob 12 is channelled to receive and to support the intermediate portion of the spring 54 and the opposed depending legs 58 and 60 of the spring 54 lie normally in engagement with the adjacent sides of lug 62 formed integrally with the knob 12 and with the adjacent side edges of the movable detent and contact arm 42. Also formed integrally with the knob is a laterally projecting stud 64 adapted to ride in an arcuate channel or the like which may be provided in the adjacent sidewall of the switch housing recess whereby to limit rotational movement of the knob between the extremities defined by the "off" position and the remote fixed contact 32 positions of the switch.

It will be apparent that as the knob lug 62 tends to rotate, in a clockwise direction for example, the spring arm 58 will move therewith while the opposed arm 60 lags thus applying tension or storing energy in the spring member 54. When such tension reaches an optimum, such as when the lug 62 approaches the next succeeding clockwise contact position of the switch, the energy thus stored in the spring 54 is abruptly released thereby causing the arm 60 in engagement with the adjacent edge of the movable contact 42 to shift the latter in a positive step and snap action to the succeeding contact position. The action, of course, will be the same upon movement of the knob 12 in a counter-clockwise direction.

The detent 52 is an important factor in cooperating with the spring 54 and in controlling the snap action movement

of the arm 42. In its preferred form, as best shown in Figs. 2 and 5 the detent 52 is of frusto-conical configuration having plane angularly opposed sidewalls 53 tending to converge. The detent 52 is adapted selectively to seat in recesses 64, 66, 68 and 70 provided in the base plate 14 in alignment, respectively, with the fixed contacts 32, 34 and 36 and the "off" position of the switch. As best shown in Fig. 2, the defining walls of these recesses form with the surface of plate 14 relatively sharp right-angled edges 72 against which the plane side wall portion 53 bears when the detent 52 seats or unseats. It will be apparent that the sliding contact of the plane sidewall portion 53 with the edge 72 will impart to the detent 52 an even and controlled movement out of its retaining recess terminating in abrupt release when the truncated apex of the detent is reached. Such movement is in contrast with the uneven and uncontrolled movement of the semi-spherical or arcuate side wall detents usually employed and contributes materially to the improved operation of switches of the present invention.

It will be understood that the particular construction and arrangement of parts herein illustrated and described is exemplary only of the principles of the present invention which embrace such various modifications thereof as come within the scope of the following claims.

I claim:

1. Detent means for an electric snap-action switch having a base supporting a plurality of fixed terminal contacts and a movable contact arm for bridging a common terminal with one of said contacts, the said means comprising recesses carried by said base adjacent said contacts and in the path of movement of said contact arm, a member carried by said contact arm for selective engagement with said recesses, the said member having opposed side walls uniformly inclined toward the path of movement of said contact arm and in the direction of said recesses and actuating means for said contact arm mounted for pivotal movement substantially in the plane of movement of said contact arm.

2. The device of claim 1 with the addition of spring means interposed between the actuating means and the contact arm.

3. The device of claim 2 wherein the spring means includes opposed spring fingers and the spring fingers are interposed between adjacent sides of the actuating means and contact arm outwardly of opposed sides of the contact arm.

4. In an electric switch structure, a pivotally mounted control arm, a pivotally mounted contact arm, spring means carried by said control arm and including opposed spring fingers for engagement with opposed sides of said contact arm, movement of said control arm being transmitted to said contact arm through said spring means and a detent member of frusto-conical configuration carried by said contact arm and cooperating with said spring means to impart a snap action movement to said contact arm.

5. The switch structure of claim 4 additionally including a base carrying a plurality of recesses having relatively sharp right angled edge portions for slidable engagement with the frusto-conical walls of said detent member.

6. An electric switch assembly which comprises, a base plate, the said base plate carrying a plurality of radially extended fixed electrical terminal contacts and recesses radially aligned with each of said fixed contacts, a radially disposed contact arm rotatably mounted upon said base

plate for selectively bridging a common terminal contact and one of said fixed terminal contacts, a detent member of frusto-conical configuration having plane converging outer walls for sliding engagement with the adjacent edge portions of said recesses, movable actuating means for said switch, resilient means carried by said actuating means and including spring fingers for engagement with opposed sides of said contact arm whereby to communicate movement of said actuating means to said contact arm, the said actuating means being movable in steps and the said resilient means being constructed and arranged to store energy upon the initial stage of step movement of the actuating means and to impart such stored energy to the rotatably mounted contact arm upon the final stage of step movement of the actuating means and the said detent member and recesses being constructed and arranged to restrain movement of the contact arm upon the storing of energy in the resilient means and to permit movement of the contact arm upon the release of said stored energy.

7. The assembly of claim 6 wherein the movable actuating means for the switch is rotatably mounted and carries a radially extended control arm, the rotatably mounted contact arm being normally positioned in radial alignment with said control arm.

8. Detent means for an electric snap-action switch having a base supporting a plurality of fixed terminal contacts and a movable contact arm for bridging a common terminal with one of said contacts, the said means comprising recesses carried by said base adjacent said contacts and in the path of movement of said contact arm, and a member of frusto-conical configuration carried by said contact arm for selective engagement with said recesses, the said member having opposed side walls uniformly inclined toward the path of movement of said contact arm and in the direction of said recesses.

9. The device of claim 8 wherein the recesses are substantially circular and provided with right angled edge portions for uniformly retaining the frusto-conical member.

10. An electric switch assembly which comprises, a base plate, the said base plate carrying a plurality of radially extended fixed electric terminal contacts and adjacent recesses radially aligned with each of said fixed contacts, a radially disposed contact arm rotatably mounted upon said base plate for selectively bridging a common terminal contact and one of said fixed terminal contacts, a tongue portion secured to and extending in the same radial direction of said contact arm, frusto-conical detent means carried by said tongue portion for selective engagement with said recesses, a pivotally mounted actuating member for said contact arm, and spring means disposed between said actuating member and said contact arm whereby abruptly to shift said contact arm.

11. The assembly of claim 10 wherein the spring means includes opposed spring fingers disposed between the opposed sides of the contact arm and the adjacent opposed sides of the actuating member.

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