May 10, 1955 F. COLLURA 2,708,227

ELECTRIC SWITCH DEVICE

Filed Feb. 12, 1952 3 Sheets-Sheet 1

Fig. 1.

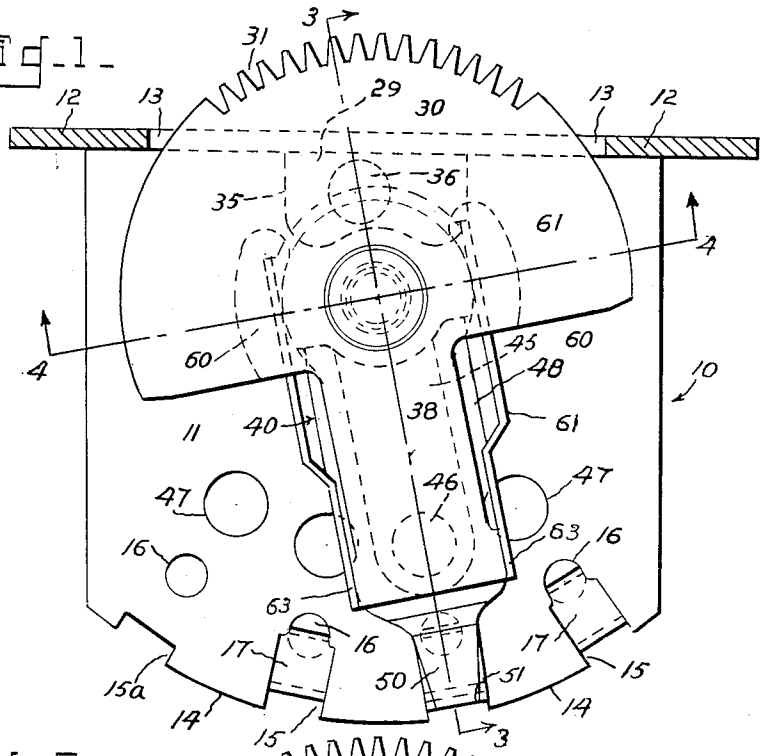
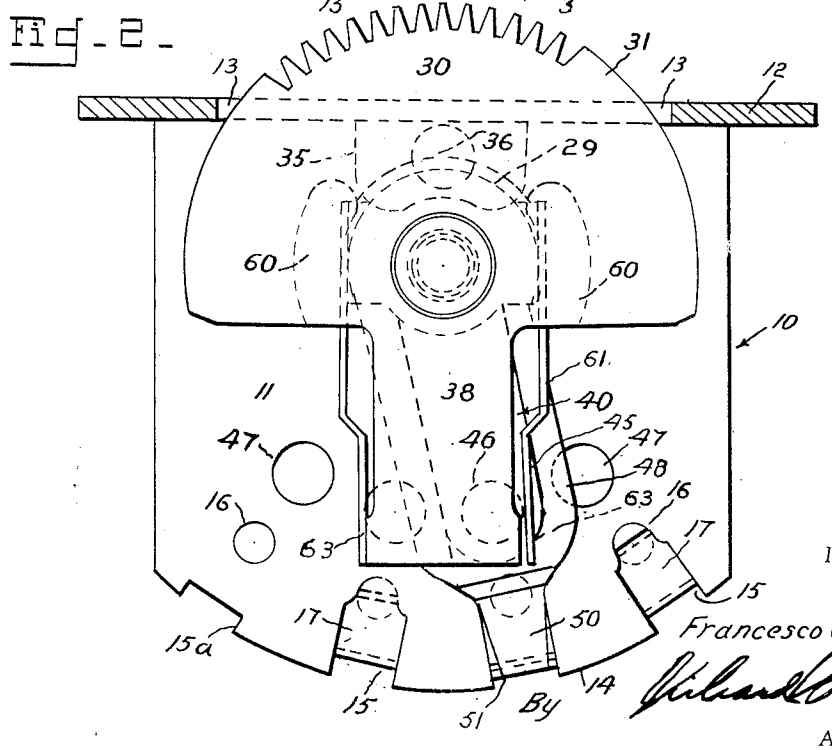


Fig. 2.



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May 10, 1955 F. COLLURA 2,708,227

ELECTRIC SWITCH DEVICE

Filed Feb. 12, 1952 3 Sheets-Sheet 2

Fig. 3.

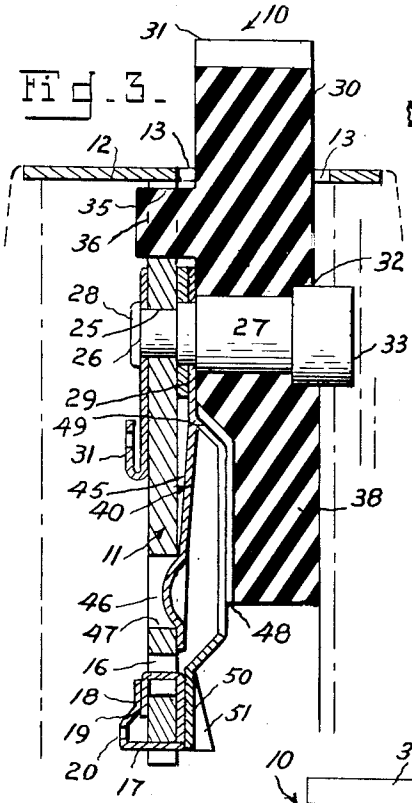


Fig. 4.

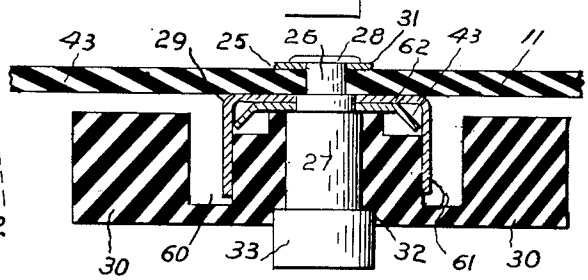


Fig. 6.

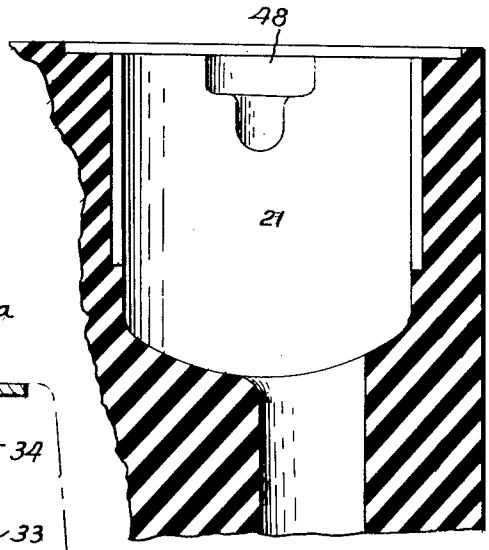
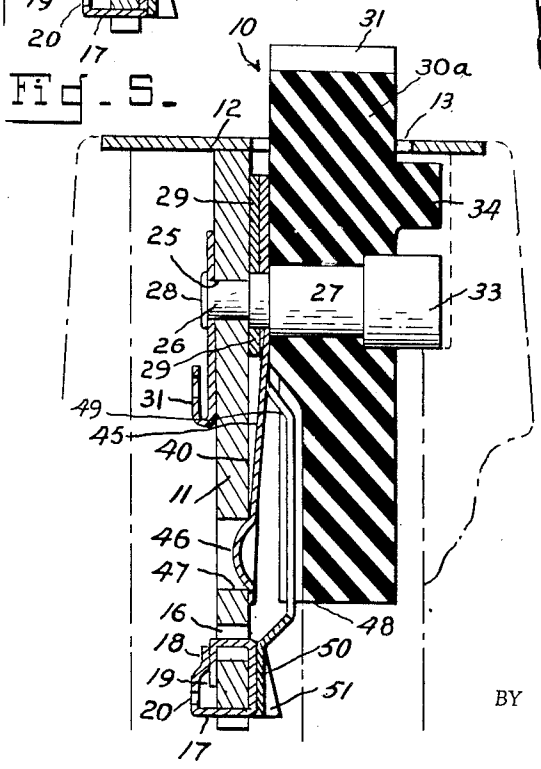


Fig. 5.



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2,708,227

ELECTRIC SWITCH DEVICE

Filed Feb. 12, 1952

3 Sheets-Sheet 3

Fig. 7.

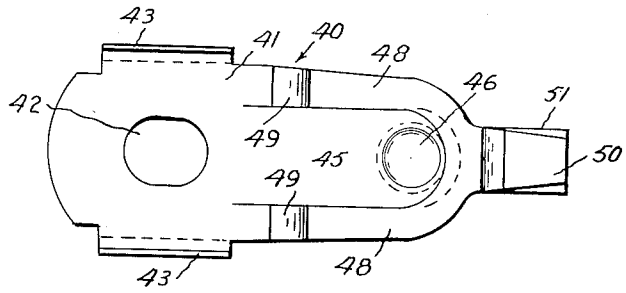


Fig. 8.

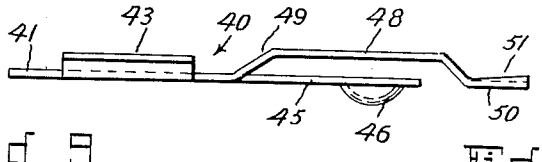


Fig. 9.

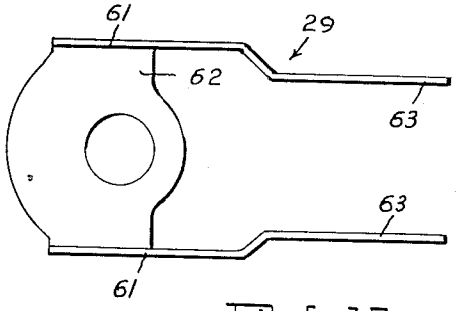


Fig. 11.

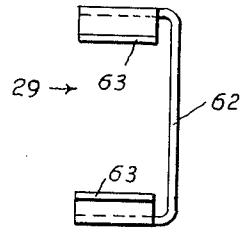
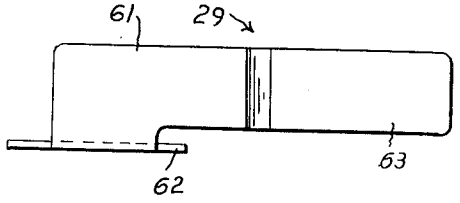


Fig. 10.



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2,708,227

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ELECTRIC SWITCH DEVICE

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Application February 12, 1952, Serial No. 271,120

7 Claims. (Cl. 200—154)

This invention relates to an electric switch device and has as its primary object the provision of an improved switching mechanism for selectively bridging a common contact and one of a plurality of contacts for closing a selected electrical circuit.

An additional object of the invention is the provision of such a switching mechanism which may be contained in a relatively small, compact space.

Still another object of the invention is the provision of such a structure provided with means whereby a snap action is imparted to a movable contact member in passing from one of a plurality of contacting positions to another.

A further and more specific object of the invention is the provision of an electrical switch structure particularly adapted for use with appliances such as electric beaters or the like, wherein a variety of speeds for the beater members are desired, or electric irons where a variety of temperatures are desirable.

A still further object of the invention is the provision of an improved electrical switching mechanism which is sturdy and durable in construction, reliable and efficient in operation, and relatively simple and inexpensive to manufacture and assemble.

Still other objects will in part be obvious and in part be pointed out hereinafter and shown in the accompanying drawing wherein there is disclosed a preferred embodiment of this inventive concept.

In the drawing:

Fig. 1 is a front elevational view of one form of switch embodying features of the instant inventive concept;

Fig. 2 is an additional front elevational view of the form of switch shown in Fig. 1 shown in an intermediate operating position;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 1, as viewed in the direction indicated by the arrows;

Fig. 4 is a fragmentary sectional view taken along the line 4—4 of Fig. 1, as viewed in the direction indicated by the arrows;

Fig. 5 is a fragmentary sectional view as in Fig. 3 of a modification of the instant switch; and

Fig. 6 is a fragmentary sectional view of a handle of an electrical appliance disclosing a recess adapted for the modification shown in Fig. 5;

Fig. 7 is a plan view of the contact spring and detent member shown in Figs. 1–5;

Fig. 8 is a side elevational view of the member shown in Fig. 7;

Fig. 9 is a plan view of the U-shaped spring member shown in Figs. 1–5;

Fig. 10 is a side elevational view of the spring shown in Fig. 7; and

Fig. 11 is a bottom end view.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Having reference now to the drawing in detail, the switch assembly generally indicated at 10 comprises a base plate 11 of insulating material, and a top plate 12, having an aperture 13 therein, secured to the base plate 11. The base plate 11 is provided with an arcuate lower extremity 14, having a series of radial slots 15 therein and apertures 16 aligned with the slots. Fixed contact members generally indicated at 17 (see Fig. 3) comprise looped metallic strips 18 extending through apertures 16 and into slots 15, the ends 19 thereof overlapping on the rear side of plate 11 and being apertured as at 20 to provide suitable electrical connections for the contact members. As best shown in Figures 1 and 2, no contact member is provided in one of the slots 15*a* to provide an off position for the switching mechanism as will be more fully described hereinafter.

The base plate 11 is provided with an aperture 25 in a relatively central position thereof, which accommodates the reduced end 26 of a conductive shaft 27, end 26 being headed as at 28 to secure the same in aperture 25, and the shaft carries a semi-circular member 30 which may be knurled about its upper extremity as at 31, to extend outwardly through aperture 13 and top plate 12. A recess 32 is provided in the outer face of member 30 and contains an enlarged portion 33 of shaft 27 to retain member 30 on the shaft. It will thus be seen that the member 30 is mounted for rotation about the central axis of the shaft 27. Means are provided for limiting the rotative movement of the member 30 and comprise an arcuate grove 35 in base plate 11 within which is seated a stud 36 carried by the member 30.

The shaft 27 may be of brass or other metallic conducting material to complete the electric circuit between the single fixed contact 31 and a selected contact 17.

Depending from and integral with semi-circular control member 30 is a radial extending arm 38 set back as shown in Fig. 3 to accommodate the contact spring and detent member generally indicated at 40. The member 40, as best shown in Figs. 7 and 8 comprises a base portion 41 apertured as at 42, to surround the stud 27 and the outer edges of base portion 41 are slightly outturned as at 43 for a purpose to be more fully described hereinafter. Member 40 includes a cutout central tongue portion 45 terminating in a concavo-convex detent 46 adapted to engage selectively in one of a series of radially disposed detent apertures 47 in base plate 11 and a bordering portion 48 provided with folds 49 to offset the same from tongue 45 and terminating in an extended end 50 having flanged edges 51, the space between the edges forming a wiping surface selectively engageable with one of contact members 17 or movable to offset position in alignment with the slot 15*a*.

As best shown in Figs. 1, 2 and 4, the side of member 30 adjacent base plate 11 is provided with a pair of oppositely disposed arcuate grooves or channels 60 forming a hub to receive the side flanges 61 of a U-shaped spring member, generally indicated at 29 and shown in detail in Figs. 9–11. The base portion 62 is apertured to mount the spring 29 for rotation about shaft 27, and the outturned edges 43 of the contact member 40, as shown in Fig. 4, are adapted to bear against adjacent portions of the side flanges 61 in frictional engagement therewith so that the spring 29 and contact member 40 will tend to rotate in unison. Side flanges 61 are provided with extended spring fingers 63 which closely normally engage opposite sides of the arm 38. The arm 38, spring unit 29 and contact member 40 are normally in alignment, as shown in Fig. 1. However, as the arm 38 is turned, the forward spring finger 63 bends therewith, as best indicated in Fig. 2, thereupon storing energy up to the point where the remainder of the spring unit 29 and the contact member 40 abruptly shift in a

snap action into the adjacent contact position and again into alignment with the arm 38.

A modification of member 30 and a cooperating recessed support are shown in Figs. 5 and 6, respectively. The modified control member 30*a* is generally similar to that shown in Figs. 1–4 except that a stud 34, corresponding in function to the stud 36, is carried on the reverse face of the member adjacent to the opposed sidewall of the pocket 21 and the sidewall is arcuately recessed as shown at 48 to receive the stud 34 whereby to limit arcuate movement of the control member 30*a*. In this form of the invention, the groove 35 in the plate 11 may be dispensed with and the overall width of the switch device may be somewhat reduced. Also, the added space at the upper portion of the plate 11 permits the use of a spring unit and contact member having extended base ends as shown in Figs. 7 and 9 for increased frictional contact between these members whereas these extended base ends must be omitted because of the absence of space in the first form of the invention, as a comparison of Figs. 3 and 5 will show. The pocket 21 as well as the pocket indicated in broken lines in Fig. 3 may be molded or otherwise formed in the handle of any electrical appliance such as an iron or food mixer and the compactness of the switch 10 is such that it may conveniently be housed in its entirety therein.

In operation, member 30 or 30*a*, spring member 29, and contact arm 40 tend to rotate semi-independently about axis 27. Rotary motion manually applied to member 30 imparts a force to the forward spring finger 63 of the U-shaped spring unit 29 thus storing energy to an optimum where the energy is then transmitted by the spring unit to the contact arm 40 at the point where the side flanges 61 of the spring unit engage the base and base edges 43 of the contact arm. In this manner, a snap action is effected with the avoidance of arcing.

Referring now to Figs. 1 and 2 to illustrate this action, it will be noted that in Fig. 1 the control member 30 and its arm 38, the spring unit 29 supported thereby and the contact arm 40 are in axial alignment, with the detent 46 seated in the aligned detent aperture 47 and the extended end 50 in electrical contact with the aligned contact member 17. In Fig. 2 control member 30 has been rotated into a new position toward the adjacent contact member 17 to contort or store energy in the spring member 29, as shown, while the contact arm 40 remains in the position shown in Fig. 1. Slight additional movement of the control member forwardly of the position shown in Fig. 2 will release the energy, transmitting the same to the contact arm, which will then abruptly shift into the new position with the parts again in alignment. The salient feature of the present invention lies in the whip action of the contact arm and the spring member from position to position making the change positive and almost instantaneous, such whip action being the result of the energy or force stored in spring member 29.

Now from the foregoing it will be seen that there is herein provided an improved switch mechanism which accomplishes all the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

As various embodiments may be made of this inventive concept, and as various modifications may be made in the embodiments hereinabove shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative and not in a limiting sense.

I claim:

1. In an electric switch structure, the combination of a base plate of insulating material having a centrally positioned aperture therein, a centrally apertured switch member comprised of insulating material and including a manual operating portion, an axially projecting stud and a radially extending arm integral with said switch member, means engaging said stud to limit movement of said switch member, a conductive shaft extending through the central apertures of said base plate and said switch member, an electrical connection for said shaft, an arcuate extremity on said base plate having a plurality of radially positioned slots therein, electrical contact members in certain of said slots and electrical connections for said contact members, and a movable conductive member resiliently connected to said radially extending arm in electrical association with said shaft and terminating in an end portion selectively engageable with one of said electrical contacts.

2. The structure of claim 1 wherein the resilient connection between the conductive member and radially extending arm of the switch member is provided by a spring member having a flanged base and opposed spaced spring fingers, said flanged base seating in grooves abutting cam surfaces formed in the switch member and the said spring fingers engaging opposite sides of said radially extending arm.

3. The structure of claim 1 wherein the base plate is provided with a plurality of radially disposed bores and the conductive member includes a resilient detent selectively engageable in one of said bores to retain said conductive member in engagement with a selected contact member.

4. The structure of claim 3 wherein said resilient detent member is integral with said switch conductive member and comprises an offset portion thereof.

5. 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, detent means carried by said tongue portion for selective engagement with said recesses, an actuating member for said contact arm mounted for pivotal movement substantially in the plane of movement of said contact arm, and spring means disposed between said actuating member and said contact arm whereby abruptly to shift said contact arm.

6. The device of claim 5 wherein the spring means is provided with spring fingers disposed at opposed sides of said contact arm.

7. The device of claim 6 wherein the fingers of the spring means are disposed between the opposed sides of said contact arm and the adjacent opposed sides of said actuating member.

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