July 18, 1950 H. J. HAMMERLY 2,515,449

SNAP OPERATING MEANS FOR ACTUATING DETACHABLE SWITCHES

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Fig. 1

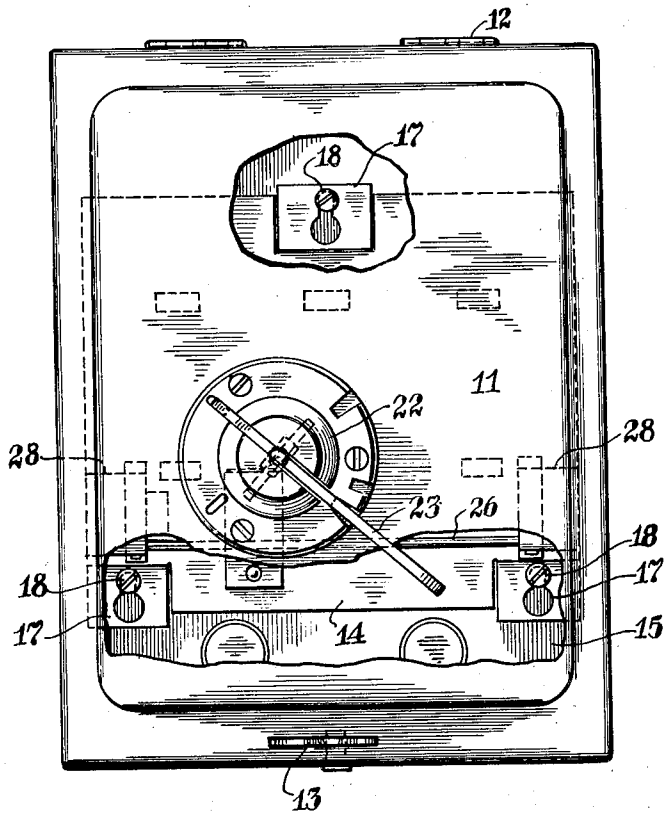
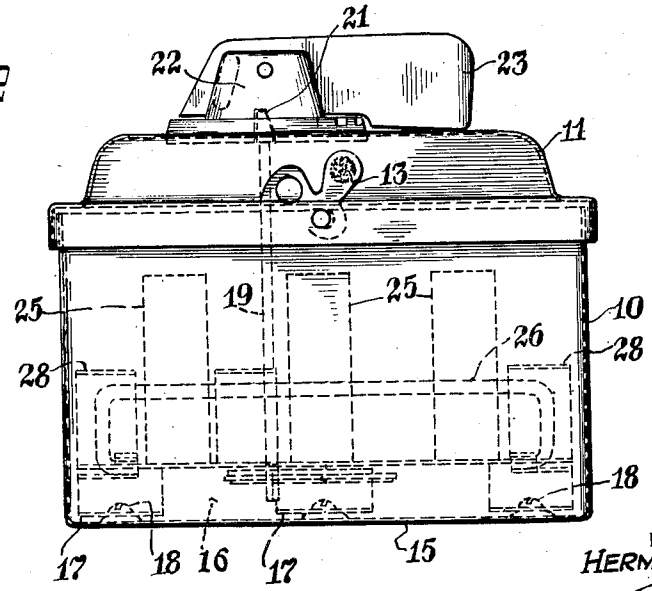


Fig. 2



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Fig. 3

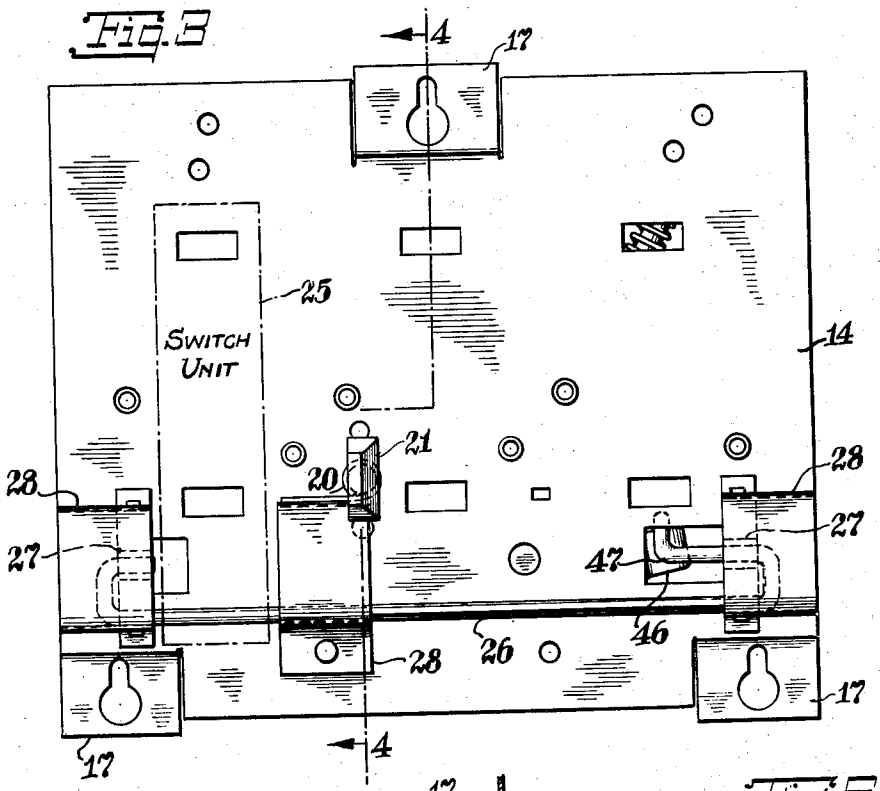


Fig. 4

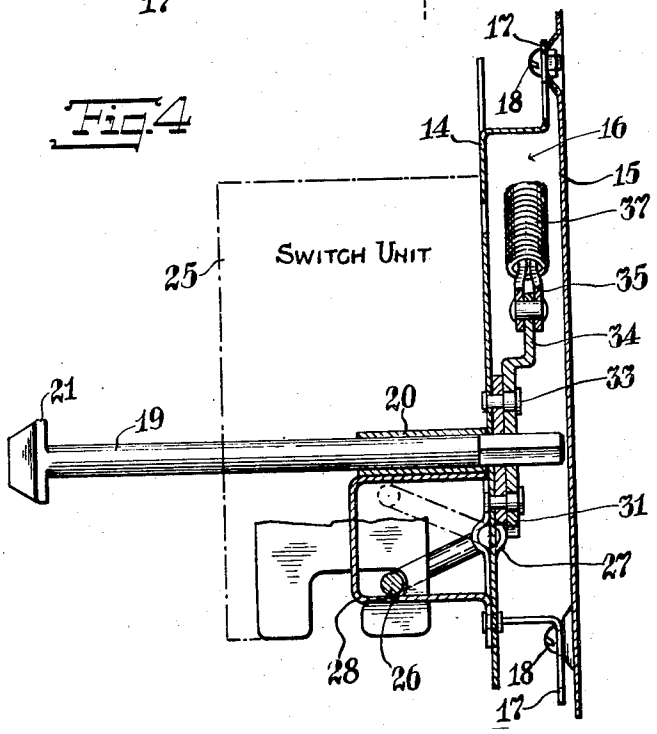
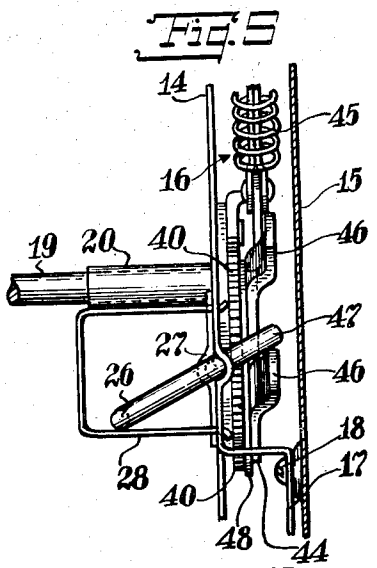


Fig. 5



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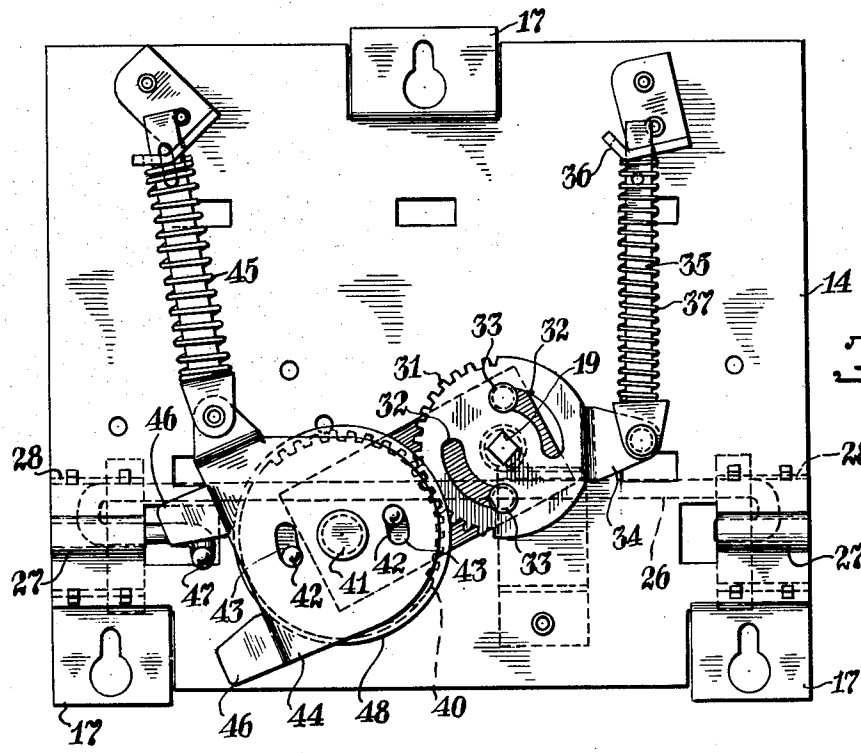


Fig. 6

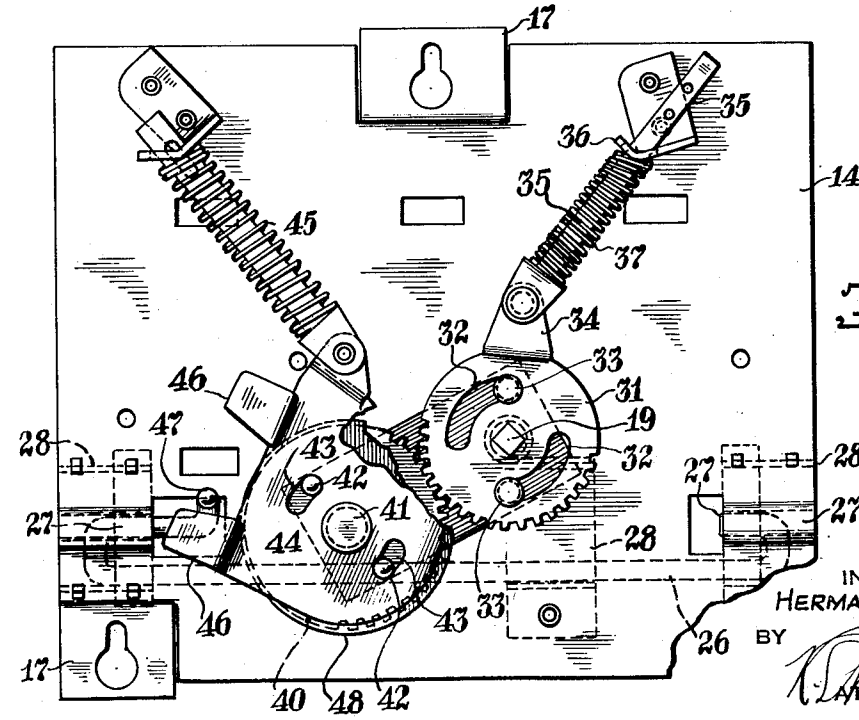


Fig. 7

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SNAP OPERATING MEANS FOR ACTUATING DETACHABLE SWITCHES

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Application April 20, 1946, Serial No. 663,685

11 Claims. (Cl. 200—67)

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My invention relates to snap action or quick make and break switches and particularly to the method of mounting the various parts of the switch.

One object is to provide for the separation of the switching contacts from the snap action mechanism.

Another object is to provide means for mounting the switching device per se so that it can be readily inspected, removed and replaced without disturbing the snap action mechanism.

Another object is to provide a construction in which the assembly and testing of the snap action mechanism can be effected independently of the contact mechanism.

Another object is to locate the snap action mechanism in such a way as to eliminate any accidental interference with it when the device is installed.

To accomplish these objects I provide a base or mounting plate, on the front of which the switch contact units may be readily installed and I mount the snap action mechanism on the back of this plate in a recess so that this assembly consisting of the base plate with the assembled parts may be installed in any suitable form of switch box or upon any wall or panel board.

Fig. 1 is a front view of an enclosed switch embodying one form of my invention, parts being broken away.

Fig. 2 is an end view of the same showing interior parts dotted.

Fig. 3 is a front view of the mounting plate indicating by dotted lines the location of a switch unit per se.

Fig. 4 is a side view and section on the plane of the line 4—4 of Fig. 3 showing parts of the snap action mechanism in one position mounted on a support.

Fig. 5 is a fragmentary side view showing the parts in another position.

Fig. 6 is a rear view of the mounting plate with the attached snap action mechanism in what may be considered the "on" position of the switch.

Fig. 7 is a similar view showing the snap action mechanism in the other extreme or "off" position. Whether these are "on" or "off" positions will depend upon the particular form of switch unit employed.

The form of switch box employed, if any, is unimportant. I have shown a box 10 with a cover 11 hinged at 12 and having a conventional latch 13, which of course is capable of being padlocked. These features are not concerned with my present invention.

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The base or mounting plate 14 is preferably of sheet metal and supported on a panel or plate 15 which in this instance is the bottom of the box 10. In order to provide a space 16 in which the snap action device can be mounted I provide offset feet 17 adapted to be detachably connected to the support 15 for instance by screws 18.

The actuating shaft 19 is supported by a sleeve 20 which forms a bearing carried by plate 14. The head 21 of this shaft may be designed to be engaged by the hub 22 of the actuating handle 23 carried by the cover.

The invention as shown is intended to accommodate three switch units 25 of any suitable character such for instance as that shown in application Serial Number 640,025 filed January 9, 1946, now abandoned, mounted in any suitable manner upon the front of the plate 14 and having movable switch members (not shown) of any conventional character actuated by a crank shaft 26 having bearings 27 at the front of the plate 14. The straps 28 secured to the base plate 14 serve as abutments to limit the movement of the crank shaft 26.

The quick make and break or snap action mechanism is mounted on the back of the plate 14 in the space 16 previously mentioned and manually actuated by turning the shaft 19, the lower end of which is of angular cross-section and slidably into a hole of corresponding cross-section in the gear member 31 which serves as a hub for the actuating shaft. This gear member has two arcuate slots 32 which permit it to turn through limited arcs on the pins or rivets 33 secured to the base plate 14. This gear member 31 has an extension lug 34 to which a rod 35 is hinged. The opposite end of this rod is guided by a slotted bracket 36 and a spring 37 on the rod tends to rotate gear member 31 either to the right as shown in Fig. 6 or to the left as shown in Fig. 7.

Gear member 40 which meshes with gear member 31 is mounted on bearing 41 for limited rotation on the back of the plate 14. Gear member 40 has pins 42 which extend into slots 43 in the throwing member 44 which is mounted on the same bearing so that the latter has limited rotative movement under pressure of spring 45. This member 44 has two extension lugs 46, 46 adapted to engage the offset arm 47 of crank shaft 26. In the position of Fig. 6, spring 45 tends to rotate gear member 40 and throwing member 44 anti-clockwise or left handed, and in

the position of Fig. 7 clockwise or right handed. A washer 48 may be interposed between members 40 and 44.

When the shaft 19 is turned left handed from the position of Fig. 6, the gear member 31 will be turned accordingly and compress the spring 37. The turning of gear member 31 rotates gear member 40 right handed. When member 31 carries the lug 34 and the spring rod 35 over the line of centers, the spring suddenly turns the gear member 31 to the position of Fig. 7 and in so doing rotates the gear member 40 and the throwing member 44 and compresses the spring member 45 until the throwing member snaps over in the manner customary in snap action toggle devices. The lower lug (Fig. 7) then thrusts against the arm 47 of the crank shaft and throws the switch unit to an "off" position. The crank shaft being limited in movement by bracket 28 thus limits the rotation of member 44 to the position of Fig. 7. The pin 42 and slot 43 constitute a lost-motion connection between gear member 40 and the throwing member 44. Movement from the "off" position of Fig. 7 to the "on" position of Fig. 6 is accomplished by simply rotating shaft 19 in the reverse direction to that just described.

The specific detail of the snap action mechanism is not important to the broad claims of my invention.

It will be seen from the foregoing that such construction not only facilitates the assembly and testing of such make and break or snap action mechanism but also makes it possible to assemble on the base plate a completely assembled contact or switching mechanism and the inspection and replacement of the switching mechanism at any time. Such construction can be assembled on any suitable type of panel board or in a conventional receptacle.

The invention also facilitates the assemblance, inspection and replacement of entire snap action mechanism either with or without the attached switch units.

I claim:

1. A switch assembly comprising a base plate having supporting feet offset at the rear to provide a recess, snap action mechanism carried by the rear of said plate in said recess, a crank shaft mounted at the front of said plate for actuating a switch contact device mounted on the front of said plate and connected to said snap action mechanism at the rear of said plate and means for actuating said snap action mechanism from the front of said plate.

2. As an article of manufacture an electric switch assembly comprising a base plate having supporting feet projecting from the rear surface thereof, snap action mechanism on said surface parallel thereto and within the space defined by the plane of the plate and the plane of said feet, a pivotal crank shaft mounted on said plate and operatively connected to said snap action mechanism and having a portion thereof extending across the opposite surface of the plate and an actuating shaft carried by said plate and operatively connected to said snap action mechanism for actuating the same, said plate having means for detachably mounting a switch unit on the front of said plate in operative engagement with the portion of the crank shaft extending across the plate.

3. As an article of manufacture, a base plate, a switch unit carried by the front of said plate, snap action mechanism mounted entirely on the back of said plate, an actuator for the snap action mechanism projecting from the front of said plate, a crank shaft carried by the front of said plate and connecting said snap action mechanism and said switch unit.

4. As an article of manufacture, a base plate, means for removably mounting a switch unit on the front of said plate, snap action mechanism mounted entirely on the back of said plate, an actuator for the snap action mechanism projecting from the front of said plate, a crank shaft carried by said base plate for connecting said snap action mechanism and such a switch unit and abutments carried by the base plate for limiting the movement of said crank shaft independently of such a switch unit.

5. In an electric switch, the combination of a base plate provided with means for removably mounting it in a switch box, means for mounting a switch unit on the front of the base plate, snap action mechanism entirely carried by the back of said plate, an actuator for the snap action mechanism carried by the front of said base plate and means carried by said plate for connecting the snap action mechanism and a switch unit on the front of the base plate.

6. A safety switch comprising a box body having a cover, a base plate removably mounted in the box body with a space between part of the base plate and the bottom of the box body, a switch unit removably mounted on the front of the base plate, quick make and break mechanism entirely carried by the back of the base plate, actuating means for the quick make and break mechanism and means connecting the quick make and break mechanism with the switch unit, said actuating means including a member carried by the cover and a member carried by said base plate.

7. Enclosed switch mechanism including a receptacle having a cover, a plate mounted on the bottom of the receptacle but spaced apart therefrom so as to leave a space, snap action mechanism carried by said plate within said space, a crank shaft carried by the front of said plate and connected to said snap action mechanism, an actuating member carried by said plate and connected to said snap action mechanism, a switch unit mounted on said plate and operatively connected to said crank shaft and an operating handle carried by the cover and connected to said actuating member when the cover is closed.

8. Enclosed switch mechanism including a receptacle, a plate mounted on the bottom of the receptacle but spaced apart therefrom so as to leave a space, snap action mechanism carried by said plate within said space, a crank shaft carried by the front of said plate and connected to said snap action mechanism, an actuating member carried by said plate and connected to said snap action mechanism and a switch unit mounted on said plate and operatively connected to said crank shaft.

9. As an article of manufacture, a base plate having an opening therein, means for removably mounting a switch unit on the front of said plate, snap action mechanism mounted and concealed entirely on the back of said plate, an actuator shaft for the snap action mechanism projecting from the front of the plate, a crank shaft pivoted to said base plate and having an extension protruding through the opening in said base plate to the rear thereof and operatively connected to the snap action mechanism, said crank shaft having a transverse member in front of said plate operatively connected to said switch unit and

means on the front of the base plate for limiting the movement of said crank shaft independently of such a switch unit.

10. A safety switch comprising a box body having a cover, a movable handle carried by said cover, a base plate removably mounted in the bottom of the box body, a switch unit removably mounted on the front of the base plate, quick make and break mechanism carried entirely on the back of the base plate including a hub member concealed by the base plate, an actuator shaft having a bearing in the base plate and having one end engaging the hub member and its other end engaging the movable handle and means carried on the front of said base plate for connecting the quick make and break mechanism and the switch unit on the front of the base plate.

11. In an enclosed switch construction, an assembly adapted to be mounted in an enclosure and comprising a base plate adapted to support a switch unit having stationary and movable members on the front of the base plate, a crank shaft supported by said base plate at the front thereof for coacting with the movable switch member, snap action mechanism entirely carried by the back of said base plate and including an oscillatable hub and a throwing member connected thereto, said crank shaft having an arm projecting beneath said base plate and coacting with said throwing member and an actuating shaft having a bearing sleeve on said base plate and connected with the hub of said snap action mechanism and projecting forward from the base plate to be engaged by an actuating member carried by the cover of said enclosure.

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