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ELECTRICAL SWITCH ASSEMBLY

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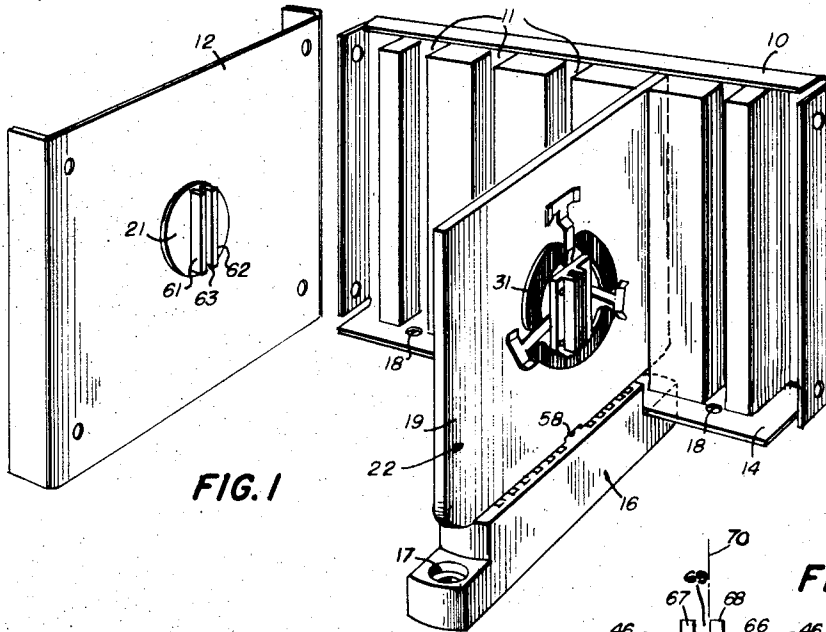


FIG. 1

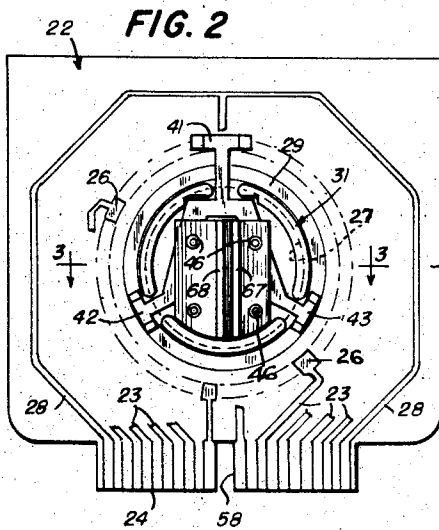


FIG. 2

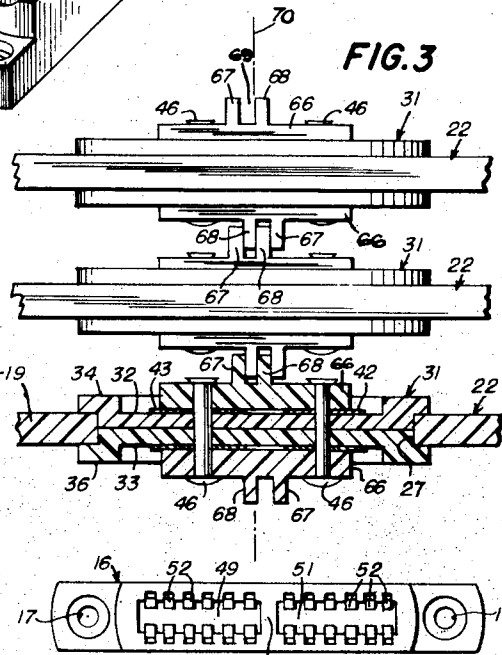


FIG. 3

FIG. 4

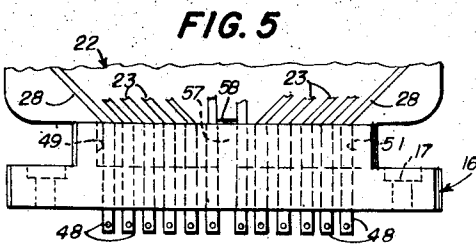


FIG. 5

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ELECTRICAL SWITCH ASSEMBLY

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4 Claims. (Cl. 200—14)

The present invention relates to an electrical switch of the type which includes a frame and a plurality of wafer units each carrying switch means thereon with the wafer units so arranged that any one may be readily removed from the frame and readily removed from operative association with its terminal contact member carried by the frame and the invention more specifically pertains to means providing a driving connection between the rotors of the switch means carried by the respective wafer units.

An object of the invention is to provide a switch assembly of the type disclosed in my patent 2,841,660 and in my application Serial No. 736,498, filed May 20, 1958, wherein the rotors of the switch means carried by the respective wafer units are actuated by interlocking connections between the rotors to thereby avoid the necessity of providing a shaft which extends throughout the length of the frame.

A more specific object of the invention is to provide a radially disposed tongue carried by the rotor of each wafer unit which is adapted to enter a radially disposed slot provided within the rotor structure of the next adjacent wafer unit so as to provide a driving connection between the rotors of the wafer units and a driving connection which will permit any one of the wafer units to be withdrawn and removed from the frame and from its terminal contact member.

Other objects and features of the invention will be appreciated and become apparent to those skilled in the art pertaining to circuit making and breaking devices as the present disclosure proceeds and upon consideration of the accompanying drawing and the following detailed description wherein an embodiment of the invention is disclosed.

In the drawing:

Fig. 1 is an exploded perspective view of portions of a switch assembly embodying the invention.

Fig. 2 is a side elevation of one of the wafer units showing the switch means at one face of the rotor.

Fig. 3 is a fragmentary plan view of a plurality of wafer units in the positions they assume when mounted in the frame with the panel of one of the wafer units and the associated rotor shown in section and taken on the line 3—3 of Fig. 2.

Fig. 4 is a plan view of one of the multiple contact receptacles.

Fig. 5 is a side elevation of a portion of one of the wafer units in position with the conductors thereon engaging contacts of one of the multiple contact receptacles.

The invention pertains to an electrical switch assembly which includes a frame having guiding grooves in the side walls thereof for receiving edge portions of a plurality of wafer units and the frame also provides support for a plurality of multiple contact receptacles. The switch frame is devoid of a shaft extending throughout the length of the frame. A portion of the frame for the switch assembly is shown in Fig. 1 which includes a side member 10 having means at the inner face thereof providing parallel extending grooves 11. The frame includes two such

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side members which are maintained in spaced relationship by end plates one of which is shown at 12. The side members of the frame may each be provided with a flange such as shown at 14 for supporting a plurality of multiple contact receptacles 16. A multiple contact receptacle 16 is provided for each pair of transversely aligned grooves 11 and is supported in position to receive the end portion of each wafer unit. The multiple contact receptacle 16 may be mounted on the flange 14 in any suitable manner such as by means of bolts which extend through openings 17 in the end portions of the multiple contact receptacles and through suitable openings 18 in the respective flanges 14.

The side members 10 for the frame may be made of any desired length and provided with spaced grooves 11 for receiving the side edges of any desired number of wafer units 22 and maintaining them in parallel spaced relationship. The end plate 12 carries a knob (not shown) on the exterior thereof which drives a disc 21 which is journaled for rotation in an opening provided in the end plate 12. The knob and the disc 21 and the means thereon as hereinafter described provide a portion of the mechanism for actuating the switch means carried by the respective wafer units which is mounted in the transversely aligned grooves 11 and one of those units will be supported in the grooves 11 adjacent the end plate 12.

The switch assembly includes a plurality of wafer units 22 and each wafer is in the form of a panel or plate 19 formed of insulating material. One or both faces of the panel carries spaced conductors 23 which may be applied by a suitable printed circuit technique and these conductors extend to one edge portion 24 of the panel. The conductors extend over the face of the panel and terminate in circumferentially spaced contacts 26 which are disposed about a circular opening 27 provided in the central portion of the panel. At least one conductor 28 extends into circuit relationship with a conducting ring 29 arranged around the central opening 27.

The switch means carried by each wafer unit includes a rotor indicated generally at 31. The rotor may be formed of two generally disc-shaped members 32 and 33 formed of insulating material. These disc-shaped members are arranged in face-to-face relationship and have a thickness substantially equal to that of the panel 19 as best shown in the lower portion of Fig. 3. The disc-shaped member 32 is provided with an annular flange 34 which overlies the face of the panel around the perimeter of the opening 27. An annular flange 36 carried by the disc-shaped member 33 overlies the opposite face of the panel in the area about the perimeter of the opening 26. A plurality of wiper arms are mounted on the rotor and one set is shown in Fig. 2. The wiper arms are formed of conductive material which have resilient characteristics. One wiper arm 41 is for the purpose of engaging the contacts 26. The other wiper arms 42 and 43 are for the purpose of engaging the conducting ring 29. In an embodiment where conductors and contacts are provided on both faces of the panel 19 wiper arms are provided at the opposite sides of the rotor.

In assembling the rotor the two disc-shaped members 32 and 33 are arranged at opposite sides of the panel 19 and the disc-shaped members are moved into face-to-face relationship while positioned in the opening 27. Rivets 46 are applied through openings in the disc-shaped members 32 and 33 and these rivets serve to hold the disc-shaped members together and maintain the wiper arms on and in operative association with the rotor. The spacing between the annular flanges 34 and 36 is such that they overlie the faces of the panel 19 around the opening 27 with slight clearance so that the rotor is free for rotation with respect to the panel. The flanges 34

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and 36 provide means effectively preventing dislodgement of the rotor from the associated panel. The annular flanges are notched to accommodate the wiper arms.

Each multiple contact receptacle 16 is provided with a plurality of contact elements 52 and terminals 48 therefor which correspond in number to the conductors carried by a wafer unit. The terminals 48 are exposed at the exterior of the frame. The multiple contact receptacles are of identical construction and include elongated slots 49 and 51 as shown in Fig. 4. The contact elements 52 are provided along opposite sides of the elongated slots 49 and 51 for being engaged by the end portions of the conductors 23 and 28 carried by the wafer units. The central portion of the side members making up the multiple contact receptacle are tied together by a bridge portion 57 and a notch 58 is provided in each wafer for accommodating the bridge portion 57.

The disc 21 which is driven by the knob from the exterior frame is provided with two spaced ribs 61 and 62 which are arranged parallel to each other and provide a groove 63 therebetween. The ribs 61 and 62 are disposed in chord positions with respect to the disc 21. This structure is provided for interfitting with similar ribs carried by the rotors 31 on each wafer unit. If the uppermost wafer unit 22 in Fig. 3 is adapted to be arranged in the grooves 11 adjacent the end plate 12 the rotor carried thereon is adapted to provide a driving connection with the disc 21. This driving connection includes a web 66 of insulating material which is secured to the face of the disc 32 by means of the rivets 46 and this web carries two ribs 67 and 68 which extend in chord directions with respect to the rotor 31 and a groove 69 is provided between the ribs 67 and 68. The rib 63 is adapted to enter the groove 63 in the disc 21 and the rib 61 enters the groove 69 formed between the ribs 67 and 68. These ribs and grooves provide a driving connection between the disc 21 and the rotor 31 of the wafer unit 22 adjacent the end plate 12.

The opposite face of the rotor 31 is provided with a web 66 but the ribs 67 and 68 are disposed in a reversed relationship with respect to the axis 70 of the rotor. The ribs 67 and 68 at opposite faces of each wafer unit 22 are in staggered relationship so that there is an interfitting of the ribs in a manner as shown in Fig. 3. Both webs 66 are secured to the respective disc-shaped members 32 and 33 by the rivets 46. The ribs 67 and 68 provide driving connections to the next adjacent rotor. Any one of the wafer units 22 may be withdrawn from the frame through the grooves 11 when the actuating knob is rotated to a position with the ribs 61 and 62 extending parallel to the grooves 11. When the ribs 61 and 62 on the disc 21 are so oriented the ribs 67 and 68 carried by the respective rotors 31 will also extend in such directions as to permit any one of the wafer units to be withdrawn from the frame while being guided by the grooves 11 to detach the conductors 23 and 28 from the contact elements 52 carried by the multiple contact receptacles 16.

While the invention has been described with reference to one type of frame and a particular structural arrangement of the rotors and contacts carried by the wafer units it will be appreciated that changes may be made in any of these elements including the multiple contact receptacles. Such modifications and others including changes in the structure of the driving connections between the rotors and the actuating knob may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What I claim and desire to secure by Letters Patent is:

1. In a switch assembly, a frame including side members, end plates maintaining the side members in spaced relationship, each of said side members having a groove therein aligned with the groove in the opposite side member, means carried by the frame having contacts thereon

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aligned with said grooves, a wafer unit slidable into said frame and guided by said grooves, conductors carried by the wafer unit engaging said contacts when the wafer unit is in position in said grooves, switch means carried by the wafer unit including a rotor mounted for rotation on the wafer unit, switch actuating means journaled for rotation on one of said end plates, and means including an interfitting rib and groove disposed generally radially of the axis of the rotor providing a driving connection between said means and the rotor.

2. In a switch assembly, a frame including side members, end plates maintaining the side members in spaced relationship, each of said side members having a groove therein aligned with the groove in the opposite side member, means carried by the frame having contacts thereon aligned with said grooves, a wafer unit slidable into said frame and guided by said grooves, conductors carried by the wafer unit engaging said contacts when the wafer unit is in position in said frame, switch means carried by the wafer unit including a rotor mounted for rotation on the wafer unit, switch actuating means journaled for rotation on one of said end plates including a disc at the inside of said end plate, a rib on said disc disposed generally radially of the axis thereof, means on the rotor providing a generally radially disposed groove receiving said rib and providing a detachable driving connection between the disc and the rotor.

3. In a switch assembly, a frame including side members, end plates maintaining the side members in spaced relationship, each of said side members having grooves therein with the groove in one side member aligned with a groove in the opposite side member, multiple contact members carried by the frame each having contacts thereon aligned with a pair of said grooves, a wafer unit slidable into the frame and guided by each pair of grooves, conductors carried by each wafer unit engaging the contacts of the associated contact member when the wafer units are in position in the frame, switch means carried by each wafer unit including a rotor mounted for rotation on its wafer unit, switch actuating means journaled for rotation on one of said end plates, means including an interfitting rib and groove disposed generally radially of the axis of the rotors providing a driving connection between said means and the rotor of the wafer unit adjacent said end plate, and means including an interfitting rib and groove disposed generally radially of the axis of the rotors providing a driving connection between the rotors of adjacent wafer units.

4. In a switch assembly, a frame including side members, end plates maintaining the side members in spaced relationship, each of said side members having a groove therein aligned with the groove in the opposite side member, means carried by the frame having contacts thereon aligned with said grooves, a wafer unit slidable into said frame and guided by said grooves, conductors carried by the wafer unit engaging said contacts when the wafer unit is in position in said frame, switch means carried by the wafer unit including a rotor mounted for rotation on the wafer unit, switch actuating means journaled for rotation on one of said end plates including a disc at the inside of said end plate, a rib on said disc disposed generally radially of the axis thereof, means on the rotor providing a generally radially disposed groove receiving said rib and providing a detachable driving connection between the disc and the rotor, a second rib on said disc providing a groove between the ribs thereon, and a rib on the last-mentioned means extending into the groove between the ribs on said disc.

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