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ELECTRIC SWITCH ASSEMBLY FOR PRINTED CIRCUIT INSTALLATIONS

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Fig. 1.

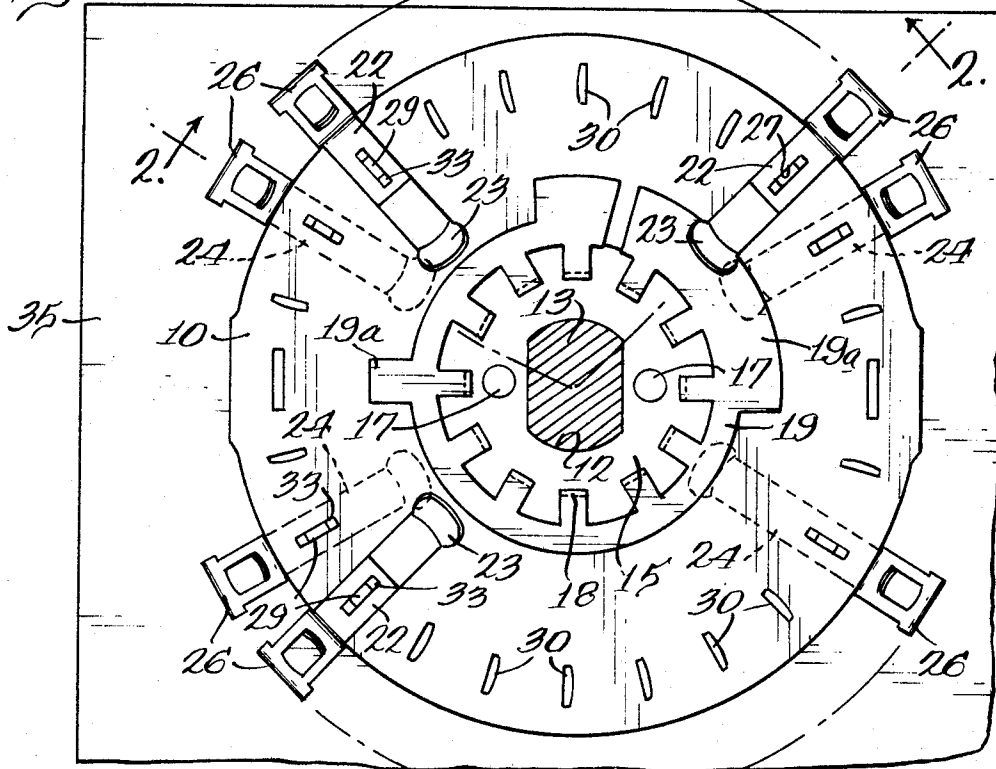


Fig. 2.

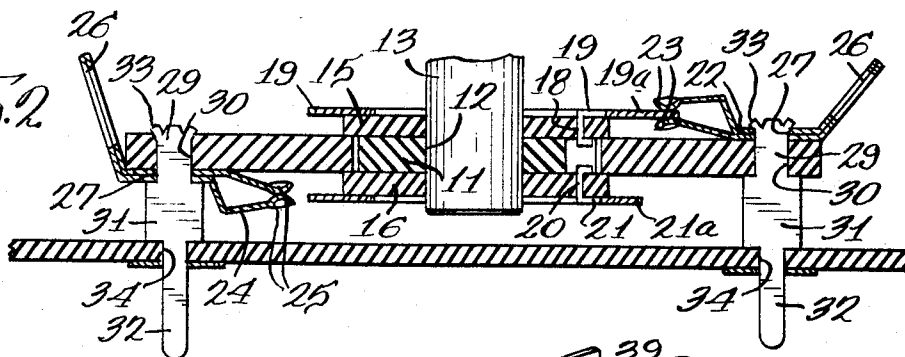
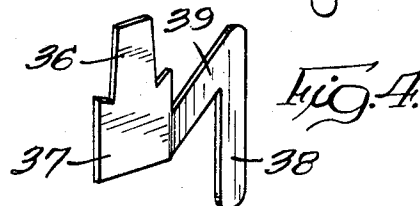
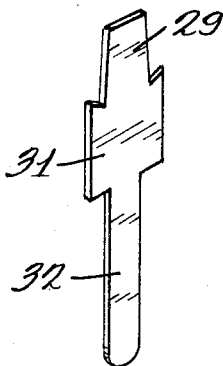


Fig. 3.



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1

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ELECTRIC SWITCH ASSEMBLY FOR PRINTED CIRCUIT INSTALLATIONS

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5 Claims

ABSTRACT OF THE DISCLOSURE

An electric switch having an insulated stator to which stator contact members are secured by means of a flat fastener projected through aligned openings in the stator and the stator contact member with which the fastener is associated, and each fastener has a terminal pin defined by an integral extension thereof whereby said fastener is operable to establish electrical connection between a connection point of a printed circuit panel and the stator contact member with which the fastener is associated.

This invention relates to electric switch assemblies of the type wherein a series of spaced apart aligned contact members secured to an insulating support are engaged in turn by a contact blade fixed to a rotor or slider incident to movement of said rotor or slider relative to said insulating support along the route occupied by said contact members on said insulating support.

It is an object of this invention to provide an electric switch assembly of the type indicated which incorporates novel terminal means through which said contact members on the insulating support are adapted for electrical connection with a printed circuit panel.

It is a further object of this invention to provide an electric switch assembly wherein the contact members are of such limited size and shape as to readily conform to the space limitations available in compact, miniaturized switch units, and each having attachment to the insulating support by means of a metal fastener of such size and shape as to afford maximum security against misalignment or displacement thereof angularly of the fastener as an axis and which combines with such advantages the provision of a fastener having an integral extension to define a terminal pin for insertion in an appropriate opening at the connection point of a printed circuit panel. In accordance with this invention the fasteners are formed of flat metal stock and the flat faces of the fastener are arranged lengthwise of the maximum dimension of the contact members so as to require a fastener receiving opening of only minimum dimension measured across the narrowest part of the contact member and the area of the insulating support to be occupied by said contact member. As a consequence the fastener contemplated by this invention provides a relatively strong physical connection between the contact member and the printed circuit and between the contact members and the insulated support occupied by said contact members while retaining the desired quality and performance of the contact members even though the size and shape of the contact members are restricted so as to meet the demands of miniaturized switch assemblies.

A further object of this invention is the provision of a novel and improved switch assembly of the type referred to which is characterized by its simplicity in construction and assembly and the consequent economy with which it may be manufactured in quantity production.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings in which:

2

FIG. 1 is a top plan view of a switch embodying the present invention and showing the switch in operative connected relation to a printed circuit installation.

FIG. 2 is a section taken along line 2-2 of FIG. 1.

FIG. 3 is an enlarged perspective view of a fastener illustrating details of its design while in disassembled relation to the switch.

FIG. 4 is a similar view of a modified form of fastener.

An electric switch assembly exemplifying the present invention in one embodiment thereof is shown in FIGS. 1, 2 and 3. As thus illustrated, a stator 10 of insulating material provides a support having a central opening occupied by a rotor having a hub or core member 11 of suitable dielectric composition. The hub 11 is formed with a rotor operating shaft opening 12 in which flattened sides of a rotor operating shaft 13 has engagement to cause the hub 11 to be driven or rotated relative to the stator 10 in response to rotation of the shaft 13 about its longitudinal axis. While the hub occupies an operative position within the central opening of the stator 10, opposite faces of the stator bordering said opening are engaged by rotor contact supporting disks 15 and 16 secured to the hub 11 in flanking relation to the axially facing surfaces of the hub 11. The disks 15 and 16 are secured to the hub 11 by rivets 17 or other suitable means whereby the disks 15 and 16 are held in concentric relation with the hub while fixed against separation from the rotor hub 11 axially of the shaft 13. Each disk 15 and 16 is provided with a rotor shaft receiving opening corresponding to the opening 12 in the hub 11.

A series of openings formed along the outer marginal area of the disk 15 in spaced apart array circumferentially of a circle concentric with the hub 11 each receiving the mounting finger 18 of a rotor contact blade 19 which extends radially beyond the outer peripheral edge of the disk 15. Similar openings provided in disk 16 likewise receive mounting fingers 20 of a rotor contact blade 21 which also extends radially beyond the outer peripheral edge of disk 16.

Contact clips 22 fastened to the face of the stator 10 which is overlapped by the disk 15 each include inner end portions which are bent and rounded to provide oppositely facing resilient double wiping jaws 23 with which the rotor blade 19 has engagement to electrically connect selected clips 22. Similar clips 24 secured to the other face of the stator 10 also include like inner end portions which provide oppositely facing resilient double wiping jaws 25. The rotor blade 21 secured to the disk 16 has engagement with the jaws 25 of the clips 24 to electrically connect selected clips 24 as the rotor operating shaft 13 is turned to move the rotor about the shaft 13 as an axis. In the particular embodiment shown in FIG. 1, it will be noted that contact blade 19 is provided with a radical extension 19^a with which the jaws 23 of clips 22 have engagement. It will also be observed that the jaws 25 of clips 24 have engagement with the rotor blade 21 associated with rotor disk 16 via a similar radial extension 21^a of rotor blade 21 except for the relatively longer clip 24 shown in the lower right hand area of FIG. 1 which has engagement with a limited circumferential portion of the blade 21 which is without said extension 21^a. The variation in the length of the clips 22 and 24 and the relative position thereof about the line of travel of the rotor blades 19 and 21 as well as the relative circumferential position and dimension of the radial extensions of the rotor blades 19 and 21 are determined according to the number of contacts which are needed to perform the specific requirements of the switch with which said contacts are associated.

Each of the contact clips 22 and 24 has a wiring lug 26 defined by the end of the clip opposite to the end thereof defining the rotor blade engaging jaws so as to

furnish means for establishing an electrical connection between the clips 22 and 24 and circuit conductors or electrical components (not shown) such as coils, resistors, capacitors, etc. The area between the wiring lug and the rotor blade engaging jaws of each of the clips 22 and 24 is provided with a narrow opening 27 of elongated dimension lengthwise of the distance between said wiring lug and the rotor blade engaging jaws thereof. A fastener, as shown in FIG. 3, comprises a flat sheet metal stamping provided with an end portion 29 which has wedging fit in the opening 27 in the clip and a corresponding opening 30 intersecting surfaces of the stator 10 in registry with the opening 27 so as to rigidly fix the position of the clip in relation to the line of travel of the rotor blade with which the clip is engageable. As shown, each fastener is provided with a central wing portion 31 which limits insertion of the end portion 29 into the openings provided in the contact clip and the stator. Reference numeral 32 designates a second end portion of the fastener which is separated from the end portion 29 by said central wing portion 31. When installed in operative fastening position as illustrated in FIG. 2, the end portion 29 of the fastener protrudes beyond the confines of the opening in the clip and the opening in the stator occupied by said end portion 29 in a direction away from the wing portion 31 a distance sufficient to permit the staking of such protruding portion of the fastener by means of integrally formed staking ears 33. Thus the staking ears 33 in cooperation with the central wing portion 31 firmly secures the end portion 29 of the fastener against withdrawal from an anchored position relative to the contact clip and the stator.

Each portion 32 of each fastener provides an integral straight pin terminal for insertion in an appropriate opening 34 at the connection point of a printed circuit panel 35 as shown in FIG. 2. The wing portion 31 provides a shoulder at its junction with the end portion 32 which serves to limit the insertion of said end portion 32 in the opening in the panel 35 so as to maintain proper spacing between the switch contacts and the surface of the panel 35 facing said contacts.

It will accordingly be evident that a fastener incorporating the features hereinbefore set forth affords maximum security against misalignment or displacement of the contact clips 22 and 24 radially or axially of the line of travel of the rotor contact blades associated therewith and in addition provides an integral terminal pin for establishing electrical connection between the printed circuit panel 35 and the contact clip secured to the stator 10 by said fastener.

FIG. 4 illustrates a modified form of fastener having an end portion 36 and a central wing portion 37 corresponding to the end portion 29 and the central wing portion 31 of the fastener shown in FIG. 3. However, the terminal pin 38 of the fastener shown in FIG. 4 is joined to the wing portion 37 via a branch arm 39 so as to position the terminal pin 38 in an axially offset relation to the axis of the end portion 36 and the wing portion 37. This construction makes it possible to utilize a fastener incorporating the features of the present invention in installations where the connection with the printed circuit board is located in offset relation to an axial projection of the position occupied by the end portions of the fastener which secures the contact clip to the stator.

The present invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The embodiments contained herein are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced thereby.

What is claimed is:

1. An electric switch having a stator contact supporting member of insulating material, a stator contact having

a mounting portion in face to face contact with said stator contact supporting member, aligned openings in said stator contact mounting portion and the area of the stator contact supporting member engaged by said stator contact mounting portion, a fastener projected through said aligned openings securing said stator contact in fixed position on said stator contact supporting member, and means operative to provide an electrical connection between the connection point of a printed circuit panel and said stator contact including a terminal pin defined by an integral extension of said fastener, and an abrupt shoulder at the junction of said terminal pin and the area of the fastener from which said terminal pin extends to establish the stator contact supporting member at a fixed distance apart from the print circuit panel.

2. An electric switch according to claim 1 wherein said stator contact has oppositely facing resilient double wiping jaws at one end thereof and a wiring lug is defined by the opposite end thereof and said stator contact mounting portion is confined to an area of the contact between said ends of the contact, and wherein the openings in the stator contact mounting portion and the area of the stator occupied by the contact which contain the fastener is of narrow elongated dimension lengthwise of the distance between said ends of the stator contact and said openings present opposite edge portions with which the opposite faces of the fastener has engagement.

3. An electric switch according to claim 1 wherein said fastener comprises a flat sheet metal stamping and the terminal pin defined by said integral extension of said fastener occupies a position in offset relation to the axis of the portion of the fastener projected through said aligned openings in the stator contact mounting portion and the stator contact supporting member.

4. An electric switch having a stator contact supporting member of insulating material, a stator contact having a mounting portion in face to face contact with said stator contact supporting member, aligned openings in said stator contact mounting portion and the area of the stator contact supporting member engaged by said stator contact mounting portion, means securing said stator contact in fixed position on said stator contact supporting member including a fastener comprising a flat sheet metal stamping having a pair of opposed end portions and a wing portion, one end portion of the fastener being projected through said aligned openings in the stator contact mounting portion and said stator contact supporting member and the other end portion of said fastener defining a terminal pin operative to provide an electrical connection between the connection point of a printed circuit panel and said stator contact, and said central wing portion being effective to space the stator contact supporting member and the printed circuit panel with which the terminal pin is operatively associated at a fixed distance apart.

5. An electric switch according to claim 4 wherein a portion of the fastener protrudes beyond the confines of the said aligned openings in the contact mounting portion and the stator area facing said contact in a direction away from said central wing portion to provide staking ears which secure the fastener against withdrawal from an installed position within said openings.

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