May 20, 1941. E. J. GLENNON 2,242,971

SWITCH STACK ASSEMBLY

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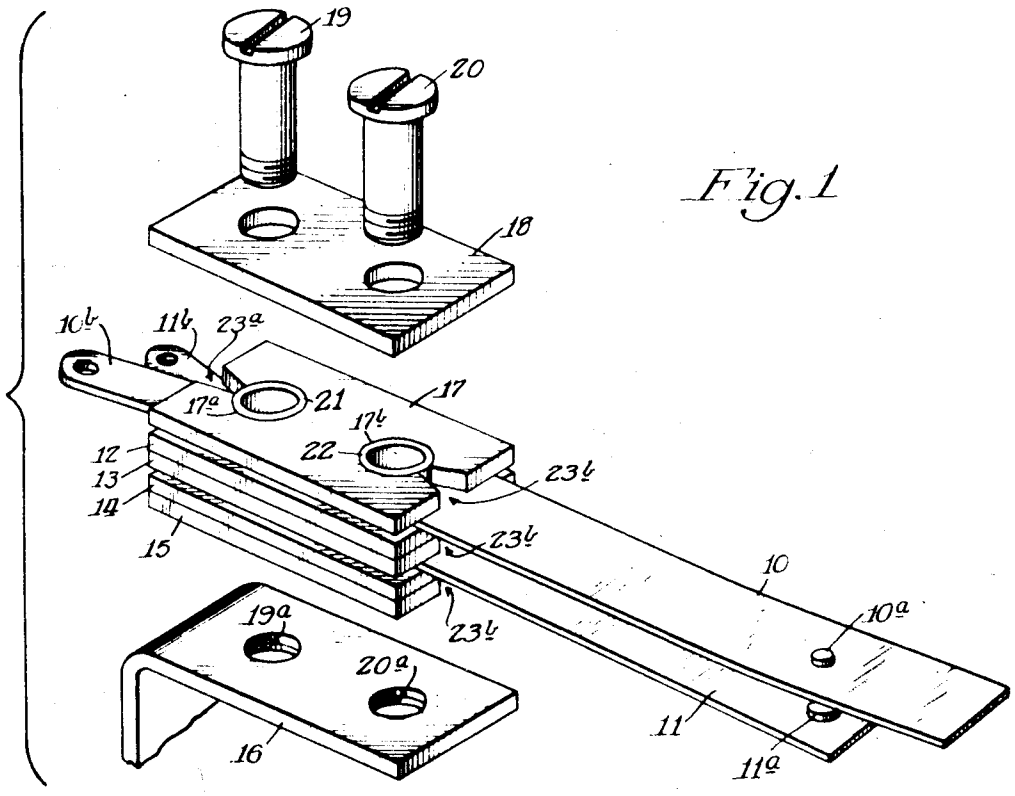


Fig. 1

Fig. 2

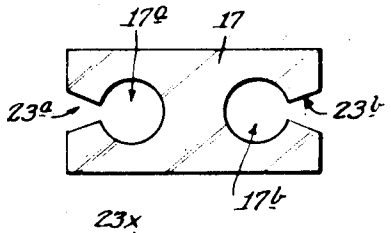


Fig. 3

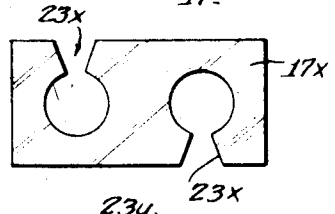


Fig. 4

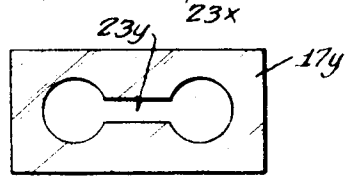


Fig. 5

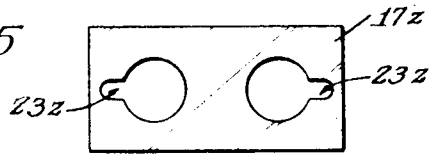
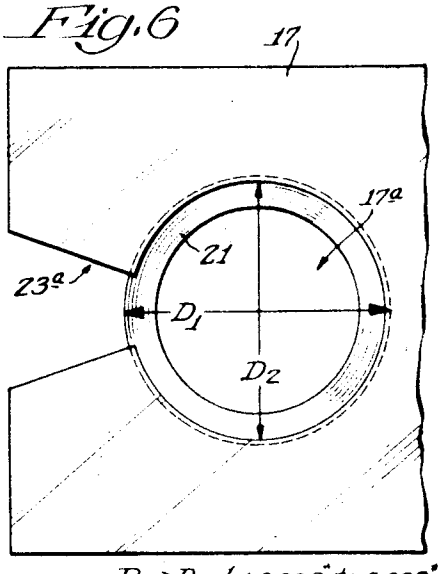


Fig. 6



$D_1 > D_2$ by 0.002" to 0.003"

Inventor
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SWITCH STACK ASSEMBLY

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5 Claims. (Cl. 200—166)

This invention relates to the assembly of small switches sometimes known as jack switches or spring leaf switches and which are characterized by the inclusion of several elongated springy switch blades mounted between insulating strips arranged in a stack with the switch blades projecting therebeyond for engagement with some operating instrumentality such as a plug, lever, or button.

A characteristic of these jack switches is the use of one or more short lengths of insulated tubing such as fiber, as a protective sleeve for an assembly screw which passes through the entire assembly of insulating spacers and also through holes in the switch blades aligned with the holes in the insulating spacers. The assembly or stack of insulating spacers or punchings is usually built up by a hand operation, but such assembly is not always at once permanently mounted on the support, it being common practice to assemble the switch stacks for shipment or other utilization before the attaching screws are permanently affixed.

A problem arises in shipping the assembled but unmounted switch stacks because the spacing insulators and switch blades tend to work off the insulating sleeves by jarring and handling and it becomes necessary to collect the relatively small parts and assemble them, all of which entails loss of time and annoyance to the manufacturer or user. In order to overcome this problem various expediencies have been resorted to, including, among others, the application of glue or adhesive to the insulating spacers or punchings to hold the same together in assembled relation, the use of a wire tie through the sleeve as a binder, or the use of rubber bands around the stack assembly. All of these expediencies increase the cost in handling and assembling the stacks and on small items of this class every slight increase in cost is a matter of great concern.

The aforementioned invention overcomes the difficulties in maintaining the switch stacks in assembled relation in a manner which does not add any appreciable increment to the manufacturing cost, as will appear hereinafter.

It is therefore a principal object of the invention to provide means for maintaining a switch stack assembly in assembled condition for purposes of handling and shipping without resort to gluing, binding or other expediencies likely to add to the manufacturing cost.

A further and more specific object of the invention is the provision of means for maintaining a switch stack assembly in assembled condition for purposes of handling and the like, said means including a provision of insulator stack punchings having undersized sleeve holes with special slot formations to permit expansion for engagement with the sleeving in a tight fit whereby the assembled stack is prevented from falling apart prior to permanent installation.

A further object of the invention is the provision of switch stack insulator punchings including one or more holes for passage of an insulating sleeve having a diameter slightly larger than said holes, and expansion formations adjoining said holes to permit forcing the punchings into assembled relation with the sleeves with a sufficiently tight fit to assure against accidental disassembly of the stack in handling or shipping prior to permanent installation.

Other objects, advantages and novel aspects of the invention reside in certain details of construction as well as the cooperative relationship of the component parts of the illustrative embodiment described hereinafter in view of the annexed drawing, in which:

Fig. 1 is an exploded perspective of a switch stack assembly.

Fig. 2 is a top plan view of one form of improved insulator punching.

Fig. 3 is a top plan view of a modified form of insulator punching or spacer.

Fig. 4 is another modified form of insulator punching or spacer.

Fig. 5 is a top plan view of a further modified form of insulator spacer or punching.

Fig. 6 is an enlarged fragment of the preferred form of insulator punching or spacer aligned with an insulating sleeve prior to assembly.

In Fig. 1 of the drawing herein there is shown to enlarged scale a switch stack structure in assembled condition and in relation to a mounting bracket preparatory to the application of the mounting screws or other means for permanently affixing the switch structure on its ultimate carrying base.

In the foregoing arrangement there are included a pair of switch blades 10 and 11 of elongated form and constructed of a suitable electro conductive springy material, each blade including near one end a suitable contact point 10*a* and 11*a* respectively, and near the opposite end a soldering lug or tail 10*b* and 11*b* respectively. Said blades are maintained in a normal condition of separation by means of one or more spacers 12 and 13 of insulating material such as fiber, Bakelite or the like, and there are an additional number of spacers or punchings 14 and 15

beneath the lower blade 11 to space the latter suitably from any mounting surface, such for example as the mounting bracket 16. Likewise, the upper blade 10 is provided with a top protective insulated plate or punching 17 to protect the switch blade from a metal top plate 18 and also to assist in rigidifying the structure and maintaning the blade 10 in a suitable fixed condition relative to the companion blade.

Means for rigidly securing the switch stack assembly to the mounting bracket 16 includes a pair of mounting screws 19 and 20 each respectively adapted to thread into a corresponding tapped hole 19a or 20a in bracket 16.

To properly align the several punched holes in the separators or insulating spacers, and also to prevent contact between the mounting screws and the edge portion of the holes in the switch blades, there are provided insulating sleeves in the form of fiber or hard rubber tubing dimensioned to fit into the aligned holes with their respective opposite ends flush with the outer surfaces of the outermost spacers or punchings. Thus the insulating sleeves 21 and 22 prevent any electrical contact between the blades and the mounting screws.

In the manufacture of various devices in which such switch assemblies are used such as relays, the stacks are not built up on the mounting bracket 16, but are assembled as stacks, that is to say, as a unit consisting of the blades 10 and 11 the plurality of spacers 12—15, and the sleeves 21 and 22. These stack units are then delivered in quantity to assemblers who mount them on the various devices, or the stacks are shipped to other manufacturers for ultimate assembly in some kind of mechanism.

In order to keep the stacks from falling apart, the hereinbefore described expediencies of gluing, binding, etc. must be resorted to.

The present invention overcomes the prior difficulties by modifying the top and bottom spacers or punchings as follows: Considering for example the top punching 17 shown in plan view in Fig. 2, the customary two holes 17a and 17b are punched in the strip or spacer, but as illustrated to enlarge scale in Fig. 6, these holes are made slightly undersized in diameter relative to the diameter D1, outside dimension of the insulating sleeve or tube 21. In other words the diameter of the punchings or hole as indicated at D2 in Fig. 6 is less than the outside diameter D1, so that ordinarily the sleeve could not be passed through the hole 17a in the punching.

To permit fitting the outside spacers with the undersized holes onto their respective sleeve portions 21 and 22 the top and bottom spacer punchings are provided with formations which are part of the sleeve holes and which permit a certain amount of expansion so that they may be forced onto the sleeve and will frictionally grip the latter with sufficient force to insure maintenance of the stack assembly in assembled condition even with reasonably rough handling. In Figs. 2 and 6 a preferred formation of the aforesaid nature for permitting expansion the provision of notches 23a and 23b cut into the opposite lateral edge portion of the spacer 17 and each communicating into the correspondingly adjacent hole 17a or 17b.

The amount of undersize in the spacer punchings in general depends upon the other dimensions of the piece in any given case. In the example shown the spacers or punchings are preferably three-quarters of an inch long by three-eighths inch wide and one-sixteenth to one-thirty-second inch thick. Under these circumstances the difference in diameter between the holes and the fiber or rubber sleeving may be two to three thousandths inch. At the bottom of Fig. 6 this difference is indicated as $D_1 > D_2$ by 0.002" to 0.003".

In Fig. 3 the spacer or punching 17x is substantially the same as that described in view of Fig. 2 except that the notches 23x leading into the sleeve holes are situated on opposite sides of the strip along the long edge thereof. This may be advantageous where particularly thin pieces of insulating material are employed and it is desired to limit the amount of give when the hole expands to engage the sleeve.

In Fig. 4 the modified spacer or punching 17y differs from those heretofore described in that a central elongated slip 23y is employed to join the two sleeve holes to permit yieldability in engaging the sleeve.

According to the arrangement of Fig. 5, the spacer or punching 17z has each of its sleeve holes provided with a short radial notch 23z to permit limited expansion, especially where the thickness of the insulating strip from which the spacer is punched is slight.

In cases where the stock from which the spacers or punchings are stamped is thick enough, it is possible to use only top and bottom spacers or punchings having undersized holes and expansion notches. However, for purposes of uniformity in production it is preferred to make all spacers or punchings in the manner illustrated in Fig. 1 for example, wherein each spacer or punching is provided with undersized holes for the sleeves and with formation permitting expansion of the hole when forced onto the sleeve. In this manner each spacer or punching grips the sleeve portion firmly and the entire assembly is thus very securely held together.

While the foregoing description is directed toward the construction illustrated, I desire it to be understood that I reserve the privilege of resorting to all of the mechanical changes of which the device is susceptible without departing from the spirit of the invention as to the beneficial objects sought to be attained, the invention being defined and limited only by the terms of the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. In a switch stack assembly substantially as described, insulator punchings having one or more holes to accommodate an insulating sleeve, said holes being of lesser diameter than the outside diameter of said sleeve, and formations communicating with said holes permitting expansion of the same to fit onto said sleeve tightly and thereby hold said stack in assembled condition for purposes of handling and the like.

2. In a switch stack assembly including insulating sleeve portions upon which insulating spacers are fitted, spacers provided with holes of lesser diameter than the sleeve portions on which they are to be fitted, said holes having cutaway portions communicating into an edged portion of the spacer whereby to permit expansion of the hole for a tight fit upon the sleeve portion as aforesaid to hold the stack in assembled condition for purposes of handling and the like.

3. An insulating spacer for use in a switch stack assembly of the type including an insulating sleeve passed through a stack of insulating

spacers, said spacer including a hole to engage said insulating sleeve, said hole being of lesser diameter than the outside diameter of the sleeve upon which it is to engage, and means including a cutaway portion leading into the edge of said hole to permit expansion of the same for tightly fitting upon the sleeve.

4. In a switch stack assembly, insulating spacers having sleeve holes with formations for expansion, said spacers being forcibly fitted upon sleeve portions which are oversize relative to the normal unexpanded condition of said sleeve holes, whereby the stack is maintained in assembled condition.

5. In a switch stack assembly of the type including a plurality of spacer elements arranged in a stack with one or more contact elements disposed between any adjacent spacer elements, and a sleeve member passing through holes in said spacer and contact elements, I claim that improvement which consists in keeping all of said elements in assembled relation for purposes of handling, transport, and the like, by the provision of a gripping fit between said sleeve member or members and the outermost ones, at least, of said spacer elements by having the sleeve of larger diameter than the said holes through which the sleeve member or members are passed as aforesaid.

EDWARD JOSEPH GLENNON.