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E. G. BAKER

2,334,897

SPRING TENSION DEVICE

Filed March 18, 1940

Fig. 1.

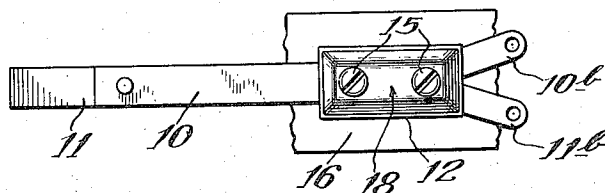


Fig. 2.

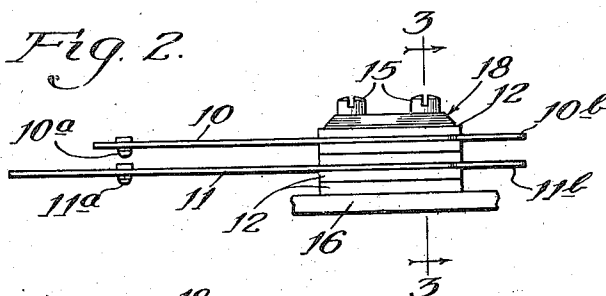


Fig. 3.

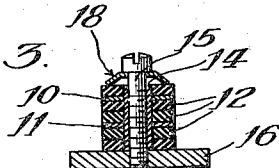


Fig. 4.

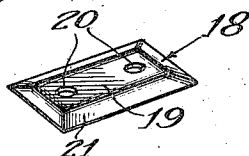


Fig. 5.

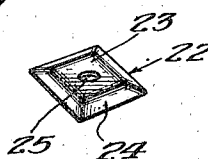
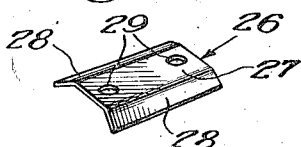


Fig. 6.



Inventor:
Edward G. Baker
By: Bair & Freeman
Attorney

UNITED STATES PATENT OFFICE

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SPRING TENSION DEVICE

Edward G. Baker, Chicago, Ill., assignor to
Guardian Electric Manufacturing Co., Chicago,
Ill., a corporation of Illinois

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3 Claims. (Cl. 200—166)

The present invention relates to devices intended for use in connection with the maintenance of a plurality of elements in assembled relation, and more particularly to devices of the type which exert a spring tension on one or more elements for imposing a frictional force to assist in securing and maintaining said elements in fixed relation to a mounting.

More specifically, it has been found that when a plurality of certain kinds of elements, such as blocks of insulating material, are assembled together as a unit with switch fingers interposed therebetween, in a widely used type of switch device, the spring tension devices heretofore available do not under usual range of variations of temperature and atmosphere, maintain the stack of blocks and switch fingers in such relationship to each other as to preclude shifting or misalignment of the contacts of switch fingers relatively to each other.

In practice it has been found that such blocks of insulating material expand by the absorption of moisture from the atmosphere and contract when moisture is given off in a relatively dry atmosphere. This expanding and contracting action is almost continuously taking place and results in developing a looseness in the assembly of the stack of blocks, so that when such a switch device is mounted in connection with apparatus subject to even slight vibration, the switch fingers are caused to move relatively to each other, either laterally or vertically, so as to misalign or improperly adjust the cooperating contact buttons of the switch fingers. Such out of adjustment of the switch fingers also results directly from the physical movement of the blocks themselves during their expansion and contraction as above mentioned.

While spring tension washers of various types have heretofore been employed for securing such stacks of insulating blocks in fixed relation, the frictional force exerted by such washers, has been found to be insufficient to overcome the above mentioned objectionable conditions.

One practical solution to this problem, that has been employed, consists in assembling the stack of blocks, with the switch fingers interposed in proper position, and then tightening the fastening elements with the spring washer in position, and then subjecting the assembled structure to a baking operation to remove excessive moisture from the blocks of insulating material, after which the fastening elements are further tightened to take up any slack or looseness developed by contraction of the blocks in the de-

hydrating action. While this method results in providing a construction wherein the switch fingers are maintained in relatively fixed relation with respect to their mounting blocks irrespective of normal changes in atmospheric conditions, the process of accomplishing this result is relatively expensive and time consuming.

The primary object of this invention is to provide a novel form of spring tension device which is particularly suitable for use in connection with a stack of blocks of insulating material, such as employed in connection with a widely used type of switch device, and wherein said spring tension device is of a form so that at all times it maintains the blocks under adequate tension and compensates for variations in thickness of the blocks of insulating material, due to their expansion or contraction incident to the reaction to variations of atmospheric conditions, and thereby maintains the switch fingers in proper aligned relation to each other.

Another object is to provide a novel and improved form of spring tension device of the character indicated which is particularly suited for use in connection with a widely used type of switch device, and wherein said spring tension device is so constructed as to permit the elimination of certain elements heretofore employed in connection with said switch devices, and which facilitates the assembly of the stack of blocks of insulating material and the switch fingers, to build up the switch device.

A further object is to provide a novel form of spring tension device of the character indicated which is formed from spring metal as a unitary stamping and which is adapted to exert a compressive force over a relatively large area.

Other objects and advantages of this invention will be apparent from the following description, taken in connection with the accompanying drawing, in which:

Figure 1 is a plan view of a switch device provided with a spring tension device embodying the present invention;

Figure 2 is a side elevation of the switch device;

Figure 3 is a vertical section through the switch device and through the stack of insulating blocks, switch fingers and my novel tension device, taken substantially as indicated at line 3—3 of Figure 2.

Figure 4 is a perspective view of a spring tension device constituting the present invention; and

Figures 5 and 6 are perspective views of modified forms of my spring tension device.

For purpose of illustration, the spring tension device constituting the present invention is shown in the drawings in association with a conventional form of switch device comprising a pair of flat, resilient switch fingers 10 and 11 mounted in parallel spaced apart relation in a stack of blocks 12 of insulating material, which are of generally rectangular form. The switch fingers include a pair of cooperating contact buttons 10a and 11a, and have terminal extensions 10b and 11b for connection to conductor wires in an electrical circuit to be controlled by the switch composed of the fingers 10 and 11.

In the construction illustrated in the drawings, the blocks as well as the switch fingers are provided with a pair of longitudinally spaced apart apertures to facilitate stacking and positioning of the blocks and switch fingers, as seen in section in Figure 3, on tubular sleeves 14, of insulating material, such as rubber. The sleeves 14 provide a passageway for entrance of suitable fastening members, which as herein shown are in the nature of screws 15, for securing the stack of blocks, with the switch fingers interposed, to a suitable mounting such as indicated at 16.

It is to be understood that for purpose of this invention it is not essential that the blocks be mounted on an insulating sleeve, as the blocks may be so formed as to provide proper insulation for the switch fingers 10 and 11 from each other as well as the fastening screws 15.

Mounted on top of the stack of blocks 12, and beneath the head of the screw 15 is a spring tension device 18 constituting the present invention. The spring tension device desirably is of rectangular form, formed as a stamping from any suitable spring metal, and includes a flat central rectangular area 19 having spaced-apart apertures 20 for registration with the apertures of said blocks and for accommodating the screws 15. Totally surrounding the central area 19 and contiguous therewith is a continuous marginal area 21 which extends downwardly and outwardly with respect to said central area 19. Because the central area is of rectangular outline, the portions of said continuous marginal area assume a form wherein each set of two opposite marginal portions or areas extend in opposite relation to each other, as seen in Figure 3. Preferably the dimensions of the spring tension device is such that the lower edge of the continuous marginal portion 21 seats upon the outer marginal area of the uppermost block 12. Thus, when the screws 15 are tightened a substantial force is exerted over a relatively large part of the top area of the stack of blocks 12.

Substantially equivalent results may be obtained by forming the spring tension device 18 of slightly larger size so that the under-inclined surface of each of the four portions of the marginal area 21, separately impinge against the respective marginal corners of uppermost block 12, and exert a substantial compressive force on the stack of blocks.

In the constructions above described, the spring tension device 18 constantly compensates for variation in thickness of the blocks 12 due to their expansion and contraction incident to changes in atmospheric conditions. Moreover, by virtue of these constructions it is possible to maintain an assembly of blocks of insulating material, together with the switch fingers 10 and 11, in relatively tight frictional engagement with each other, irrespective of atmospheric condi-

tions, so that the switch fingers 10 and 11 are maintained at all times in proper functioning relation with respect to each other and their assembly in the stack of blocks. My novel form of spring tension device permits dispensing with the mounting plate usually placed on top of the stack of blocks, and the lock washers or equivalent elements heretofore employed, and therefore facilitates the assembly of a switch structure of the character indicated, resulting in saving of material and time for more economical production.

Figure 5 discloses a modified construction of spring tension device, indicated at 22, of square outline, and having a square central area 23, provided with an aperture 25 for receiving a fastening screw 15. The central area 23 is surrounded by a continuous marginal area 24, extending downwardly and outwardly with respect to said central area 23. In certain instances, a tension device of this type is adequate for exerting the necessary compressive force to properly maintain an assembly of elements in relatively tight, fixed relation. If desired two spring tension devices 22, may be employed in lieu of the single device 18 embodied in the construction shown in Figures 1 to 4.

In the modified construction disclosed in Figure 6, the spring tension device, indicated at 26, is of rectangular outline, including a central area 27, extending from end to end. Contiguous with opposite sides of said central area 27, are downwardly and outwardly inclined portions 28. The central area is provided with a pair of spaced-apart apertures 29, for accommodating screws 15 for assembling with a plurality of elements. The form of tension device 26, may be used in either of the two manners described with respect to the tension device 18.

Although I have herein shown and described my novel spring tension device in association with blocks of insulating material of a switch device, manifestly it is capable of use in various other assemblies of elements. While I have disclosed certain prepared embodiments of my invention, it should be apparent that it is capable of further modification without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting this invention to the precise embodiments herein disclosed, except as I may be so limited in the appended claims.

I claim as my invention:

1. In combination with a switch stack assembly of the class described, an accommodation header 18 or 26 comprising a piece of spring metal bowed to provide a concavo-convex configuration, and provided with one or more holes 20 or 29 for passage of a mounting screw 15 or the like extending into said assembly, said header 18 or 26 being adapted for mounting on the top-most member 12 of the stack with its concavity facing said member 12 and edgewise portions bearing by urge of said screw 15 against the stack with space available in the concavity for accommodation of protruding portions of the stack, substantially as set forth.

2. In a switch stack assembly of the type including one or more elongated spring switch blades 10-11 mounted between two or more insulating members 12, and secured to a mounting member 16 by means of one or more screws 15 passed through said blade or blades 10-11 and said insulating members 12 and surrounded by an insulating sleeve 14 likewise passing through

said blade or blades 10—11 and insulating members 12, the combination of a header means adapted to automatically take up looseness between said insulating members 12 and blades 10—11 and to compensate for ordinary oversize in tolerance in the length of said sleeve 14, said means comprising a header member 18 or 26 constructed of spring metal or analogous material of substantially rectangular form and bowed transversely with openings 20 or 29 therethrough to accommodate mounting screws 15 passing through said sleeve 14, said header 18 or 26 being adapted to overlie the topmost insulating member 12 and to have edge portions pressed against said member 12 by tightening up of said mounting screw or screws 15 with any protruding portion of the sleeve 14 as aforesaid extending into the space beneath the bowed portion of the header 18 or 26 immediately surrounding said screw or screws 15.

3. A switch stack assembly, comprising, in combination, a plurality of switch blades 10—11, secured between alternately positioned insulating

wafers 12 arranged in a stack, there being one or more insulating sleeves 14 passed through said blades 10—11 and wafers 12 in said stack to provide a protective passage for a mounting screw 15, said stack being adapted for mounting on a support 16 by means of screws 15 passed through said sleeves 14, together with a header member 18 or 26 in the form of an elongated piece of metal bowed transversely of its length and provided with mounting holes 20 or 29 for alignment with said sleeves 14, said screws 15 being passed through said mounting holes 20 or 29 into said sleeves 14 and turned up against said header 18 or 26 to spring the latter 18 or 26 against the topmost insulating wafer 12 in said stack, whereby to provide a concavity between the underside of the header 18 or 26 and said topmost wafer 12 and to cause edgewise portions of the header 18 or 26 to bear against the latter 12 when said screw 15 is turned up, and to provide a space to accommodate oversize in length of said sleeves 14.

EDWARD G. BAKER.