

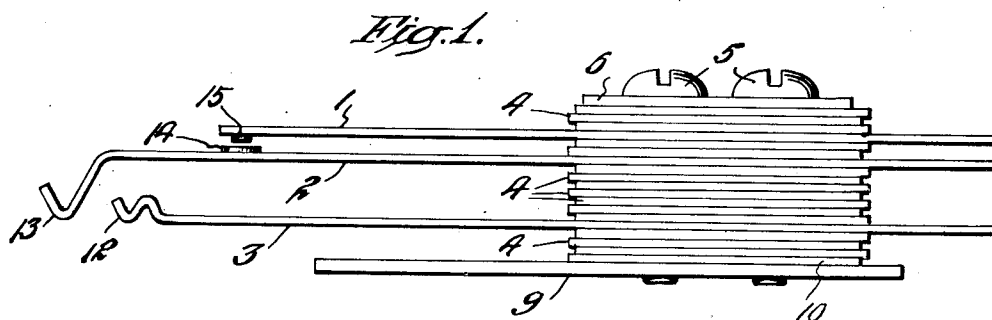
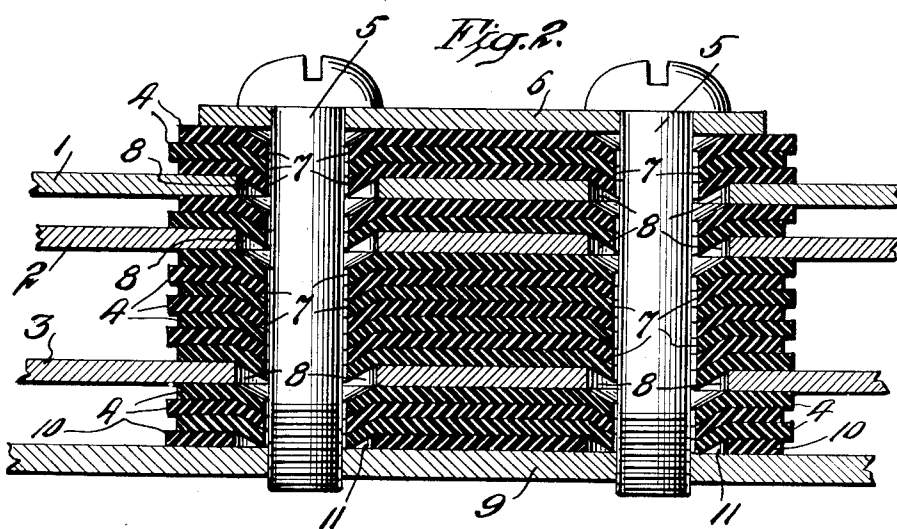
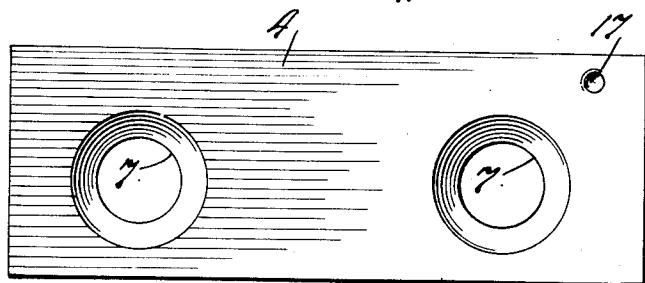
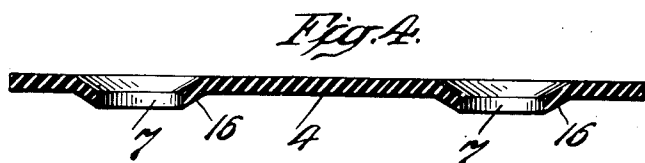
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INSULATOR FOR PILE-UP SWITCHES

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## INSULATOR FOR PILE-UP SWITCHES

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The present invention relates generally to a novel method of making multiple contact switch structures of the flat spring-nest type such as the jack and other spring-nest assembly switches commonly employed with communication systems. It consists moreover in a special form of insulator adapted for standardization and to permit of pile-up assembling to provide the spacing and insulating requirements to meet varied switch conditions and with the elimination of the customarily employed bushings surrounding the securing screws.

A presently employed and conventional manner of manufacturing multi-contact spring-nest and jack assemblies is to employ flat spring contact elements and flat insulating elements interposed therebetween each of which is provided with spaced openings for the reception of insulating bushings through which are extended the securing or clamping screws ordinarily threaded to a supporting frame member. This structural arrangement is objectionable and costly in that to meet the varied and numerous spacing requirements of differing assemblies requires the stocking and employment of bushings of different lengths with possibility of misusing bushings of excessive or deficient length and the resulting danger of causing short circuiting or crushed bushings.

In accordance with the present invention an improved spring-nest switch structure is produced by the employment of a novel form of insulator of standardized construction formed to provide the required insulation between contacts and insulation and spacing of the spring-nest from the securing screws fulfilling the function of and eliminating the requirement of the bushings. The improved form of insulator is further of a formation to provide for face contact and a nesting relation permitting of the employment of multiples of insulators of standard thickness in pile-up arrangement so as to provide for the varied spacing between the contact or spacing elements.

The foregoing and other important features and advantages of the present improvements will be more fully understood by reference to the accompanying drawing wherein like reference characters are applied to the corresponding parts in the several views.

In the drawings:

Fig. 1 is a view in side elevation showing a typical multiple contact element switch assembly embodying the features of the invention;

Fig. 2 is a partial and enlarged sectional view through the insulating and supporting portions

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with the section taken vertically and longitudinally through the securing screw apertures;

Fig. 3 is an enlarged plan view of one of the insulator elements, and

Fig. 4 is a longitudinal, vertical sectional view centrally through the apertures of the insulator of Fig. 3.

As a typical embodiment and adaptation of the invention it is here shown incorporated in a multi-contact switch structure of the spring-nest or jack type as commonly employed in telephone communication systems and adapted to have its circuits closed or altered by a plug connector. The spring-nest assembly as indicated, consists of the flat spring elements 1, 2 and 3 separated by and insulated from each other by insulator plates or elements 4 and secured or clamped together by means of longitudinally spaced securing screws 5 passing through holes or apertures in an upper clamping plate 6, through apertures 7 in the insulating elements and relatively enlarged apertures 8 in the contact elements 1, 2 and 3 having threaded engagement at their lower ends with a supporting or frame member 9. In this assembly insulator elements 4 are interposed between the clamping plate 6 and the uppermost contact 1 and insulators 4 are likewise interposed between the lower contact 3 and a base insulator 10 having enlarged openings 11 bearing against the frame 9. The contacts 3 and 2 are shown of conventional form having bent ends or tip formations 12 and 13 to be engaged by the usual plug tip and ring or sleeve portions. The contact 2 and likewise contact 1 are also provided with normally spaced contact points 14 and 15 as ordinarily employed for closing of a circuit by plug actuation.

In accordance with the present invention the insulator elements 4 are preferably standardized as to thickness and formation to permit of their employment in varied spacing between the contact elements to meet specific requirements. They are further of special form at the region of their openings or apertures. As shown the aperture walls are formed in angularly disposed and offset marginal portions 16. These inclined aperture marginal portions have an outer diameter corresponding to the diameter of the openings in the contact elements and have an inner diameter such as to provide a close fit relative to the securing screws and the degree of off-setting desirably corresponds to the thickness of the insulator as indicated.

The apertures 7 are likewise located to be non-centered both longitudinally and laterally of the

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insulators thereby to permit staggering of the end and side marginal edges in the pile-up assembling of the elements by merely alternately reversing their position in assembling. This staggering, for the purpose of increasing moisture leakage path, is accordingly effected with the employment of similar and standardized insulator elements and to facilitate the proper stacking of the elements they are provided with visible indication, such as a hole or other deformation, as indicated at 17 designating the sides of greater extension as here shown.

The angular offsetting of the aperture marginal wall portions as indicated permits of their being stack assembled with the spring or contact elements so as to provide for their insulated and spacing relation. It further provides the insulation between, and likewise the positioning of, the spring elements and the securing screws. As will be noted, in the pile-up assembling of the insulators there will be a nesting relation of the marginal offset 16. In the forming of the insulators, which may desirably be of a phenol fiber composition or other suitable insulating material, the marginal offsets or bushing portions 16 are desirably formed with their edge portions feathered to provide vertical aperture walls. This produces an edge formation permitting close tolerance reception of the screws and centering of the parts under the clamping pressure. The resulting simplified construction, incident to the employment of the standardized insulators as described, offers substantial manufacturing economies incident to the reduction in number of differing parts, eliminates the requirement of separate bushings as referred to and further, materially simplifies the assembling operation in that the nesting arrangement, to a substantial degree, effects self-centering of the parts in the stacking and clamping operations. It further self-centers the screws in relation to the spring holes upon tightening thereby insuring proper alignment of the spring elements relative to the terminal plug and with similar simplification of the insulator staggering alignment as referred to.

While there is shown and described a preferred embodiment of the features of the invention, it will be understood that varied modifica-

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tions may be made therein without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. A pile-up switch structure comprising in combination with frame and spring members, of a plurality of insulator elements positioned to insulate and space the spring and frame members, said insulator elements being of plate form having apertures for receiving clamping screws and formed with angularly offset aperture marginal portions adapted for nesting registration, said spring members having relatively enlarged openings adapted to receive therein the insulator offset portions to space and insulate the springs from the screws, said apertures being staggered in position relative to the sides and ends of said plate to effect staggered edge projection on reverse position assembly and securing screws fitted to the insulator apertures and attached to the frame for clamping of the parts.

2. A pile-up switch structure as claimed in claim 1 wherein the insulators have deformation marking to identify its position.

3. An insulator for a spring-pile switch assembly composed of a plate of insulating material of substantially uniform thickness having a plurality of apertures therein, said apertures being formed with angularly projected marginal portions adapted to permit face engagement of piled insulators with nesting of said projected marginal portions, said apertures being formed in a staggered arrangement relative to both the sides and end portions of said plate.

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