May 10, 1932. H. N. WAGAR 1,857,828

CIRCUIT CONTROLLING DEVICE

Filed April 30, 1930

FIG. 1

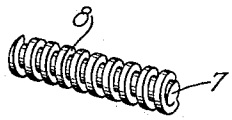


FIG. 2

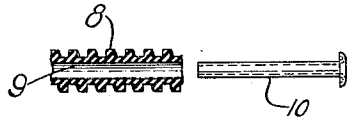
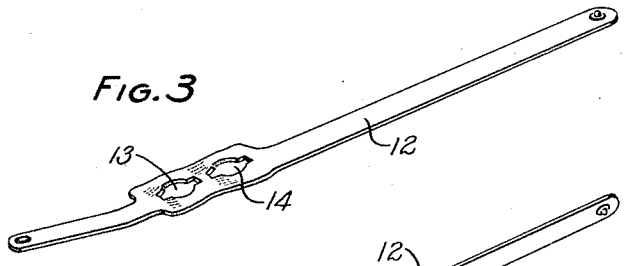


FIG. 3



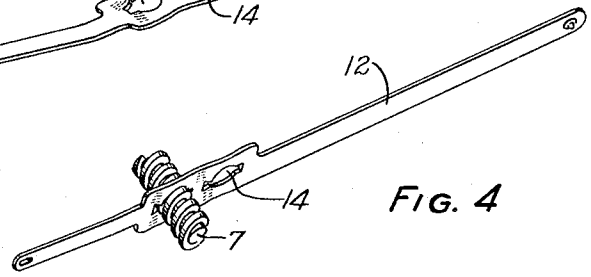
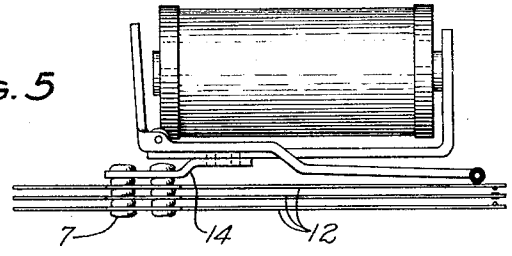


FIG. 4

FIG. 5



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UNITED STATES PATENT OFFICE

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CIRCUIT CONTROLLING DEVICE

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This invention relates to circuit controlling devices of the spring contact type and more particularly to insulating separators employed in the spring assembly of such devices.

In certain types of apparatus and particularly in various classes of electrical apparatus, such as electromagnetic relays, keys, etc., extensively employed in telephone exchange systems, a plurality of superimposed circuit controlling contact springs are actuated by a common armature, manual lever or the like. The springs are arranged in parallelism and are insulated from each other.

Heretofore, it has been usual practice to insert insulating spacers between adjacent contact springs, there being holes punched in both the springs and spacers to permit the passage of a bolt, or its equivalent, through the combination. An alternative arrangement consisted of a tubular bushing which passed through the springs and insulating separators, and made fast by means of a rivet, or any other suitable means.

These methods of assembling spring contact units have proven very satisfactory and result in highly efficient and durable contact units. However, from the nature of the construction of such units, these methods require numerous operations, such as cutting the spacers to predetermined dimensions, accurately aligning the spacers and springs and assembling the pile-up element by element, which require considerable time and precise workmanship.

It is an object of this invention to improve the construction of spring pile-ups and to effect a simple, economical method of assembling the various elements which constitute a spring contact unit.

This object is attained in accordance with a feature of the invention by the provision of a threaded insulating bushing which serves as a spacer for the several contact springs and is adapted to be screwed into the aligned holes in the springs to effect a unit spring pile-up.

The invention will be readily understood from the following detailed description made with reference to the accompanying drawings in which Fig. 1 is the preferred form of the insulating bushing which constitutes a feature of the invention: Fig. 2 discloses an alternative form of bushing: Fig. 3 shows a contact spring particularly designed to function with the bushings shown in Fig. 1 and Fig. 2: Fig. 4 is a combination spring and bushing: Fig. 5 shows a unit spring pile-up, embodying the features of this invention, mounted on a relay structure.

The bushing 7 shown in Fig. 1 is made of any thermoplastic insulating material and is made up as a threaded element. The thread 8 may be formed in any suitable manner, such as by means of a cutting tool, or by extrusion.

In Fig. 2 a tubular element 9 is employed and is also provided with a thread 8. In this type of bushing an elongated eyelet is employed for the purpose of securing the bushing and springs together as a unit and for providing a convenient means of mounting the unit. The ends of the eyelet may be turned over by means of a spinning operation. A rod may also be substituted for the tuning or eyelet.

Fig. 3 shows a contact spring 12 provided with a set of mounting holes 13 and 14. The inner periphery of the holes 13 and 14 constitute one convolution of an internal thread having the same pitch as the thread on the bushings 7 and 9.

In assembling a spring pile-up embodying the features of this invention the contacts are placed in a suitable jig to place the holes therein in alignment and the insulating bushing is threaded through the holes. Heat is then applied to the combination to render the bushing material slightly plastic and pressure is applied to the bushing to effect a rigid engagement between the bushing and the springs. A forming tool is employed to round off the ends of the bushing. When a bushing such as is shown in Fig. 2 is employed it is screwed into the holes in the springs, an eyelet such as 10 put through the bushing and a spinning tool employed to compress the whole combination, at a predetermined temperature, and the eyelet spun over to complete the unit.

As shown in Fig. 5 the spring units may be mounted on brackets such as 14, which in turn are secured to the relay structure.

This design of spring unit renders it possible to stock large quantities of the various elements which constitute a contact spring unit and reduces the number of assembly operations to a minimum. The threaded insulator may be stocked in various desirable lengths or in a single long length and cut to the desired dimension during assembly. The insulator in reality, constitutes a bushing and a plurality of insulating spacers made up as an integral unit. The depth of the thread is so dimensioned as to correspond to the desired spacing between adjacent spring elements so that after assembly, the springs are uniformly spaced.

It is also evident that by resorting to this design of spring unit any desired spring combination may be readily and economically effected.

The compressing of the unit after assembly at a predetermined temperature causes the wearing surface of the thread on the insulator to assume a substantially horizontal position with respect to the vertical axis of the bushing thereby causing the contact springs to extend from the bushing in a plane at right angles to the axis of the bushing.

What is claimed is:

1. In a circuit controlling device, the combination of a plurality of spring strips having aligned holes therethrough and a threaded insulator passing through the aligned holes in said spring strips, each convolution of the insulator thread serving as a spacer for adjacent spring strips.

2. In a circuit controlling device, the combination of a plurality of spaced spring strips having aligned holes therethrough and an insulator provided with a thread the depth of which equals the space between adjacent spring strips, located in the aligned holes in said spring strips, each convolution of the insulator thread serving as a spacer and cooperating with adjacent spring strips in maintaining them in spaced relationship.

3. In a circuit controlling device, the combination of a plurality of spring strips having aligned holes and a bushing located in the aligned holes in said strips and provided with a spiral ridge each convolution of which serves as a spacer for adjacent strips.

4. In a circuit controlling device the combination of a plurality of spring strips having aligned holes therethrough, the inner periphery of each of the holes in said strips constituting a single convolution of an internal thread of a predetermined pitch and a threaded insulator passing through the aligned holes in said spring strips, the thread on said insulator having the same pitch as the thread on said strips.

5. A spring contact unit comprising a plurality of superposed contact springs and an insulating bushing passing through said contact springs and provided with a continuous spiral ridge, each convolution of said spiral ridge cooperating with adjacent contact springs in maintaining them in superposed spaced relationship.

6. A spring contact unit comprising a plurality of superposed contact springs, a bushing common to and supporting all of said contact springs and a spacer interposed between each pair of adjacent contact springs for maintaining said contact springs in spaced relation, all of said spacers collectively forming a continuous spiral ridge formed integrally with said bushing.

In witness whereof, I hereunto subscribe my name this 28th day of April, 1930.

HAROLD N. WAGAR.