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3,371,152

CONTACT SPRING

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FIG. 1

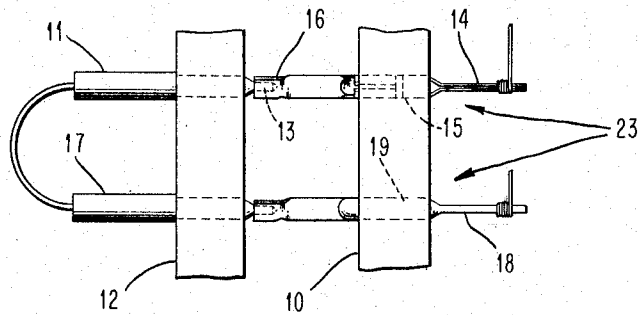


FIG. 2

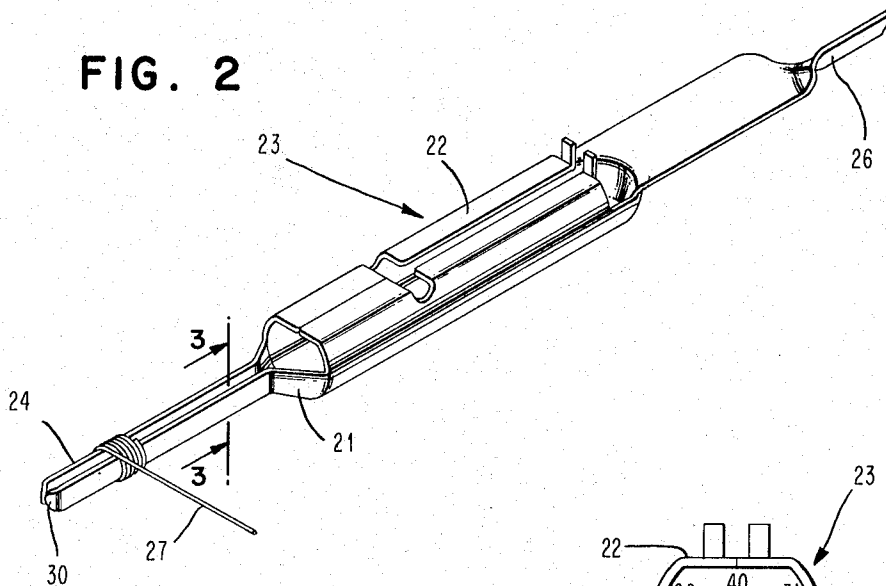
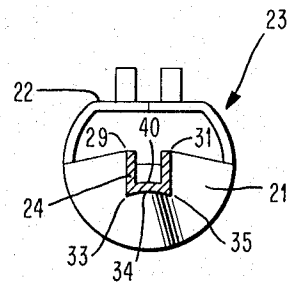


FIG. 3



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CONTACT SPRING

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This invention relates in general to the art of plugboard contact springs. In particular, this invention relates to a plugboard contact spring which is equipped to handle wire wrap connections.

A shortcoming in the known state of the art of plugboard contact springs has been that they are unsuitable for use with wire wrap machinery. Briefly, the use of wire wrap machinery is a technique of providing ohmic connections from terminal to terminal by simply wrapping a bare wire lead several times around a terminal post. The use of this type of machinery is of considerable importance in present day production techniques since it permits terminal to terminal connections to be made rapidly and inexpensively by avoiding inefficient and costly hand soldering and/or insertion techniques. The economic importance of using wire wrap machinery can be appreciated, since in the digital computer art, for example, literally thousands of such connections must be made. Summarizing, therefore, the presently known state of the art, no contact springs have been devised for use with a removable, programmed plugboard arrangement that are readily adapted for use with automated wiring techniques such as wire wrap machinery.

It is, therefore, an object of the instant invention to provide a new and improved contact spring.

It is another object of the instant invention to provide a new and improved contact spring for use with a plugboard arrangement.

It is yet a further object of the instant invention to provide a new and improved contact spring for use with a wire wrap connection.

It is still a further object of the instant invention to provide a new and improved contact spring which can be readily employed with wire wrap machinery.

It is a further object of the instant invention to provide a new and improved contact spring designed to receive a wire wrap connection that can be simply fabricated.

In accordance with a feature of this invention, there is provided a plugboard contact spring which incorporates as an integral part thereof a formable termination post suitable for a wire wrap connection. The termination post suitable for wire wrap requirements consists of a channel member (i.e., a member with a channel formed therein) which is fabricated in such a manner as to provide four sharply edged corners. The sharply edged corners of the channel-formed termination member present a strong bite on the turns of wire wound by a wire wrap machine, thereby assuring that a good ohmic connection is made.

In accordance with a further feature of the instant invention, the channel-formed member of the contact spring can be readily fabricated and made integral with the remaining portions of the contact spring. In other words, the use of a channel-formed wire wrap post provides a cross section with biting edges required for wire wrap connections and at the same time, the entire contact spring can be stamped and formed as an integral unit by relatively simple tooling methods.

In accordance with another feature of the instant invention, a good bite for a wire wrap connection is obtained by making at least two of the four angles comprising the channel-formed termination post less than 90 degrees. The "less than 90-degree" angles are developed by making an arcuate indentation on the surface of the post member which lies opposite the channel.

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The novel features that are considered characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, as well as additional objects and advantages thereof, will become apparent from the following description when considered in conjunction with the accompanying drawing, in which:

FIGURE 1 depicts the combination of a removable plugboard interconnected with a fixed plugboard;

FIGURE 2 is an isometric view of the contact spring provided by the instant invention;

FIGURE 3 is a sectional view of the channel-shaped wire wrap termination post of the contact spring depicted in FIGURE 2.

Referring now to the drawings, and in particular to FIGURE 1, the removable front plugboard 12 is depicted in juxtaposition to the fixed plugboard 10. The fixed plugboard 10 comprises a support means which accurately positions a plurality of contact springs such as springs 15 and 19. The removable plugboard 12 houses a plurality of apertures which may receive a male connector such as connectors 11 and 17. The plurality of apertures of the plugboard 12 are aligned with the plurality of contact springs of the plugboard 10. The removable front panel 12 is conventionally called a programmed plugboard since it can be programmed for a desired data routing such as accounting, payroll, etc., by inserting the male connectors 11 and 17 in certain hole locations. Thus, to exemplify a possible programming arrangement, two apertures are interconnected by the male connectors 11 and 17. The male connectors 11 and 17 therefore make an electrical contact with contact springs 15 and 19 respectively in the stationary plugboard 10. It should be understood, that leads are wire wrapped around the post members 14 and 18, of the contact springs 15 and 19, respectively. These wire leads are connected to various circuit elements in the internal section of an electronic device and are not shown in order to preserve simplicity and ease of understanding.

Referring now to FIGURE 2, there is depicted the contact spring 23, which is a more detailed view of the contact springs 15 and 19 positioned within the stationary plugboard device 10 (FIGURE 1). The contact spring 23 comprises three sections, namely, the central barrel 22, the wiper arm 26 extending from one end of the barrel 22 and the wire wrap termination post 24 connected to the other end of the barrel member. The contact spring 23 is made from a suitable thin gauge of spring contact material, such as beryllium copper, "phosphor bronze," etc., either material being gold plated for good ohmic contact. The barrel section 22 has a semi-circular cross sectional area so that it can be frictionally positioned in the stationary plugboard device 10. Integrally formed with one end of the barrel section 22 is the wiper contact 26. The wiper contact 26 (16 in FIGURE 1) is arranged in such a manner that when the male connection of the removable plugboard 12 is to make contact with some of the contact springs of the stationary plugboard 10, the reduced diameter (in dotted form) 13 of the male connector will be positioned against the wiper 16. The electrical contact (i.e., between the wiper 16 and the reduced diameter male portion 13) is made secure by tightening means (not shown) which forces the male portion 13 to jut up against the wiper element 16, thereby assuring electrical conduction.

Returning again to FIGURE 2, the channel-formed wire wrap termination post 24 is integrally formed with the other end of the barrel section 22 of the spring contact 23. The termination post 24 is integrally joined to the barrel section 22 by means of a transition section 21. The wire wrap termination post 24 has a channel formed therein as the flat metal stack is stamped in fabricating the spring so that at least four sharply edged corners are readily provided. This feature is most significant in that it

has been found that this cross sectional area readily adapts itself to mechanical stamping techniques and at the same time develops the required sharply edged corners. At least four sharply formed corners are required for the wire wrap termination post in order that a good ohmic connection can be obtained when a wire lead such as 27 has several turns of wire positioned thereon by a wire wrap machine (not shown). The end 30 of the termination post 24 is provided with two small tabs which are bent in a particular manner and shaped so as to provide a lead for the post into the wrapping head (not shown) of the wire wrap machine.

FIGURE 3 shows a sectional view of the channel-formed cross sectional area of the wire wrap termination post 24 (FIGURE 2). Four sharply formed edges 29, 31, 33 and 35 are depicted and provide the good bite required for a wire wrap connection such as 27 (FIGURE 2). It can be appreciated that sharp edges are required for a good ohmic connection between the wire wrap 27 and the contact spring 23 (FIGURE 2) since no soldering of any kind is used to make the connection permanent. In a particular embodiment, the sides of the channel-shaped termination post are approximately 0.049 inch on a side and the diagonal is 0.070 inch.

A significant feature of the instant invention resides in the fact that the sides resulting in sharply formed edges 33 and 35 subtend an angle which is less than 90 degrees. The less than 90 degree angle subtended by the edges 33 and 35 are formed because of the arcuate indentation 34 of the surface lying opposite the surface having a channel 40 formed therein. Thus, in the process of forming the channelized section of the contact spring 23, a machine punch acting downwardly in cooperation with a die member in the shape of the arcuate indentation 34 causes the sharply edged corners 33 and 35 to be formed. By means of this simple manufacturing technique, the entire contact spring 23 (FIGURE 2) can be integrally fabricated by simple forming methods, which are nevertheless economical. In other words, the U-shaped termination post not only provides the sharply edged corners that are required for wire wrap terminations, but at the same time this type of cross sectional area allows it to be integrally formed with the remaining sections of the contact spring 23 (namely, the barrel 22 and the wiper 26) by a single transition section 21. Hence, no welding steps are involved in fabricating the contact spring 23.

In summary, the instant invention provides a contact spring used in conjunction with a plugboard arrangement which is readily adaptable for use with wire wrap machinery. In accordance therewith, a channel-shaped wire wrap termination post is integrally formed with a barrel section for frictionally positioning in a fixed plugboard arrangement, as well as being integrally formed with a wiper arm for electrical contact with a male element of an interconnection wire. The channel-shaped termination post of the contact spring is so formed so as to provide at least four sharply edged corners. The four sharply edged corners of the termination post provides a good bite on the turns of bare wire which are wrapped thereon by wire wrap machinery. In this manner good ohmic connections can

be simply and economically obtained in a large scale system.

Obviously, many modifications and variations of the present invention are possible in the light of the above teaching. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A contact spring for a stationary plugboard device having a barrel shaped section adapted to be frictionally positioned in said plugboard device, said barrel section having first and second end positions, a wiper element integrally formed with said first end position of said barrel shaped section, said wiper element adapted to make an ohmic connection with a contact element of a removable plugboard device the improvement comprising: (a) a channel shaped post member integrally formed at said second end position of said barrel shaped section, (b) said channel shaped post member having four sharply edged corners running the length thereof, at least two of which sharply edged corners being formed by an arcuate indentation of the surface lying opposite the surface having the channel therein, said four sharply edged corners providing biting surfaces for a continuous wire wrap connection.

2. A contact spring for a stationary plugboard device having: a barrel shaped section adapted to be frictionally positioned in said plugboard device, said barrel section having first and second end positions, a wiper element integrally formed with said first end position of said barrel shaped section, said wiper element adapted to make an ohmic connection with a contact element of a removable plugboard device the improvement comprising: (a) a channel shaped post member integrally formed at said second end position of said barrel shaped section, (b) said channel shaped post member having four sharply edged corners running the length thereof, at least two of which sharply edged corners being formed by an arcuate indentation of the surface lying opposite the surface having the channel therein, (c) the angles formed by said at least two sharply edged corners being less than 90 degrees, said four sharply edged corners providing biting surfaces for a continuous wire wrap connection.

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