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H. H. WESSEL

1,946,889

ELECTRICAL CONNECTER

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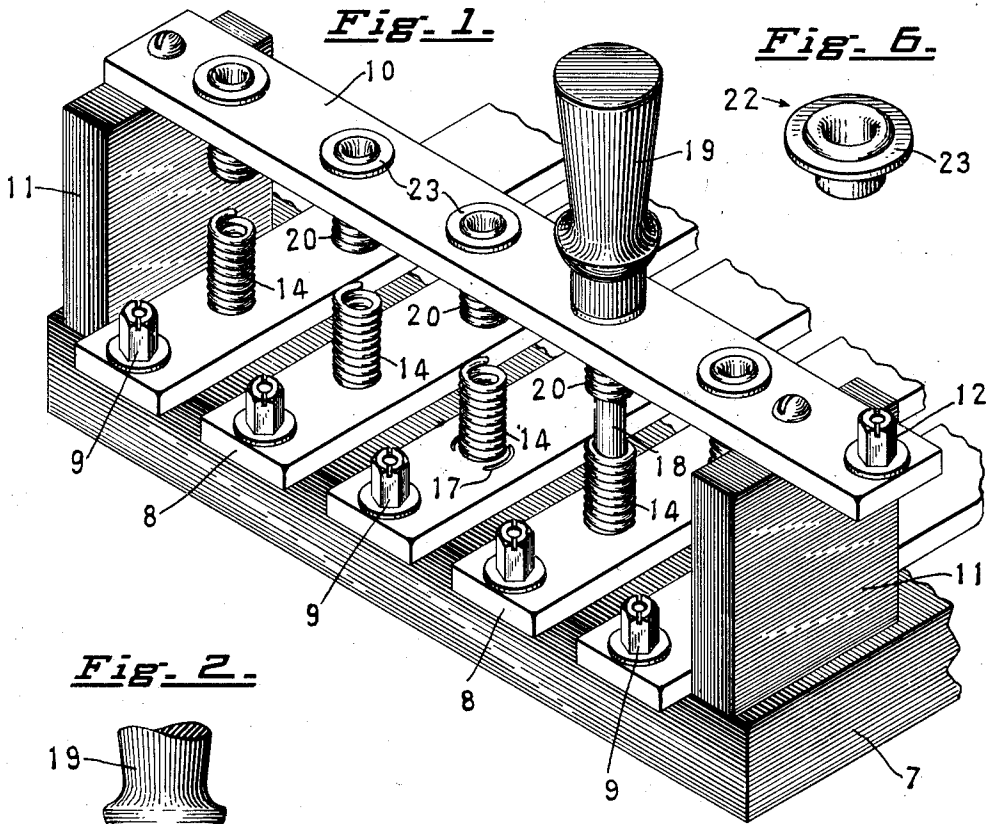


Fig. 5.

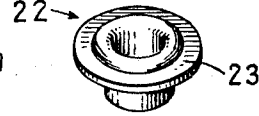


Fig. 2.

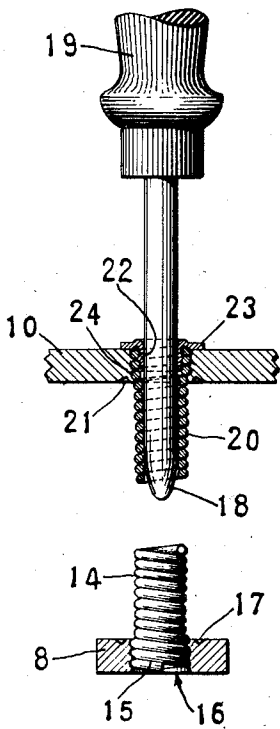


Fig. 3.

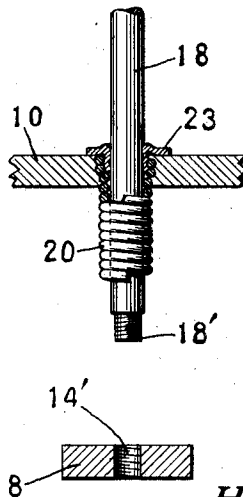


Fig. 4.

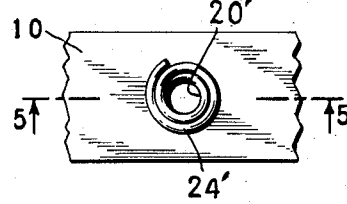
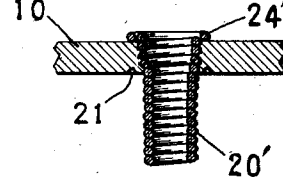


Fig. 5.



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ELECTRICAL CONNECTER

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5 Claims. (Cl. 173—324)

My invention relates to electrical connectors and applies particularly to a means for connecting or disconnecting the bus bars on what is generally known as a plug board which is a special form of panel board.

Such plug boards usually consist of a number of bus bars mounted on a suitable base with one or more other bus bars positioned on a higher plane and extending at right angles across the bars on the base. What are commonly known as connecting plugs or pins are used for electrically connecting or disconnecting the bars of one set with the bars of the correlated set as required to suit the various conditions in service.

It has been general practice to make the plugs with some form of a handle having a projecting pin or rod and to perforate the bus bars to receive the pin. In order to insure ample electrical connection or contact surface, it has been the practice to provide the respective bars with additional machine made and comparatively expensive contact bushings of one form or another and, in many instances, the construction also requires an additional nut to secure the bushing in position.

Among the objectionable features of the former types of bushings are the comparatively great cost and the extreme accuracy required in adjusting or aligning the bushings on the two sets of bus bars so that the connecting pins or rods might be accurately guided into their proper connecting positions.

Another objection to former types of bushings is that it is very difficult to fit the holes in the bushings closely enough to the connecting pins to accurately guide the pins into engagement with the correlated bushings and to insure a full electrical contact. Unless the pins or rods do fit snugly into the holes in the bushings the contact will be poor and the plugs are liable to shift into a position which might cause dangerous arcing or to become entirely dislodged from the bus bars.

Another objection to former types of bushings is that most of them project a considerable distance above the upper bus bar, thus requiring a longer plug pin and a deeper enclosing box.

The general object of my invention is to provide a bus bar connecting means which is much cheaper and more practical than former similar devices and which obviates the various undesirable features of former constructions.

Fig. 1 is a perspective view showing one form of construction embodying my invention.

Fig. 2 is a fragmentary view and partial sec-

tion showing one of the connecting pins or plugs partially inserted into the outer sleeve.

Fig. 3 is a similar view of a modification.

Fig. 4 is a plan view of a fragment of another modification.

Fig. 5 is a sectional view of the part shown in Fig. 4 on the plane of the line 5—5.

Fig. 6 is a perspective view of the eyelet used in the preferred form of my construction.

The conducting parts in constructions of this character are mounted upon some form of an insulating base 7. The individual bus bars 8 are secured on such a base in any suitable manner and are provided with circuit terminals such as 9.

The transverse bus bar 10 is usually supported from the base through the medium of insulating blocks 11 at opposite sides of the base and each bar has at least one circuit terminal such as 12.

Bus bars are usually made of copper because of its relatively high electrical conductivity. Each of the lower bars has a socket 14.

The upper or transverse bar 10 is provided with a number of resilient metallic sleeves 20—20 each of which is preferably made in the form of a helix or coil of wire and mounted in line with one of the sockets 14.

Each coil or sleeve is preferably secured to the bar in the following manner: the upper end of the coil 20 is formed with an enlarged portion 24 which is slightly larger in diameter than the hole in the bar into which it is to be fitted. A metal eyelet 22 has a tubular portion and a slightly recessed flange 23. The outside diameter of the tubular portion is such that it just fits inside of the coils of the enlarged end 24 of the sleeve and the inside diameter of the tubular portion of the eyelet 22 is somewhat smaller than the diameter of the connector pin 18.

To assemble the parts, the sleeve or coil 20 is set into the hole in the bus bar with its enlarged end or flange 24 resting upon the upper surface of the bar. The tubular portion of the eyelet 22 is then set inside of the enlarged portion of the sleeve, then, with the bus bar properly supported upon a suitable block or die, a punch of substantially the same diameter as that of the conducting pin 18 and having a tapered or rounded end, is forced into the eyelet and the bushing portion of the eyelet and the enlarged end of the sleeve are forced downwardly into the hole in the bar so that the recess in the flange of the eyelet is somewhat flattened

and the flange is seated upon the surface of the bar.

As the portion of the punch which is of full diameter passes through the tubular portion of the eyelet, it forces the metal of the eyelet outwardly against the coils 24 of the spring 20 and this action, in turn, forces the coils outwardly and into the soft metal of the bar 10. Thus the metal of the eyelet and the bar is forced into the spaces between the coils of the sleeve and the coils become embedded to a considerable extent in the relatively soft metal of the bus bar and the bushing. Simultaneously with the coil embedding operation, indents 21 are forced into the metal of the bar and thus, by means of a single and simple press operation, the sleeves or coils 20 become securely anchored in position.

Each of the bus bars 8—8—8—8 is preferably provided with a coiled sleeve or socket 14 having an enlarged end portion 15 like that of sleeve 20.

In this form, the eyelet is omitted and the sleeve is secured in position by simultaneously forcing the enlarged end 15 of the sleeve into a hole 16 of slightly less diameter and forcing the coils outwardly into the metal of the bar. Indents 17 further anchor the sleeve in position.

In the modification shown in Fig. 3, only one coiled sleeve member 20 is employed. In this form, the conducting pin 18 is provided with a threaded end 18' and a shoulder. The bar 8 is provided with a screw threaded socket or opening 14' in alignment with the sleeve 20 to receive the threaded end 18' of the conducting pin 18 and the shoulder on the pin serves as a stop for the pin.

In the modification shown in Fig. 4, the spring sleeve 20' is substantially the same as sleeve 20 in Fig. 2 except that the last coils of the enlarged end are wound into a spiral form which serves as a flange 24' for the sleeve.

This sleeve 20' is secured in position in a manner very similar to that of coil 14 in bar 8 as shown in Fig. 2.

Obviously, the bus bars could be screw threaded to receive the coils of the sleeves and the coils could be forced into position or soldered but such constructions would be comparatively expensive and it is found in practice that, for all ordinary conditions, the methods of assembling the sleeves and the bus bars as herein described are comparatively inexpensive and practical.

It will be understood that the respective coils are preferably arranged in pairs so that each sleeve coil 20 is substantially aligned with a correlated socket coil 14.

By reason of the resiliency of the coils, it is not necessary that the members of each pair of coils be in exact alignment, in fact it is preferable that the free ends of the coils especially those of the coils 20, should be in somewhat relatively angular or staggered relation so as to tension or bias against the sides of the pin 18 when the pin is inserted to complete an electrical connection. This tension or side strain aids greatly in securing the pin in position and insures a positive electrical connection between the respective coils and the bus bars.

While I have shown a construction which includes five main bus bars and a single cross-connecting bar, it will be understood that the num-

ber of bars may be varied to provide for other electrical connections when so desired.

It will readily be seen that these forms of resilient sleeve and socket contacts afford a very simple and inexpensive means of connection for a pin or plug connector which can always be relied upon to hold the connecting pin securely in position and to provide effective electrical contact.

I claim:

1. A plug board construction including two electrically conducting bars spaced apart from each other, a helical spring socket having one end secured to one bar and having its other end projecting toward the other bar and resilient laterally, a helical spring sleeve having one end secured to the other bar and its other end projecting toward the spring socket and resilient laterally, said sleeve and said socket being constructed and arranged to receive an electric plug connector inserted through the sleeve into the socket and to electrically connect the sleeve and the socket.

2. A plug board construction including a conducting bar, a helical spring sleeve having its front end secured in said bar and having its rear end projecting rearwardly of said bar and resilient laterally and an electric socket supported in the rear of said spring and spaced apart therefrom, said spring sleeve and socket being adapted to be electrically connected by a plug connector inserted through the sleeve into said socket.

3. A plug pin connecting means including a front bar and a rear bar spaced apart from the front bar, a coiled spring having its front end secured to the front bar and projecting freely toward the other bar and forming a conducting sleeve and a coiled spring having its rear end secured to the rear bar and projecting forward freely toward the front bar and forming a socket, the free ends of the springs being slightly out of alignment whereby a plug pin inserted through the spring sleeve into the spring socket will electrically connect the sleeve and the socket and will be frictionally held by the biasing of at least one of the springs.

4. A plug board connector including a bus bar having an opening, a coiled spring sleeve having one end secured in said opening and the other end extending freely from the bus bar and movable laterally with respect thereto and a bushing having a flange overlapping the end of the spring and having a tubular portion extending inside of the spring and expanded outwardly into spaces between the convolutions of the spring and forming an electrical conducting guide passage for a plug.

5. A plug board connector including a bus bar having an opening, a coiled spring sleeve having one end secured in said opening and the other end extending freely from the bus bar and movable laterally with respect thereto and a bushing having a flange overlapping the end of the spring and having a tubular portion extending inside of the spring and expanded outwardly into spaces between the convolutions of the spring, the end of the spring within the opening in the bus bar being larger in diameter than the rest of the spring and the interior diameter of the tubular portion of the bushing being substantially the same as the interior diameter of that part of the spring which extends beyond the bushing.

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