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S. A. SESNY ET AL
SELF-LOCKING PLUG CONNECTOR

2,779,929

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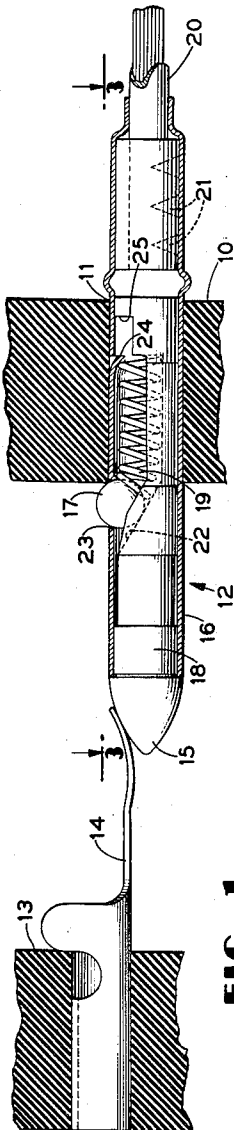


FIG. 1

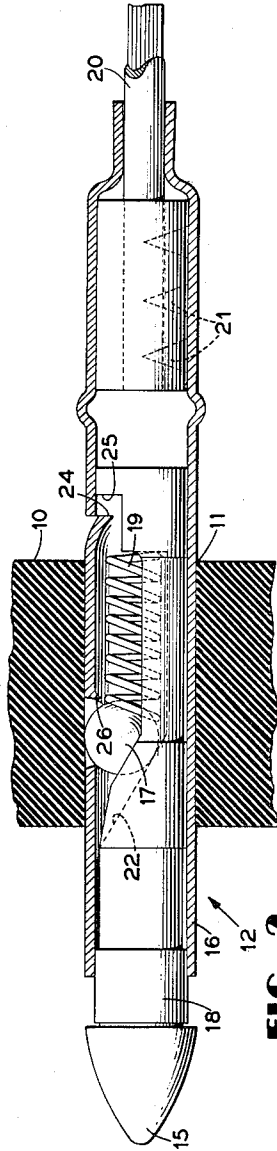


FIG. 2

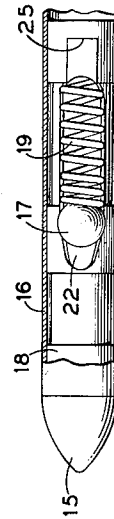


FIG. 3

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SELF-LOCKING PLUG CONNECTOR

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2 Claims. (Cl. 339—217)

This invention relates generally to self-locking plug connectors and more particularly to self-locking plug connectors adapted for use in the plugboard or circuit connecting panel of an electroresponsive device.

The improved plug connector described hereinafter is of the type disclosed in U. S. Patent No. 2,624,774, granted to James M. Cunningham on January 6, 1953. This type of self-locking plug connector is one that can be readily inserted and withdrawn from the plugboard, but cannot be pushed out by pressure applied to the bullet nose of the connector. Hence, this type of plug connector is capable of performing a dual function of resisting the tendency to break contact with the corresponding contactor due to the exertion of a compressive force on the contactor side of the plugboard panel while readily disengaging from the corresponding contactor when a pulling, or tensile, force is used on the front side of the panel.

An object of this invention is to provide a simplified self-locking plug connector arrangement to the extent that the initial manufacturing assembly of the same is greatly facilitated.

In line with the foregoing, another object of this invention is to provide a self-locking plug connector which is well suited to economical methods of manufacture.

Another object of this invention is to provide a plug connector having an improved self-locking mechanism.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawing, which discloses, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawing:

Fig. 1 is a sectional view in elevation of the embodiment of the invention as it is fully inserted within the removable plugboard.

Fig. 2 is a sectional view in elevation of the embodiment of the invention as it is about to be inserted into the removable plugboard.

Fig. 3 is a plan view, partly in section, of the invention as taken along lines 3—3 in Fig. 1.

The particular type of plug connector to which this invention applies is adapted for use with an electroresponsive device comprising a fixed plugboard, with permanent connections to an electrical circuit, and a removable plugboard. The fixed plugboard contains rows and columns of electrical contactors with which the corresponding plug connectors of the removable plugboard are brought into contact so as to complete an electrical circuit.

Referring to Fig. 1, the reference numeral 10 represents the removable plugboard panel containing a plurality of openings within one, such as 11, of which the plug connector 12 is shown inserted. The fixed plugboard panel 13 also comprises a plurality of openings within which are inserted a like number of contactors, such as 14. The plug connectors of the removable plug-

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board upon being brought into contact with the aforementioned contactors complete an electrical circuit.

The self-locking plug connector 12 comprises a slidably mounted bullet nose 15, a relatively movable elongated hollow cylindrical sleeve 16 having a hole therein, within which is disposed a spherical latch 17 which is conjointly supported by supporting means 18 made integrally with the nose 15, and spring 19. Inserted within the right end of the plug connector is an insulated wire 20 which is electrically and mechanically connected to the connector through the medium of a plurality of piercing contact points on a sleeve, such as shown at 21.

Support 18 has a channeled inclined camming surface along which latch 17 moves (see also Fig. 3). The action of spring 19 upon latch 17 is such to cause the latch to protrude from the hole in sleeve 16. As the support 18 and spring 19 are enclosed by the sleeve 16, and since the outer diameter of sleeve 16 is equal to the diameter of the base of the nose 15, a smooth line plug connector is obtained (see Fig. 2) when spherical latch 17 is caused to retract against the biasing action of spring 19 within the limits of the transverse dimension of sleeve 16.

The plug 12 is readily inserted into the opening 11 in the front side of the plugboard panel 10 so as to make a connection with the corresponding contactor 14. Referring again to Fig. 1, the compressive force applied in an axial direction by contactor 14 to nose 15, forces spherical latch 17 to extend beyond the limits of the cross-sectional dimension of sleeve 16, as does spring 19, and against the back side of plugboard panel 10. This compressive force causes latch 17 to move up the inclined surface 22 of support 18 in order to "squeeze" latch 17 between the inclined surface and the back side of panel 10. Of course, the hole in sleeve 16 has a smaller diameter than that of latch 17 so that the latch is not completely ejected from the plug connector 12. The foregoing action results in a firm resistance of the plug connector to a pressure which is attempting to force the connector out of contact with the contactor.

When a pulling, or tensile, force is applied to the connector from the front side of the panel, the sleeve 16 will be moved in the direction in which the force is applied so that the sleeve at region 23 will depress latch 17 within the sleeve 16, and against the action of spring 19. Of course, this pulling force must overcome any compressive force being exerted upon nose 15. Thus, latch 17 is caused to move down the inclined surface 22 until the latch is retracted within the limits of the transverse dimension of sleeve 16. Due to the movement of the sleeve, the nose 15 is no longer contiguous with the sleeve. In the event that too great a movement is imparted to sleeve 16, projection 24 will engage stop 25.

Upon reinsertion of the plug connector into the opening 11, latch 17 will come into contact with the front face of panel 10. This reinsertion force will cause the panel to move latch 17 down the inclined surface 22, and against the action of spring 19. This will cause nose 15 and support 18 to move to the left until latch 17 is caused to retract, once again, within the limits of the transverse dimension of sleeve 16. Upon being restored to the original position shown in Fig. 1, the spherical latch 17 will again be in position against the back side of plugboard panel 10 to prevent the breaking of contact with contactor 14 when pressure is applied to the nose 15, while readily being capable of being withdrawn from the panel due to a pulling force.

It may be seen that spring 19 is not essential to this invention. Use of a lip 26 so that latch 17 cannot move out of alignment with the opening in sleeve 16 will permit proper plug connector operation of one lacking a spring 19. Of course, the latch will not be biased so as to normally

extend beyond the limits of cross-sectional dimension. However, a compressive force applied to nose 15 will "squeeze" latch 17 between inclined surface 22 and lip 26, and beyond the limits of cross-sectional dimension.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In combination with a plugboard having an opening of predetermined cross-sectional dimension, a plug connector for insertion within the opening of said plugboard comprising a hollow cylindrical sleeve with a radial opening therein; means for preventing said connector from being pushed out of said plugboard by pressure applied directly to said plug connector from the back side of said plugboard, said means comprising a member having an inclined surface, and a spring biased spherical latch so arranged within said sleeve on the surface of said member as to normally extend through the radial opening of said sleeve beyond the limits of cross-sectional dimension thereof and in engagement with the back side of said plugboard, whereby pressure directly applied to said plug connector from the back side of said plugboard maintains said latch beyond the limits of cross-sectional dimension of said sleeve and in engagement with the back side of said plugboard; and means for operating upon said sleeve in response to a withdrawal force exerted upon said connector from the front side of said plugboard, to move

said latch along the inclined surface of said member to within the limits of cross-sectional dimension of said sleeve and out of engagement with the back side of said plugboard.

2. An electrical plug connector for insertion into an opening in a plugboard having a predetermined cross-sectional dimension, comprising a hollow cylindrical sleeve of corresponding cross-sectional dimension having a radial opening therein; a contactor including a nose element of corresponding cross-sectional dimension and a member having an inclined camming surface attached to said nose, said nose element positioned in axial alignment with the longitudinal axis of said sleeve, and said member arranged within said sleeve so as to be movable with respect thereto along the longitudinal axis thereof; a spherical latch supported by the inclined camming surface of said member within said radial opening for movement therein toward and away from the longitudinal axis of said sleeve; and a compression spring so arranged within said sleeve between said latch and said member as to bias said member to one limit of relative movement between said member and said sleeve whereat said sleeve abuts said nose to cause the inclined camming surface of said member to move said latch to a locking position beyond the limits of cross-sectional dimension of the opening in said plugboard.

References Cited in the file of this patent

UNITED STATES PATENTS

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