Nov. 15, 1966 M. NEUMANN ET AL 3,286,052

CONNECTOR PLUG FOR POWER DISTRIBUTION TRACK

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FIG. 1

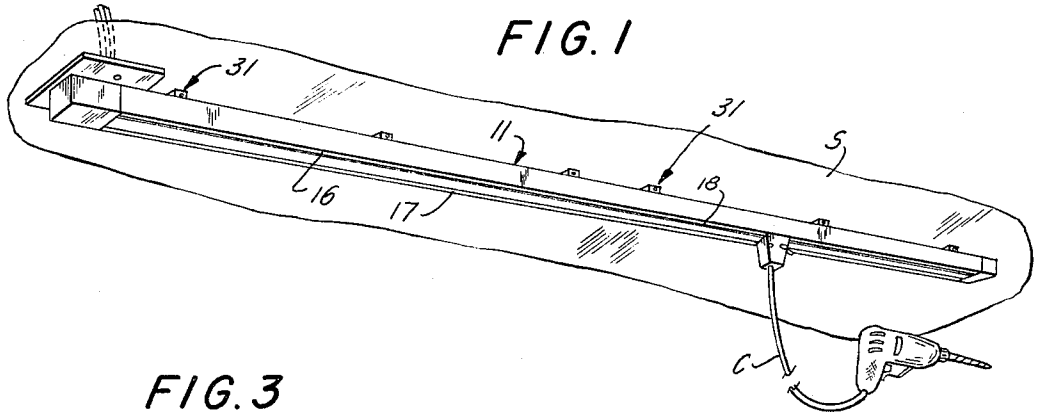
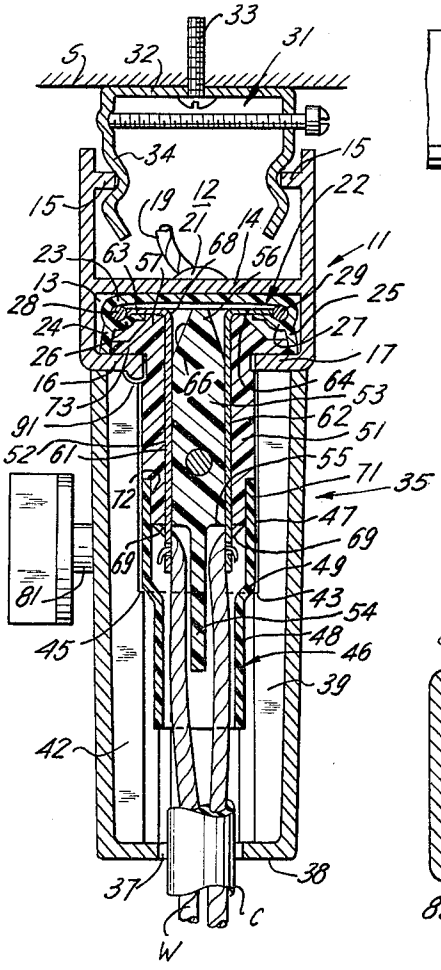


FIG. 3



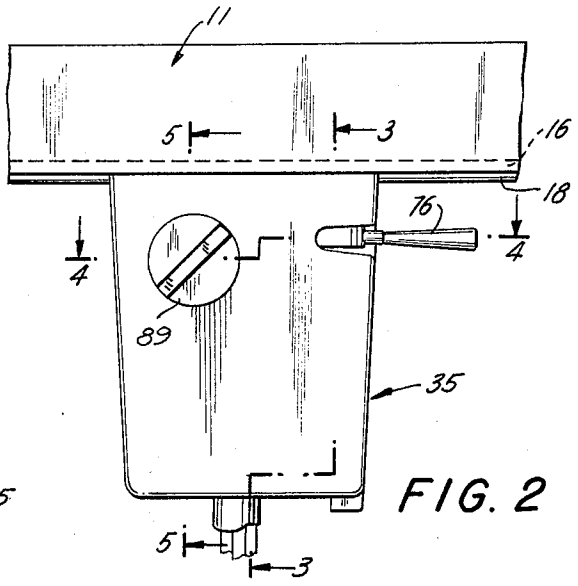
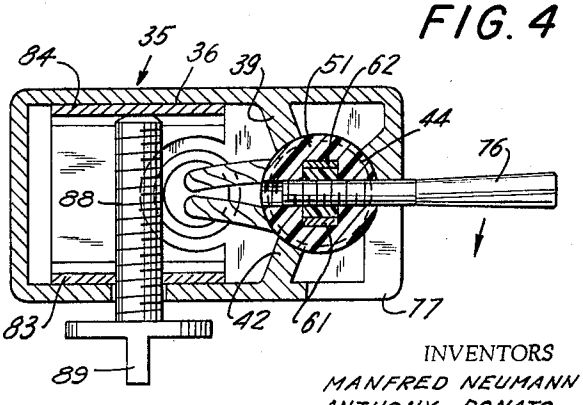


FIG. 2

FIG. 4



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FIG. 5

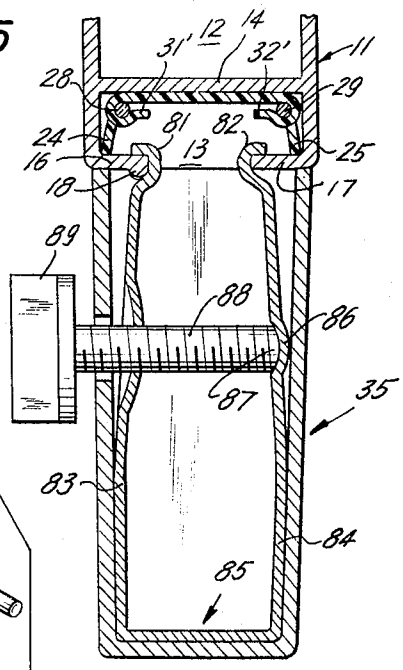


FIG. 6

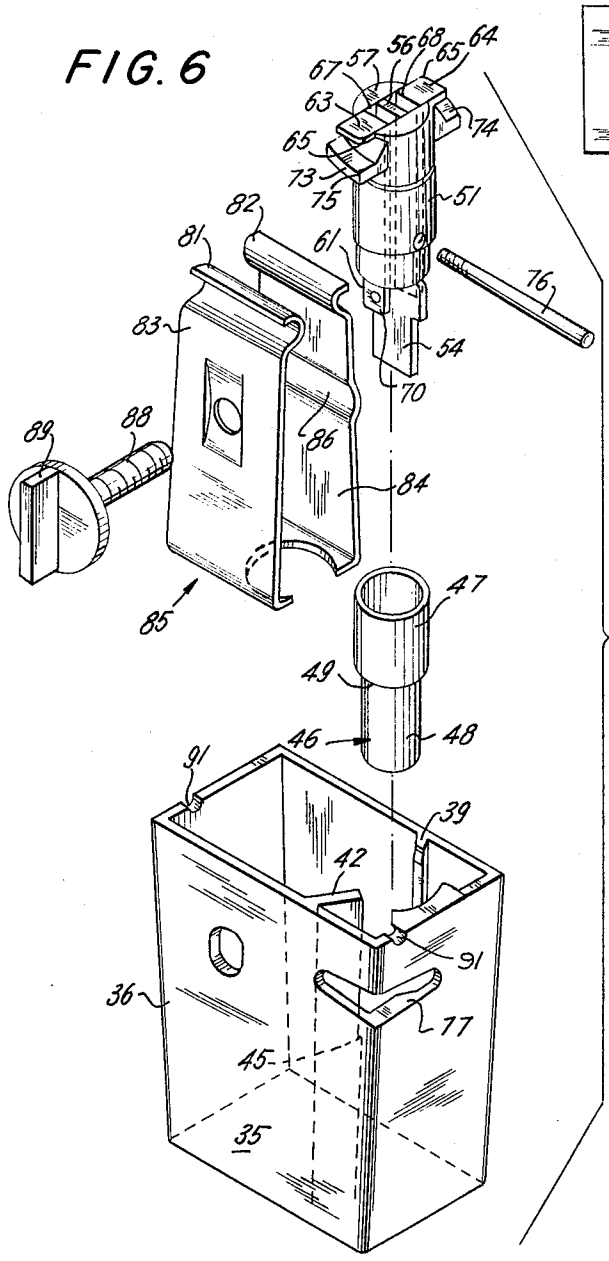
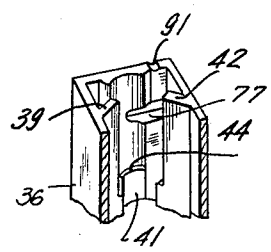


FIG. 7



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CONNECTOR PLUG FOR POWER DISTRIBUTION TRACK

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4 Claims. (Cl. 200—51)

This invention relates to the art of electric power distribution systems of the type utilizing power distribution tracks having conductors arranged within a flanged channel extending through the area in which power distribution is to be effected and more particularly to the connector plug which provides an electrical connection between electrical equipment and the conductors carried by the track.

As conducive to an understanding of the invention, it is noted that a variety of power distribution tracks such, for example, as shown in copending application Serial No. 282,538, for Electric Power Distribution, have been evolved for extending electrical conductors through an area in which electric power is desired, to permit coupling thereto of any electrical equipment within the area, at any point along the length of the power distribution track.

Although a variety of different types of electric connector plugs may be utilized in conjunction with said tracks, it is desirable to provide an arrangement whereby the connector plug, even though the electrical connection to the track is not made, will be maintained in engagement with the track, yet movable to any desired position along the length thereof.

It is accordingly among the objects of the invention to provide a connector plug which may readily be fabricated and which may be releasably mechanically connected to a power distribution track of the above type, which may be moved to any desired position along the length of the track without disengagement therefrom and thereupon locked in desired position and which will provide an electrical connection between the conductors carried by the track and associated electrical equipment, independently of such mechanical connection, which mechanical and electrical connection may be accomplished with a simple manipulation and without the need for any tools.

According to the invention, these objects are accomplished by providing a connector plug housing within which an insulated body member is rotatably mounted. The body member is formed with conductor strips having laterally extending contact fingers which may selectively be moved into and out of electrical contact with the conductors of the power distribution track. Also provided in the housing are locking configurations in the form of flange engaging jaws adapted mechanically to lock the housing with respect to the power distribution track. The locking configurations are such that they may be adjusted to permit sliding of the housing along the track without disengagement therefrom or locking of the housing in fixed position with respect to any desired position along the track. As a result of this arrangement, the connector plug may be maintained in desired mechanical proximity with respect to the power distribution track, while electrical connection to the equipment may be selectively effected as desired.

In the accompanying drawings in which is shown one of various possible embodiments of the several features of the invention,

FIG. 1 is a perspective view of the connector plug shown in use for effecting connection of a power tool with a power distribution track,

FIG. 2 is an enlarged side elevational view of the connector plug of FIG. 1,

FIG. 3 is a cross sectional view taken along line 3—3 of FIG. 2 showing the details of how the connector plug provides electrical connection with respect to the conductors of the power distribution track,

FIG. 4 is a cross sectional view taken along line 4—4 of FIG. 2 showing the locking means,

FIG. 5 is a sectional view taken along line 5—5 of FIG. 2 showing another view of the locking means,

FIG. 6 is an exploded perspective view of the connector plug, and

FIG. 7 is a fragmentary perspective view of the interior of the connector plug.

Referring now to the drawings, in the illustrative embodiment shown in FIG. 1, for example, the power distribution track **11** is of the type more fully described in copending application Serial No. 282,538, filed May 12, 1963. Thus, the track **11** comprises an elongated member, preferably of extruded aluminum, which may be secured with respect to a surface S which may be a ceiling or other surface along which it is desired to have an electrical power connection. The track **11**, as shown in FIG. 3, is formed with two spaced substantially U-shaped channels **12** and **13** spaced by a common partition or wall **14**. The channel **12** is formed with inturned spaced flanges **15** positioned below the upper edges of the legs of the channel. The channel **13** is formed with inturned spaced flanges **16** and **17** at the free ends of the legs thereof. Flange **16** is provided with a ground locating bead **18** affording desired polarity of connection of the equipment to be powered and supported by the track, and a ground wire **19** is desirably connected to the wall **14** as at **21**.

Positioned in channel **13** is an elongated insulating strip **22** which is formed with a base **23** adapted to lie against and be secured to partition or wall **14** in any suitable manner.

Spacer legs **24** and **25** are formed integral with the lateral edges of base **23** and dependent therefrom, with the free ends of said legs reacting against channel flanges **16** and **17** respectively as best seen in FIG. 3 so as to bias the base **23** against the wall **14**. Curved conductor engaging flanges **26** and **27** formed integral with legs **24** and **25** define sheaths extending inwardly therefrom and surrounding conductors **28** and **29** respectively, conductor **28** illustratively being the ground side of the circuit in a two wire system. Lips **31'** and **32'** extend inwardly from the inner edges of sheaths **26** and **27** and are slightly spaced from and extend parallel to base **23** so as to limit access to conductors **28** and **29** only along a plane parallel to the surface of base **23**, whereby inadvertent contact with the conductors is prevented. Mounting of the track **11** with respect to any desired surface is effected by means of supporting spring clips **31** as shown in FIGS. 1 and 3, said spring clips having a base portion **32** adapted to be secured to the surface S as by screw **33** and having legs **34** adapted to engage the flanges **15** of channel **12**.

As the details of the track construction and clip mount are more fully described in said copending application, they will not be further described.

In order to effect a connection between the electrical equipment and the power distribution track **11**, a connector **35** is provided.

The connector plug is formed with a box-like housing **36**, rectangular in cross section as illustrated in FIG. 4 and slightly tapered in elevation as shown in FIG. 2, the walls of said housing extending in planes at substantially right angles to each other. Housing **36** is preferably die cast and has an aperture **37** in its bottom wall **38** through which a power cord C may be extended. The housing is formed with interior ribs **39**, **41** and **42** as shown in FIG. 7. Positioned for rotation on seats **43**, **44** and **45**, formed in the ribs, is a sleeve member **46** having an upper portion

47 of relatively larger diameter than the lower portion 48 and defining an annular shoulder 49 which rests on said seats.

Sleeve 46 accommodates a plug body 51 which is of a cylindrical configuration and is formed of insulating material. The plug body has an axial bore 52 therethrough in which is positioned a plug insert 53, the bore 52 and insert 53 both being rectangular in cross section. The insert 53 has a substantially rectangular spacer plate 54 extending longitudinally from its outer end 55 and the insert 53 is desirably of length such that the nose end 56 thereof is flush with the nose end 57 of plug 51.

Extending through the bore 52 of the plug 51 is a pair of conducting strips 61 and 62 which are securely retained in the plug 51 by the insert 53 which clamps the strips against the bore wall of the plug. The inner ends of the strips 61 and 62 are bent outwardly at right angles to the length thereof so that they extend past the nose end 57 of the plug and define contact fingers 63 and 64, the upper left hand corner of finger 64 and the lower right hand corner of finger 63 being beveled at 65 as is clearly shown in FIG. 5. To permit inward displacement of the contact fingers 63 and 64 when they engage the conductors 28 and 29, the nose end 56 of the insert is desirably beveled as at 66 to provide openings 67 affording clearance for the root ends 68 of the contact fingers.

To prevent inward movement of the strips 61 and 62, each has a struck out portion 69 adapted to abut against the end 55 of the insert 53 as shown in FIG. 3.

The sleeve 46 which is of insulating material, shields the ends 70 of the conducting strips 61 and 62 to which the ends of the electric wires W in cord C are connected. The inner end 71 of sleeve 46 is desirably retained by force fit on an annular peripheral shoulder 72 at the end 55 of the plug.

Aligned with the contact fingers 63 and 64 and extending laterally outward from the plug 51 are diametrically opposed locking flanges 73 and 74 positioned near the nose end of the plug. The upper left hand corner (not shown) and the lower right hand corner of the locking flanges are beveled as at 75 as clearly shown in FIG. 6.

The distance between the ends of the contact fingers 63 and 64 is substantially equal to the distance between the conductors 28 and 29 as measured from their facing surfaces as best shown in FIG. 3. The distance between the ends of the locking flanges 73 and 74 is substantially equal to the distance between the facing surfaces of spacer legs 24 and 25 of strip 22.

A handle 76 extends through slot 77 in housing 36 into threaded engagement with plug body 51 as best shown in FIG. 4. Slot 77 extends from a side surface to the front surface of the housing 36 as shown in FIGS. 4 and 6 thus permitting rotation of plug body member 51 through 90 degrees.

Mechanical coupling of the connector plug housing 36 to the track 11 is effected by means of concave jaws 81, 82 on the upper end of the legs 83 and 84 respectively of a U-shaped locking member 85. A bearing indent 86 on leg 84 is contacted by the nose 87 of screw 88 extending through a threaded opening in leg 83, said screw being formed with knob 89 arranged externally of housing 36, as best shown in FIGS. 2 and 5.

In order to effect a polarized connection between connector plug housing 36 and track 11, housing 36 is formed with a notch 91 as best shown in FIGS. 3 and 6 to insure proper indexing and orientations of the connector plug 35 with respect to track 11 so that contact finger 63 for example will engage conductor 28.

In use of the above described connector plug 35, the housing 36 is positioned in proximity to flanges 16 and 17 of the track 11 with contact fingers 63, 64 and locking flanges 73, 74 extending longitudinally of channel 13 and with polarity notch 91 receiving the track bead 18, to insure desired polarity of connection, it being understood that the contact finger 63 of plug 51 is adapted for connection to the ground side of the track by virtue of this alignment of bead 18 with notch 91.

Jaws 81 and 82 of connector plug 35 are positioned between the opposed faces of track flanges 16 and 17, which fit into the concavity of such jaws. Thereafter, by turning knob 89, legs 83 and 84 are separated causing jaws 81 and 82 to grip the flanges 16 and 17 respectively, securely to lock the housing in fixed position with respect to the track.

Electrical connection is effected by thereupon moving the handle 76 through an arc of 90 degrees which will cause the contact fingers 63 and 64 to enter the spaces between the lips 31', 32' and the base 23 of the insulating strip 22 and wedge against the associated conductors 28 and 29. In addition, such movement will cause the ends of flanges 73 and 74 to wedge against the spacer legs 24 and 25 with the flanges 73 and 74 resting on flanges 16 and 17 of the track, as shown in FIG. 3. As a result, a positive electrical connection will be provided and since the flanges 73, 74 rest on the flanges of the track 11, there will be no vertical strain on the contact fingers.

It is noted that in the event the plug 35 should be reversed and the bead 18 was not in alignment with notch 91, the plug would be inclined slightly by reason of the abutment of the uninterrupted edge of the plug against the bead. As a result the locking flanges 73, 74 would abut against the inner edge of flanges 16 and 17 when an attempt was made to rotate the plug to provide electrical connection, so that such electrical connection could not be completed.

If it should be desired to break the electrical connection of the electrical equipment to the track 11, it is merely necessary to rotate the handle 76 through an arc of 90 degrees in the opposite direction. Where it is desired to move the connector plug to another position along the track, after the electrical contact has been broken as above described, it is merely necessary to turn screw 88 slightly so that the locking action of the jaws 81 and 82 against flanges 16 and 17 will be released, but with the jaws still in engagement with such flanges, and slide the connector plug to the new position and thereupon lock the plug in place by rotating the screw 88 in the opposite direction. At this time electrical connection can be afforded merely by moving handle 76 through an arc of 90 degrees.

It is thus seen that a simple, yet highly efficient connector plug is provided which will afford secure mechanical connection to the track independently of the electrical connection thereto and which may be moved to any desired position along the track without being disengaged therefrom.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. As an article of manufacture, a connector plug for use with a power distribution track of the type having a pair of spaced parallel conductors within a flanged channel, said plug comprising a substantially rectangular housing, a body member of insulated material rotatably mounted in said housing, said body member having a nose end normally protruding from one end of said housing and having a pair of diametrically opposed locking flanges extending laterally from said body member adjacent its nose end, a pair of diametrically opposed contact fingers extending laterally outward from the nose end of the body member and aligned with and spaced from said locking flanges, said housing having two adjacent walls formed with a slot extending at right angles, a handle extending

through said slot into engagement with said body member to rotate said body member and its associated locking flanges and contact fingers with respect to said housing, locking conformations selectively movable with respect to said housing and mounted therein, said locking conformation comprising a U-shaped member in said housing having a cross piece and a pair of legs, the free ends of each of said legs having an outwardly extending concave jaw adapted to engage the flanges of said channel, and means for moving said legs independently of said means for rotating said body member, said means comprising a screw extending between said legs to move the same toward and away from each other.

2. The combination set forth in claim 1 in which said plug has an axial bore therethrough, a pair of spaced parallel conducting strips extending through said axial bore, said contact fingers extending laterally from the ends of the strips, an insert in said bore between said conducting strips, said insert having a spacer plate rigid therewith and extending longitudinally from the end of the insert remote from the nose end of the body member, said plate extending between and beyond the associated protruding ends of said conducting strips, a sleeve of insulating material positioned in said housing and affixed at one end to the end of the body member remote from the nose end thereof, said insulating sleeve encompassing the associated protruding ends of said conducting strips.

3. The combination set forth in claim 1 in which said conductor carrying channel is formed with a longitudinally extending polarity bead, and said connector housing is formed with a notch engaging said bead to insure desired polarity of connection between said track and said connector plug.

4. The combination set forth in claim 1 in which a pair of spaced parallel conducting strips extend through said body member adjacent the nose end thereof, said contact fingers extending laterally from the protruding ends of said strips, and the nose end of said body member through which said conductor strips extend has enlarged openings to permit lateral movement of the associated ends of said conducting strip when said contact fingers engage the conductors in said channel.

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