Aug. 3, 1965 H. R. WANTZ, JR 3,199,062

PARALLEL GROOVE CONNECTOR FOR HOT-STICK APPLICATION

Filed March 1, 1962

FIG. 1.

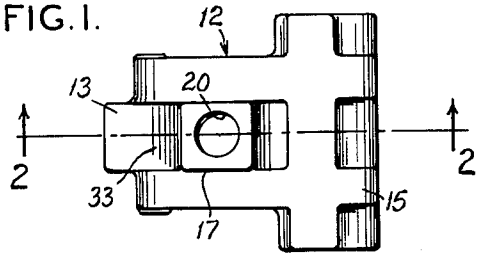


FIG. 3.

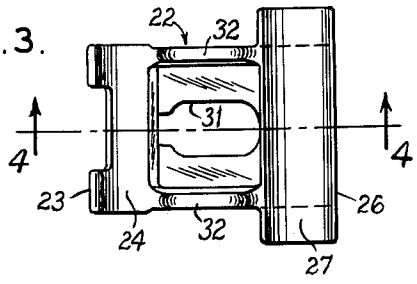


FIG. 2.

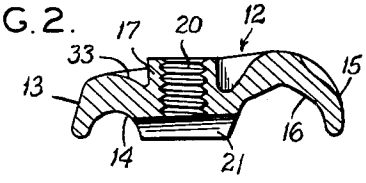


FIG. 4.

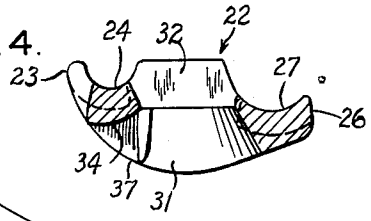


FIG. 5.

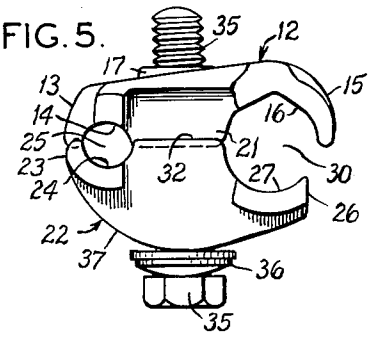


FIG. 6.

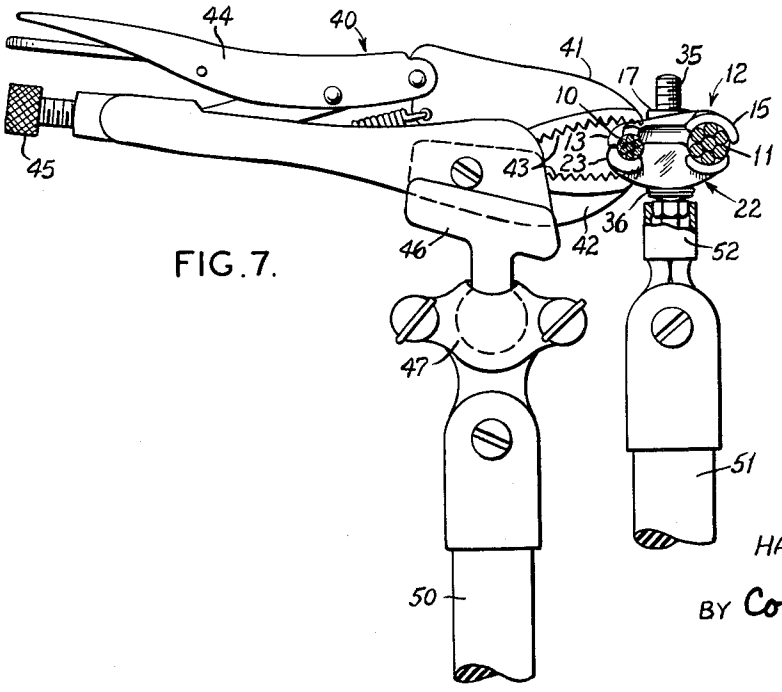


FIG. 7.

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PARALLEL GROOVE CONNECTOR FOR HOT-STICK APPLICATION

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3 Claims. (Cl. 339—109)

This invention relates generally to improvement in an electrical connector and to an assembly for installing such connector to a "hot" line, and more particularly to an improved parallel-groove connector and to a combination of such connector with a tool which enables a tap wire to be held while the connector is operatively attached to a through main wire.

It is an important objective to provide a parallel groove connector constructed to exert a substantially constant clamping force on a tap wire upon application of a suitable tool while the body sections of such connector are pivoted about the tap wire to open and close on a through main wire.

An important object is achieved by the provision of a pair of mating body sections having tap and main wire grooves therebetween, the body sections having means by which a tap wire is clamped in the tap wire groove and yet which enables the body sections to pivot selectively about the tap wire as the fastening means interconnecting the body sections closes the sections onto a main wire placed in the main wire groove.

Another important objective is realized by the provision of an arcuate surface on each body section, the arcuate surfaces being relatively opposed about the tap wire in the tap wire groove so that clamping forces applied to the arcuate surfaces retain the tap wire between the body sections yet permit the sections to swing about the tap wire as the fastening means selectively closes the sections on the main wire.

Still another important object is afforded by particularly locating the arcuate surfaces in opposed relation substantially about a pivot point substantially located at the center of a tap wire placed in the tap wire groove, and by clamping the arcuate surfaces with a cooperating tool so that a relatively constant force will be exerted substantially diametrically through the above-mentioned pivot point.

Another important objective is provided by the provision of a curvilinear camming surface on one of the body sections engageable by the fastening means which acts to move the body sections together easily upon tightening of such fastening means even though the body sections are clamped to the tap wire.

Other important advantages are realized by utilizing a bolt as the fastening means interconnecting the body sections, and by providing at least one of the body sections with a transverse slot through which the bolt freely extends, the bolt moving relatively along the slot as the body sections swing about the tap wire as the bolt is tightened to clamp the sections together.

Another important object is achieved by the combination of an electrical connector of the type previously mentioned with a clamping tool that engages means on the body sections to clamp a tap wire in the tap wire groove and yet enables the body sections to pivot selectively about the tap wire in order to obtain the functional results stated.

Yet another important objective is afforded by the provision of serrated jaws on the tool which can be impressed into the arcuate surfaces of the connector, the serrations or teeth enabling the connector to be held open even if the force applied by the tool relative to the pivot point

tends to close the connector, and enabling relatively easy rotational movement of the connector body sections even when slight interference exists as a result of the tool pressure per se or as a result of a slightly unfavorable relation of the applied force to the pivot point.

It is an important objective to provide a parallel groove connector adapted for "hot" line application which is simple and durable in construction, economical to manufacture, efficient in operation, and which can be easily installed by any one with only a minimum of instruction.

The foregoing and numerous other objects and advantages of the invention will more clearly appear from the following detailed description of a preferred embodiment, particularly when considered in connection with the accompanying drawing, in which:

FIG. 1 is a top plan view of the upper body section of the electrical connector;

FIG. 2 is a cross-sectional view as seen along line 2—2 of FIG. 1;

FIG. 3 is a top plan view of the lower body section;

FIG. 4 is a cross-sectional view as seen along line 4—4 of FIG. 3;

FIG. 5 is an end elevational view of the electrical connector assembled;

FIG. 6 is a cross-sectional view of the connector showing the tap wire clamped between the sections by a clamping tool and showing the installation of such connector to a main wire, and

FIG. 7 is an end elevational view of the connector, the tool for clamping the connector temporarily on the tap wire and the tool for clamping the connector to the main wire.

Referring now by characters of reference to the drawing, it is seen that the electrical connector is of the parallel groove type adapted to interconnect operatively a tap wire **10** with a through main or "hot" wire **11**.

From FIGS. 1 and 2, it is seen that the upper body section generally referred to at **12** of the electrical connector includes at one side a body flange **13** having formed in its underside a longitudinal arcuate seat **14**. At the opposite side of body section **12**, there is provided a body flange **15** having formed in its underside a longitudinal substantially arcuate seat **16**. For reasons which will appear later, it will be noted that the arcuate seat **16** is considerably larger than its laterally spaced yet cooperating seat **14**.

Located intermediately of the side body flanges **13** and **15** is an upstanding boss portion **17** having a threaded vertical bore **20** therethrough. The bore **20** is located on the transverse axis of the body section **12** as is represented by section line 2—2 of FIG. 1.

To facilitate positioning of the upper body section **12** upon assembly, the body section **12** is provided with downwardly depending end shoulders **21**. These shoulders **21** extend between the side flanges **13** and **15**, and more particularly extend between the arcuate seats **14** and **16**.

The electrical connector includes a cooperating lower body section referred to generally at **22**, the lower body section **22** being best illustrated in FIGS. 3 and 4. The lower body section **22** is provided with a side body flange **23** having an upwardly facing longitudinal arcuate seat **24**. It will be importantly noted that the arcuate seat **24** has substantially the same radius as the arcuate seat **14** formed in the cooperating body section **12**, and that such body seats **14** and **24** are aligned vertically to provide a groove **25** as is best seen in FIG. 5 when the body sections are assembled, the groove **25** being particularly adapted to receive the tap wire **10**.

The opposite side of body section **22** includes a body flange **26** having an upwardly facing, longitudinal arcuate seat **27**. The substantially arcuate seat **27** is considerably

larger than its laterally spaced, yet associated arcuate seat 24. Importantly, it will be noted that the arcuate seat 27 has substantially the same radius as the arcuate seat 16 formed in the cooperating body section 12, and that such arcuate seats 16 and 27 are aligned upon assembly of the body sections 12 and 22 so as to form a groove 30, as is best seen in FIG. 5, adapted to receive the main wire 11.

The body portion intermediately of the side body flanges 23 and 26 of the lower body section 22 is provided with a slot 31 formed depth-wise therethrough, the slot 31 extending transversely between the side flanges 23 and 26. At each end of the intermediate body portion, there is located an upstanding shoulder 32. When the body sections 12 and 22 are assembled, the end shoulders 32 of the lower body section 22 embrace the depending end shoulders 21 to preclude relative longitudinal movement of such body sections and to assure alignment of the threaded bore 20 with the slot 31.

The upper body section 12 is provided with an arcuate surface 33 on the side body flange 13. The cooperating body section 22 is provided with an arcuate surface 34 on its side body flange 23. When assembled as is illustrated in FIGS. 5 and 6, the arcuate surfaces 33 and 34 are disposed in opposed relationship substantially about the tap wire 10 in the tap groove 25. More specifically, the arcuate surfaces are opposed substantially about a pivot point substantially located at the center of the tap wire 10.

The ideal situation would be realized if the arcuate surfaces 33 and 34 were formed of a given radius extending from the center of a tap wire of a predetermined size. However, in view of the fact that the tap wire 10 is not always of the same diameter but may vary depending upon the job application, it is not always possible that the arcuate surfaces 33 and 34 be formed by an absolutely exact radius extending from the center of the tap wire 10, but for all practical purposes this condition is met because the radius extends, if not from the center point, at least very close to it.

For reasons which will later appear, under this structural arrangement of the arcuate surfaces 33 and 34, a substantially constant clamping force can be applied across the diameter of the tap wire 10 which will enable the body sections 12 and 22 to hold the tap wire 10 therebetween yet enable the body sections to swing or pivot about the tap wire 10.

A bolt 35 constituting a fastening means extends upwardly freely through the slot 31 and threadedly engages the bore 20 formed in the upper body section 12. Washers 36 are disposed between the head of the bolt 35 and the underside of the lower body section 22. As is best seen in FIGS. 5 and 6, the underside of body section 22 is provided with a curvilinear camming surface 37 adapted to engage the bolt 35 through the washers 36. As will appear, upon tightening the bolt 35, the bolt 35 will act on the camming surface 37 to swing the lower body section 22 upwardly toward the upper body section 12 very easily. As the lower body section 22 swings upwardly, the bolt 35 moves relatively along the slot 31.

Utilized with this parallel groove connector is a clamping tool generally indicated at 40 in FIGS. 6 and 7. This tool 40 can be, and is in the embodiment shown, of conventional construction. This tool is of a type manufactured and sold by the Peterson Manufacturing Company of De Witt, Nebraska, and is disclosed in U.S. Patents Nos. 2,280,005 and 2,514,130.

Briefly, the tool 40 includes a pair of clamping jaws 41 and 42 having serrations or teeth 43. These jaws 41 and 42 are opened and closed upon the arcuate surfaces 33 and 34 as is best seen in FIG. 6, to exert a constant clamping force across the diameter of the tap wire 10 held in the groove 25. With this particular type of tool 40, the lever arm 44 is squeezed closed to the position illustrated in FIG. 7 so that the jaws 41 and 42 engage the arcuate surfaces 33 and 34. The adjusting screw 45 has been previously manipulated so that the desired clamping force is exerted on such arcuate surfaces 33 and 34 by the jaws 41 and 42. The general operation of tool 40 is well known, but the particular application and usage of this tool 40 is unique with the parallel groove connector disclosed in order to obtain the important functional advantages.

To facilitate assembly of the electrical connector, the tool 40 is attached to a bifurcated yoke 46 which is in turn swivelly connected by a ball and socket structure 47 to a "hot" line stick 50.

Another "hot" line stick 51 is utilized to claim the body sections 12 and 22 together. This "hot" line stick 51 is provided with a socket 52 adapted to fit and receive the head of bolt 35. Upon twisting the stick 51, the bolt 35 can be selectively loosened or tightened.

It is thought that the installation of the electrical connector and the functional results and advantages have become fully apparent from foregoing detailed description of parts, but for completeness of disclosure, such installation will be briefly set forth.

First, the electrical connector is assembled by placing the body sections 12 and 22 in superimposed relation, one above the other, as is shown in FIG. 5, with the end shoulders 32 embracing the end shoulders 21, with the seats 14 and 24 aligned to form the tap wire groove 25 and with the arcuate seats 16 and 27 aligned to form the main wire groove 30. Then the bolt 35 is inserted upwardly through slot 31 into threaded engagement with bore 20 to hold the body sections together.

For "hot" line installation, the tap wire 10 is inserted between the body sections 12 and 22 into the tap wire groove 25. The bolt 35 is loosened so that the body sections 12 and 22, and particularly the main wire groove 30, can open sufficiently to allow entry of the main wire 11.

The tool 40 is applied to the electrical connector by clamping the jaws 41 and 42 respectively on the arcuate surfaces 33 and 34 so as to exert a substantially constant pressure on the tap wire 10. Because of the structural arrangement of the arcuate surfaces 33 and 34 relative to each other and relative to the tap wire 10, it is seen that the clamping forces are exerted substantially through a pivot point located substantially at the center of the tap wire 10. The tool 40 clamping the arcuate surfaces 33 and 34 in this manner holds the tap wire 10 securely in place between the body sections 12 and 22 and acts to hold the body sections open in the position illustrated in FIG. 6. The tool jaws 41 and 42, aided by the provision of teeth 43 impressed into the arcuate surfaces 33 and 34 of the connector, act to hold the body sections 12 and 22 open even if the force applied by the tool 40 relative to the pivot point tends to close the connector.

The electrical connector is then raised into position for operative connection to the "hot" main wire 11 by the "hot" stick 50. The stick 50 is used to manipulate the connector so that the main wire 11 is inserted between the body sections 12 and 22 into the main wire groove 30 as is suggested in FIG. 6. After the main wire 11 is located in groove 30, the other stick 51 is utilized to clamp the body sections together to secure the main wire 11. Specifically, the socket 52 is fitted over the head of bolt 35 and is turned to tighten the bolt 35 threadedly.

As the bolt 35 is threadedly tightened, the bolt 35 swings the body sections 12 and 22 together about the tap wire 10 while the body sections are held tight to the tap wire by the clamping forces applied to the arcuate surfaces 33 and 34 by tool 40. The camming surface 37 operatively engaging the bolt 35 causes the lower body section 22 to move quickly and easily toward its mating upper body section 12, the bolt 35 moving relatively along the transverse slot 31.

After the main wire 11 has been clamped securely between the body sections 12 and 22 in main wire groove 30 upon threaded tightening of bolt 35, the socket 52 is

disconnected from the bolt head and the stick **51** is removed.

At this stage, the tool **40** is still clamped on the arcuate surfaces **33** and **34**. To release the tool **40**, the stick **51** or some other implement is used to trip the lever **44** which will automatically spread the clamping jaws **41** and **42**, and thence release such jaws from the body sections **12** and **22**. This tool **40** can then be utilized to connect additional electrical connectors in the manner previously described.

For precautionary reasons, the socket **52** of stick **51** is reapplied to the bolt **35** and the bolt **35** is tightened even further, if possible, after removal of the tool **40**.

Although the invention has been described by making detailed reference to a single preferred embodiment, such detail is to be understood in any instructive, rather than in any restrictive sense, many variants being possible within the scope of the claims hereunto appended.

I claim as my invention:

1. An electrical connector comprising:
(a) a pair of mating body sections, said body sections having a tap wire groove and a main wire groove therebetween,
(b) each body section being provided with an outer arcuate surface, said surfaces being opposed substantially about a tap wire placed in the tap wire groove, the arcuate surfaces directing opposed clamping forces applied to the arcuate surfaces substantially across the tap wire so as to hold the body sections open for insertion of a main wire into the main wire groove and to preclude free rotation of the body sections, and
(c) fastening means interconnecting said body sections and selectively closing the body sections onto the main wire groove while the body sections are held tight to the tap wire by clamping forces applied to the arcurate surfaces, the body sections swinging about the tap wire.

2. An electrical connector comprising:
(a) a pair of mating body sections, said body sections having a tap wire groove and a main wire groove therebetween,
(b) each body section being provided with an outer arcuate surface, said surfaces being opposed substantially about a pivot point substantially located at the center of a tap wire placed in the tap wire groove, the arcuate surfaces directing opposed clamping forces applied to the arcuate surfaces substantially across the tap wire and through the pivot point so as to hold the body sections open for insertion of a main wire into the main wire groove and to preclude free rotation of the body sections, and
(c) fastening means interconnecting said body sections and selectively closing the body sections onto the main wire located in the main wire groove while the body sections are held tight to the tap wire by clamping forces applied to the arcuate surfaces, the body sections swinging about said tap wire and pivot point.

3. A parallel groove electrical connector comprising:
(a) a pair of mating body sections, said body sections having laterally spaced, parallel tap and main wire grooves therebetween,
(b) each body section being provided with an outer arcuate surface, said arcuate surfaces being opposed substantially about a pivot point substantially located at the center of a tap wire located in the tap wire groove, the arcuate surfaces directing opposed clamping forces applied to the arcuate surfaces substantially across the tap wire and through the pivot point so as to hold the body sections open for insertion of a main wire into the main wire groove and to preclude free rotation of the body sections,
(c) a bolt extending between said grooves and operatively interconnecting said body sections, the bolt selectively closing the body sections onto the main wire located in the main wire groove while the body sections are held tightly to the tap wire by clamping forces applied to the arcuate surfaces,
(d) one of said body sections being provided with a slot through which the bolt freely extends, the bolt moving relatively along said slot as the body sections swing about the tap wire and pivot point, and
(e) one of said body sections including a curvilinear camming surface engaging the bolt to move the body sections together easily upon tightening of said bolt.

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