Dec. 10, 1963 C. G. SORFLATEN 3,113,822

ELECTRICAL CONNECTOR

Filed July 14, 1961

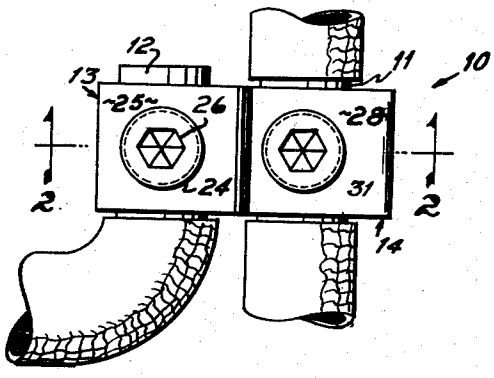


Fig. 1

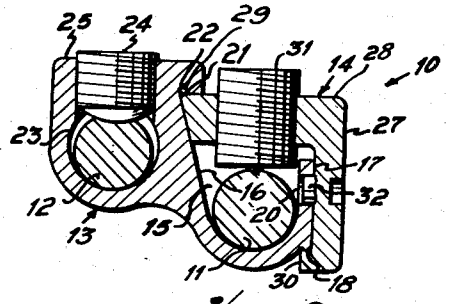


Fig. 2

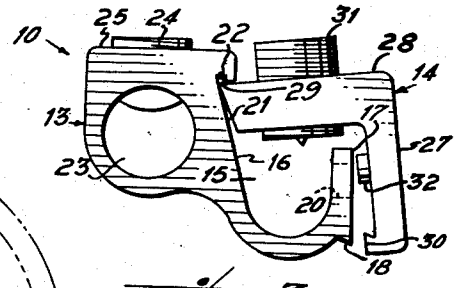


Fig. 3

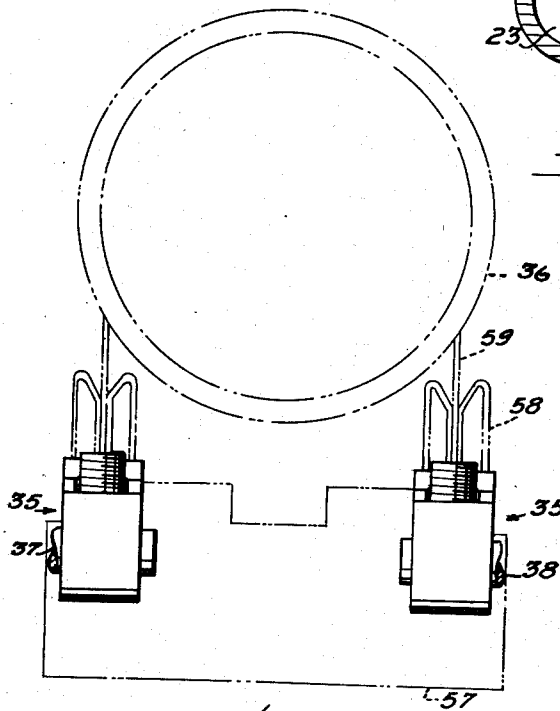


Fig. 4

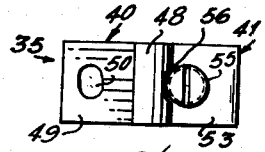


Fig. 5

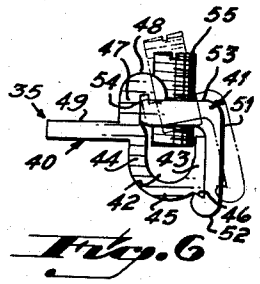


Fig. 6

INVENTOR.
Chester G. Sorflaten
BY
Wood, Herron & Evans
ATTORNEYS

United States Patent Office 3,113,822 Patented Dec. 10, 1963

3,113,822

ELECTRICAL CONNECTOR

Chester G. Sorflaten, Cincinnati, Ohio, assignor to Ilsco Corporation, Cincinnati, Ohio, a corporation of West Virginia

Filed July 14, 1961, Ser. No. 124,105
2 Claims. (Cl. 339—272)

This invention relates to electrical conectors and is more particularly directed to a connector for joining a tap wire to a continuous wire without cutting or breaking its continuity.

In the past, many different forms of electrical connectors have been proposed for making tap connections to continuous lines and the like. While these previous connectors have been satisfactory in many respects, they have all been subject to one or more serious defects. One of the principal difficulties is that the previous connectors have been unduly complex and have required that a workman assemble a number of different parts when installing a connector. For example, a typical connector might require an electrician to assemble as many as five or six separate clamping members, bolts, and the like, in order to complete a tap connection.

One important object of the present invention is to provide an exceedingly simple tap connector which can readily be installed on a continuous wire by merely slipping two pieces together and tightening a set screw which is carried by one of the pieces.

An additional object of the present invention is to provide a connector in which the tap wire and continuous wire can be separately joined with the connector. In conventional type connectors, the main wire connection and tap wire connection must be made at the same time. This requires that the workman hold both wires in alignment while at the same time holding the several individual clamping parts and attempting to tighten the clamping means. In contrast, when installing the present connector the tap connection can be made separately either before or after a connection is made to the continuous main wire.

Another object of the present invention is to provide a connector which can be preassembled and shipped and which is automatically retained in its assembled condition, but which can readily be disassembled by merely unthreading a single set screw a few turns without disengaging the set screw from its support member.

A still further object of the present invention is to provide a connector which is an extremely simple construction and can be fabricated from two extruded members so that the connector is very economical to produce.

More particularly, a preferred form of connector constructed in accordance with the principles of the present invention comprises an extruded base member having a channel formed therein. The base member also includes a lip formed at each side of the channel and means remote from the channel, such as a second wire receiving opening with a set screw for joining the base member to a tap line. In addition to the base member, the present connector comprises a clamp member having two lips adapted for interengagement with the lips of the base member. The clamp member also includes a horizontal wall for enclosing the channel and set screw adapted to be threaded downwardly into the channel. The base member further comprises a recess which matingly receives an element carried by the clamp member, such as a projection or a portion of the set screw, to prevent longitudinal separation of the base member and clamp member. The interengaging lips of the base member and clamp member are effective to prevent lateral disengagement of the base member and clamp member when the set screw is tightened against a line disposed within the channel.

When the clamp member and base member are assembled for shipment, these members are held in assembled relationship by the engagement of the projection and recess which prevents longitudinal separation; and by the engagement of the lower portion of the set screw with the outer wall of the base member channel which prevents lateral separation.

One of the principal advantages of the present connector is that it is exceedingly easy to install. When a workman is provided with a preassembled clamp, in order to make a connection, it is only necessary that he partially unthread the set screw so that the set screw clears the channel wall and permits separation of the base and clamp member. These two members are then placed around the conductor with their respective lips in engagement and are locked in place by merely tightening the set screw down against the main conductor. A tap wire can then be inserted in the separate opening provided in the base member, or if the connector is of the type having a mounting flange in place of a second opening, it can be bolted to another piece of equipment, such as a meter, or the like. In the case of a tap connection the connector is further advantageous since it is exceedingly compact and has smooth lines which greatly facilitate taping of the finished connection.

Another important advantage of the present connector is that the projection and recess provide a locating function which greatly facilitates assembly of the two parts in their proper relationship. Moreover, the present connector is foolproof in that if the connector is not properly assembled and an attempt is made to tighten the set screw, the set screw does not enter the channel but rather bears against a wall of the channel, resulting in a separation of the base member and clamp member so that it is impossible to make a faulty connection which will later come apart.

These and other objects and advantages of the present invention will be more readily comprehended from a consideration of the following detailed description of the drawings illustrating two preferred embodiments of the invention.

In the drawings:

FIGURE 1 is a top plan view of one preferred form of connector.

FIGURE 2 is a cross sectional view taken along line 2—2 of FIGURE 1.

FIGURE 3 is an end view of a connector shown in FIGURE 1.

FIGURE 4 is a front view of two connectors of a modified form showing the manner in which these connectors are utilized to provide a connection to a meter.

FIGURE 5 is a top plan view of the modified form of connector shown in FIGURE 4.

FIGURE 6 is a side view of the modified form of connector

As shown in FIGURE 1, one preferred form of connector 10 is employed as a tap connector to join a tap wire 12 to a continuous main line 11. As is shown in FIGURES 2 and 3, connector 10 comprises a base member 13 and a clamping member 14. In the preferred embodiment, each of these members is constituted by a section of an elongated extrusion of a conductive metal, such as aluminum.

More particularly, base member 13 comprises an upwardly opening channel portion 15 including an inner wall 16 and a vertical outer wall 17. The lower edge of outer wall 17 is provided with a downwardly extending lip 18 adapted to engage a cooperating lip formed on the clamping member 14. Outer wall 17 of base member 13 is provided with a transverse opening 20 adapted to receive a locating lug formed on the clamping member. Base member 13 further comprises an upwardly

extending wall section 21 which extends upwardly beyond the upper edge of inner wall 16. The upwardly extending wall section 21 is provided with an undercut, upper lip 22 adapted to cooperate with a lip formed on the clamping member. Base member 13 also includes a longitudinal conductor opening 23 for receiving tap wire 12. The connector base and tap wire are locked together by means of a suitable set screw 24 or the like. In the embodiment shown, set screw 24 threadably engages a suitable opening in top wall 25 of base member 13 and is provided with a hexagonal top recess 26 for engagement with a conventional hexagonal wrench or the like.

Clamping member 14 comprises an outer, or vertical wall 27 joined to a horizontal or top wall 28. The lower edge of vertical wall 27 preferably includes an upwardly extending lip 30 adapted to fit under and be engaged with a lower lip 18 formed on outer wall 17. The clamping member further comprises an upwardly extending lip 29 adapted to engage the mating recess of upper lip 22 of the base section.

The top horizontal wall 28 of the clamping member is adapted to enclose channel 15 and is provided with a suitable threaded opening for receiving a set screw 31, the lower sides of the set screw being adapted to be forced against a main line disposed in channel 15. Vertical wall 27 of clamping member 14 is provided with an inwardly extending boss lug 32 formed in any suitable manner, such as by partially punching through wall 27. When the clamp is assembled, this lug 32 is received within opening 20 formed in outer wall 17 of the base.

When assembled as shown in FIGURE 2, tap wire 12 is received within opening 23 and is securely held in place by set screw 24. Similarly, main conductor 11 is received within channel 15 while the upper and lower lips 29 and 30 of the clamp member respectively engage recess 22 and lip 18 of the base member. Set screw 31 is tightened to firmly hold the clamp upon the main conductor. It will readily be appreciated that the further the set screw 31 is threaded inwardly, the tighter the lips on the clamp member are pressed upwardly against the cooperating lips on the base member. The engagement of these lips prevents lateral separation of the clamp and base members. The engagement of lip 29 in recess 22 further prevents rotation of the clamp member 10 about a vertical axis relative to body member 13 when torque is applied to the set screw. Lengthwise disengagement of the clamp member and base member is prevented by the engagement of lug 32 with opening 20 in the base member.

Moreover, even when no conductor is present in channel 15, outward pivotal disengagement of the clamp member from the base member is prevented by the lower portion of set screw 31 so long as that set screw is threaded inwardly to a position where the bottom of the set screw is disposed below the uppermost edge of outer wall 17.

In order to disassemble the clamp member from the base member, it is only necessary to thread set screw 31 upwardly until its lower surface is disposed above the top edge of the outer wall 17. When the set screw 31 is thus raised, the clamp member is first slid downwardly relative to the base member (sufficient clearance being provided between wall 28 and the upper edge of wall 17) to disengage lower lip 30 of the clamp member from lower lip 18 of the base member. Thereafter, the clamp member is pivoted outwardly (counterclockwise in FIGURE 3) to effect complete disengagement of the two members.

When connector 10 is assembled and shipped, clamp member 14 is assembled with base member 13 by inserting lip 29 beneath lip 21 and lip 30 beneath lip 18. With lug 32 seated within recess 20, the outer wall 17 of the base member is in abutment with wall 27 of the clamp member. Set screw 31 is then threaded inwardly

to a position, such as that shown in FIGURE 2, in which the bottom of the set screw lies below the top of wall 17. Thereafter, the base member and clamp member are positively held together until a workman threads set screw 31 outwardly. Conventionally, this assembled connector is also shipped with set screw 24 in place. Consequently, a workman desiring to use the connector need only thread set screw 31 outwardly for a few turns until the clamp member 14 can be shifted downwardly and outwardly so as to become disengaged from the base member. Thereafter, the main line is placed within channel 15 and the clamp member 14 reassembled with the base member and set screw 31 tightened in place.

One of the important features of the present clamp is that the side of the set screw 31 normally resides very close to the inner surface of wall 17. Thus, if a workman should attempt to tighten set screw 31 with the clamp imperfectly assembled in a position such as that shown in FIGURE 3, it will not be possible for him to tighten the set screw since the set screw will engage the upper end of outer wall 17. During the assembly operation, either after or before, the main conductor has been inserted in channel 15, and the clamp member tightened in place, a tap wire 12 is inserted in opening 23 and set screw 24 is tightened in place to secure the tap wire in the connector.

A modified form of connector 35 is shown in FIGURES 4, 5, and 6. As is there shown, connector 35 is adapted to provide connections to an electrical meter 36, or the like, from conductors 37 and 38. More particularly, modified connector 35 comprises a base member 40 and a clamp member 41, each preferably formed of an extruded conductive metal, such as an aluminum alloy. The base member 40 is configurated to form an upwardly opening conductor receiving channel 42 defined by an outer wall 43 and an inner wall 44 joined by a curved bottom wall 45. As in the preferred embodiment, the lower portion of outer wall 43 is provided with a downwardly extending lip 46. An upwardly extending wall portion 47 extends from inner wall 44 upwardly above the upper edge of outer wall 43 and terminates in an overhanging lip 48. A rearwardly extending mounting flange 49 extends horizontally from wall portions 44 and 47 and is preferably provided with a bolt receiving opening 50.

Clamp member 41 includes a vertical wall 51 having an inwardly and upwardly turned lower lip 52 adapted to cooperatively engage a lower lip 46 of wall 43. Clamping member 41 also includes a horizontally extending upper wall 53 adapted to enclose channel 42. This wall extends inwardly from the upper end of wall 51 and terminates in an upwardly extending lip 54 adapted to interfit with a mating groove in overturned lip 48 on the base member. Upper wall 53 of clamp member 41 is provided with a threaded opening for receiving a set screw 55.

As is best shown in FIGURES 5 and 6, the outer edge of set screw 55 extends downwardly closely adjacent to outer wall 43 of the base member, while the opposite peripheral portions of this set screw are received in an arcuate recess 56 formed in overturned lip portion 48 of the base member. The base member and clamp member are so dimensioned that when the members are assembled as shown in FIGURE 6, the innermost edge of upper horizontal wall 53 of the clamp member abuts upper extending wall portion 47 of the base member, while the outer wall 43 of the base member abuts vertical wall 51 of the clamping member. Also, as in the preferred embodiment, when set screw 55 is tightened downwardly against a conductor in channel 42, the corresponding upper and lower lips of the base member and clamp member are drawn into tight engagement with one another. These lips thus prevent outward lateral disengagement of the clamping member from the base member, while longitudinal separation of these members is prevented by the

engagement of the set screw with recess **56** in overhanging lip **48**. Moreover, even when no conductor is disposed within channel **42**, the clamp member and base member are still held in locked engagement so long as set screw **55** is threaded downwardly so that its lower end is beneath the upper edge of outer wall **43**. For in this position, any tendency of the clamp member to become disengaged by outward pivotal motion is prevented by the engagement of the set screw with wall **43**.

In order to separate the clamping member from the base member, it is only necessary to thread set screw **55** outwardly to a position in which it clears wall **43**. Then the clamp member is shifted downwardly a slight distance relative to the base member (upper horizontal wall **53** being spaced above the upper edge of wall **43** a sufficient distance to permit this relative vertical movement) and lower lip **52** of the clamp member is disengaged from the lower lip **46** of the base member. Thereafter, the clamp member is pivoted outwardly in a counterclockwise direction as is shown in FIGURE 6 to effect disengagement of the two members.

When using the modified form of connector **35**, flanges **40** of each of two connectors are bolted to an insulating mounting block **57**. The same bolts used to hold these flanges to the mounting block also mount female spring connectors **58** to effect an electrical connection as well as secure the assembly to the mounting block. These female connectors in turn receive the knife blade contacts **59** of meter **36** and complete an electrical connection from conductors **37** and **38** through the meter. This modified form of connector is particularly advantageous for use in making connections to meters where the connections must be made within a closely confined area of a housing. In the past it has been necessary to bend the short lengths of conductors present within the housing so that the conductors could be inserted longitudinally through openings in the connectors. However, when using the present modified form of connector the ends of the conductors can readily be inserted from the top and merely laid in the channel formed in the base member.

From the foregoing disclosure of the general principles of the present invention and the above description of two preferred embodiments, those skilled in the art will readily appreciate the many modifications to which the present invention is susceptible. Thus, for example, it is contemplated that if it is desired to use the modified form of clamp as a tap connector, flange **40** can be replaced with a conductor receiving opening, such as opening **23**, and a threaded opening for receiving a second set screw. Alternatively, if the embodiment of FIGURES 1–3 is to be used to provide connections to a meter, or the like, conductor opening **23** and set screw **24** can be replaced by a mounting flange, such as flange **40**. Still other changes will readily suggest themselves to those skilled in the art. Accordingly, I desire to be limited only by the scope of the following claims.

Having described my invention, I claim:

1. An electrical connector comprising a base member configurated to form an outer wall and an inner wall defining a conductor receiving channel, said outer wall having a downwardly extending lip formed thereon, an upwardly extending section disposed over said inner wall, said section having a downwardly extending lip formed thereon, a clamp member including a vertical wall and a horizontal upper wall, said vertical wall having an upturned lip in engagement with said downwardly extending lip on the outer wall of the base member, said horizontal wall having an upwardly extending lip formed thereon in engagement with said downwardly extending lip on the upwardly extending section, a threaded opening in said upper horizontal wall, a set screw in engagement with said opening, said set screw being threadable to a position in which a portion of said set screw extends below the upper edge of said outer wall, said last named portion of said set screw being disposed closely adjacent to said wall and being engageable with said wall to limit outward pivotal movement of said clamp member, the lip formed on said upwardly extending section having a recess formed therein, the set screw carried by said clamp member being in engagement with the recessed portion of said lip to prevent longitudinal disengagement of said clamp member and base member, said clamp member and said base member being dimensioned whereby said members are held in assembled relationship when said set screw is threaded so that said set screw extends a small distance below the upper edge of said outer wall.

2. An electrical connector comprising an extruded base member configurated to form a planar outer wall, a planar inner wall and an arcuate interconnecting wall portion defining a conductor receiving channel, said outer wall having a downwardly extending lip formed thereon, an upwardly extending section disposed to overhang said inner wall, said section having a downwardly opening groove therein extending from one side of said section to the other side thereof, an extruded clamp member of generally right angular cross section, and including a planar vertical wall and a planar horizontal upper wall, said vertical wall having an upturned lip in engagement with said downwardly extending lip on the outer wall of the base member, and serving to hold said vertical wall in engagement with said planar outer wall, said horizontal wall having an upwardly extending lip formed thereon in engagement with said downwardly opening groove and said upwardly extending section of the base member, said horizontal wall of the clamp member terminating in a planar edge disposed in abutment with said inner wall of the base member, said horizontal wall having a threaded opening formed therein, a set screw in engagement with said opening, said set screw being threadable to a position in which a threaded portion of said set screw extends below the upper edge of said outer wall, said last named portion of said set screw being disposed closely adjacent to said wall and being engageable with said wall to limit outward pivotal movement of said clamp member, said base member having a recess formed therein, and means carried by said clamp member in engagement with said recess to prevent longitudinal disengagement of said clamp member and base member, said clamp member and said base member being dimensioned whereby said members are held in assembled relationship when said set screw is threaded so that said set screw extends a small distance below the upper edge of said outer wall.

References Cited in the file of this patent

UNITED STATES PATENTS

2,237,097	Elfert	Apr. 1, 1941
2,285,928	Jensen	June 9, 1942
2,774,953	Trier	Dec. 18, 1956
2,865,013	Kazanowski	Dec. 16, 1958

FOREIGN PATENTS

177,271	Great Britain	Mar. 29, 1922
888,909	France	Sept. 20, 1943
1,046,939	France	July 15, 1953
1,067,494	Germany	Oct. 22, 1959

OTHER REFERENCES

Publication, Reliable Electric Co., page 87, Electrical World, Apr. 4, 1960.