Jan. 16, 1940. L. FRANK 2,187,230

WIRE OR ROD CONNECTOR

Filed May 4, 1938

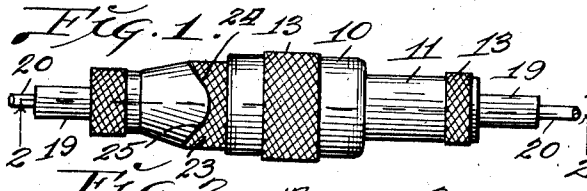


FIG. 1.



FIG. 3.

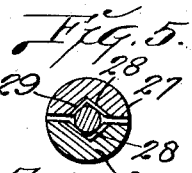


FIG. 5.

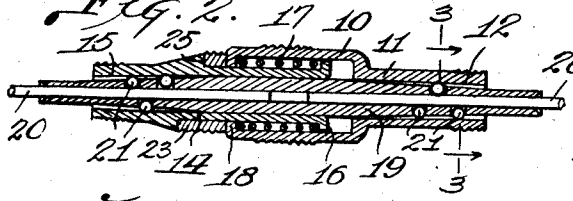


FIG. 2.

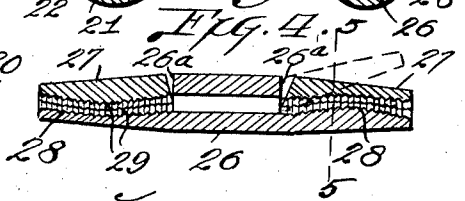


FIG. 4.

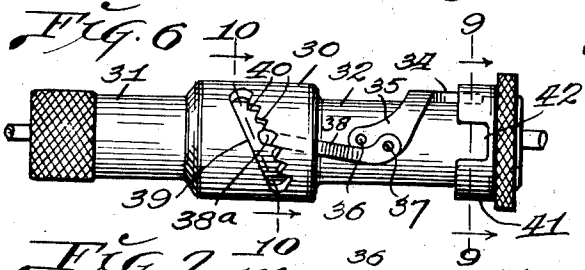


FIG. 6

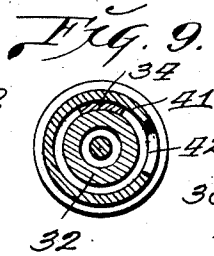


FIG. 9.

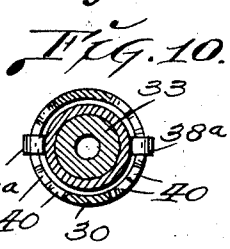


FIG. 10.

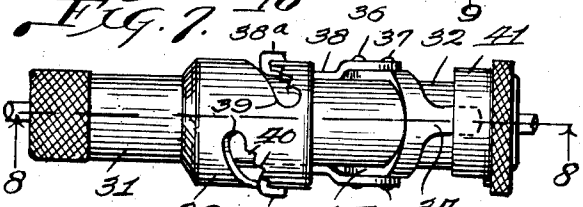


FIG. 7.

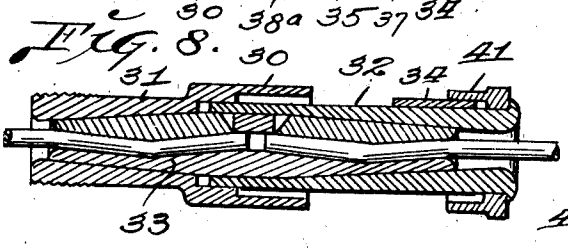


FIG. 8.

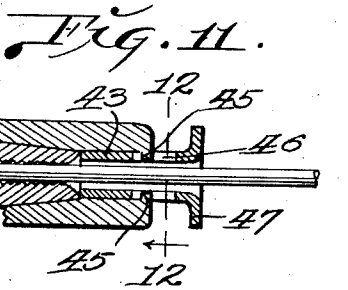


FIG. 11.

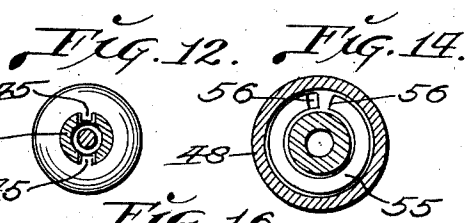


FIG. 12. FIG. 14.

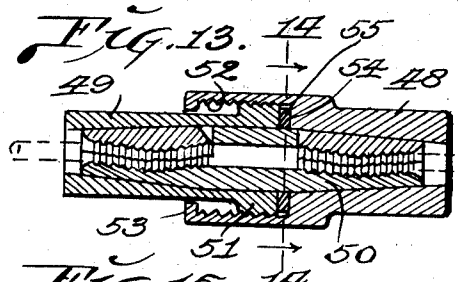


FIG. 13.

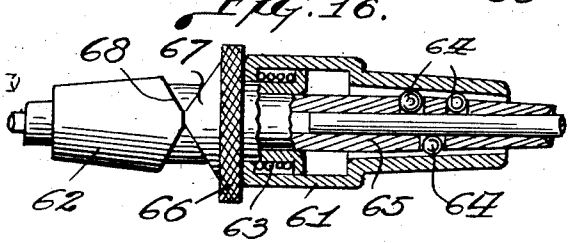


FIG. 16.

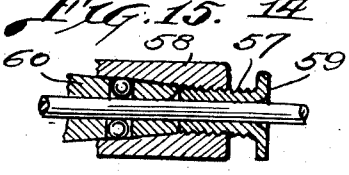


FIG. 15.

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Patented Jan. 16, 1940

2,187,230

UNITED STATES PATENT OFFICE

2,187,230

WIRE OR ROD CONNECTOR

Louis Frank, Taft, Calif., assignor of one-third to Adolph Reader, Taft, Calif.

Application May 4, 1938, Serial No. 205,911

6 Claims. (Cl. 287—75)

My invention relates to a connector for wires, rods, cables and the like and the construction herein described and claimed is an improvement on the wire or rod connector forming the subject matter of my co-pending application for United States Letters Patent filed February 21, 1938, Serial No. 191,637.

The principal objects of my present invention, are to generally improve upon and simplify the construction of the connector disclosed in my aforesaid pending patent application and further, to provide a relatively simple, practical and inexpensive device that may be conveniently employed for connecting wires, rods or cables, and particularly wires that are utilized as conductors for electric current and said connector being constructed so as to perform its wire clamping and connecting functions without the use of screws, bolts, nuts, binding posts or other similar devices that include exposed binding elements.

Further objects of my invention, are to provide a connector of the character referred to that is practically automatic in its wire or rod gripping and clamping functions, to provide a connector that may be easily and quickly applied to or removed from wires, rods and the like, to provide a connector wherein the exposed parts may be wholly or partially composed of insulating material, thereby minimizing the possibility of shocks to the operator while applying the connector to current carrying wires and further, to provide a connector that will be highly effective in gripping the inserted ends of the wires or rods and to firmly clamp same against withdrawal.

A further object of my invention, is to provide a connector that may be conveniently employed in connection with the current carrying wires of practically all electrical appliances, such as sockets, switches, terminals or in fact any electric wiring elements wherein it is necessary to connect a current supply wire with one or more branch current distributing wires.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will be hereinafter more fully described and claimed and illustrated in the accompanying drawing in which:

Fig. 1 is a top plan view of a connector constructed in accordance with my invention.

Fig. 2 is a longitudinal section taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged cross section taken approximately on the line 3—3 of Fig. 2.

Fig. 4 is a longitudinal section through the center of a modified form of the wire or rod clamping member.

Fig. 5 is an enlarged cross section taken on the line 5—5 of Fig. 4.

Fig. 6 is a side elevational view of a modified form of the connector.

Fig. 7 is a plan view of the modified form of the connector.

Fig. 8 is a longitudinal section taken on the line 8—8 of Fig. 7.

Fig. 9 is a cross section taken on the line 9—9 of Fig. 6.

Fig. 10 is a cross section taken on the line 10—10 of Fig. 6.

Fig. 11 is a detail section taken through one end of the connector and showing a sliding tube utilized for disengaging the clamping member from the housing.

Fig. 12 is a cross section taken on the line 12—12 of Fig. 11.

Fig. 13 is a longitudinal section taken through the center of a modified form of the connector.

Fig. 14 is a cross section taken on the line 14—14 of Fig. 13.

Fig. 15 is a detail section similar to Fig. 11 and showing a modified form of the means utilized for disengaging the rod or wire gripping member from the housing.

Fig. 16 is an elevational view, partly in longitudinal section and showing a modified form of the connector.

Referring by numerals to the accompanying drawing and particularly to the construction illustrated in Figs. 1, 2 and 3, 10 designates a hollow cylindrical member that forms the body of the connector and projecting from one end thereof is a tubular member 11, the opening 12 through which gradually tapers toward its outer end. The body 10 and extension 11 are preferably provided with circumferentially disposed knurled portions 13 to facilitate the gripping of the device while the same is being manipulated. The parts 10 and 11 may be formed wholly of metal or of suitably insulating material or where formed of metal they may be coated or sheathed of insulating material, so as to prevent the possibility of shocks being transmitted to the persons handling the connector.

Arranged for longitudinal sliding movement within the hollow body 10, is the inner portion of a tubular member 14 and the outer portion of the opening through said tubular member gradually decreases in diameter toward its outer end as designated by 15. The end of tubular member 14 within body 10, is provided with a circumfer-

ential flange 16 and bearing against said flange is one end of an expansive coil spring 17, the opposite end bearing against a flange 18 that projects inwardly from the inner end of body 10. This spring 17 yieldingly resists telescopic movement of the parts 10 and 14 away from each other. Extending entirely through member 10, its extension 11 and member 14, is a tubular core 19, both ends of which project a short distance beyond the outer ends of the parts 11 and 14 and the outer portions of this core gradually decrease in diameter toward their outer ends to correspond with the tapered portions 12 and 15.

Tubular core 19 is adapted to receive the adjacent ends of rods, wires, cables or the like 20, that are connected by the device and the inserted ends are adapted to be gripped by small balls 21 of hardened metal that occupy apertures 22 that are formed in the tapered end portions of said core. The tapered inner faces 12 and 15 of the parts 10 and 14 bear on the balls 21 and press the same inwardly to grip the inserted ends of the rods or wires 20, thus firmly holding the same in connected relation, and in this connection it will be understood that the expansive force of spring 17 normally acts against the flanges 16 and 18 to move member 14 into the body member 10, thus causing the inclined surfaces 12 and 15 to force the balls into gripping engagement with the inserted ends of the rods or wires.

In order to move body member 10 and tubular member 14 apart or away from each other to relieve pressure upon the balls 21 that grip the inserted rods or wires, a collar 23 is mounted to rotate freely upon member 14 immediately adjacent the flanged end 18 of body 10 and the outer edge of this collar is inclined with respect to the axis of the connector so as to form an eccentric 24. This eccentric edge bears against a correspondingly inclined eccentric shoulder 25 that is formed on the outer surface of member 14. The outer face of the collar 23 is knurled in order to facilitate manipulation.

When collar 23 is rotated in either direction, its inclined edge 24 bears against the inclined edge 25 with the result that tube 14 and body 10 will be moved away from each other against the resistance of spring 17, so as to relieve pressure upon the balls 21 and consequently releasing the inserted ends of the rods or wires.

When the parts 10 and 14 have been moved away from each other as just described, the projecting ends of the tubular member 14 may be engaged and moved lengthwise a short distance in order to release the balls from their gripping engagement with the inserted rods or wires.

In Figs. 4 and 5 I have shown a modified form of the rod or wire gripping core and in this construction a tubular body 26 has portions of its ends cut away to form notches 26a and loosely arranged in said notches are separately formed jaws 27. The under faces of the jaws and the faces of the notched portions of core 26 that underlie said jaws are provided with longitudinally disposed grooves 28 that register with one another and the faces of said grooves are provided with transversely corrugations 29 in order to more firmly grip the inserted ends of the wires or rods. The grooves 28 are preferably curved or made zigzag lengthwise of the core so as to correspondingly kink and more firmly grip the inserted ends of the wires, rods or the like.

Both ends of the core and the jaws 27 are tapered toward their outer ends to correspond with the tapered inner end portions 12 and 15 of the connector and when said core is positioned within the connector, the balls engage the tapered surfaces of the core and jaws so as to produce clamping action upon the ends of the rods or wires.

In the modification illustrated in Figs. 6 to 10 inclusive, the body of the connector is formed in two parts, one part comprising a tubular member 30 having an extension 31 of reduced diameter and the opening through the reduced portion 31 gradually tapers toward the outer end thereof. The other member forming the body of the connector comprises a tubular member 32, one end of which is positioned within the tubular body 30. The outer portion of the opening through member 32 gradually decreases in diameter toward its outer end and thus the two parts of the connector are adapted to receive a wire gripping core 33 which may be identical in construction with the core 19 that carries the balls 21 or the core 26 having the jaws 27. This form of connector has no expansive spring for moving the two members of the connector away from each other, but such movement is brought about through the use of a lever 34 having a bifurcated portion 35 that overlies member 32 and the ends of the arms comprising such bifurcated portion being pivotally secured at diametrically opposite points on member 32 by pins 36.

Pivotally secured to the arms of member 35 by pins 37, are arms 38 that extend alongside of member 32 into member 30 and the ends of these arms within said member are provided with outwardly projecting hooks 38a that extend through inclined slots 39 that are formed in the opposite sides of member 30.

The edges of the slots 39 that are engaged by the hooks 38a are notched as designated by 40 for the reception of said hooks 38a and as the slots 39 are inclined, the extended or contracted position of the parts 31 and 32 with respect to each other may be varied, so that said parts will properly cooperate with core 33 and when such adjustment is accomplished the hooks 38a are shifted from one pair of notches to another, depending upon the longitudinal adjustment of the parts of the connector.

When lever 34 is swung downward on to member 32 to draw the parts 31 and 32 into clamping engagement with the enclosed core, the pins 37 occupy a position just below the plane occupied by the pins 36, and thus the lever 34 and arms 38 are held in latched position and to secure the lever in such position its outer end projects beneath a collar 41 that is mounted for rotation on the outer end of member 32.

This collar 41 is provided with a notch 42 which, when turned into proper position permits the end of lever 34 to be positioned beneath the collar and after so doing the collar may be rotated a short distance in either direction, so as to move the notch out of registration with the end of the lever and thereby retaining the latter in latching position.

In Figs. 11 and 12, I have shown manually operable means for conveniently moving the body of the connector and the core longitudinally with respect to each other, in order to facilitate the disengagement of the rod or wire from the connector.

This means comprises a short tube 43 that is

mounted for sliding movement in the end of the body of the connector beyond the end of the rod or wire gripping core 44 and said tube being retained in operative engagement with the body of the connector by means of diametrically opposite ears 45 that project into short longitudinally disposed slots 46 that are formed in tube 43.

The outer end of tube 43 is provided with a flange 47 to enable it to be readily engaged and moved lengthwise.

After the parts of the connector have been released from clamping engagement with the core and there is tendency of the core to stick to the connector or to the engaged rod or wire, tube 43 is pressed inwardly, thereby engaging against the end of the core, and such action effects disengagement of the core from the body of the connector or a disengagement of the core from the inserted wire or rod.

In Figs. 13 and 14, I have shown a modified construction comprising tubular connector body members 48 and 49, the outer ends of the openings through which are tapered for engagement with the correspondingly tapered end portions of a wire or rod gripping core 50, which may be identical with core 19 or the core 26 and one end of body member 49 projects into body member 48. The end of member 49 that projects into member 48 is provided with a circumferential flange 51 that is externally threaded for engagement with an internal thread 52 that is formed in member 48. Member 49 is prevented from being wholly withdrawn from member 48 by a flange 53 that is formed on the end of member 48 and which forms a stop for the flange 51 and consequently limiting the movement of member 49 away from member 48.

Arranged within member 48 and bearing against an internal shoulder 54 therein, is a conventional lock washer 55 having oppositely disposed beveled ends 56 that are adapted, when the member 49 is screwed to its limit into member 48, to engage respectively the inner end of member 49 and the shoulder 54 to prevent the same from unscrewing and becoming loose after having been moved into clamping engagement with the core 50.

In Fig. 15 I have illustrated a modified form of the means utilized for overcoming the sticking of the core to the body of the connector and this construction comprises a short tube 57 that is externally threaded for engagement in the threaded end of the body 58 of the connector.

The outer end of this threaded sleeve carries a flange 59 to enable said sleeve to be conveniently rotated and the inner end of said sleeve is adapted when screwed inwardly to bear with pressure against the end of the wire or rod gripping core 60.

In the modification illustrated in Fig. 16, the body of the connector comprises two parts 61 and 62 that are similar in construction and functions to the parts 10 and 14 previously described. These parts are normally urged toward each other by an expansive spring 63 similar to spring 17 and the internally tapered end portions of the members 61 and 62 are adapted to engage wire or rod gripping balls 64 that are carried by a core 65. If desired, a core similar to the core 26 illustrated in Fig. 4 may be used in this particular form of connector.

In order to move the connector body members 61 and 62 apart, so as to release the core from its gripping engagement with the inserted ends of the rods or wires, a ring 66 having a knurled edge to facilitate manipulation is mounted to rotate on member 62 adjacent the inner end of member 61. Carried by this ring is a pair of diametrically opposite lugs 67 having inclined faces, thus providing eccentrics that are adapted to engage inclined faces 68 that are formed on body member 62. Thus when the high points of the eccentrics, or the points between the pair of inclined faces, are in engagement with each other, the parts 61 and 62 are moved to their limit of movement away from each other as illustrated in Fig. 16, thus in effect releasing the core that grips the inserted ends of the rods or wires, and when ring 66 is rotated a quarter of a turn the spring 63 acts to move the body members 61 and 62 toward each other, so as to cause the core to grip the ends of the rods or wires.

Thus it will be seen that I have provided a wire or rod connector that is relatively simple in construction, inexpensive of manufacture, and very effective in performing the functions for which it is intended.

The connectors may be made in various sizes for the accommodation of wires and rods of different sizes and by insulating the exposed parts of the connectors, or by forming the parts wholly from insulation, the possibility of shock to the user of the device is eliminated and no insulating tape or the like is required in making connections between current carrying wires or cables.

An especial advantage of the connector is that the same may be used for connecting wires, rods or the like, without requiring the use of special tools or equipment and the construction of the cores and their cooperative effect with the body of the connector is such that the inserted ends of the rods or wires are very securely gripped and maintained in connected relation.

A further advantage of my improved connector is the extending of the ends of the core beyond the ends of the body of the connector and the use of means in one or both ends of the holder whereby the core and holder may be moved a sufficient distance lengthwise with respect to each other to overcome any tendency of the core and body members to stick to each other after having been in service for an extended period of time.

It will be understood that minor changes in the size, form and construction of the various parts of my improved wire or rod connector, may be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In a wire or rod connector, a tubular core, means on the end portions of said core for gripping inserted wires or rods, a two-part housing enclosing said core and adapted to move the gripping means into engagement with the inserted wires or rods, a spring arranged between the parts of the housing and adapted to normally move the same toward each other and manually operable means mounted for rotation on one of said body members for moving the body members in opposite directions away from each other.

2. In a wire or rod connector, a tubular core, means on the end portions of said core for gripping inserted wires or rods, a two-part housing enclosing said core and adapted to move the gripping means into engagement with the inserted wires or rods, a spring arranged between the parts of the housing and adapted to normally

move the same toward each other and manually operable means mounted for operation on one of the body forming members and engaging the other body forming member for drawing said body forming members longitudinally away from each other.

3. A wire or rod connector as set forth in claim 2 and with means for latching said manually operable means to the body member on which it is mounted.

4. In a wire or rod connector, a tubular core, means on the ends of said core for gripping the inserted ends of rods or wires, a two-part telescopic housing enclosing said core and means screw seated in the outer ends of the parts of said housing for applying pressure to the ends of said core.

5. In a wire or rod connector, a two-part housing, there being threaded engagement between the two parts of the housing whereby the same may be moved toward or away from each other, a tubular core within said housing, means on said core for engaging and gripping the inserted ends of wires or rods, a lock washer arranged between the parts of the housing for securing the same against separating movement after they have been moved to their limit of movement toward each other and co-operating means on the two parts of the housing for limiting their movements away from each other.

6. In a wire or rod connector, the combination with a two-part telescopic housing, of means for moving the parts of said housing longitudinally toward each other, means for moving the parts of the housing longitudinally away from each other, a tubular core extending lengthwise within said housing, the end portions of said core being cut away to form notches, jaws loosely mounted in said notches, the adjacent faces of which jaws and the notched portions of said core being provided with longitudinally disposed zigzag, transversely corrugated grooves for the reception of inserted wires or rods, the end portions of said core and said jaws being tapered toward their outer ends and the outer portions of the openings through the parts of the housing being correspondingly tapered.

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