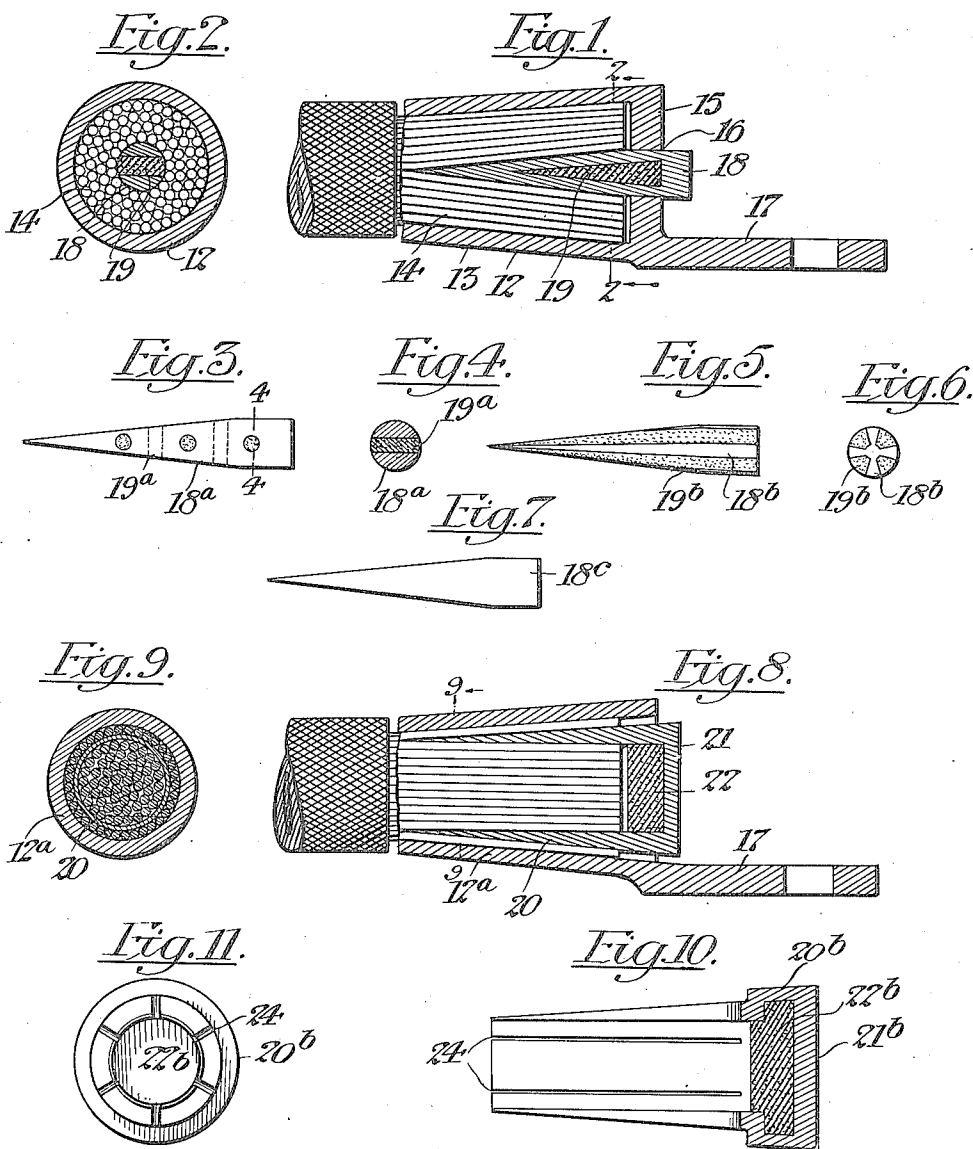


E. H. FAILE.
CONNECTOR FOR ELECTRIC CONDUCTORS.
APPLICATION FILED JAN. 15, 1915.

1,188,056.

Patented June 20, 1916.
2 SHEETS—SHEET 1.



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Fig. 13.

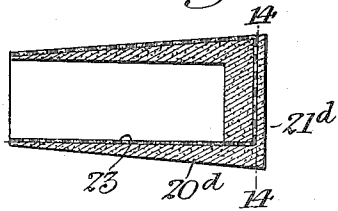


Fig. 14.

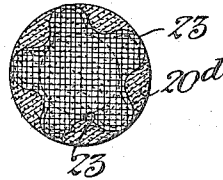


Fig. 12.

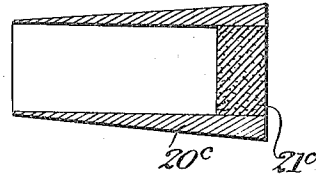


Fig. 15.

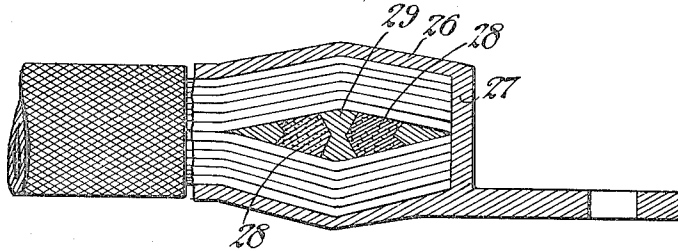


Fig. 16.

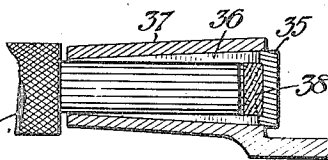
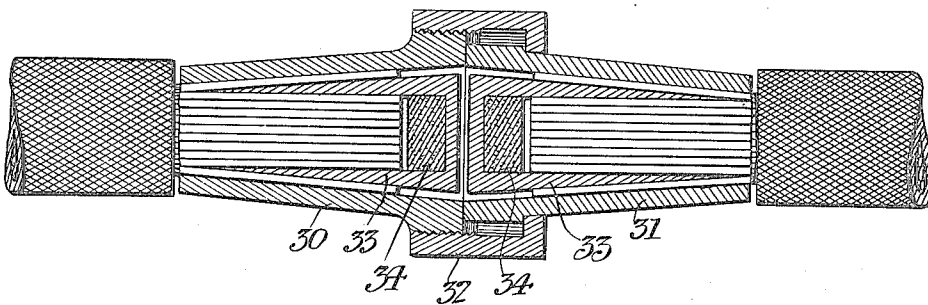


Fig. 17.

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UNITED STATES PATENT OFFICE.

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CONNECTOR FOR ELECTRIC CONDUCTORS.

1,188,056.

Specification of Letters Patent.

Patented June 20, 1916.

Application filed January 15, 1915. Serial No. 2,310.

To all whom it may concern:

Be it known that I, EDWARD HALL FAILE, a citizen of the United States, and resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Connectors for Electric Conductors, of which the following is a specification.

My invention relates to connectors commonly employed for securing the end of a multiple strand cable either to the end of another cable or to any suitable terminal, and relates more particularly to that type in which there is provided a socket having a portion of its internal wall of greater diameter than the cable inlet to the socket so that the strands, after being inserted, may be wedged apart into the space of larger diameter.

The main essential feature of my present invention involves the construction of the wedge. The wedge itself includes a fusible part so that after the wedge has been driven into position it is only necessary to apply heat to the outer surface so as to melt the fusible part. This fusible part, which is preferably of solder, flows in among the spread-apart strands so that they cannot be withdrawn from the socket. The socket itself being of metal not readily melted by the flame, will quickly conduct the heat directly to the solder in case the latter is not exposed after the wedge is driven in.

As the fusible wedge forms a part of the article of manufacture, it is evident that no separate soldering apparatus need be employed, as the wedge includes the solder. No separate tool need be employed for spreading the strands within the socket as the wedge itself constitutes the spreading implement. It is merely necessary to insert the strands within the socket, drive in the wedge and apply heat to the exterior for a limited time.

It is evident that the details of construction of the socket and wedge may be varied within the scope of the appended claims without departing from the spirit of my invention and that therefore various different embodiments of my invention may be designed.

In the accompanying drawings, I have illustrated several different forms, each of

which possesses certain advantages peculiar to itself, but all of which embody my invention.

In these drawings, Figure 1 is a longitudinal section through an assembled socket, wedge and cable end; Fig. 2 is a cross section on the line 2—2 of Fig. 1; Fig. 3 is a side elevation of a form of wedge having transverse passages filled with solder; Fig. 4 is a cross section on the line 4—4 of Fig. 3; Fig. 5 is a side elevation of a wedge having longitudinal grooves filled with solder; Fig. 6 is an end view of the form shown in Fig. 5; Fig. 7 is a side elevation of a wedge formed entirely of solder; Fig. 8 is a longitudinal section showing one form of an assembled socket, wedge and cable end, the wedge being of annular form; Fig. 9 is a cross section on the line 9—9 of Fig. 8; Fig. 10 is a longitudinal section of another form of annular wedge; Fig. 11 is an end view of the wedge shown in Fig. 10; Figs. 12 and 13 are longitudinal sections of other forms of annular wedges; Fig. 14 is a cross section on the line 14—14 of Fig. 13; Fig. 15 is a longitudinal section of a somewhat different form of socket in which the wedge is driven transversely to the strands, Fig. 16 is a longitudinal section of a connector for the abutting ends of two cables and having a plurality of wedges somewhat similar to that shown in Fig. 8, and Fig. 17 is a longitudinal section of a further modified form of connector and wedge.

In the specific form shown in Figs. 1 and 2, I have illustrated a socket 12 having a frusto-conical chamber, the smaller end serving as a cable entrance opening and of a diameter substantially equal to the diameter of the group of strands 14 of the cable. At the opposite end or base, the chamber is partly closed by an end wall 15 in which there is a central aperture 16. The peripheral wall and the end wall are preferably formed integral and have also integral therewith a suitable attaching lug 17. This member may be formed of any suitable material but is preferably non-fusible under ordinary working conditions; that is, it is not readily fused by an application of a torch or flame directly thereto.

For inserting within the aperture 16, I provide a wedge 18 which may have its body

portion formed of copper or other substantially non-fusible metal, and extending lengthwise of the wedge is a chamber or transverse passage filled with solder or other readily fusible material 19. This fusible material is exposed at opposite sides of the wedge so that as the wedge is heated the solder can melt and flow out into the interstices between the strands irrespective of the position in which the wedge and socket may happen to be lying at the time. In using this form, the insulation may be cut away from the exterior of the cable, leaving the strands exposed for a length substantially equal to the depth of the socket, and the group of strands inserted into the socket until they come adjacent to, or in contact with, the end wall 15. The wedge 18 is then driven through the opening 16 to spread the strands apart as shown in Fig. 1 and heat is applied to the end of the wedge or to the side of the socket for a sufficient length of time to partially or wholly melt the solder. The solder not only holds the strands in their spread-apart position, but also prevents the withdrawal of the wedge, which latter prevents the strands from coming back to their original position. A portion of the solder may directly connect certain of the strands to the wall of the socket, although even if this action does not take place, the cable will be effectively held within the socket.

It is not at all essential that the chamber in the wedge containing the solder be of the form shown in Figs. 1 and 2, as it is evident that I may form the wedge as shown in Figs. 3 and 4. This wedge 18^a has a plurality of holes bored therethrough in different directions and each hole is filled with solder or other fusible material 19^a.

In Figs. 5 and 6, I have shown a wedge 18^b in which there are longitudinal grooves filled with solder 19^b. In Fig. 7 I have shown a wedge 18^c of similar external form but constructed entirely of solder.

It is not essential that the tapered wedge be a pointed conical wedge adapted to be driven in, at, or adjacent to the center of the cable as it may, if desired, be an annular tapered wedge adapted to separate one or more of the annular layers of strands from the remaining strands. In Figs. 8 and 9 I have shown a socket member 12^a similar to that shown in Fig. 1, except that the end wall 15 is omitted and the aperture at the base of the socket is of the full size of the end of the chamber. In this figure, I have shown a wedge having an annular wall 20 substantially cylindrical upon its inner surface and tapered on the outer surface so as to constitute an annular wedge. At the base, there is a transverse wall 21 integral with or rigidly secured to the peripheral wall 20. Within the wedge and adjacent to

the end wall 21 is a mass of solder or other fusible material 22. In this form I have shown the wedge of such size and diameter that it may serve to separate merely the outer layer of strands of the cable and press the strands of said layer against the peripheral wall of the socket. Thus, the end wall 21 of the wedge substantially closes the aperture in the end of the socket except for a small annular space of a width equal to the diameter of one strand. After the insertion of a wedge, the solder may be melted by the application of heat directly to the exterior wall 21 or less quickly by the application of heat to the wall of the socket.

In forming the wedge shown in Fig. 8, I may employ metal tubing drawn, cut, or spun to the required thinness at one edge and suitably closed at the upper, or I may stamp out the wedge from a sheet of metal or may form it from a blank including radial projections, each serving eventually to form a separate portion of the peripheral wall 20. In Fig. 7, the conical wedge is shown as being formed entirely of solder and it is likewise possible to form a wedge similar to that shown in Fig. 8, entirely of solder.

A further form which an annular wedge may take is that shown in Figs. 10 and 11. Here, the wedge has a head portion including an end wall 21^b and a peripheral wall 20^b having slots 24 running lengthwise thereof. The slots need not extend all of the way to the end wall 21^b, but may terminate in a mass of solder 22^b which is adjacent to the end wall. For effectively insuring the retention of the solder during the transportation and handling of the wedge, the peripheral wall 20^b, adjacent to the end wall 21^b, may be so formed as to make the internal chamber of greater diameter at this point or present a shoulder behind which the solder may engage and be retained and at the same time this portion will extend out radially past the end of the outer strands and close the end of the socket. This wedge may be driven into place in the same manner as the wedge shown in Fig. 8, but it has the added advantage that the solder, when melted, may flow through the slots 24 and thus reach the peripheral wall of the socket and insure the proper binding together of the wedge, strands and socket.

In Fig. 12 I have shown a wedge having a peripheral wall 20^c similar to the peripheral wall 20 shown in Fig. 8, but the end wall 21^c is formed entirely of solder. The slotting of the peripheral wall is not as essential as it is in a construction where the wedge is closed by a substantially non-fusible end wall.

In Figs. 13 and 14 I have shown a wedge of the same general form as that shown in Fig. 8, but having its peripheral wall 20^d and its end wall 21^d formed primarily of

solder but having incorporated therein a reinforcement of a less fusible material. This may be wire gauze 23 which may be corrugated within the peripheral wall.

5 It is not essential that either a conical or an annular wedge be driven endwise into the strands, as the socket may be so formed as to facilitate the driving in of the wedge in some other direction. In Fig. 15, I have
10 shown a socket member 26 with the peripheral wall of substantially double frusto-conical form and with an end wall 27 of substantially the same diameter as the inlet end of the member. The peripheral wall at
15 one side is provided with a substantially diamond shaped opening into which a wedge 29 of corresponding form may be driven. This wedge is shown as having recesses therein filled with solder 28. These are
20 shown as extending through the body portion of the wedge but it is of course evident that they may be of any other suitable character, adapting the wedge to carry the cold solder into the interior of the cable and permit it to be there melted.

The devices shown in Figs. 1, 8 and 15 are particularly designed for use in securing the end of a cable to a terminal. It is of course evident that these devices may be
30 used for securing two or more cable ends together by superposing the lugs and bolting them together. I have shown the metal body provided with a single cable receiving opening whereby it may be attached to a
35 single cable end, but I do not wish to be in any way limited as to the number of cable receiving openings in the same body.

One means which may be employed for securing together cable ends is shown in
40 Fig. 16. Here, there are employed two socket members 30 and 31, each of the same general form as the body of the socket member shown in Fig. 8, but one of them is threaded and the other provided with a
45 shoulder so that the larger ends may be rigidly clamped together by a threaded collar 32. Each cable may be inserted in the end of its corresponding socket member and the ends of the strands of each cable may be
50 spread apart by a wedge 33. This wedge is formed of or includes the solder and may be similar in construction to the wedges shown in any of the foregoing figures, or may be of any other suitable form embodying a
55 fusible part and suitable for the purpose. In the drawings, I have shown two wedges 33, each filled with solder plugs 34 and constructed substantially as shown in Fig. 8.

Although the wedge member is primarily
60 designed for spreading the strands of the cable by driving or otherwise forcing it into position, yet it is of course evident that the strands might be spread apart by the use of a separate wedge member which may be
65 withdrawn and replaced by a wedge formed

of or embodying solder. In this case, it would not be necessary to drive the solder wedge more than enough to force it home in the opening already formed or even this amount of forcing action may in some cases
70 be unnecessary.

The wedge need not necessarily spread the strands apart particularly if an annular wedge be employed and the cable be comparatively small. I may make a wedge
75 substantially as shown in Figs. 8, 12 or 13 and slot the side walls as shown in Fig. 10. This wedge if made of the proper size may be driven into the socket outside of all of the strands and the slots will permit the separate sections of the peripheral wall to be
80 forced inwardly and effectively grip the strands without necessarily spreading them. In Fig. 17 I have shown a wedge 35 of substantially the same general form as is shown in Fig. 8, but with slots 36 extending lengthwise thereof. The wedge is of such size that it is driven in outside of all the strands and comes between the strands and the peripheral wall of the socket 37. The solder 38,
85 when melted, after the wedge is driven in, will act substantially as in the other constructions hereinbefore described and will bind the strands, wedge and socket together.

I have referred to the fusible material as
90 being solder but it is of course evident that the specific composition forms no portion of my invention and that various different metals or alloys may be employed as the solder. To facilitate the proper adhesion of
95 the solder, either the socket wall or the wedge, or both, may be tinned if desired.

In defining the construction as including the fusible part, I mean to include either a wedge having a part substantially non-fusible and a part of solder, or a wedge formed
100 entirely of solder. Only a part of this latter need be fusible if the application of heat be properly timed. I have used the terms "fusible" and "non-fusible" in a relative
105 sense as the socket, even though formed of copper, would be fusible under some conditions, but would not be readily fusible by the application of such heat as would be required to melt solder. Therefore, I intend to
110 include such metals as copper, brass, or the like, as non-fusible materials for the present purpose, as they cannot readily be fused by such heat as the ordinary electrician in installing the device would bring to bear.
115

From the foregoing description and from the drawings, it will be seen that my invention may be carried out in a large number of different ways and that the main essential
120 feature of my invention resides in the wedge which is composed of, or includes, solder so that after the wedge has been driven into place, heat may be applied and the soldering operation automatically performed.

Having thus described my invention, what
125

I claim as new and desire to secure by Letters Patent is:

1. An article of manufacture for use as a connector for multiple strand cables, including a socket member having an entrance opening adapted to receive the end of the cable, and having a separate opening through which a wedge may be inserted, said wedge embodying therein a mass of solder adapted to be fused upon the application of heat to the exterior of the article after the insertion of the cable and wedge in the socket.

2. A connector for multiple strand cables including a socket member having a chamber provided with an entrance opening adapted to receive the end of the cable and a wedge adapted to be inserted between the strands of the cable to spread said strands apart, said wedge having a fusible part adapted to be fused upon the application of heat to the exterior thereof after the insertion of the wedge between the strands.

3. A connector for multiple strand cables including a socket member having a chamber provided with an entrance opening adapted to receive the end of the cable and a wedge adapted to be inserted between the strands of the cable to spread said strands apart, said wedge having a substantially non-fusible part and a fusible part, the latter being adapted to be melted by the application of heat to the exterior thereof after the insertion of the wedge.

4. An article of manufacture for use as a connector for multiple strand cables including a socket member having an entrance opening adapted to receive the end of the cable and having a separate opening through which a wedge may be inserted to bind the strands of the cable in said socket member, said wedge being formed of readily fusible material.

5. A connector for multiple strand cables, including a socket member having a chamber provided with an entrance opening adapted to receive the end of the cable, a portion of said chamber being of greater diameter than said entrance opening, and a wedge formed of readily fusible material adapted to be inserted between the strands of the cable to spread said strands apart into the chamber portion of greater diameter.

6. A connector for multiple strand cables including a socket having separate entrance openings for separate cable ends, and means for spreading apart the strands within the socket, said means including readily fusible material.

7. A connector for multiple strand cables including a socket member having a chamber provided with an entrance opening adapted to receive the end of a cable a portion of said chamber being of greater diam-

eter than said entrance opening and a wedge adapted to be inserted between the strands of the cable to spread said strands apart into the chamber portion of greater diameter, said wedge having a substantially non-fusible part and a fusible part, the latter being adapted to be melted by the application of heat to the exterior thereof after the insertion of the wedge.

8. A connector for multiple strand cables including a socket member having a chamber provided with an entrance opening adapted to receive the end of the cable and a wedge adapted to be inserted between the strands of the cable to spread said strands apart, said wedge having a tapered body portion and a chamber or recess therein receiving and retaining a solid mass of solder prior to the insertion of said wedge between the strands.

9. A connector for multiple strand cables including a socket member having a chamber provided with an entrance opening adapted to receive the end of the cable and a wedge adapted to be inserted between the strands of the cable to spread said strands apart, said wedge having a tapered body portion of substantially non-fusible material and a mass of fusible material incorporated therein, said body portion having openings along its length through which said fusible material may escape upon the application of heat to the wedge after the insertion of the latter.

10. A wedge including a tapered body portion of substantially non-fusible material and having a chamber or recess and a mass of solid solder within said chamber or recess.

11. A wedge for use in securing the strands of multiple strand cables within sockets, comprising an annular tapered body portion having a fusible part.

12. A wedge for use in securing the strands of multiple strand cables within sockets, comprising an annular tapered body portion having a transverse wall of fusible material.

13. A wedge for use in securing multiple strand cables within sockets comprising an annular tapered body portion provided with slots extending lengthwise thereof, a transverse end wall at the larger end of said body portion and integral with said body portion, and a mass of solder within said body portion and adjacent said end wall.

14. A connector for multiple strand cables including a socket member having a chamber provided with an entrance opening adapted to receive the end of the cable, and a wedge adapted to engage with the strands of the cable to retain them within the socket, said wedge having a tapered body portion formed of substantially non-fusible material and a mass of fusible material incorporated

therein, said body portion having openings along its length through which said fusible material may escape upon the application of heat to the wedge after the insertion of the latter.

15. A connector for multiple strand cables including a socket member having a chamber provided with an entrance opening adapted to receive the end of the cable, and a wedge adapted to engage with the strands of the cable to retain them within the socket, said wedge having a tapered body

portion formed of substantially non-fusible material and a mass of fusible material incorporated therein, said body portion having slots extending lengthwise thereof.

Signed at New York city, in the county of New York and State of New York, this 14th day of January, A. D. 1915.

EDWARD HALL FAILE.

Witnesses:

C. W. FAIRBANK,
FLORENCE LEVIEN.