April 24, 1928. R. R. MACDONALD 1,667,485

CONNECTER

Filed Aug. 25, 1927

Fig. 3.

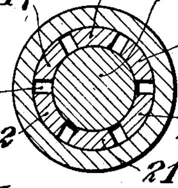


Fig. 4.

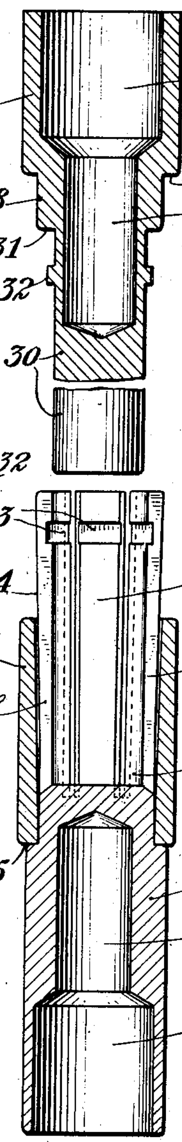


Fig. 1

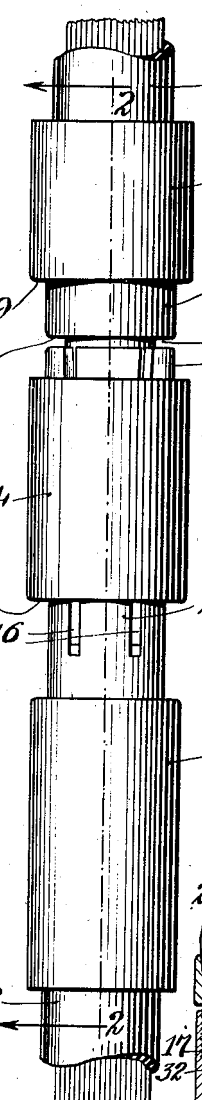
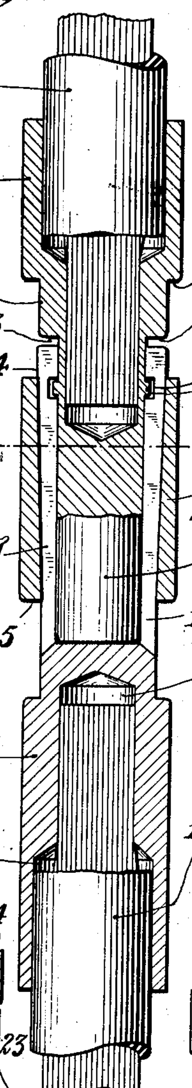


Fig. 2.



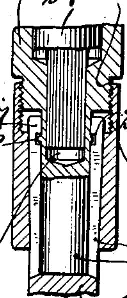


Fig. 5.

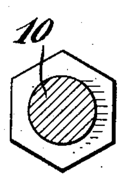


Fig. 6.

INVENTOR
Rob Roy Macdonald
BY
[signature]
HIS ATTORNEYS

Patented Apr. 24, 1928. 1,667,485

UNITED STATES PATENT OFFICE.

ROB ROY MACDONALD, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO LEO O. SMITH, OF BROOKLYN, NEW YORK.

CONNECTER.

Application filed August 25, 1927. Serial No. 215,305.

It is customary to employ insulated stranded copper conductor cables of considerable capacity for transmitting high tension electric currents as employed on surface and multiple unit cars, and also for electric locomotives from controllers, reversers and switching equipment to main motors as well as from third rail contact shoes to main trolleys and other apparatus. For some purposes the cable employed is rather stiff or inflexible whereas for other purposes the cable is yielding or extremely flexible. The heavier cable although relatively inflexible is employed in all places where it can be practically used because it is less expensive than the flexible cable. In many instances, for example, where car trucks are subject to relative radial movements as on curved tracks, it is necessary for the cable to be as flexible as possible. In all instances irrespective of the type of cable, it is customary to employ connecters for the purpose of quickly connecting and disconnecting adjacent parts of a cable. It is to these cable connecters that this invention more particularly relates.

Heretofore many types of cable connecters have been employed. Among these is the sleeve type connecter which is provided with machine screws or tap bolts for clamping the cable. This type of connecter is not satisfactory because of the frequent breaking of the bolts, the stripping of the threads of the bolts, and the difficulty in maintaining the bolts sufficiently tight when they are in good condition. Another form of connecter is known as the "I" and bolt type. For the purpose indicated, this type of connecter is not practical because the members thereof occupy too much space, and furthermore, like the sleeve type, there is difficulty in keeping the bolts tight. Furthermore, in both these types of connecter considerable time is necessary in connecting and disconnecting the parts and there is also considerable trouble in providing the necessary insulation for the screws and bolts.

Another form of connecter is known as the screw type. The use of this type of connecter is not practical for the purpose indicated because of the difficulty in connecting and disconnecting the parts thereof, which operation requires the use of two wrenches, one for holding the connecter from rotating and the other for turning the threaded sleeve of the connecter.

The most common form of connecter employed for railroad use is known as the clasp type. Although this type of connecter is now considered standard equipment on many railroads, it is, nevertheless, not satisfactory because of the fact that the parts as supplied are not interchangeable. This, no doubt, results from the manner in which the clasp is manufactured, being formed as it is by a milling machine combination side and face cutter. These tools become narrow during the cutting and sharpening processes and consequently, the slots in the clasp are not uniform. Inasmuch as, in use the surfaces of the connecters must be in exact relationship to each other to a small fraction of an inch, the parts of the clasp connecter do not fit correctly and the sections thereof are not interchangeable, as aforesaid. In practical use when the joints between the parts of this clasp type connecter are tight, the workmen simply hammer them together and thereby damage the parts. When the joints are loose and open they are liable to cause short circuits with all the trouble which may be incident thereto. Experiences demonstrate that many of these connecters are cracked or broken within short periods of time, which, of course, results in unnecessary expense.

Furthermore, the parts of this type of connecter are so constructed that when connecting the same they must be held at right angles to each other. As will be understood, this results in bending the strands of the cables each time the parts of the connecter are connected and disconnected. The bending of the cable usually is at a point where the same is soldered to the connecter, resulting in either breaking the soldered joint or the strands of the cable. This reduces the carrying capacity of the cable and also increases the liability of short circuits.

Then again, in order to inspect the joint between the strands of the connecter and the cable, in some instances it is current practice to cut back the cable insulation leaving the connecter bare at the very point where the insulation is supposed to extend inside the connecter, and then to cover the bare section of the cable by insulation or adhesive tape. This tape may be removed for the purpose of

inspecting the wire strands, but often times the broken strands are in the center of the cable and if so, it is difficult, if not impossible, to find them.

From the standpoint of practical operation a new and satisfactory connecter is undoubtedly needed as it is believed will be obvious from the foregoing. The object of my invention is the provision of such a connecter. In carrying out the invention the connecter preferably comprises a socket member, a stud member and a sleeve member movable on a portion of the socket member to secure and maintain the parts in position when connected for use, the sleeve being operated in both the connecting and disconnecting operation by a suitable tool provided for this purpose. The parts of the connecter are so formed so as to provide a maximum contact between the parts thereof so that electrically connected the connecter is substantially an integral unit; the parts of the connecter are, furthermore, so constructed so as to be uniform and consequently interchangeable, and still furthermore, the parts of the connecter are so constructed that in putting them together and separating the same it is unnecessary to twist the cable, whereby, it will be noted, the tendency to disrupt the strands of the cable is eliminated and the difficulty of insulating the joint between the cable and the connecter is obviated.

The connecter made in accordance with my invention will be hereinafter more particularly described in connection with the accompanying drawings in which Figure 1 is an elevation of the connecter.

Figure 2 is a section on line 2—2, Fig. 1.

Figure 3 is a transverse section on line 3—3, Fig. 2.

Figure 4 is a view similar to Fig. 2 showing the parts disconnected.

Figure 5 is a partial section similar to Fig. 2 showing another form of the invention and

Figure 6 is an end view of the same.

Referring to the drawing and particularly to Figures 1 to 4 inclusive it will be seen that in carrying out this invention the connecter made in accordance therewith comprises three principal parts, namely a socket member, a stud member and a sleeve member by which the socket and stud members may be maintained in their operative relationships. The body of the socket member is indicated at 10. This socket member is preferably made of cold rolled medium hard stock bar brass, but, of course, may be made of any other suitable material. This portion of the socket member requires no machining on the outer part thereof. This part of the socket member, however, is provided with a two diameter bore as indicated at 11 and 11′ for the reception therein and connection thereto of a cable 12. At the other end of the socket member the same is provided with a bore 13. The outer surface of the socket member at this end thereof is turned down in a lathe to provide an exterior taper surface 14 thereon which extends from the extremity of the socket member to a shoulder 15. This tapered end of the socket member is then provided with slots 16 preferably formed by a milling machine saw. This forms a series of tongues at this end of the socket member. These tongues are equally spaced and are six in number as illustrated although as it will be understood, there may be any necessary or desirable number of these tongues. The tongues are designated by the reference characters, 17, 18, 19, 20, 21 and 22 respectively. Interiorly the tongues are provided with recesses indicated at 23. These recesses extend circumferentially and are appreciably distant from the extremities of the tongues.

Associated with the socket member is a sleeve member indicated at 24. This is preferably made of the same material as the socket member. Exteriorly the sleeve member requires no machining. Interiorly, however, it is bored and reamed to provide an inner surface at the same inclination as that of the outer surfaces of the tongues 17 to 22 inclusive. In constructing the socket member the tongues thus formed are more or less resilient and have a tendency to spring outwardly, and initially the sleeve member is fitted over the tongues by drawing the free ends thereof together and then passing the sleeve over them. By subsequently releasing the tongues they return to their initial positions and automatically maintain the sleeve in position thereon.

The stud member includes a body portion 25 which is preferably made of the same material as the other parts, that is, as the stud member and the sleeve. At one end this stud member is provided with a two diameter bore as indicated at 26 and 26′ for the reception therein and connection thereto of a cable 27. The stud member includes a portion of reduced diameter 28 between which and the body of the stud member there is a shoulder 29, and it also includes a stem 30 of still further reduced diameter between which and the portion 28 there is a shoulder 31. The stem 30 of the stud member in a suitable position is provided with a flange 32. It will be understood that the portions of reduced diameter of the stud member are formed in a lathe so that they may be made uniform. The stem 30 of the stud member is adapted to enter the bore 13 in the socket member when the tongues of the socket member are released and the stem 30 is of sufficient length to extend to the base of the bore 13. Moreover, the outer diameter of the

stem 30 is substantially the same as the diameter of the bore 13. The flange 32 and the grooves 23 are so placed that when the stem 30 is in position in the bore 13 the flange 32 is in place to enter the grooves 23. The parts of the connecter may then be locked in their operative positions as shown in Figure 2 by using a suitable tool to force the sleeve into place. This tool may be a lever having a pair of spaced triangular plates adapted to enter and fit between the shoulder 15 and the adjacent end of the sleeve member for forcing the sleeve member to position. In doing so, of course, the tongues of the socket member are brought positively into contact with the surface of the stem of the stud member and the flange 32 is caused to enter the recesses 23 which locks the parts together. The same form of tool may be employed in disconnecting the members of the connecter. In doing so, the triangular plates thereof are adapted to fit between the shoulder 29 and the opposite end of the sleeve to force the sleeve back to its initial position thereby relieving the tongues and permitting the same by their resiliency to automatically spring outward thus releasing the flange 32 from the recess and also releasing the stem 30 so that the parts of the connecter may be readily separated. By referring to Figure 2 it will be seen that the parts are so designed that when in their connected positions there is a space 33 of appreciable extent between the shoulder 31 and the extremities of the tongues. This is provided in order to prevent the tongues from being accidentally sprung or otherwise damaged if, as sometimes happens, the connecter should be dropped in either connecting or disconnecting the parts thereof.

In some forms of the connecter, particularly in smaller designs, or those which in use may be subjected to an extrordinary amount of vibration or shocks, it may be advisable to positively connect the sleeve to the stud member. In so doing, as shown in Figures 5 and 6, the material of which the parts of the connecter are made is preferably hexagonal stock of the material hereinbefore indicated or any other suitable material. In this form of the invention the section of the stud member of intermediate diameter, that is, the section extending between the shoulders 29 to 31 is preferably screw threaded as indicated at 34, and the sleeve member 24 is provided with a tapped extension 35 so that by the use of a wrench or other suitable tool or tools the socket and stud members may be held in position and the sleeve turned to place to positively connect and lock them together.

I claim as my invention:

1. In an electric cable connecter, a socket member adapted at one end for connection to a cable and having a plurality of spaced tongues at the other end thereof, a stud member adapted at one end for connection with a cable and having a stem at the other end thereof, and means associated with the tongues for forcing the same into contact with the said stem when the stem is in position between the said tongues.

2. In an electric cable connecter, a socket member adapted at one end for connection to a cable and having a plurality of spaced tongues at the other end thereof, a stud member adapted at one end for connection to a cable and having a stem of reduced diameter at the other end thereof, and means on the said tongues to force the same into contact with the said stem to lock the stem relatively to the said tongues when the stem is in position between the said tongues.

3. In an electric cable connecter, a socket member adapted at one end for connection with a cable, a plurality of spaced longitudinally disposed tongues at the other end of the socket member, a stud member adapted at one end for connection with a cable, a stem at the other end of the said stud member and adapted to be inserted into position between the said tongues, and means movable on the said tongues to force the same into contact with the said stem when the stem is in position between the tongues.

4. In an electric cable connecter, a socket member adapted at one end for connection with a cable, a plurality of spaced longitudinally disposed tongues at the other end of the socket member, a stud member adapted at one end for connection with a cable, a stem at the other end of the said stud member and adapted to be inserted into position between the said tongues, and means slidable on the said tongues to force the same into contact with the said stem and to lock the stem in place relatively to the tongues when the stem has been placed in position between the tongues.

5. In an electric cable connecter, a socket member, a plurality of spaced resilient tongues formed in the socket member at one end thereof, a stud member, a stem of reduced diameter at one end of the said stud member, the said tongues being initially spreadable to receive the said stem between them, and means movable relatively to the said tongues for forcing the same into contact with the said stem after the stem is forced into position between the said tongues.

6. In an electric cable connecter, a socket member, a plurality of spaced resilient tongues formed in the socket member at one end thereof, the outer surface of the said tongues being tapered from their extremities toward the opposite end of the socket member, a stud member, a stem at one end of the stud member adapted to be received between the said tongues, and means mova-

ble on the tapered surface of the said tongues for forcing the same into contact with the said stem after the stem is in position between the said tongues.

7. In an electric cable connecter, a socket member, a plurality of spaced resilient and initially spreadable tongues formed in one end of the socket member so as to extend longitudinally thereof, the outer surface of the said tongues being tapered from the extremities thereof toward the opposite end of the stud member so as to cause the same to have a section of reduced diameter at approximately the inner ends of the said tongues thereby providing a shoulder on the socket member, a stud member, a stem at one end of the stud member adapted to be received between the said tongues and having a bore tapered at substantially the same inclination as that of the outer surfaces of the said tongues, the said sleeve when moved in one direction being adapted to force the said tongues into contact with the said stem after the stem is in position between the said tongues and when moved in the opposite direction to permit the tongues to spread, thereby releasing the said stem making the socket and stud members readily separable.

8. In an electric cable connecter, a socket member and plurality of spaced tongues formed in the socket member to extend longitudinally thereof at one end of the same, the outer surfaces of the said tongues being tapered from the extremities thereof toward the opposite end of the socket member to provide a section of reduced diameter and a shoulder adjacent the inner ends of the said tongues, the said tongues each being provided with an internal recess adjacent the outer end of the tongue with the said recesses being circumferentially disposed, a stud member, a stem at one end of the stud member adapted to be received between the said tongues and having a flange adapted to enter the said recesses in the tongues, and a sleeve fitting over the said tongues and having a bore tapered at substantially the same inclination as the outer faces of the said tongues, the said sleeve being adapted to be moved in one direction to force the said tongues into contact with the said stem with the flange on the stem in position within the said recesses in the tongues to lock the said stud member to the socket member and when moved in the opposite direction to free the said tongues permitting them to spread whereby the said stud member is readily separable from the socket member.

9. In an electric cable connecter, a plurality of spaced longitudinally disposed tongues formed in one end of the socket member, the outer surfaces of the said tongues being tapered from the extremities thereof toward the other end of the socket member thereby providing a section of reduced diameter and a shoulder on the socket member adjacent the inner ends of the said tongues, a stud member, a stem on one end of the stud member adapted to be received between the said tongues and to extend the entire length thereof, the said stud member having an intermediate section between the stem and the opposite end thereof thereby providing a shoulder thereon, and a sleeve fitted over the said tongues and having a bore tapered at subtsantially the same inclination as that of the tapered surfaces of the said tongues, the said sleeve being adapted to be forced to position by a suitable tool cutting between the shoulder on the socket member and the adjacent end of the sleeve to force the said tongues into contact with the said stem and to be moved in the opposite direction by a tool operating between the said shoulder on the stud member and the opposite end of the said sleeve to free the said tongues and to then make the said stud and socket members readily separable.

Signed by me this 16th day of August, 1927.

ROB ROY MACDONALD.