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METHOD AND MEANS FOR SOCKETING COMPOSITE WIRE STRANDS

Filed Feb. 14, 1924

Fig. 1.

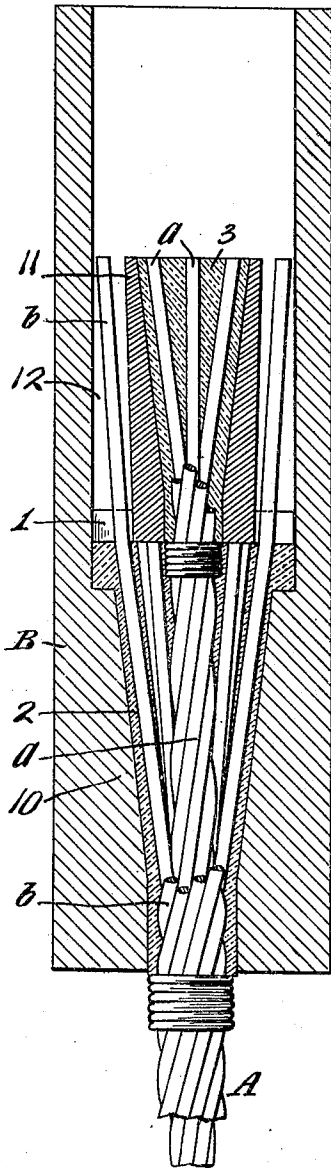


Fig. 2.

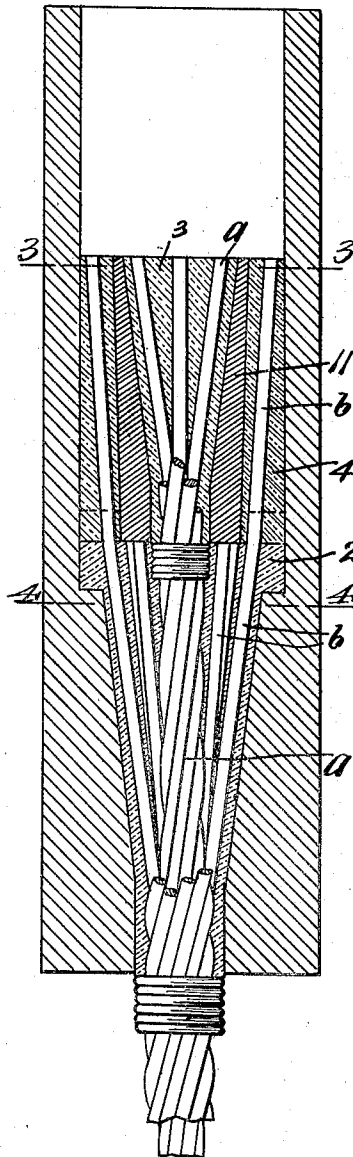


Fig. 3.

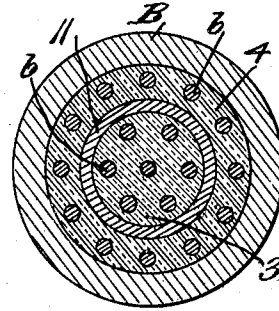


Fig. 4.

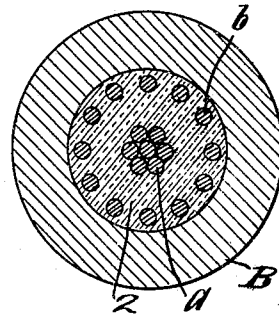


Fig. 5.

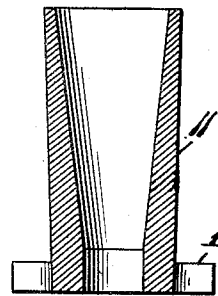
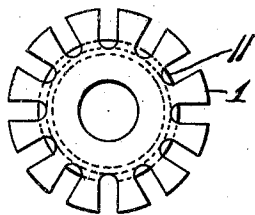


Fig. 6.



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UNITED STATES PATENT OFFICE.

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METHOD AND MEANS FOR SOCKETING COMPOSITE WIRE STRANDS.

Application filed February 14, 1924. Serial No. 692,629.

To all whom it may concern:

Be it known that I, CHARLES C. SUNDERLAND, a citizen of the United States, residing at Trenton, county of Mercer, and State of New Jersey, have invented certain new and useful Improvements in Methods and Means for Socketing Composite Wire Strands, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improved method and means for socketing composite wire strands, such as are now used especially for power transmission purposes and electrification work, the especial object of the invention being to provide a socket connection that will develop a high efficiency of the composite strand and prevent breaking of the wires of less strength or lower elastic limit under strand tension.

Such composite strands are commonly made of two kinds of metal, for instance, with some wires of steel and the others of aluminum, or some of copper weld material, that is, steel with a copper covering, and the others of hard drawn copper, the inside wires of the strand being made of the metal of greater strength and higher elastic limit. In such composite strands, it is quite difficult to make a socket connection in the regular manner that will develop a high percentage of the ultimate strength of the composite strand, because of the fact that the elastic limit of some of the wires is reached at a much earlier period than of others and failure then occurs by breaking of the weaker wires before the full strength of the stronger wires is utilized.

The invention aims, therefore, to develop a socket and method of socketing, whereby the wires of different metal will be socketed separately and their socketing be combined so that they will act in unison to compensate for variations in the ultimate elongation of the two materials and the differences in their elastic limit and ultimate strength. This result is secured by socketing the wires so that a certain amount of slip of the weaker wires under tension will be permitted and thus transfer a certain proportion of the load to the stronger wires, while on increase of tension further slip will be prevented and the stronger

and weaker wires will then act in unison under such increased tension on the strands, and thus the aggregate wire strength of both the weaker and stronger wires be utilized to a much larger extent than under present methods of socketing.

For a full understanding of the invention, a detailed description of my new method and socket in the preferred form will now be given in connection with the accompanying drawings, showing the invention as applied to a composite strand of common form, and the features forming the invention will then be specifically pointed out in the claims.

In the drawings—

Figure 1 is a central section longitudinally of the socket before completion of the socketing operation;

Figure 2 shows the complete socket and strand;

Figures 3 and 4 are cross-sections on the lines 3—3 and 4—4 of Fig. 2;

Figure 5 is a detail longitudinal section of the separate basket, and

Figure 6 is a reverse plan of Fig. 5.

Referring now to the drawings, A is the composite wire strand to be secured in the socket, this strand being shown as a nineteen wire strand of common form, the seven inner wires *a* being of high strength steel, or of steel with a copper covering, and the twelve outside wires *b* being of hard drawn copper, aluminum, or other material of lower elastic limit than the inner wires, according to the use for which the composite strand is designed.

The socket B in which the strand is to be secured, has a tapering basket 10 at the end of the socket which receives the strand, this basket being formed by the inner wall of the socket or otherwise fixed thereto, and a separate basket 11, which is movable longitudinally relatively to the socket B, this basket 11 being enclosed in an enlarged cylindrical opening 12 continuous with the opening of the basket 10 at its larger end. This basket 11, as shown in Figs. 5 and 6, has its outside wall straight or only slightly tapering, and is preferably formed with a spider 1 at its base for holding the outer strand wires *b* separated.

The outer wires *b* are separated and socket in the basket 10, which is filled

with filling metal 2, this filling metal 2 being of a comparatively low melting-point, so as not to amalgamate with the wires *a*, *b*, and so as to flow to a slight extent when subjected to sufficient pressure. The inner wires are not separated in this basket 10, but pass through it without separation, and are separated in the separate basket 11, and this basket filled with filling metal 3, so as to socket the inner wires *a* in the basket 11, this filling metal 3 being of such high melting point as to secure efficient amalgamation between the wires and filling metal, which, with the wedging action of the basket, permanently and fixedly attaches the wires *b* in basket 11, the partially completed construction being then as shown in Fig. 1. After this operation, the space 12 between the socket shell and the outer side of basket 11 around the wires *b* is filled with filling metal 4. As the wires *b* are to slip somewhat, however, this metal is not of such character as to secure amalgamation between the wires and metal, and little or no wedging action on this body of metal 4 is provided for, the outer side of the wall of basket 11 being straight or nearly so. The construction will then be complete as shown in Fig. 2.

It will be understood that the extension of the socket beyond the basket 11, or the outer wall of the socket, will be of suitable form, according to the use for which the socket is intended, whether as a terminal socket or as a double socket for connecting two strands, the illustration being only for the purpose of explaining my improved method and means for socketing the strand wires.

The action of the socket under tension is as follows: Under light tension on the strand, the outside wires *b* will carry load proportionate to the inside wires, but, as the tension is increased, the outside wires *b* will slip in their socket attachment sufficient to transfer a larger proportion of the load to the inside wires *a*, and this action will cause the separate basket 11 to press upon the filling metal 2 in basket 10 and increases the gripping action on all the wires *b* by the wedging action of the socket, so as to prevent further slip and utilize the strength of the wires *b* as well as the wires *a*. With proper proportioning, therefore, the outside wires can slip sufficiently to compensate for the difference in physical properties of the inner and outer wires and yet supply sufficient gripping force to securely grip the outside wires at the proper time and thus secure a large proportion of the ultimate strength of all the wires in the strand.

It will be understood that the invention is not limited to the specific form of the strand or socket shown, but that the inven-

tion is applicable in connection with strands of different forms and arrangements of wires, and that the specific construction of the socket may be changed, while retaining the invention defined by the claims.

What I claim is:

1. The method of socketing a wire strand which consists in socketing some of the wires in a basket fixed relatively to the socket and in such a manner as to permit limited slip of the wires in the basket, and socketing others of the wires fixedly in a separate basket at the larger end of the socket free to move longitudinally of the socket.

2. The method of socketing a composite strand having wires of different strength and elastic limit, which consists in socketing the weaker wires in a socket basket with a filling metal of low melting point to avoid amalgamation and permit slip of the wires under tension, socketing the stronger wires in a separate basket free to move in the socket and arranged at the larger end of the weaker wire basket, and filling said stronger wire basket with filling metal of higher melting point for securing amalgamation and utilizing the full strength of the wires.

3. The combination with a wire strand, of a socket having a fixed basket for the strand in which some of the wires are separated and secured so as to permit slip of the wires under tension, and a separate basket at the larger end of the socket free to move longitudinally of the socket under tension, said separate basket having the other wires of the strand socketed fixedly therein.

4. The combination with a composite strand having wires differing in strength and elastic limit, of a strand socket having separate baskets for the stronger and weaker wires, and filling metal of different melting points in the two baskets, the filling metal for the weaker wires being of lower melting point to permit slip of the weaker wires under tension.

5. The combination with a composite strand having wires of different strength and elastic limit, of a strand socket having two wedging baskets arranged in line and receiving respectively the stronger and weaker wires, the basket receiving the stronger wires being separate from the socket shell and free to move therein longitudinally of the shell, and filling metal in said baskets and between said separate basket and the socket shell, the filling metal in the basket for the weaker wires and between the separate basket and socket shell being of low melting point to prevent amalgamation and permit limited slip of the wires in the basket under tension.

6. The combination with a composite strand having inner and outer wires of

different materials, the inner wires being of greater strength and higher elastic limit than the outer wires, of a socket having a wedging basket for the strand, a separate
5 wedging basket for the inner wires, said separate basket being of smaller outside diameter than the socket shell and arranged at the larger end of the strand basket with the outer wires between the separate basket and socket shell, filling metal of low melting 10 point in the strand basket, and in the space between the inner wire basket and socket shell, and higher melting point metal in the inner wire basket.

In testimony whereof, I have hereunto 15 set my hand.

CHARLES C. SUNDERLAND.