

H. W. FISHER.
CABLE CONSTRUCTION.
APPLICATION FILED JULY 10, 1916.

1,266,006.

Patented May 14, 1918.

FIG. 1.

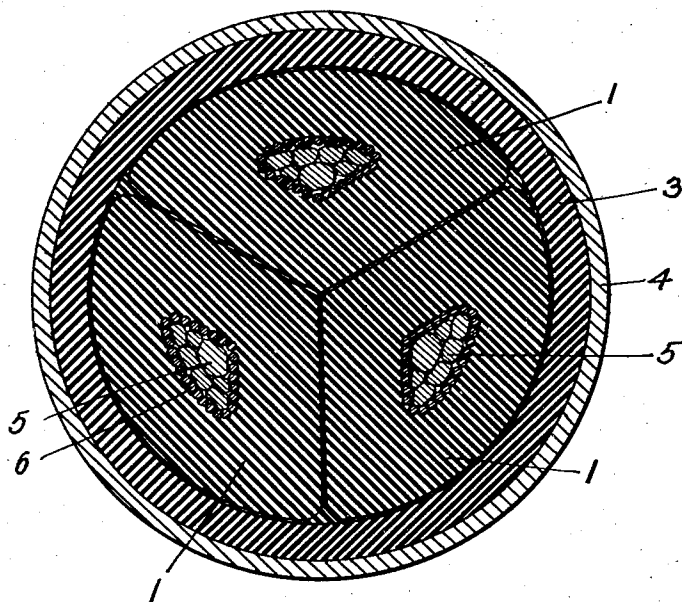


FIG. 2.

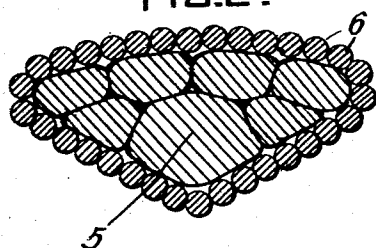
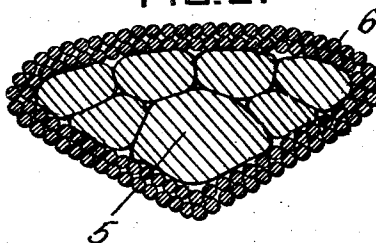


FIG. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

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CABLE CONSTRUCTION.

1,266,006.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY W. FISHER, residing at Huguenot Park, Staten Island, and State of New York, a citizen of the United States, have invented or discovered certain new and useful Improvements in Cable Construction, of which improvements the following is a specification.

My invention relates to improvements in the construction of cables, the conductor or conductors of which are stranded; that is to say, cables whose conductor or whose several conductors are individually composed and made up of a plurality of parts, a bundle of wires, each of which carries a portion of the whole current. I show and shall describe my invention applied in the construction of a multiple-conductor cable, but it will be understood in the sequel that it is of general applicability in cable-construction, whether the number of conductors be many or one only. Further, I show it applied in the construction of a sector-shaped conductor for a multiple-conductor cable, but again it will be understood that the invention is not limited to the making of a conductor of any particular shape. The objects in view are economy in cable-making, and efficiency and durability in service.

The invention is illustrated in the accompanying drawings, in which Figure 1 shows in cross-section a multiple-conductor cable with sector-shaped conductors, in the making of which, in the manner hereinafter described, my invention is realized; Fig. 2 is a like view and on larger scale of one of the conductors of the cable as it is completed and before insulation is applied to it and before it is assembled with other like insulated conductors to form the cable; and Fig. 3 is a view similar to Fig. 2, but illustrating a modification in structure.

Fig. 1 shows a three-conductor cable, such as is used for carrying three-phase alternating currents. The conductors with their envelops 1 of insulation are in the making of the cable twisted together and covered with the belt insulation 3 and the lead sheath 4. Of course the cable here shown in detail is exemplary; the invention is applicable to cables of all sorts in which stranded conductors are employed, and in other respects the cable may be such as the builder wishes.

The advantage of a stranded conductor lies in the fact that it is more flexible than

an integral conductor of the same cross sectional area; and, consequently, as between cables including the same number of conductors of equal carrying capacity, the conductors of one being single and the conductors of the other stranded, the cable which has stranded conductors is the more flexible and in that respect better suited to conditions of manufacture, installation, and service. On the other hand, a stranded conductor cable is of necessity more bulky than a solid-conductor capable of equal carrying capacity, because a bundle of wires of a given total cross-sectional area is more bulky than a single wire whose cross-sectional area is the same as the total of the wires of such bundle. It follows that, other things being equal, a stranded-conductor cable, while more flexible, is also larger than a solid-conductor cable. And it will of course be recognized that the cable which has larger conductors requires more insulating material and more sheathing material and is therefore in these respects more expensive than the solid-conductor cable. Besides, service conditions are generally such that the smaller the cable the better—so long as current capacity is not diminished.

It is with economy of space in view that sector-shaped conductors are used in multiple-conductor cables; for, with a given minimum permissible thickness of insulation between conductors, approximation to sector shape admits of greater compactness than retention of circular shape for the individual conductors. In dealing with stranded conductors,—particularly in the case of the sector-shaped stranded conductor—it has heretofore been proposed to compact together the assembled strands, to compress the bundle, to pass the assembled stranded conductor through roll pass or die, or to shape the bundle under a hammer, crowding and compacting the strands together, crushing them to some extent out of their original shape, so as to reduce the over-all thickness of the conductor. There is, however, disadvantage in so compacting the bundle of strands. It is inevitable that, in consequence of the compressive action of die roll or hammer, sharp or rough points and edges will be developed, and the greater the compressive strains the more pronounced will be this result. Sharp and rough points and edges are undesirable; they tend to damage

the applied insulation and they become points of weakness where (the cable being in service) the insulation may break down, more especially because of the increased electric density at sharp points, where actual discharges may take place.

My invention enables me to enjoy the advantage of compressing the stranded conductor without the disadvantage of producing danger points. It consists essentially in building up the heart or center portion of the conductor and subjecting that portion when so built up to such compressive and consolidating action as has been indicated above, and then in applying to and upon the portion of the conductor so assembled and dealt with a surrounding and enveloping portion which also shall be part of the completed conductor functionally, and which shall be smooth-surfaced (that is to say, free of dangerous points and angles) and so the dangers which have been indicated above and which are defects in such cables as previously made are avoided and overcome.

While this invention may be carried out in various specific ways, I shall describe it carried out in my preferred manner.

The envelop of this preferred form consists, as will presently appear, in a wrapped-on layer of smooth wire. The invention in general terms consists in the application of an envelop whose surface is free of such points and angles as would constitute danger points; and manifestly a wrapped-on layer of smooth wire affords an envelop possessing that desired character.

Referring to the drawings, and particularly to Fig. 2, the stranded conductor there shown, consisting of a bundle of strands, may for present purposes be described to be composed of two parts; a central bundle 5, and an outer surrounding layer of strands 6. The central bundle of strands may be a bundle of straight-away wires or it may be a bundle of wires twisted in familiar manner. If made up of straight-away wires, the component wires may be of special shapes and special grouping in various sizes. The central bundle 5, however, after it has been made up, is compressed and compacted and reduced in over-all dimensions in any suitable or preferred manner, as by hammering or rolling or otherwise. When it has been so compressed and

diminished, the outer enveloping layer 6 is laid on, this layer being composed of smooth wire, in a suitable number of strands, wrapped about the consolidated central body. Fig. 3 shows that instead of a single layer a plurality of layers of smooth wire may be wrapped on the central bundle.

It will be understood that it is only in relation to these construction operations that the central bundle 5 and the enveloping layer 6 can be considered separate parts or separate bodies; for, in the matter of current carrying, the conductor is one stranded conductor.

Manifestly the outer enveloping layer 6 may be made of relatively fine wire, and accordingly be in and of itself a layer of small bulk.

From the foregoing description it will be plain that, so far as concerns the central bundle 5, I gain the benefit and advantage of compression; and that, by the presence of the super-added and uncompressed layer 6, I avoid the disadvantage and dangers of a rough and sharp-edged conductor.

It is manifest that, while I have shown my invention in its application to a multiple-conductor cable with sector-shaped stranded conductors, it is applicable generally to stranded-conductor cables.

I claim as my invention:

1. The method herein described of making a stranded cable conductor which consists in gathering a bundle of strands, compressing the bundle when gathered with incidental development of sharp edges, and enveloping the compressed and sharp-edged bundle in a superadded layer of a smooth surface conductor.

2. A cable conductor composed of a central bundle of strands brought together and compacted and shaped one upon another by pressure into a bundle having incidentally developed sharp edges, and a layer of smooth surfaced conductor enveloping the compressed and sharp edged bundle.

In testimony whereof I have hereunto set my hand.

HENRY W. FISHER.

Witnesses:

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JOHN KEER PROECK.