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ELECTRICAL CABLE

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Fig. 1.

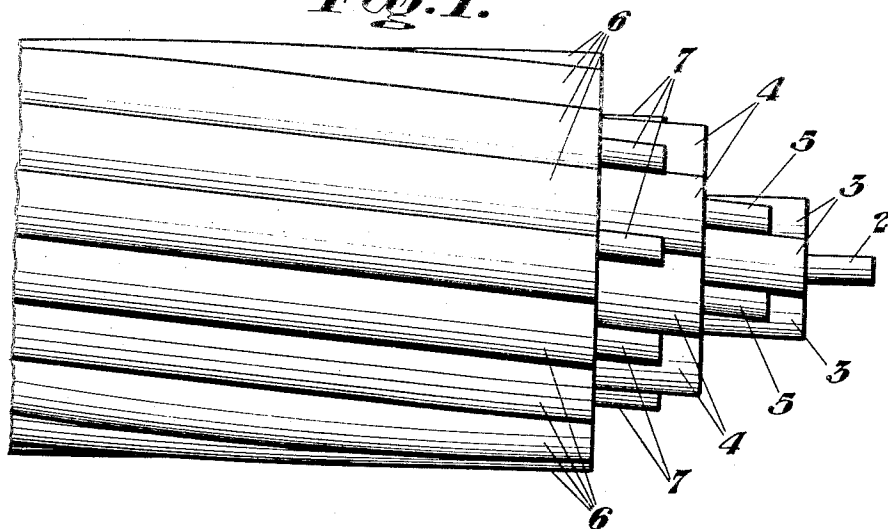
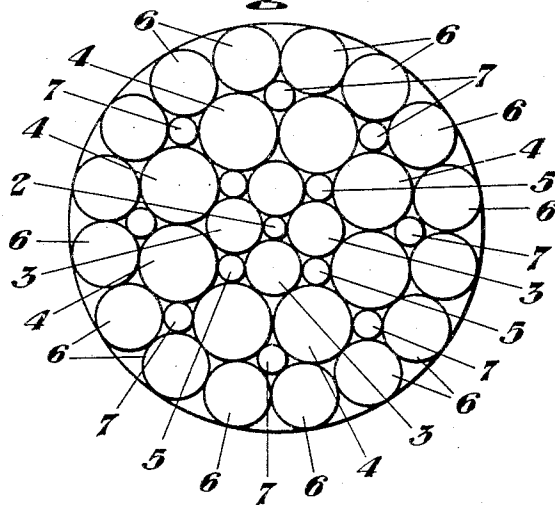


Fig. 2.



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ELECTRICAL CABLE

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11 Claims. (Cl. 117—58)

This invention relates to electrical cables of the type including one or more stranded conductors with the usual insulation, lead sheath and armoring, and more particularly relates to the construction of the strand or strands forming the conductor.

One object of the invention is to provide an electrical conductor of improved construction wherein a series of round wires of varying diameter are compactly assembled so that the wires of the separate layers forming the stranded conductor have the same or equal lay and are so selected in size as to combine flexibility with a maximum cross-section of metallic area for any given diameter of conductor.

Another object of the invention is the provision of an electrical conductor wherein a series of round wires of selected sizes or diameters are stranded so as to avoid the nicking associated with the usual cross-lay constructions, especially when the conductor is subjected to sharp bends.

A further object of the invention is the provision of an electrical conductor wherein the wires are helically wound around a central core and are locked in assembled position, so that displacement thereof when in service is overcome and prevented.

In the accompanying drawing:

Figure 1 is a fragmentary plan showing a short length of electrical conductor having the wires thereof constructed and arranged in accordance with the teaching of my invention.

Figure 2 is an end view of the electrical conductor of Figure 1.

Referring more particularly to the drawing, the conductor has a core 2 formed of a single wire of small diameter. The core 2 is surrounded by a layer of wires 3 larger in diameter than the core wire and helically wound side by side upon the same.

The inner layer formed by the wires 3 is surrounded by an intermediate layer of wires 4 of large diameter which are helically wound and extend in the same direction as the wires 3. This intermediate layer is formed of double the number of wires in the inner layer of wires 3.

The intermediate layer of wires 4 is surrounded by an outer layer of wires 6 which are double the number of wires in the intermediate layer and extend in the same direction. The wires forming the outer layer are also smaller in diameter than the wires 4 of the intermediate layer but larger in diameter than the wires 3 of the inner layer.

between the inner and intermediate layer of wire; and a filler wire 7 between the intermediate and outer layers thereof. This construction locks the wires of the conductor firmly in place.

I have found by constructing an electrical conductor strand of 41 wires including a core wire and filler wires in the manner described (all the wires being stranded in one operation) of an outside diameter of 0.321 inches, in which the core wire is .02" in diameter, the wires of the inner layer .04" in diameter, the wires of the intermediate layer .063" in diameter, the wires of the outer layer .051" in diameter and the filler wires all .024" in diameter; then by such construction I have been able to obtain a volume efficiency or ratio of actual metal cross-section to total cross-section of conductor of approximately 84 per cent.

By arranging the wires in layers and by selecting the sizes of the various wires, a conductor strand is obtained composed of all round wires which is flexible and compact, having a minimum diameter and a maximum amount of metal for that diameter.

Many attempts have been made in the past to construct electrical cables of wires of other shapes than round so as to combine the advantages of flexibility due to the use of a number of small wires and volume efficiency due to the ability to reduce the interstices between the wires of the conductor strand, but such constructions have not come into common use due to the excessive cost of producing and stranding shaped wires. Attempts have also been made in the past to construct electrical cables of selected all round wires but all such constructions heretofore proposed failed to completely lock the wires of the various layers and thereby failed to prevent permanent deformation, resulting from distortion by "bird-caging" during bending of the cable.

By arranging the wires in the manner I have shown and described all of the wires in the outer layer are completely locked in position. Also by laying all of the wires in the same direction and in one operation in forming the strands, nicking of one wire upon another is avoided and the wires have a line bearing on adjacent wires instead of point bearing usually present in strands formed of layers of wires of different lay.

While I have shown and described one specific embodiment of my invention, it will be understood that I do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of my invention, as defined by the following claims.

I place a filler wire 5 in the interstices formed

I claim:

1. An electrical cable composed of at least one conductor, said conductor comprising a plurality of wires wound helically around a core in three concentric layers of the same pitch or lay with fillers positioned between each of the respective layers, whereby all of the wires track with one another, the wires of the outer layer each being larger in diameter than the wires of the inner layer but smaller in diameter than the wires of the intermediate layer, each of said conductors having a volume efficiency of approximately 85 per cent.

2. An electrical conductor comprising a plurality of wires wound helically around a core in three concentric layers of the same pitch or lay with fillers positioned between each of the respective layers, whereby all of the wires track with one another, the wires of the outer layer each being larger in diameter than the wires of the inner layer but smaller in diameter than the wires of the intermediate layer, the said conductor having a volume efficiency approaching 85 per cent.

3. An electrical cable composed of one or more conductors, each of the said conductors composed of not more than forty-one wires including a core wire and fillers, the said wires being helically wound around the core wire in three concentric layers of the same pitch or lay so that all of the wires track with one another, said fillers positioned between the respective layers, each of the wires of the intermediate layer being larger in diameter than the wires of the adjacent layers, each of the said conductors having a volume efficiency approaching 85 per cent.

4. An electrical conductor composed of not more than forty-one wires including a core wire and fillers, the said wires being helically wound around the core wire in three concentric layers of the same pitch or lay so that all of the wires track with one another said fillers positioned between the respective layers, each of the wires of the intermediate layer being larger in diameter than the wires of the adjacent layers, the said conductor having a volume efficiency approaching 85 per cent.

5. An electrical cable composed of one or more conductors, each of the said conductors comprising a plurality of wires helically wound about a core wire in three concentric layers of the same pitch or lay with fillers positioned between each of the respective layers, whereby all of the wires track with one another, the wires of the inner layer being at least .04" in diameter, the wires of the intermediate layer being at least .063" in diameter, the wires of the outer layer being at least .051" in diameter, and the filler wires being about .02" in diameter, each of the said conductors having a volume efficiency approaching 85 per cent.

6. An electrical conductor composed of a plurality of wires helically wound about a core wire in three concentric layers of the same pitch or lay with fillers positioned between each of the

respective layers, whereby all of the wires track with one another, the wires of the inner layer being at least .04" in diameter, the wires of the outer layer being at least .051" in diameter, and the filler wires being about .024" in diameter, the said conductor having a volume efficiency approaching 85 per cent.

7. An electrical cable composed of one or more conductors, each of the said conductors comprising a plurality of wires helically wound about a core wire in three concentric layers of the same pitch or lay with fillers positioned between each of the respective layers, whereby all of the wires track with one another, the area of each of the wires of the inner layer being about 40 per cent of the area of the wires of the intermediate layer and at least 50 per cent of the area of the wires of the outer layer, each of the said conductors having a volume efficiency approaching 85 per cent.

8. An electrical conductor composed of a plurality of wires helically wound about a core wire in three concentric layers of the same pitch or lay with fillers positioned between each of the respective layers, whereby all of the wires track with one another, the area of each of the wires of the inner layer being about 40 per cent of the wires of the intermediate layer and at least 50 per cent of the area of the wires of the outer layer, the said conductor having a volume efficiency approaching 85 per cent.

9. A cable composed of at least one conductor, said conductor comprising a plurality of wires wound helically around a core in three concentric layers of the same pitch or lay with fillers positioned between each of the respective layers, whereby all of the wires track with one another, the wires of the outer layer each being larger in diameter than the wires of the intermediate layer, each of said conductors having a volume efficiency of approximately 85 per cent.

10. A conductor composed of not more than forty-one wires including a core wire and fillers, the said wires being helically wound around the core wire in three concentric layers of the same pitch or lay so that all of the wires track with one another, said fillers positioned between the respective layers, each of the wires of the intermediate layer being larger in diameter than the wires of the adjacent layers, the said conductor having a volume efficiency approaching 85 per cent.

11. A conductor composed of a plurality of wires helically wound about a core wire in three concentric layers of the same pitch or lay with fillers positioned between each of the respective layers, whereby all of the wires track with one another, the wires of the inner layer being at least .04" in diameter, the wires of the outer layer being at least .051" in diameter, and the filler wires being about .024" in diameter, the said conductor having a volume efficiency approaching 85 per cent.

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