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ELECTRICAL CABLE

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Fig. 1.

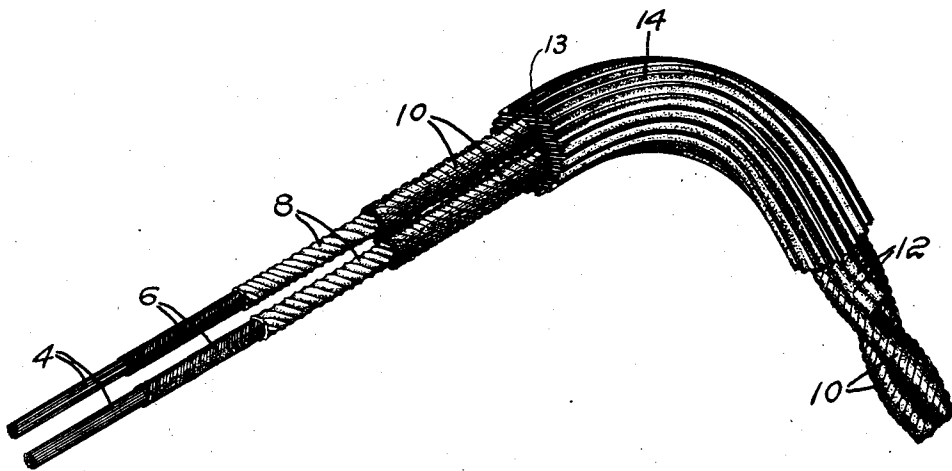
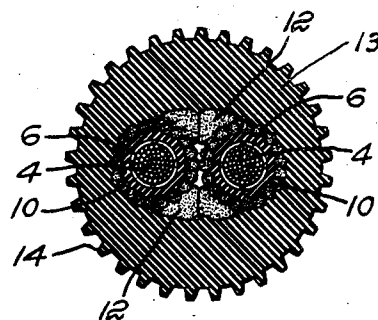


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ELECTRICAL CABLE.

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The present invention relates generally to insulated electric cables and more particularly to that type of cable which contains one or more flexible conductors. This type of cable, although adapted for more general use, is particularly adapted and more commonly used to supply current to portable electrical devices such as lamps, heating appliances, motor driven household appliances and tools.

The principal object of the invention is to improve the construction of such a cable and provide an improved cable which will be exceedingly durable and well adapted to withstand the rough physical treatment to which such cables or cords are often unwittingly subjected as well as the usually disastrous effects of a current in excess of that for which the conductors were designed. The invention will be best understood by reference to the following description, when taken in connection with the accompanying drawings of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claim.

In the drawings:

Figure 1 is a perspective view of an electric cable exemplifying the invention, on a somewhat enlarged scale; and

Figure 2 is a cross-sectional view of the same, on a still larger scale.

Referring to the drawings, and to the embodiment of the invention which is selected for exemplification, there is shown an electric cable comprising two conductors 4, each composed of a multiplicity of strands of wire of good conductivity, such as copper, associated with one another in any suitable manner. Each of these conductors is provided with a covering 6, such as a thin layer of cotton helically wound thereon. About this covering is an inner jacket 8, of appropriate vulcanizable material, such as an insulating rubber compound.

Surrounding each inner rubber jacket is an intermediate jacket 10, comprising a number of strands of material, which is preferably non-combustible, such as asbestos. These strands are suitably assembled about the inner jacket as by braiding or winding the same thereon after the latter has been partly cured. As shown in the drawing, the strands of the jacket 10 are helically wound

tightly upon the jacket 8 when it is still somewhat plastic.

In the valleys presented by adjacent portions of the intermediate jackets 10 are fillers 12, each comprising a plurality of relatively large cross-section strands which may be of such a character as to impart high tensile strength to the assembly. These fillers present a rounded surface between the assembled conductors over which to form the outer jacket and promote flexibility by the elimination of the relatively stiffer rubber compound which would otherwise fill the spaces between the conductors. These strands may be and are herein of non-combustible material such as asbestos. The conductors with their described coverings are twisted as shown at the right-hand portion of Fig. 1 to enable the cable to flex freely in all directions. At the left-hand portion of Fig. 1, they are shown parallel merely for the sake of clearness of illustration of the various elements.

About the conductors and their coverings and the fillers, assembled as above described, is an outer jacket 13 of suitable vulcanizable material, such as appropriate rubber compound which is impervious to water and air. Preferably, the rubber compound is black, contains metallic oxides in addition to the usual ingredients, and is molded under relatively great pressure, all of which increases its heat conductivity. Excellent results have been secured by the use of 65 per cent of zinc oxide although it is possible to employ other oxides such as iron and aluminum.

The external surface of the outer jacket is preferably corrugated, or ribbed and herein is provided with a multiplicity of longitudinal ribs 14, which possess several advantages, among them the fact that they add to the heat radiating surface, they permit a desirable degree of flexibility by spreading apart on a curve, as represented at the right-hand side of Fig. 1; and they readily adapt themselves to openings of various sizes, within reasonable limits, while still affording a proper degree of frictional contact therewith. This is desirable where the cable is inserted in an opening leading to a terminal of a socket or appliance to which the cable is connected. It is found in practice that the cable can be forced into an opening

with which it has a snug fit with greater facility than a cable which has a smooth external surface.

5 The material of the external jacket 13
may be applied by any one of the well known processes which is best adapted to the purpose. When the material has been applied the assembled cable is placed between
10 molds which are brought together to compact the cable, forcing the assembled parts into intimate contact, filling all voids and excluding all air from the cable. If the molds are correspondingly shaped the outer jacket will be ribbed or grooved as shown.
15 The entire cable is then subjected to vulcanizing heat which cures the outer jacket and completes the curing of the individual insulation upon the conductors.

20 The cable when in service, and when subjected to severe tests, is found to have a life many times greater than other cables at present available in the trade for like purposes. Tests have been made by purposely short-circuiting the conductors and
25 raising the amperage of the current. It is found that this cable shows a lower temperature under the same conditions of test as compared with other cables intended for a like purpose, and whereas others soon
30 commence to burn, and in many cases are completely destroyed by fire, this cable has withstood similar conditions without failure. This may be, and is probably, due to several factors, among them the high heat
35 conductivity and radiation characteristics of the outer jacket, the fact that it excludes air which would otherwise support combustion, and the fact that this jacket is combined with an intermediate jacket of non-com-
40 bustible material. It may be that the highly compressed condition of the inner jackets about the conductors is another factor.

The use of the outer jacket of rubber has another important advantage, namely: that it renders the cable entirely water-proof, so
45 that it may be submerged in water without the slightest danger. This is of course important because the outer braided cotton covers usually employed absorb much moisture, and this is found to be destructive to the cables. The rubber covering is also
50 advantageous as compared with a cotton cover, because the latter separates when bent, and the next time is apt to bend at the same place, thus eventually causing weakening
55 and breaking of the conductors, as well as admitting moisture to the interior of the cable.

Having thus described one embodiment of the invention, but without limiting myself
60 thereto, what I claim and desire by Letters Patent to secure is:

An electrical cable comprising, in combination, a pair of conductors, inner jackets
65 of vulcanizable material, one about each of said conductors, and intermediate jackets of non-combustible, fibrous material, one about each inner jacket and embedded therein, fibrous, non-combustible, filler material disposed in the valleys presented by
70 adjacent portions of said intermediate jackets, and an outer molded cylindrical jacket of flexible vulcanizable material of relatively high thermal conductivity, the said
75 outer jacket being formed with a plurality of longitudinally extending integral ribs to provide a heat radiating surface having a superficial area exceeding by approximately
80 50% the normal superficial area of a smooth cylindrical surface of like diameter.

In testimony whereof, I have signed my name to this specification this 10th day of October, 1922.

HANS V. WODTKE.