June 5, 1934. C. CREMER 1,961,962

ELECTRIC CABLE

Filed March 13, 1929

Fig. 2

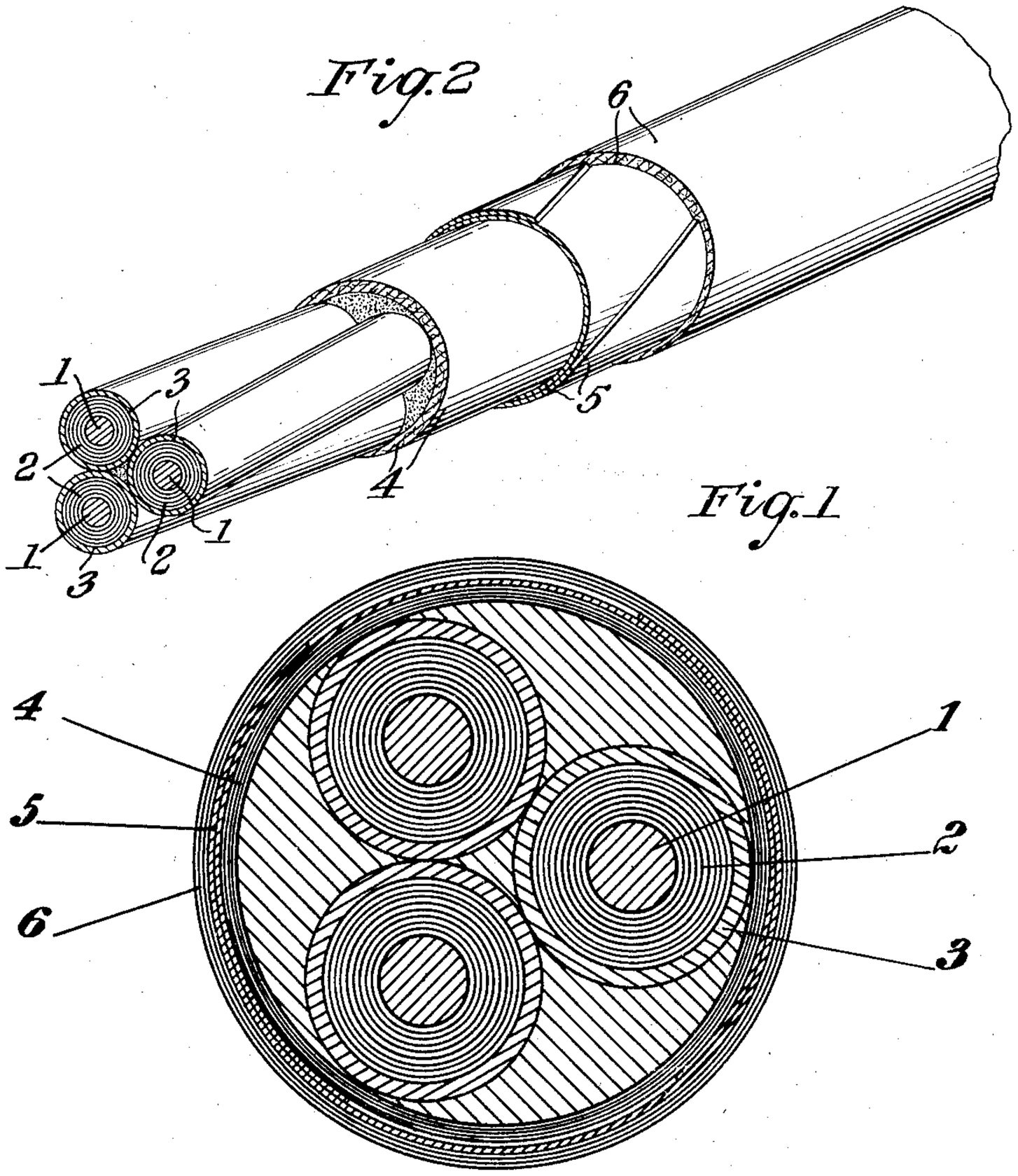

Fig. 1

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ELECTRIC CABLE

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3 Claims. (Cl. 173—266)

According to existing standards governing the manufacture of cables for heavy current, for twisted multiple core cables having copper cross-sections exceeding ten square m. m., stranded conductors composed of several twisted wires must be employed. A determining factor for this requirement was the circumstance that the twisted cables had to have a sufficient flexibility to permit it to be easily laid. Now the experiments of the applicant have shown, that the flexibility of a cable depends not only on the nature of the cross-section of the conductor, but also particularly on the diameter of the lead covering whose resistance to bending rapidly increases with the diameter. Moreover, the flexibility is dependent also on the resistance which the twisted cores offer to an axial displacement, that is on the friction of the strand surfaces. The greater or less stiffness of the insulating layers, generally impregnated paper, is of proportionately less influence.

How large the factors are individually which determine the flexibility of a cable, is in practice of secondary importance, what matters is only the resulting flexibility of the complete cable. It has now been established by experiment that this total-flexibility of a twisted heavy current cable remains within normal limits even with the employment of relatively stiff conductors, if the remaining resistances to bending, in particular that of the lead covering, are suitably reduced.

According to the invention a multiple core cable is made of several intercoiled conductor cables each provided with a metal covering, whose individual conductors consist of one solid wire of over 10 sq. m. m. cross-section. The total flexibility of this cable is greater than that of the normal cable with a common lead covering enclosing all the cores. Because, in the first place, with the cable according to the invention, the total lead cross-section is smaller than that of a normal cable with girdle insulation and a common lead covering. In the second place, the resistance to bending of the lead coverings of the individual cores by reason of their considerably smaller diameter is, taken together, appreciably less than that of a corresponding cable with girdle insulation. Thirdly, because the individual cores due to their smooth surfaces yield more readily to displacement upon each other.

The flexibility is further materially assisted in that with such a multiple core cable made of several single-core cables twisted together, the individual cores lie in plain helical paths with respect to one another.

Multicore cables with several insulated conductor-cores twisted together and each provided with a lead-covering are well known; but with conductors having cross-sections of over ten square millimeters the conductors always consisted of several stranded wires. The invention consists in the improvement, that in combination with this kind of multicore cables conductors are employed, which consist each of one solid wire.

The employment of solid wires as the conductors gives the further advantage that with the same effective cross-section the diameter of the conductor and with it the diameter of the cable is smaller. From this, a considerable economy in manufacture results through the saving of material and avoidance of the labour of twisting stranded conductors. Moreover, as is known, the smooth surface of the solid conductor appreciably reduces the dielectric stress on the insulation in comparison with stranded conductors so that the cable is safer in operation.

Fig. 1 discloses a sectional view of the composite cable; and

Fig. 2 discloses a perspective view of the composite cable with portions broken away.

The drawing shows one constructional embodiment of the cable according to the invention. 1 are the solid conductors of a three core cable. 2 are the insulating layers, 3 the lead coverings, 4 is the usual inner jute layer or bedding, 5 the armouring, for example iron or steel strip or wire, and 6 the outer jute layer.

In the appended claims, the term ungirdled is used to exclude an outer, continuous, impervious metal sheath for the cable as a whole, as for example lead sheaths which are commonly used.

Having now particularly described and ascertained the nature of my said invention, I declare that what I claim is:—

1. In an ungirdled electric cable, a plurality of main, conductor elements, each conductor consisting of a single wire having a smooth, uninterrupted exterior length and being above twenty-five square millimeters in cross section, impregnated insulating material surrounding each of said conductors individually, said wire contacting said material at all points of the length of the wire and leaving no gaps between the wire and material, whereby the impregnating material is prevented from flowing out the ends of the cable and the dielectric stress is reduced, said insulating material being surrounded by a metal sheath, and the sheathed conductor elements being twisted together helically.

2. A heavy-current, ungirdled electric cable having greater flexibility, higher conductivity, and

lesser dielectric stress than a girdled cable of the same diameter, comprising three conductors, each consisting of a single, solid, unstranded wire greater than twenty-five square millimeters in cross-section, each of the wires being twisted helically around the others and having smooth, uninterrupted, exterior surfaces throughout its length, impregnated insulating material surrounding each of said conductors, a lead covering surrounding the insulating material of each of said wires, a jute bedding between the three twisted conductors, a resilient steel strip wound helically around the bending and a jute protective covering wound around the steel.

3. A heavy-current, ungirdled electric cable having greater flexibility, higher conductivity, and lesser dielectric stress than a girdled cable of the same diameter, comprising three conductors, each consisting of a single, solid, unstranded wire greater than twenty-five square millimeters in cross-section, each of the wires being twisted helically around the others and having a smooth, uninterrupted, exterior surface throughout its length, impregnated insulating material surrounding each of said conductors, a lead covering surrounding the insulating material of each of said wires, a fibrous bedding between the three twisted conductors, and a strip of flexible strong material wound helically around the bedding.

CARL CREMER.