June 27, 1939. J. WERTZHEISER ET AL 2,164,168

ARMORED ELECTRICAL CABLE

Original Filed May 15, 1935

Fig. 1.

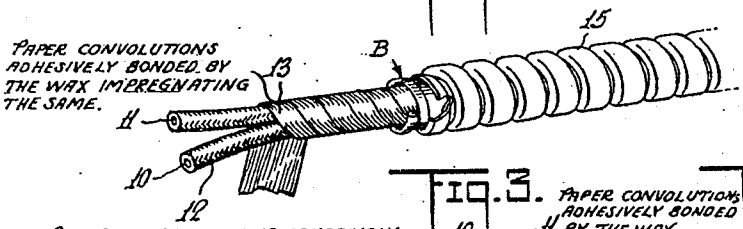


Fig. 3.

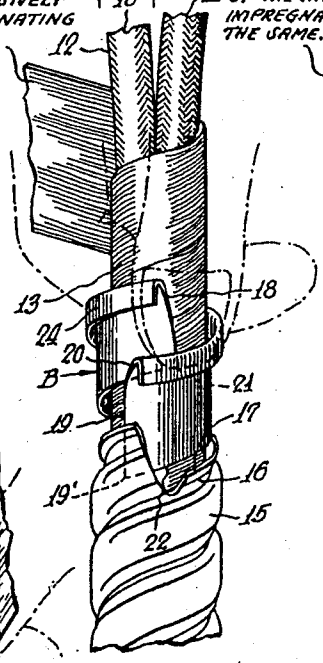
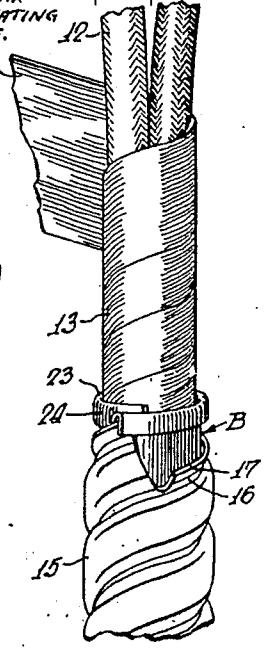


Fig. 4.



PAPER CONVOLUTIONS ADHESIVELY BONDED BY THE WAX IMPREGNATING THE SAME

Fig. 2.

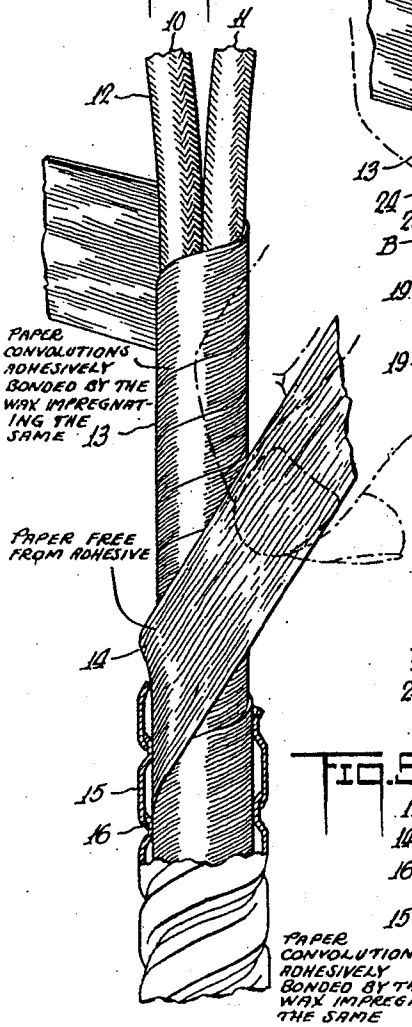


Fig. 5.

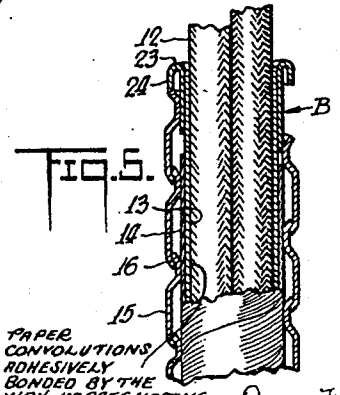
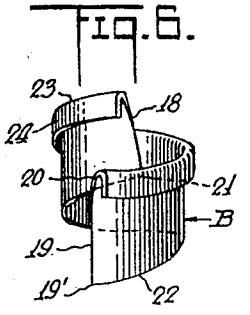


Fig. 6.



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Patented June 27, 1939 2,164,168

UNITED STATES PATENT OFFICE

2,164,168

ARMORED ELECTRICAL CABLE

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Original application May 15, 1935, Serial No. 21,524. Divided and this application October 4, 1935, Serial No. 43,530

2 Claims. (Cl. 174—109)

Our present invention is concerned with armored electric conductors or cables of the familiar type commonly used in the electric wiring of building constructions.

Among the objects of the invention are to provide an armored cable of the above type, which may be expeditiously produced by automatic machinery, and which is substantially proof against electrical failure as for instance, due to tearing loose during installation of any insulation on the conductors that might have adhered to the armor sheath.

Another object is to provide an armored cable of the above type, with adequate protection along the entire exposed severed sharp edge of the sheath, and readily applied in installation of the cable, to preclude any possibility of cutting the insulation of the protruding outwardly turned conductors.

A feature of the invention is the use, preferably, of paraffin impregnated paper, applied about the insulating conductors, preferably by helical winding, the heat evolved in the assembly serving to soften the wax and autogenously to bond the superposed convolutions to each other.

Another feature is the superposition of another layer of unwaxed or unparaffined paper interposed between the bonded protective paper layer and the conventional outer helically wound metal armor sheath.

This application is a division of our pending application, Serial No. 21,524, filed May 15, 1935, and patented on October 29, 1935, under No. 2,018,939.

In the accompanying drawing, in which are shown one or more of the various possible embodiments of the several features of the invention,

Fig. 1 is a perspective view of a length of the armored cable, with the protective bushing inserted,

Fig. 2 is a perspective view partly in longitudinal section, showing the removal of a portion of the outer protective layer,

Fig. 3 is a view similar to Fig. 2 showing one step in the application of the protective bushing,

Fig. 4 is a view similar to Fig. 3, showing the final step in the application of the bushing,

Fig. 5 is a view in longitudinal cross-section showing the bushing applied, and

Fig. 6 is a perspective view of the bushing as an article of manufacture.

Referring now to the drawing, there is shown an armored cable illustratively with two conductors 10 and 11, each covered by conventional insulation, illustratively braided covering 12. The conductors are shown enclosed in an insulating protective covering, which is preferably a continuous spirally wound sheet of paper 13 impregnated with wax, preferably paraffin. The width of the paper is illustratively three times the pitch at which it is wound, so that the completed sheath will be three-ply. In the conventional process of fabricating the armored cable by winding the protective covering simultaneously with the armor sheath, the paraffin or other wax becomes sufficiently softened to afford an adequate bond of the various convolutions and to effect a secure continuous insulating enclosure sheath, and this without the need for special application of any form of adhesive.

In addition to the bonded protective sheath, there is preferably employed, according to the present invention, the further outer insulating covering 14 of paper, devoid of wax or other adhesive, which is wound about the inner protective sheath 13. About the parts thus far described, is wound the conventional metal sheath 15 comprising a strip of metal wound on a pitch substantially equal to its effective width, the overlapping helical edges being crimped together at 16.

In the armored cable made as described, the outer paper layer 14 is free from any adhesive bond with respect to the sheath and substantially free of such bond with respect to the inner protective covering 13. Accordingly, no adhesive connection between the conductor or its protective covering and the outer metal sheath can occur, so that in bending and manipulating the latter, there is no possibility of tearing loose any of the protective insulation, and electric failures from this cause are not apt to occur.

In use of the device, after cutting or severing the sheath as at 17 adjacent the outlet box or other terminal structure, the outer insulating layer 14 only is preferably removed down to a point slightly below the exposed end of the sheath, thereby to afford clearance for the insulating bushing which may be of conventional construction. Thus, it is seen that the insulating bushing fits snugly in said clearance thus left between the bonded protective sheath 13 and the inner wall of the metallic armor 15. In constructions in which the entire insulating protection must be removed between the insulated conductors and the metal sheath, a simple fibre bushing may not fit with sufficient snugness to assure its retention, while an attempt to introduce a bushing without removal of any of the insulating covering between the insulated conductors and the

metal armor usually involves difficulty. While, as above noted, a conventional bushing may be employed, we have shown in Fig. 6 of the drawing one embodiment of the bushing, claimed in the parent application, of which this is a division. This bushing is shown of helical conformation and of peripheral length somewhat greater than one complete convolution. The split ends 18 and 19 of the fibre bushing B are displaced longitudinally of the bushing along a pitch such that the trailing end 20 of the leading edge 19 overlaps the leading end 21 of the trailing edge 18. The leading end 19' of the leading edge 19 constitutes a guiding conformation for ready installation of the bushing and the part of the bushing adjacent said leading edge 19 becomes wedged or anchored in place in the application of the bushing, as best shown in Figs. 3 and 4. The leading rim 22 of the bushing is preferably of pitch somewhat greater than that of the outer or trailing rim 23, as appears from the fact that the leading split edge 19 is longer than the trailing split edge 18. Preferably, the pitch of the leading rim 22 of the bushing is substantially equal to that of the helically wound sheath, and the trailing rim 23 which has an outwardly turned flange 24 is of somewhat lesser pitch.

The application of the bushing is quite expeditious, since it requires nothing more than the single manipulation of introducing the leading or anchoring end 19' with the thumb pushing it home to effect secure anchorage and then following with light pressure with the index and middle finger on the trailing rim 23 to wedge it home.

The bushing thus securely wedged in place is effective around the entire periphery of the sharp severed edge of the armor sheath, so that the construction avoids the objection to ordinary split insulating bushings, in which protection is substantially lacking at the region of the split. In the present construction, the split region is in fact of enhanced security, since a double layer of fibre is presented thereat.

It will thus be seen that there is herein described apparatus in which the several features of this invention are embodied, and which in its action attains the various objects of the invention and is well suited to meet the requirements of practical use.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. An armored electric cable comprising one or more insulated conductors, paraffin paper strip helically wound thereabout, said strip being wax impregnated and of width several times the pitch of the winding to present overlapping areas, the wax of said overlapping areas serving as the means for welding the same together in a unitary flexible structure, and a second helical strip of paper, free from wax, wound about said first strip, and a metal strip helically wound about the protective covering to form the armor sheath.

2. An armored electric cable comprising one or more insulated conductors, a wax covered paper strip helically wound in overlapping relation about said conductors with the wax of said strip bonding the overlapping areas thereof together in a substantially unitary flexible insulating sheath thereabout, an outer layer of protective paper free from adhesive, encircling said first covering, a helically wound metal sheath enclosing said protected conductors, whereby a split insulating bushing frictionally may be retained in place between the armor and paraffin paper protective covering in the space left by the removal of the outer paper layer for substantially the depth of such bushing.

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