

[54] ELECTRICAL CONDUCTIVE COATED CABLE

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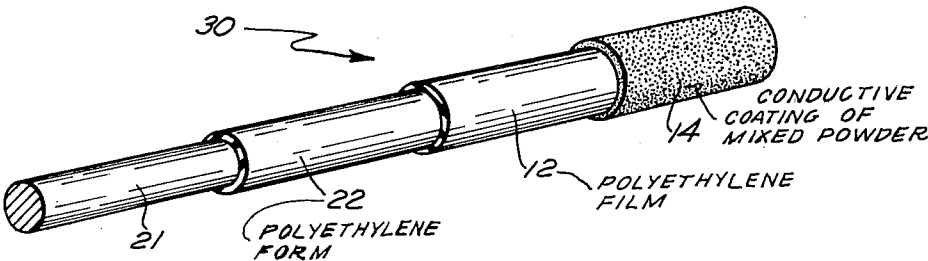
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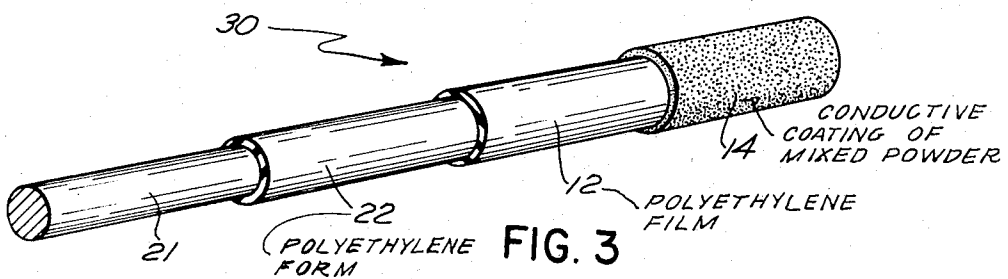
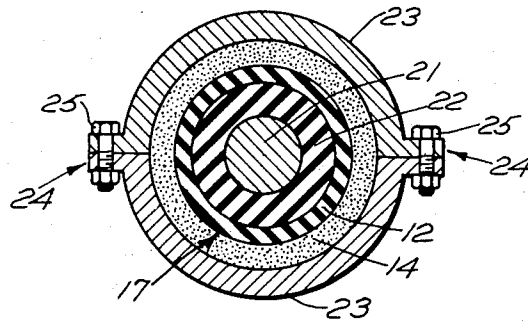
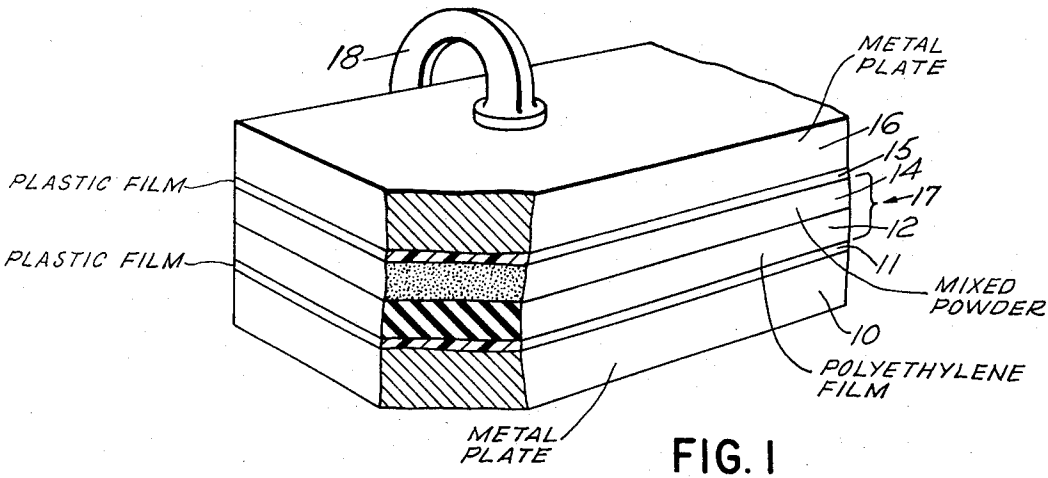
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[57] ABSTRACT

A conductive material formed on the surface of a polyethylene film comprises a homogeneous mixture of polyethylene powder, nickel powder, silver flake and polyethylene oxide of a high molecular weight. The conductive material is bonded by means of fusion to the polyethylene film to form a coating which is then bonded to the outer surface of a polyethylene cable.

1 Claim, 3 Drawing Figures





ELECTRICAL CONDUCTIVE COATED CABLE

This application is a division of application Ser. No. 393,534 filed Aug. 31, 1973 for Fusible and Electrical Conductive Coating.

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

The present invention generally relates to polyethylene jacketed cables and more particularly to a conductive material that can be bonded to such cables.

Foam polyethylene cable when used to form part of a submarine antenna system need selected surface areas that are electrically conductive. Prior art coatings such as conductive paints and adhesives either failed to adhere to the polyethylene jacket or formed such a weak bond to the polyethylene that slight abrasion removed the coatings. Spiral wound wire and metal strips affixed to the outside of cables were also attempted but broke upon the flexing of the cable during use.

SUMMARY OF THE INVENTION

It is therefore a general object and purpose of the present invention to provide an electrically conductive coating. It is a further object to provide the conductive coating to the outer surface of a foam polyethylene jacketed cable. Further objects are that the conductive coated cable have good flexibility, good corrosion resistance in sea water, and capable of being sealed at least to 500 psi.

These and other objects are accomplished according to the present invention by providing a specific electrically conductive mixture and forming a coating by adhering the mixture to a polyethylene film by means of heat and pressure. The coating is then bonded to the outer surface of a polyethylene cable by means of being clamped inside a cylindrical split mold and heated.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an assembly for providing a coating for an electrical cable;

FIG. 2 is an assembly for bonding the coating of FIG. 1 to the electrical cable; and

FIG. 3 shows the coated cable formed by bonding the coating of FIG. 1 to the electrical cable.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A specific mixture for providing an electrical conductive coating for a polyethylene cable has the following composition:

Example 1

	% by weight
Polyethylene powder	35.59
Nickel powder	14.23
Silver flake	49.82
Polyethylene oxide	.36

The polyethylene powder, nickel powder and silver flake that are used in the composition are 200 mesh or less in size. The polyethylene oxide has an average molecular weight of 4,000,000. All the above materials are

commercially available and should be high quality for best results. In addition, the above components of polyethylene powder, nickel powder and silver flake can be varied by 10 percent of their respective weights either individually or in unison with other components without destroying the effectiveness of the mixture.

The polyethylene oxide can be increased by up to 10 percent of its respective weight or decreased anywhere down to zero. Although the polyethylene oxide makes a positive contribution, it has the problem that it is water soluble and would tend to deteriorate the product when in use over an extended period of time.

When the polyethylene oxide is omitted the mixture has the following ingredients.

Example 2

	% by weight
Polyethylene powder	35.72
Nickel powder	14.28
Silver flake	50.00

The above components can also be varied by 10 percent of their respective weights either individually or with another ingredient.

Once the proportions of the above ingredients in either Example 1 or 2 have been measured, the ingredients are mixed together until they appear homogeneous.

In order to form a conductive coating from the homogeneous mixture and apply the coating over a foam polyethylene cable the following procedure is performed.

Referring to FIG. 1, a first flat metal plate 10 is covered on its inner surface with a plastic film 11 such as MYLAR or other non-adhering high temperature substance. The length and width dimensions of the plate depend on the desired size of the coating to be formed. The thickness of the plastic film used was approximately 5 mils. This dimension, however, is not critical. A 4-6 mil thickness polyethylene film 12 having the same length and width as the plastic film 11 and plate 10 is placed on the plastic film 11. A screen (not shown) is then placed on film 12 and the mixed powder 14 comprised of the materials of either Examples 1 or 2 is sprinkled on and through the interstices of the screen. The screen is then squeegeed to level off the mixture 14. Then the screen is removed. The size of the screen used can vary from 25 to 200 mesh and have a depth for providing a 5-10 mil thickness for the mixed powder 14.

Another layer of plastic film 15 similar to film 11 is applied on top of powder 14. A second metal plate 16 is then placed on top of film 15 and metal plates 10 and 16 are clamped together by any clamping means such as C clamp 18. The assembly formed is placed in an oven or otherwise heated to 300°-350°F. When the powder 14 heats up and begins to flow out of the assembly the heat is removed and the assembly is permitted to cool. The heating normally takes between an hour and an hour and a half. The purpose of the heating is to bond the polyethylene film 12 to the mixture 14 to form a coating 17.

The clamp 18 and metal plates 10 and 16 are then removed from the assembly. The plastic films 11 and 15 are then peeled off of the bonded coating 17. The function of the films 11 and 15 is to prevent the coating 17 from adhering to plates 10 and 16.

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The coating 17 as formed has a high electrical resistant layer comprised of the polyethylene film 12 and a low electrical resistant layer comprised of mixture 14.

Referring now to FIG. 2 there is shown a cable 20 comprised of a copper conductor 21 and a polyethylene foam jacket 22. The coating 17 formed of layers 12 and 14 is wrapped around jacket 22 with the polyethylene film 12 placed in juxtaposition to polyethylene jacket 22. A cylindrical split mold 23, having flanges 24, is then wrapped around coating 17. Split mold 23 has an inside diameter equal to the outside diameter of the coating 17. The mold 23 after being placed over the coating 17 is clamped by nuts and bolts 25. The clamped assembly is heated to 325°F causing a fusion between the polyethylene foam jacket 22 and the film 11. The heating normally takes between ½ hour and 1 hour. After such fusion the heat is removed from the assembly and after cooldown the coated cable is removed from the split mold 23.

FIG. 3 shows a view of the coated cable 30 formed by the processes described. The cable 30 has layers partially removed for clarification. The respective components of cable 30 are the copper conductor 21, polyethylene foam layer 22, polyethylene film layer 12 and conductive layer 14.

There has therefore been described an electrical cable and the processes by which it is made.

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The resistivity of the outer surface of the cable measures 1 ohm or less per foot of length. In addition, the outer surface is suitably insulated from the internal conductor along its length. The cable formed is rugged enough to withstand the rigors of a marine environment whether rolled on a cable reel or unrolled and is capable of going through submarine hull fitting systems without having its electrical properties impaired.

It will be understood that various changes in the details, materials, steps and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

What is claimed is:

1. An electrical cable comprising:

an electrical conductor;

a first polyethylene cover enclosing said conductor; a second polyethylene cover enclosing and bonded to said first polyethylene cover; and

an electrically conductive coating comprising a mixture of polyethylene powder, nickel powder and silver flake, said electrically conductive coating enclosing and bonded to said second polyethylene cover.

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