

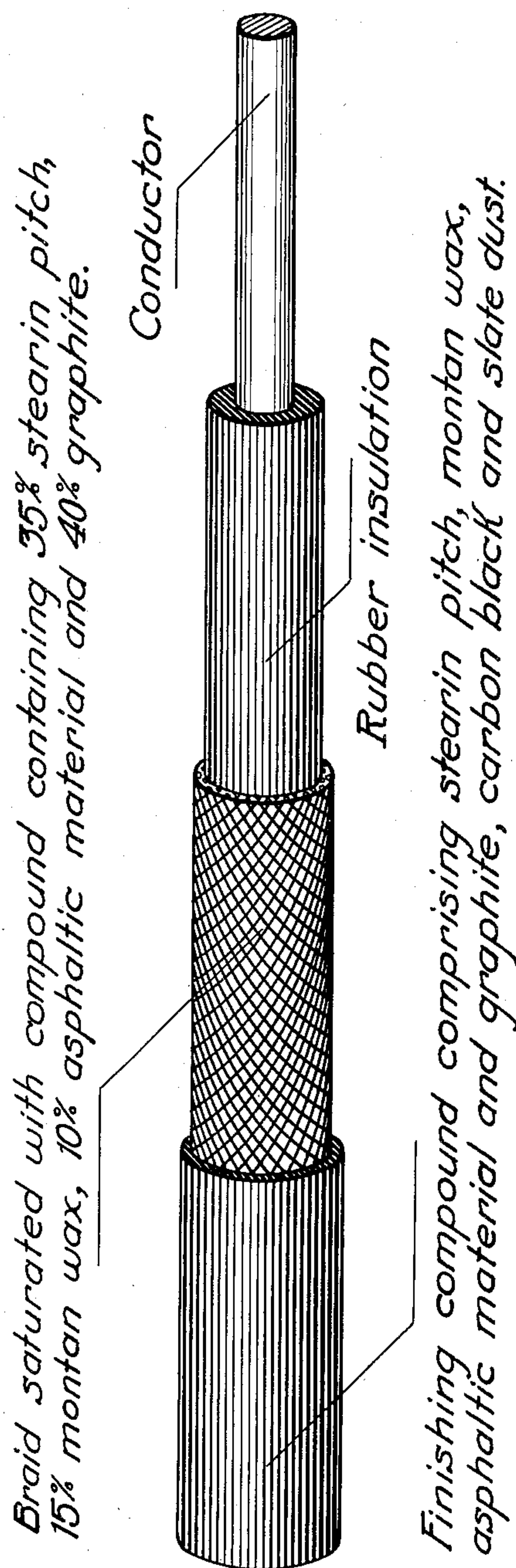
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CONDUCTOR COVERING, METHOD AND COMPOUND FOR TREATMENT THEREOF

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## UNITED STATES PATENT OFFICE

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CONDUCTOR COVERING, METHOD AND  
COMPOUND FOR TREATMENT THEREOFJohn W. Olson, Dobbs Ferry, N. Y., assignor to  
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This invention relates to an improved conductor covering as well as the method and compound for improving the conductor. The chief feature relates to the inclusion of graphite in the jacket enclosing the conductor. The graphite can be applied by incorporating it in either the saturant or finisher during the method of manufacturing the conductor, all as will hereinafter more fully appear.

Heretofore, in the manufacture of wire or cable for installation in conduits or ducts, it has been the common practice to cover the rubber insulation or other type of insulation, such as varnished cambric with a fibrous jacket, such as a cotton braid, jute, or sisal braid and to saturate such jacket by passing the jacketed conductor through a bath of compound usually of an asphaltic base. This bath has been either a flame retardant or non-flame retardant material. And it is old in the art to use saturants of wax, stearin pitch, petroleum base asphalts or natural base asphalts.

In wire or cable adapted to be pulled through ducts or conduits, it has heretofore been the practice to coat the saturated fibrous jacket with wax to increase the ease of pulling the same. When such wire has been made flame retardant, stearin pitch has been applied over the saturated fibrous covering and then a thin coating of wax-like compound applied over the stearin pitch. The waxes used have been low in melting point and frequently melted or flowed if the cables were operated at the maximum temperature permitted by the insulated covering. Very high melting point waxes which would meet the service conditions and which would still provide the lubricating coating on the saturated fibrous covering are very costly and for this reason have not been applied to any large extent. Where a thin wax coating has been used over stearin pitch, in practice, the coating frequently rubs off when passed over a projection or turn in the conduit or duct, this results in exposure of the adherent or tacky stearin pitch and interferes materially with the pulling of the conductor into a duct. Conductor jackets treated with conventional impregnating compounds, when bent on a small radius, are open to the objection that such bending has a tendency to cause disintegration of the compound with a consequent lessening of its intended protective function.

The single figure in the accompanying drawing is an elevation with parts broken away, illustrating an embodiment of the invention. The legends in the drawing are to be interpreted in an illustrative rather than a limiting sense.

My invention aims to overcome these difficulties

and to provide an improved product as well as a method for treating the same and a compound for saturating the jacket. In the improved conductor covering, the graphite incorporated will permit the same to be readily pulled into conduits or ducts without sticking or dragging. The characteristics of the improved conductor covering are such as to permit of higher operating temperatures in service without injurious effect on the conductor covering. The improved covering can be embodied in a flame retarding or non-flame retarding jacket depending upon the constituents of the saturant or finishing material used.

The invention avoids the use of the old low melting point waxes and contemplates the use of graphite filled saturants or finishers to overcome the difficulty of sticking of coils or reels, or the difficulty of pulling the covered wires or cables into ducts or conduits.

The wax-like substances used heretofore have been paraffin and the like, which have a relatively low melting point and are subject to migration and sticking of the cable in the conduit or ducts.

In treating conductor coverings, according to my improved method, if desired, I may incorporate either flake or amorphous graphite in a saturant of bituminous or asphaltic material and pass the conductor with its enclosing fibrous jacket through this material. Or, I may first pass the jacketed conductor through a suitable saturant and then apply the graphite by passing the conductor through a container containing graphite so that the same will adhere to the saturated jacket, whereupon the saturated and graphite coated conductor can be passed through a die such as is commonly employed in the art.

The thus treated conductor covering may then be subjected to a finishing treatment by passage through a bath consisting of a compound of bituminous material, asphaltic material and wax such as Montan wax, this bath also containing a substantial quantity of graphite.

Alternatively, the jacketed conductor may be subjected to a conventional saturating treatment in asphaltic or bituminous materials and then subjected to a finishing treatment by passage through a bath carrying a substantial percentage of graphite. Regardless of whether the graphite treatment of the jacket is accomplished during the saturating or finishing step, I deem it important to apply a sufficient percentage of graphite so that in the finished product the coating will be rendered non-sticky and endow the coated conductor with self-lubricating characteristics.



A suitable compound may be made up as follows:

	Per cent
Stearin pitch -----	35
5 Montan wax -----	15
Asphaltic material such as gilsonite -----	10
Graphite either amorphous or flake -----	40
	100

10 In some cases, I find that good results can be secured by employing a smaller percentage of graphite, in which case I add carbon black and slate dust. Thus, an alternative compound, approximately as follows may be used:

	Per cent
Stearin pitch approximately -----	30
Montan wax approximately -----	18
Asphaltic material such as gilsonite -----	12
20 Flake graphite -----	15
Carbon black -----	10
Slate dust -----	15
	100

25 The compound described is usually maintained in a molten or liquid state by suitable heating appliances located in juxtaposition to the tank in which the compound is held. As the jacketed  
30 conductor leaves the bath of the compound, it is passed through a steel die for the removal of excess compound and is then cooled by being led through a water trough. After such cooling, the thus treated product is smoothed by passage  
35 through a heated metallic die. And in some cases the product may be subjected to a finishing or polishing operation consisting in coating it with a mixture of paraffin and Montan wax and then passing it through a heated die. But, it is  
40 to be understood that the final paraffin and Montan wax treatment are not essential and that the graphite incorporated is sufficient to render the jacket non-sticky and self-lubricating.

45 Electric conductor jackets, when treated according to the method herein described and having incorporated therein the improved bituminous, pitch or asphaltic vehicle carrying graphite, is endowed with greatly improved characteristics and the improved character of the jacket is particularly noticeable when the conductor is bent  
50 on a small radius. Such bending does not tend to disintegrate or rupture the impregnating materials and it is thought that the inclusion of graphite, due to its lubricating qualities, is a material factor in endowing the composition with  
55 this desirable characteristic.

60 While I have described specifically the improved product, its method of manufacture and the composition of saturating or finishing material used in the treatment of the jacket it is to be understood that the disclosure is to be interpreted in an illustrative rather than a limiting sense since variations may be made without departure from the invention as defined with particularity in the appended claims.

What I claim is:

1. In the manufacture of insulated wire, the method which comprises enveloping a conductor with an absorbent jacket and subjecting said jacket to treatment in a bath containing stearin  
5 pitch, Montan wax, asphaltic material and graphite.

2. In the manufacture of insulated wire, the method which comprises providing a conductor having an absorbent jacket and subjecting the  
10 jacket to treatment in a bath containing stearin pitch, Montan wax, gilsonite, carbon black, slate dust and graphite.

3. In the manufacture of insulated wire, the method which comprises providing a conductor  
15 having an absorbent jacket and subjecting the jacket to treatment in a bath containing stearin pitch, Montan wax, asphaltic material and graphite, the percentage of graphite in the bath being between fifteen and forty percent.

4. A conductor having an enveloping jacket of fibrous material impregnated with a compound comprising stearin pitch, montan wax, asphaltic material and graphite, the latter being present in  
20 sufficient quantity to endow the jacket with self-lubricating characteristics.

5. A compound for treatment of conductor coverings comprising stearin pitch, Montan wax, asphaltic material and graphite, the amount of the  
25 latter ranging from fifteen to forty percent of the total.

6. A compound comprising stearin pitch, Montan wax, asphaltic material, flake graphite, carbon black and slate dust, the percentage of  
30 graphite being not less than fifteen percent of the total.

7. A conductor having an insulating covering, a jacket of fibrous material enclosing the insulating covering, said jacket being impregnated with a flame-resistant and moistureproof composition comprising stearin pitch and containing  
35 sufficient graphite to render the surface of the impregnated material self-lubricating.

8. The conductor of claim 7 in which the graphite comprises between 15 and 40 per cent  
40 of said impregnating composition.

9. The conductor of claim 7 in which said impregnating composition also comprises Montan wax and asphaltic material.

10. A conductor having a covering of rubber insulation, a fabric enclosing said layer of rubber  
45 insulation, said fabric being impregnated with a flame and moistureproofing composition comprising a stearin pitch, said composition having sufficient graphite at its outer surface to render it self-lubricating.

11. An electric conductor having a covering of rubber insulation, a braided covering of fibrous material enclosing said rubber insulation and a flame and moistureproofing composition impregnating said braided covering and comprising  
50 stearin pitch of between 15 to 40 per cent of graphite at its surface to render said surface self-lubricating.

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