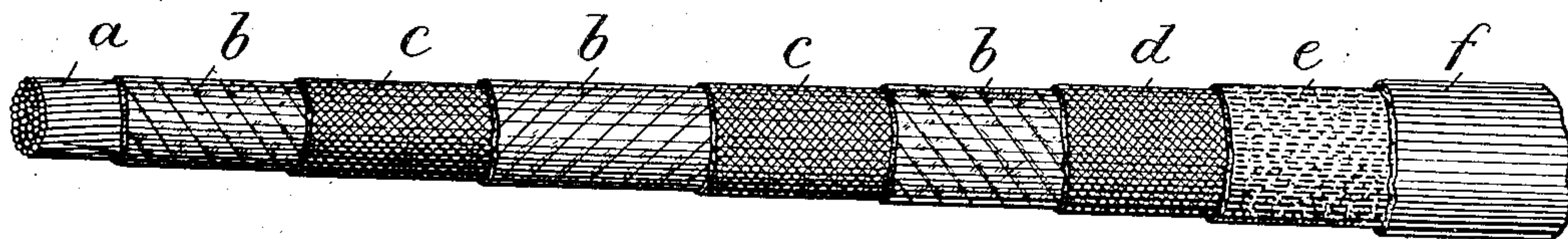


965,810.

W. GEIPEL.  
ELECTRIC CABLE.  
APPLICATION FILED JULY 24, 1908.

Patented July 26, 1910.



Witnesses.  
C. P. Wright Jr.  
N. M. E. H. J.

Inventor.  
William Geipel,  
By A. Pattison,  
att.

# UNITED STATES PATENT OFFICE.

WILLIAM GEIPEL, OF SOUTHWARK, ENGLAND.

## ELECTRIC CABLE.

965,810.

Specification of Letters Patent. Patented July 26, 1910.

Application filed July 24, 1908. Serial No. 445,181.

*To all whom it may concern:*

Be it known that I, WILLIAM GEIPEL, a subject of the King of Great Britain and Ireland, residing at Southwark, in the county of London, England, have invented an Electric Cable, of which the following is a specification.

This invention relates to the manufacture of electric cables and the like and of material for use therein, of the kind wherein the cable covering or coverings comprise yielding bituminous material such that when the cable is subjected to bending or like strains fracture or injury thereto is resisted or prevented by sliding or other more or less relative flow of the bituminous material. Now for these purposes according to this invention there is employed a waterproof and insulating bituminous tape comprising in a non-liquid condition bitumen, solidified petroleum and a suitable softening oil the said tape being in the manufacture of a cable applied to the conducting core by winding in concentric layers.

Tape of the kind referred to according to this invention comprises tape of paper or textile material or both, and hereinafter included in the term paper, wholly coated with waterproof insulating and lubricating semi-liquid bituminous material as hereinafter set forth.

It has been proposed in the manufacture of electric cables to employ bitumen or like substance along with substances as petroleum for reducing its consistency and to impregnate tape therewith previous to its application to a cable and such broadly does not constitute this invention which consists in the manufacture and employment of bituminous material containing solidified petroleum and in electric cables possessing by reason thereof the properties stated.

According to one method of constructing such a cable the conductor or core, or each conductor or core where two or more are used in the construction of the cable, is wrapped with paper which has been previously treated or coated with an insulating composition comprising asphalt, bitumen, pitch or like bituminous substances, hereafter included in the term "bituminous insulating material", combined or compounded with other material adapted to form therewith a soft, yielding, elastic lubricating material possessing high insulating properties and great durability and which will al-

low the contiguous layers of paper coated therewith to slide one upon another, as is necessary in order that the cable may be readily bent without liability of the paper or bituminous insulating material becoming fractured.

The paper may be coated while in the form of sheets and be afterward cut into tapes, but it is preferred to cut the sheets of paper into tapes before treatment with soft bituminous insulating composition material of the kind referred to and to afterward pass the tapes through such material so that the edges of the paper tapes shall be thoroughly coated with the said insulating material as well as the opposite surfaces of the tapes.

Soft bituminous insulating material of the kind referred to, suitable for the purpose set forth, can advantageously be produced by thoroughly incorporating with a bituminous insulating material of the kind described in the specification of former British Letters Patent No. 8071 of 1902, and known under the trade name of liconite, a suitable insulating liquid, as for example liquid paraffin of good quality, in such proportion as to produce an insulating composition that is normally of a soft or semi-solid character. Bituminous compounds such as have hitherto been used for insulating electric cables and also such as that produced for example in the manner described in the said former specification, are normally of too hard or unyielding a nature for the purpose of attaining the object of this invention. The special soft bituminous insulating material or composition above referred to is however free from this objection. Such a material or composition can be produced by melting bituminous insulating material produced as described in the said former specification and adding the said insulating liquid thereto. Or the insulating liquid may be incorporated with the said bituminous insulating material during the production thereof. Or, instead of adding insulating liquid to the said bituminous insulating material, the quantity of petroleum used relatively to the acetate of aluminium, colophony or other resin and alkali, mentioned in the said former specification, may be increased to such an extent as to produce bituminous insulating material which, at ordinary temperatures, is of a soft semi-liquid character.

A bituminous insulating composition con-



5 taining about 63% (sixty-three per cent.) of purified asphalt, about 18.4% (eighteen decimal four per cent.) of solidified petroleum and about 18.6% (eighteen decimal six per cent.) of liquid paraffin of good quality has been found by experiment to give satisfactory results. It is however to be understood that the invention is not limited to these proportions of materials as the same may be varied and yet give satisfactory results and they are only here given by way of example.

10 According to one method of manufacturing a cable according to the present invention, with soft bituminous insulating material of the kind referred to, paper, string or other insulating material or fabric, (hereinafter included in the term paper), is coated all over with a soft or semi-liquid insulating composition of the character hereinbefore referred to, as by drawing it through a bath of such composition, the coated paper, preferably in the form of tape, being formed into coils that are placed in a cable making machine and afterward unwound and wound upon a conductor after the manner ordinarily adopted in covering a conductor with ordinary paper tape. The paper before being treated with the said bituminous insulating material may be passed through a bath of an insulating material, for example paraffin or the like, that will be readily absorbed by the paper and which, while tending to preserve the insulating property of the paper, will not have a deleterious effect on the bituminous insulating material subsequently applied to the paper.

35 For the purpose of strengthening the cable, textile fabric, preferably in the form of tape and coated or impregnated or not, with semi-solid insulating composition of the kind mentioned, or with other good insulating material, may be wound between adjacent layers or groups of layers of the coated paper, and also it may be, around the outermost layer of such paper.

45 The accompanying drawing shows in side elevation, and by way of example, one construction of electric conductor or cable according to this invention.

50 *a* is the conductor comprising a group of metal wires, *b* strips or groups of strips of impregnated paper coated with soft or semi-solid insulating material of the kind hereinbefore referred to, *c* strips of textile fabric coated or impregnated with insulating material and arranged between the strips *b* of impregnated and insulated paper, and *d* an outer layer of fabric impregnated or coated with insulating material.

60 Insulated cables produced in the manner hereinbefore described can be readily bent, to the extent necessary in practice, without damaging the layers of insulating material the various parts of which can move over

each other to the extent necessary, without being fractured or damaged. Such cables may, if desired, or for special purposes, be provided with an additional external protective covering *e* of jute or equivalent material, or with lead *f*, or as shown, with coverings of jute *e* and lead *f*, or be armored in any known or suitable way, but this, for most purposes will be unnecessary.

What I claim is:—

1. An electric cable comprising a conductor and a winding of tape coated with a semi-solid bituminous compound comprising bitumen, solidified petroleum and an insulating liquid.

2. An electric cable comprising a conductor and a winding of tape coated with a semi-solid bituminous compound comprising bitumen, solidified petroleum and liquid paraffin.

3. An electric cable comprising a conductor and a winding of paper tape coated with a semi-solid insulating compound comprising purified asphalt, solidified petroleum and liquid paraffin.

4. An electric cable comprising a conductor and spirally wound strips of paper coated with an insulating compound comprising purified asphalt, solid petroleum, acetate of aluminium, resin and alkali, and liquid paraffin in such proportion as to render the compound semi-solid at ordinary temperatures.

5. An electric cable comprising a conductor and spirally wound paper tape coated with a bituminous insulating compound comprising about 63% of purified asphalt; 18.4% of solidified petroleum, and 18.6% of liquid paraffin.

6. An electric conductor having an insulating covering composed of fabric in tape form impregnated with an insulating liquid and coated with a semi-solid bituminous compound comprising bitumen and solidified petroleum as set forth.

7. An electric cable comprising a conductor and, wound thereon, paper tape impregnated with an insulating liquid and coated before application to the conductor with a semi-solid bituminous insulating compound comprising bitumen and solidified petroleum.

8. An electric cable comprising a conductor, layers of paper tape coated with a semi-solid bituminous insulating compound of bituminous insulating material comprising bitumen, solidified petroleum and liquid paraffin, said paper tape being wound spirally on said conductor, and layers of textile fabric between said layers of coated paper.

9. An electric cable comprising a conductor, layers of paper strips coated with a semi-solid bituminous insulating compound comprising purified asphalt, solidified petroleum and liquid paraffin, said strips of coated



paper being wound on said conductor, and strips of fabric wound between layers of the coated paper.

10. An electric cable comprising a conductor layers of paper tape coated with a semi-solid bituminous insulating compound composed of bituminous insulating material comprising bitumen, solidified petroleum and liquid paraffin, said coated paper tape being wound spirally on said conductor, and layers of textile fabric impregnated with insulating material, arranged between layers of the coated paper tape.

11. An electric cable comprising a con-

ductor, layers of paper strips coated with a semi-solid bituminous insulating compound comprising purified asphalt, solidified petroleum and liquid paraffin, said layers of coated paper being wound on said conductor, and strips of textile fabric impregnated with said semi-solid insulating compound arranged between layers of the coated paper.

Signed at London, England, this 13th day of July, 1908.

WILLIAM GEIPEL.

Witnesses:

F. L. RANDS,

A. NUTTING.