

N^o 4681



A. D. 1903

Date of Application, 27th Feb., 1903

Complete Specification Left, 28th Dec., 1903—Accepted, 27th May, 1904

PROVISIONAL SPECIFICATION.

Improvements in or connected with Electric Cables and the Jointing of the same.

I, ALBERT PARKER HANSON, of 43 Dorotheenstrasse, Berlin, in the Kingdom of Prussia, Engineer, do hereby declare the nature of this invention to be as follows:—

5 My invention relates to improvements in or connected with electric cables and the jointing of the same, by means of which certain advantages are obtained; and it is specially though not exclusively applicable for telephone exchange purposes where it is desirable to have a large number of conductors led to the switch boards or switching devices within very small compass and yet with each conductor or group of conductors readily accessible for jointing, replacing or
10 other purposes.

A cable constructed under my invention may be broadly stated to be one in which a number of conductors are arranged between layers of paper or other suitable material the said material being when desired perforated or arranged
15 so as to leave gaps or openings for jointing or other desired purposes.

20 In order that the nature of my invention may be more readily understood I shall proceed to briefly refer to certain contemplated forms thereof which will I anticipate give good results in practice. In all the forms hereinafter mentioned the conductors may be bare or insulated in any convenient manner and they may be arranged singly or in pairs for working on metallic circuit and they may be
25 crossed at intervals for the purpose of avoiding induction sounds.

In one contemplated form, the conductors are spaced apart and glued or cemented to sheets of paper and these are built up so that the cable consists of alternate layers of separated wires and of paper paraffined or otherwise treated when desired. Instead of paper, fabric or tissue of any desired material may
30 be employed.

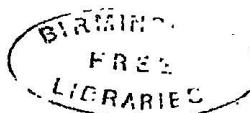
In another contemplated form instead of separating the conductors by flat strips or sheets of paper or other material they may be separated by a single sheet or strip which is folded or corrugated longitudinally. The wires are then placed at the bottoms of the folds or corrugations and the upper parts of the
35 said material are then bent over laterally so that each conductor lies in a kind of elongated pocket and is completely separated from its neighbours.

In a third form the conductors may simply rest between two layers of insulating material without being either cemented to or folded into the said material.

40 In a fourth contemplated form instead of separating the conductors by continuous lengths of paper or other material I use a number of short strips or layers of the latter spaced some distance apart so as to leave the conductors visible and accessible at intervals.

In a fifth contemplated form instead of using flat strips or layers, whether long or short, I employ corrugated strips or sheets, either long or short, and

[Price 8d.]



Improvements in or connected with Electric Cables and the Jointing of the same.

with the corrugations lying either longitudinally or transversely with respect to the conductors. In this case, and when the corrugations are longitudinal, the conductors lie in the depressions but without having the elevations folded over them as in the second case hereinbefore mentioned.

In a sixth contemplated form the conductors are wound helically round an insulating body, such for example as paper or twine, and then placed between layers as aforesaid. 5

To permit of access to the conductors for jointing or other purposes, orifices or perforations may be made in the layers of paper or other material or the same object may be attained by using short lengths of material as aforesaid and leaving intervals between the respective lengths. Not only may joints be made at these openings or intervals but the conductors themselves may be led out thereat and passed through other orifices or intervals to other layers of the cable. Or, the conductors of contiguous layers may be jointed together at these orifices or intervals in any desired manner. It is not necessary that the conductors of each layer should lie parallel to one another as they may be made to cross one another at any desired angle. 10 15

Instead of the separate wires being crossed at intervals pairs or groups of wires may be so crossed and either with or without a separating layer of paper or other material. 20

The perforations, orifices or intervals hereinbefore mentioned may be so spaced that instead of being coincident they may "break joint" as it is termed, and the same remark applies to the joints twists and crossings of the conductors and separating material. By this means cables of more uniform thickness throughout their length are obtained besides being more convenient for jointing. 25

The cables may be sheathed or armoured in any of the usual ways. The conductors themselves may be wires of any desired shape in cross section and when desired may be formed *in situ* by electro-deposition or by mechanical deposition as for example by printing with metallic powder in a suitable medium.

I desire it to be understood that the several forms hereinbefore referred to are to be taken as typical or illustrative of modified forms which it is not necessary to describe in detail. 30

Dated this 27th day of February 1903

For the Applicant

J. G. LORRAIN, M.I.E.E., &c.
Norfolk House, Norfolk Street, London, W.C.
Chartered Patent Agent. 35

COMPLETE SPECIFICATION.

Improvements in or connected with Electric Cables and the Jointing of the same. 40

I, ALBERT PARKER HANSON, formerly of 43 Dorotheen Strasse, Berlin, now of Lützow 6, Charlottenburg, in the Kingdom of Prussia, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:— 45

My invention relates to improvements in or connected with electric cables and the jointing of the same, by means of which certain advantages are obtained; and it is especially though not exclusively applicable for telephone and like.

Improvements in or connected with Electric Cables and the Jointing of the same.

exchange purposes where it is desirable to have a large number of conductors led to the switchboards or switching devices within very small compass and yet with each conductor or group of conductors brought out or made accessible at regularly recurring intervals for purposes of connecting them to the contacts, jack springs or other apparatus in connection with which the cable is used.

A cable constructed under my invention may be broadly stated to be one in which a number of conductors are arranged and held upon a layer of paper or other suitable material or embedded into the same, said layer where desirable being perforated or arranged so as to leave openings or gaps which permit of other wires or conductors being connected to the cable wires or through which the cable wires protrude for the purpose stated.

In my Provisional Specification I describe several contemplated forms. I have since discovered that the first and third of these forms are not novel and I desire it to be understood that I make no claim to them whatever. The second, fourth, fifth and sixth contemplated forms as well as the manner of rendering the conductors accessible, I consider new and claim as my invention.

In order that my invention may be more readily understood, I shall refer to the accompanying drawings which illustrate certain forms. In these forms the conductors may be bare or insulated in any convenient manner, preferably with a thin coating of varnish or the like, and they may be arranged singly or in pairs for working on metallic circuit. Where desirable the two wires of a pair or several wires of a group may be so spaced relatively to each other and to other wires or they may be so twisted together or regularly transposed as to diminish or eliminate disturbances from induction.

In the form illustrated in Fig. 1 the conductors $a a$ are spaced apart and glued or cemented to the ribbon of paper c . Where desirable a second ribbon of paper d is glued or otherwise held upon the first in order the better to hold the wires $a a$ in position and to give the cable more stability. Where such a covering (d) is used; it is, of course, not necessary to attach the wires $a a$ to the ribbon c . The paper may be waterproofed, paraffined or otherwise treated or, when desired, layers of other suitable substance may be employed in its stead. The layer c is provided with openings $e e$ through which the wires $a_1 a_1$ may be brought into contact with and connected to the cable wires $a a$.

In Fig. 2 is shown at the left a form in which a single elongated opening e in, and on the right a complete severing of, the ribbon c serves the purpose of rendering the wires $a a$ accessible for the attachment of the wires $a_1 a_1$.

In Fig. 3 sheets or cross running strips of insulating material $c c$ are employed instead of a continuous ribbon running lengthwise of the wires $a a$.

In Fig. 4 is shown a cable in which the layers of insulating material enclosing the wires $a a$ are corrugated in such a manner that the bare wires $a a$ come in contact with the sheets of insulating material $c d$ at a few points only, thus securing good insulation and reducing the capacity of the single wires. The corrugations may be made to run in any desired direction or arranged in any suitable way, one object sought, being as stated to have the conductors come in contact with the insulating material at as few points as possible. Another object in corrugating the paper or insulating material is to give the cables a certain desired thickness without adding much to their weight, an advantage of importance when cables are laid one upon the other and it is desired to space them properly to correspond with the thickness of the jacks or other apparatus with which they are used.

This form of cable with or without cross leads $a_1 a_1$ and openings $e e$ is the form referred to in my Provisional Specification as the fifth contemplated form. It offers advantages not hitherto obtained in any form of cable, is new and I claim it as my invention.

As shown in Figure 4 the wires $a a$ run in the hollows of the longitudinal corrugations of the layer d but touch the latter at very few points—theoretically not at all—being lifted away from d by the cross leads $a_1 a_1$, which are attached

Improvements in or connected with Electric Cables and the Jointing of the same.

to the wires $a a$ through the openings $e e$. The cross leads $a_1 a_1$ lie in the corrugations of the layer c , either being straight and lying flat upon the upper side of c throughout its breadth or, as shown in the figure, being bent downward where the connections are to be made and thus themselves only touching the layer c for short distances on either side of the openings. The corrugations of the layers d and e may, however, as stated above be transverse or lie at any angle to the direction of the wires $a a$ in which case the wires $a a$ rest upon the ridges of the corrugations and consequently touch the layers only at predetermined points. The cross leads $a_1 a_1$ are then preferably laid in the hollows of the corrugations of the upper layer c .

In Fig. 5 the two wires a & b of each pair are wound helically around a piece of thick soft string, a strip of paper or other suitable body, or, properly insulated single wires may be twisted together and, properly spaced, held between the layers c and d . This form of cable is also new and I desire to claim it. Openings e may be made in the layer c through which both wires of a pair $a b$ are made accessible, or one of the wires of the pairs may be made accessible through openings in the layer c while the other is made accessible from the other side of the cable through openings in the layer d .

In Fig. 6 the wires $a a$ themselves protrude through openings or orifices in the layer c . In this form the end of the protruding loops may for example be soldered directly to jack springs, contacts or other wires or the loops may be so arranged as to barely extend over the edge of the insulating material c where, held firmly by the whole being pressed between the layers of any suitable material or in any other manner, the wires may serve directly as contacts, such as are used in many systems of automatic telephony. Banks of such contacts containing several rows each may be produced by superimposing several cables one upon the other and compressing them into a complete whole.

In Fig. 7 although the wires of the cable $a a$ are entirely enclosed, only one sheet of insulating material has been used. The wires having been deposited in longitudinal corrugations or pockets in the insulating material c and this material folded over in the manner shown. This form of cable is that referred to in my Provisional Specification as a second contemplated form.

In Fig. 8 the wires $a a$ of the cable are embedded in a layer of insulating material such as paper pulp, cellulose, guttapercha or the like. At regular intervals the wires are laid bare through the openings $a a$ in order to permit of the cross leads $a_1 a_1$ being connected to them.

In the construction of these cables I have employed conductors of round and flat cross sections or I have even formed the conductors *in situ* by electro-deposition or by mechanical deposition as for example by ruling lines of metallic powder in a suitable medium directly upon the layer of insulating material.

In many instances such for example as where the cables are used for connecting the multiple jacks in an ordinary telephone exchange or the bank contacts of an automatic exchange, it is desirable to lay up the cables one above the other.

In such cases layers of sheet metal may be interposed between the several cables to prevent induction between the wires of the cables so separated or each cable may be sheathed or armoured in any of the usual ways to attain the same end or to render them more fire or moisture proof.

I desire it to be understood that the several forms hereinbefore described are taken as typical or illustrative of modified forms many of which would arise in various applications of my invention.

Having thus particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1) An electric cable composed of a plurality of wires held between bands or sheets of insulating material corrugated in such a way that the wires come

Improvements in or connected with Electric Cables and the Jointing of the same.

in contact with the insulating material only at certain points along their length, substantially as described.

2) An electric cable composed of pairs or groups of wires twisted together or wound about a supporting body and enclosed between strips or sheets of
5 insulating material or embedded in the same, substantially as described.

3) An electric cable, consisting of a plurality of wires laid singly or in groups in longitudinal corrugations or pockets in a strip or sheets of insulating material and having these corrugations closed above the wires, substantially as described.

4) In an electric cable or arrangement of wires a common insulating body
10 provided at intervals with orifices or openings which permit of other wires being connected to the cable wires or through which the cable wires are looped out, substantially as described.

5) In an electric cable a plurality of conductors each insulated from the other
15 and each looped or brought to the outside of the cable in proper order relatively to other conductors so brought out, and laid bare for the purpose of serving as a contact, as for example in connection with automatic exchange switching mechanism.

Dated this 24th day of December 1903

ALBERT PARKER HANSON,
Applicant.

20

Fig. 1



Fig. 2



Fig. 3

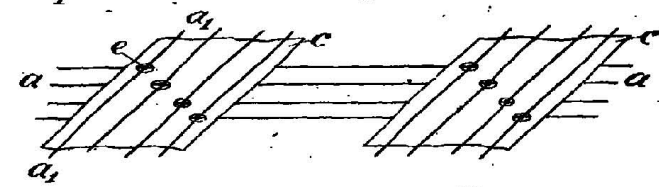


Fig. 4

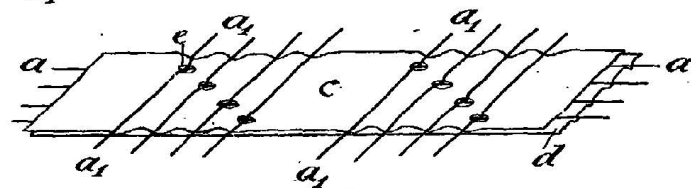


Fig. 5

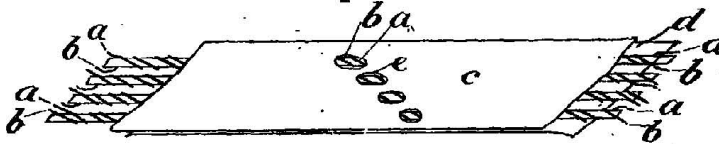


Fig. 6

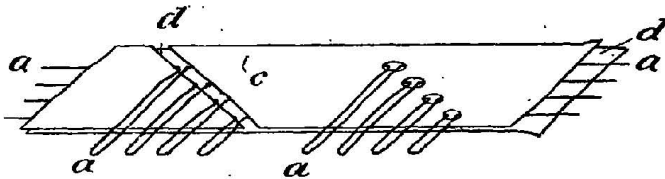
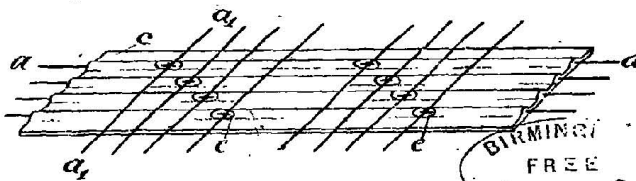


Fig. 7



Fig. 8



[This Drawing is a reproduction of the Original on a reduced scale.]

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