

(No Model.)

W. R. PATTERSON.
INSULATING TELEGRAPH CABLES.

No. 369,259.

Patented Aug. 30, 1887.

Fig. 1.

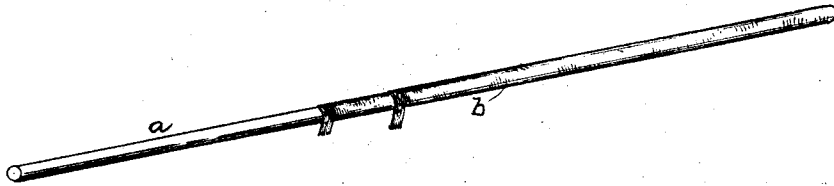
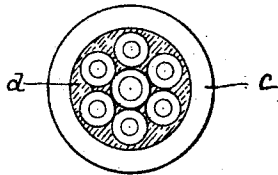


Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM R. PATTERSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE
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INSULATING TELEGRAPH-CABLES.

SPECIFICATION forming part of Letters Patent No. 369,259, dated August 30, 1887.

Application filed March 21, 1887. Serial No. 231,642. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. PATTERSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Insulating Telegraph-Cables, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to insulating electric conductors; and its object is to obtain any desired degree of uniformly low insulation throughout the length of the conductors.

My invention is especially applicable to electric conductors which are separately insulated by some fibrous material saturated with some insulating-filling and a core of such conductors waterproofed and protected by an exterior covering of lead, iron, rubber, or other suitable material. The specific insulating properties of all the materials employed to insulate such conductors are very high, and a low degree of insulation in such cables is generally an indication of some serious defect in the manufacture. This very high insulation is, however, in long cables used for telephonic work, often the cause of objectionable cross-talk, since the currents induced on the wires can escape only at the ends where they are grounded. If the insulation were of such a low degree that these induced currents could disseminate themselves through the mass of the core, and so that no static charge could be held, and at the same time high enough to prevent trouble from direct escape of current from one wire to another, the conditions would be most favorable for successful working of the cable-lines. If the insulation is made low by the presence of moisture which has not been fully removed from the fibers, the current will establish an electrolytic action which in time may destroy the efficiency of the cable. The insulation must be uniformly low, since if the points where the insulation is brought down are far apart the good effect is lost, and it is necessarily so low at such points as to endanger the life of the cable.

By my invention I secure the desired degree of low insulation by treatment of the fiber preferably before it is carded or spun, so

that the fibers which go to make up any particular part of the covering will be in exactly the same condition as those in any other part.

The treatment I give the fiber is preferably by moistening it with a solution from which the water will be removed by the subsequent process; leaving an inert, harmless, and poorly conducting salt or other compound uniformly distributed throughout the insulating fiber. Common salt in water is such a solution which I have found to answer the purpose; or a finely-divided solid may be scattered through and upon the fiber, such as plumbago.

The necessary precautions are to use such a material that when in solution the solution will have no deleterious effect upon the fiber or upon the wire, from which the water may be expelled easily, and which will have no effect upon or with the material afterward employed as an insulating-filling. For instance, if paraffine or paraffine-oil is to be used as filling, the material used upon the fiber must be free from sulphur or sulphur compounds, such as sulphides.

I am aware that it has been proposed to coat wires insulated with fiber and insulating-filling with plumbago, paint, metallic oxides, &c., to form a poorly-conducting surface upon the insulation as a preventive of induction, leaving a highly-insulating medium between the conducting-wire and such exterior coating. I, however, distribute the poorly-conducting medium uniformly through the body of normally high insulating material as well as upon its surface, so that the insulation of the conductor may be made uniform and as low as shall be desired.

In the accompanying drawings, Figure 1 is a perspective view illustrative of a single conductor, *a*, clothed with a fibrous material, *b*, which is evenly permeated with salt. Fig. 2 is a sectional view of a lead-pipe-covered cable, *c*, having seven conductors, each separately clothed, as in Fig. 1, and then saturated with paraffine-wax, the space around the core being filled with paraffine, *d*, which may be forced in in any well-known way.

For the purpose of my invention herein it is evident that a rubber tube, a winding of lead tape, or even an iron pipe might be used

as the equivalent of the lead pipe. Any fibrous material, like cotton, hemp, or jute, may be used as the clothing for the wires. I prefer paraffine as an insulating-wax, though it is
 5 evident that resin and shellac, tallow, beeswax and resin, and other compounds might be used for saturating the fiber and filling the space in the pipe about the core.

The essential feature of my invention consists in providing a clothing for the wires that
 10 has been impregnated with salt, carbon, or plumbago evenly distributed, so as to materially reduce the insulation of the different conductors, so that induced currents may escape,
 15 so as to prevent injurious cross-talk in the telephone-cables.

It is evident that almost any metallic salt may be used, as common salt, sulphate of copper, and sal-ammoniac. The solutions sprinkled
 20 upon or otherwise applied to the fiber should be free from acid, so as not to rot the fiber, and should be of such character that the water may be readily expelled. Plumbago-dust I preferably apply dry in the form of dust. The
 25 salts are most easily applied in solution, though it is evident that salt properly dried might under suitable conditions be sprinkled or dusted upon the fiber.

Sulphides could not be used in paraffine cables on account of the decomposition of the
 30 melted paraffine by the sulphide.

After the moisture is expelled the salt or its equivalent poor conducting material should be inert, so as not to injuriously affect the fiber,
 35 the conductors, or the insulating-filling.

The skeins of yarn, before they are wound on the bobbin, may be dipped in brine composed of, say, ten parts of water to one of salt. The amount of salt, however, would vary ac-
 40 cording to the insulation required. When

plumbago is used, I throw on enough of the dust to darken all the fiber. In either case enough of the poor conductor should be mingled with the fiber so that when charges of
 45 electricity are sent into the wire through a telephone at intervals, say, of one second, the wire being open at the distant end, the clicks heard in the telephone will be of substantially the same loudness.

Having thus described my invention, I claim
 50 as new and desire to secure by Letters Patent—

1. The combination, with the conductors of a telegraph or telephone cable, of a fibrous insulating-covering and salt or its equivalent
 55 mingled uniformly with the fiber for reducing the insulation thereof, substantially as described.

2. The combination, with the insulating fiber, of a salt or its equivalent free from acid and inert as to the fiber, the conductor, and
 60 insulating paraffine or wax, said salt being commingled uniformly with the fiber throughout the length of the cable to lower the insulation of the separate conductors, as described.

3. The combination, with the conductors of
 65 a telephone-cable, of a fibrous insulating material wound upon the separate conductors, a filling of insulating material for protecting the conductors within the outside pipe or covering, and a poor insulating substance mixed
 70 with the fiber uniformly to reduce the insulation and prevent the retention of the static charge.

In witness whereof I hereunto subscribe my name this 16th day of February, A. D. 1887.
 75

WILLIAM R. PATTERSON.

Witnesses:

WM. M. GILLER,
 GEORGE P. BARTON.