S. F. VAN CHOATE.

CABLE AND TESTING POST FOR SUBTERRANEAN TELEGRAPHS.

No. 96,641. Patented Nov. 9, 1869.

Fig. 1.

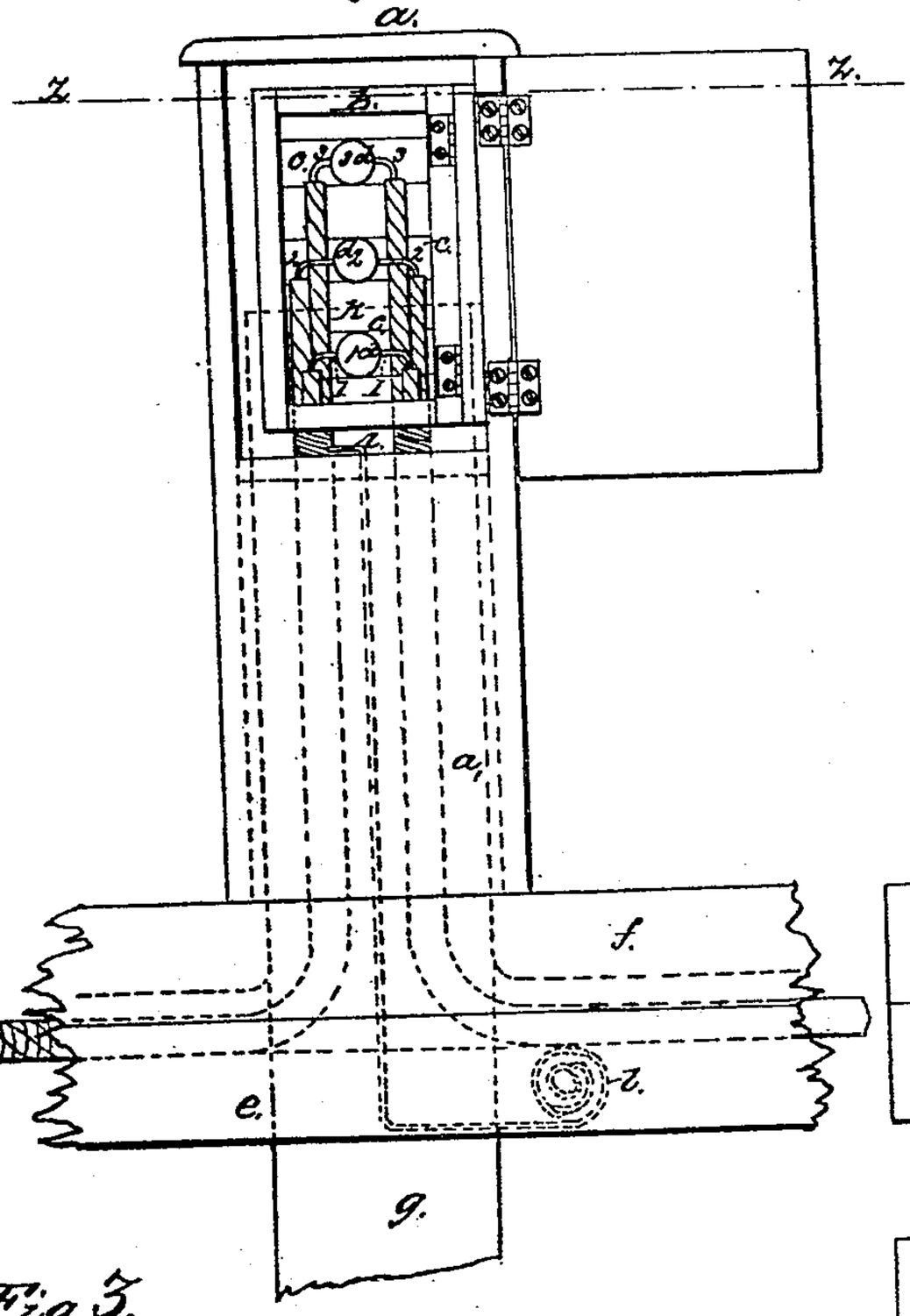


Fig. 3.

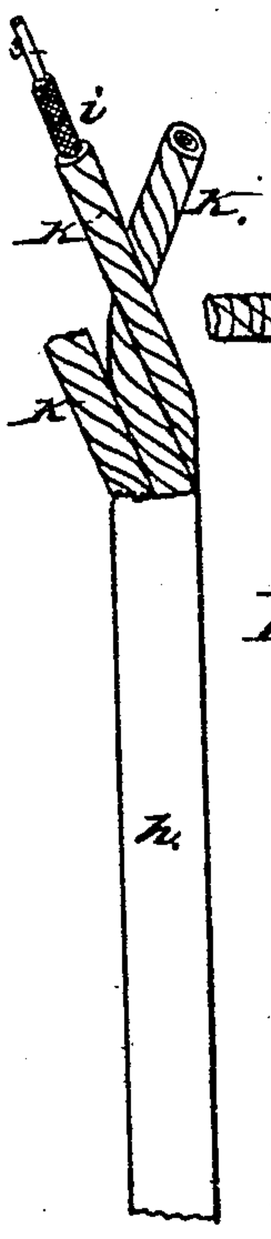
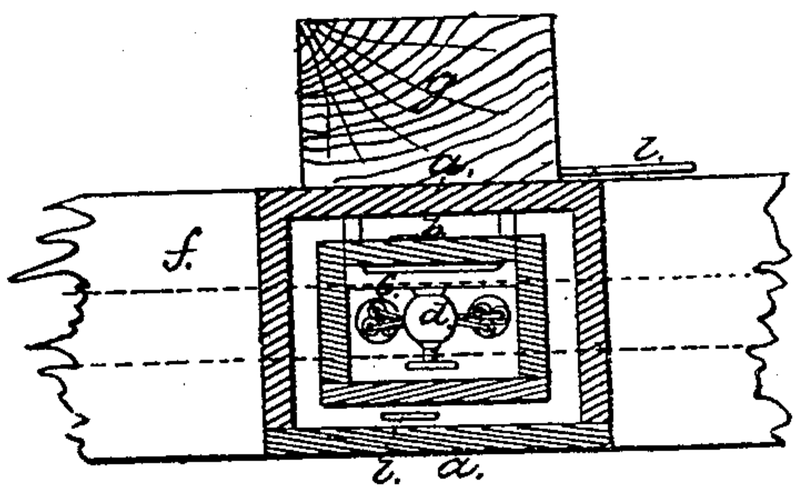
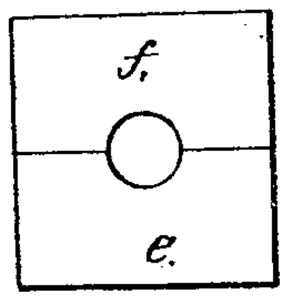


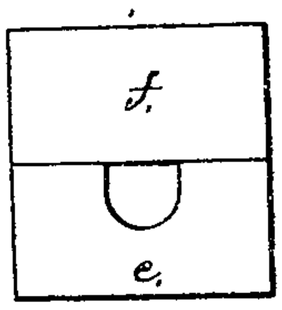
Fig. 2.



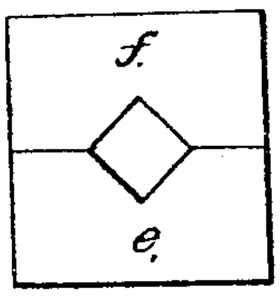
A.



B.



C.



Witnesses.

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IMPROVEMENT IN CABLES AND TESTING-POSTS FOR SUBTERRANEAN TELEGRAPHS.

Specification forming part of Letters Patent No. **96,641**, dated November 9, 1869.

To all whom it may concern:

Be it known that I, SILVANUS FREDERICK VAN CHOATE, of Boston, in the county of Suffolk and State of Massachusetts, have invented Improvements in Telegraphy; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

My invention relates to the manufacture and use for telegraphic purposes of conductors constructed in a peculiar manner, and also to operating and testing the same, as hereinafter to be described.

Having selected a conductor of suitable size and metal, I proceed to cover it, first with a fibrous wrapping of clean silk, cotton, or other equivalent, by winding or plaiting the same upon its surface in such a manner as to form a continuous interposed protection against contact of the wire with the gutta-percha or other preservative, protecting, or insulating material, after which I apply over the fiber a layer or coating of gutta-percha or other suitable substance or material, and otherwise protect said fiber and its inclosed conductor as may seem proper.

The objects intended by interposing a coating of clean fiber between the conducting-wire and the insulating or protecting material may be briefly stated.

The electrical current, which is found to be more or less retarded in case the conductor is covered directly by gutta-percha, asphaltum, or other gummy, bituminous, or greasy substance, is, by the interposition of the clean fibrous cushion, saved from such retardation. The open nature of the cushion thus surrounding the conductor allows a circulation of air around the conductor through the ends of the cable, while the cable, if strained or attenuated by resting upon prominences on the ocean bed, or by being caught in the process of "paying out," suffers no essential injury, as its conductor, lying loosely in its cushioned envelope, is drawn through the covering without suffering the strain which it would be subjected to were the wire a rigid and homogeneous part of the entire structure.

Cables constructed in this manner may be laid under the ground in the following manner: Wooden scantlings or strips of plank of desired dimensions—say two by four inches and of any length—are prepared with grooves to correspond with the dimensions of the cable. This wood is thoroughly prepared with asphalt varnish or other preservative substance, in order to prevent decay. A proper ditch being dug, the lower strip or scantling is laid down at the bottom of the ditch with the groove upward. The cable is then placed along in the groove, and the top scantling or strip is placed in position over the first strip and spiked or otherwise secured, after which the ditch is filled up. These strips may be laid in a continuous series.

The cable may also be protected by a kind of metal piping formed of a fillet or strip of sheet lead or other metal and wound by machinery around the cable in a spiral or other manner.

After my cable is laid underground, I provide for regulating and testing it as follows:

Testing boxes or posts (shown in the drawing) are located at desirable points along the line of telegraph—say a mile or two miles apart. For durability they may be made of cast-iron. These boxes have a door, which is secured by a lock and key, and so constructed as to exclude the rain. They are set upright, similar to a post, and are hollow, closed at the top and open at the bottom, which is connected with the scantling containing the cable, and, if necessary to give them permanency, they may be secured to a post, as represented in the drawing, the post being set firmly in the ground by the side of the scantling, which latter may be secured to the post by spikes or otherwise.

Holes are formed in the top strip or scantling, under the bottom end of the box, so as to allow the ends of the cables to pass up through the hollow post to reach the testing-box, which is located in the post.

In order to prevent the moisture from coming in contact with the connecting-points of the cable, I arrange a second box, preferably of wood, inside of the post-box, as shown in the drawing, in such a manner that there shall be an air-space all around between the inside box and the outside post-box, except at one or two points at the back or sides, where the inside box is secured to the outside one. This

space is to keep the interior of the inner box dry if by any means moisture should get inside of the post-box. The inside box is provided with a door, to be opened when it is desired to get at the connections of the wires inside. In this inner box I arrange as many metallic screw-cups or binding screw-posts as may be necessary to connect the wires in the cables. These screw-posts are fastened to strips arranged to separate them, and are so constructed as to have an air-space behind them, as seen in the drawing. A ground-wire is also arranged or connected with the post-box, or, the box being metal, it may answer as a ground itself. This ground or ground-wire is used to terminate the wires of the cables at this point when desired for testing the circuits, forming a circuit from the testing-box to the next box, or to the next office or station, as may be desired.

To facilitate testing the cables or one of the wires of the cables, and to direct operators in so doing, the post-boxes, as well as the screw-connections, are numbered, as may be desired, the latter to correspond to the wires in the cables and the posts to correspond with lists kept at the stations or offices.

Suppose it necessary or desirable to have tested the wire corresponding to No. 1, to the right, which might be north, and also at post-box No. 1. A repair-man would be sent out, and on arriving at the post-box No. 1 he would proceed to unlock and open the outside door of the post-box and likewise the inside box. He would unscrew or disconnect the wires at screw-cup No. 1, and take the end of the wire to the right, and would connect it to a pocket or portable instrument or sounder, which he could place on the top of the post-box. He would then connect the ground to his instrument, so as to form a circuit to the right through the magnet of his instrument, when he could, in case the circuit was complete, communicate to the next post-box or to any office in the circuit to the right he desired, provided there was a battery in the circuit. But if the wire No. 1 was broken between this point (No. 1) and the battery, then he could not communicate, and thus any of the wires in the testing-box either to the right or left could be tested and any difficulty between the offices and boxes detected. In order to do this it is absolutely necessary to have this ground or ground-wire at this point, because without it a single wire could not be tested without disturbing another wire for the purpose of forming a circuit.

Other tests of any wire—say No. 1—may be performed without the employment of a ground or ground-wire located at the testing-post, by taking one of the other wires—say No. 2—and forming a circuit back to the battery, or by connecting the testing-instrument between the two ends of any of the wires in the box; but the ground-wire or ground-connection at the post or testing-point is the only plan to test a wire without disturbing another wire. Besides it may be very important to be operating on No. 1 to the left while the testing is going on to the right, in which case the wire to the left may be connected to the ground, when a circuit could be operated to the left undisturbed while the difficulty existed to the right.

In conctructing lines of land-telegraph, to save the trouble and difficulty of splicing and for other reasons, including economy, I make my cables in lengths only sufficient to reach from one testing-box to another. This is very important, as it saves the necessity of providing at each section of the cable the various materials and compositions used in its covering and insulation. In cases where a cable contains a dozen or two of wires their splicing, insulating, and wrapping would be a tedious and expensive operation, and somewhat uncertain in its results.

The testing-post, as well as the inner box, together with all its attachments excepting the binding-screws, are prepared to prevent moisture and decay and the whole thoroughly coated inside and out with asphalt varnish, to protect the iron from rusting and to prevent spiders or other insects from making webs or inhabiting the inside cavities.

In cases where cables are laid across rivers or other waters, a testing-post is located on either side.

The drawings show, in Figure 1, an elevation of an apparatus embodying my invention, the elevation being taken with the door of the box-post open and with the door of the inner box open, showing the terminal adjacent ends of two sections of cable as separated into its contained wire-conductors, the corresponding wires of each section being shown as applied to the screw-cups or couplings. Fig. 2 is a sectional plan, the section being taken in the plane of the line *z z* in Fig. 1, the doors of the apparatus, however, being shown as closed in Fig. 2. Fig. 3 represents a cable composed of three conducting-wires, each covered or wrapped with a fibrous material, in accordance with my invention, before being covered with asphalt varnish, gutta-percha, or other suitable non-conducting repellent of moisture.

The iron box-post is marked *a*, the interior wooden box *b*, the wooden strips across the interior of and at the back of box *b* are denoted by *c*, and the screw-cups or couplings on said strips are marked *d*, each being also marked with the number denoting a special wire of the cable. The scantling or horizontal wooden trough-like strips are marked, the lower one *e* and the upper one *f*, and the wooden post to which *a* is confined is marked *g*.

h denotes the entire cable or collection of wires and their and its wrappings and envelopes.

Sections or end views of the horizontal tube or scantling are shown at the details A, B, and C.

The separate naked wire-conductors which are made up into a cable are marked 1, 2, &c. The fibrous wrapping or plaiting on each wire

is marked *i*, and the non-conducting water-proof covering of each wire is marked *k*.

The separate wires may be further prepared by other layers or coatings of any desired material, and when sufficiently coated or protected the separately protected or covered wire-conductors are twisted together any desired amount, and the assemblage of wires thus twisted may be covered and wrapped with any number of layers or coatings of any suitable material.

The ground or ground-wire to be used in connection with the testing-instrument is marked *l*, and is denoted by the dotted line seen in Fig. 1, and its lower end buried deep enough to insure its contact with damp earth, the lower end being preferably coiled to obtain a considerable surface contact of the wire with the damp earth.

I am well aware that submarine and subterranean telegraph cables have been submerged within scantling boxes or troughs, and, further, that testing-boxes in some form have been adopted. So far as my knowledge (which has been very extensive) extends, however, no provision has been made heretofore for a perfect protection against ingress of moisture to the interior of these boxes and to the cable, and the failure to provide this has been to a great extent the cause of the failure in the successful working of the above-mentioned class of telegraph-lines. Neither have the termini of the wires within the testing-boxes been provided with individual distinguishing-characters to enable an accident to be instantly detected.

By my construction of the testing-boxes I secure perfect protection of the contents of the inner box from moisture, &c., while by my system of numbering the screw-caps or connections I am enabled to designate to the repair-man the exact wire which is disabled.

The numerical arrangement of the test-boxes themselves greatly facilitates the repairing of the cable, inasmuch as the time of the repair is economized as well as that required for discovering the locality of the injury to the wire.

I claim—

1. A conducting-cable for telegraphic purposes, in which a layer of clean, dry, fibrous material is interposed between the conducting-wire and the insulating-coating, in the manner and for the purposes set forth.

2. The construction of the testing-boxes for telegraph purposes, whereby access of moisture is prevented, substantially as hereinbefore described.

3. In the construction of testing-boxes of telegraph-wires, affixing suitable characters for designating individual wires as well as the boxes themselves, substantially as before described.

4. The combination, with telegraph-conductors, of ground-wires located at the test-boxes of the same, substantially as and for the purposes specified.

5. The combination, with subterranean telegraphic conductors and test-boxes, of ground-wires, substantially as and for the purposes specified.

S. F. VAN CHOATE.

Witnesses:

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