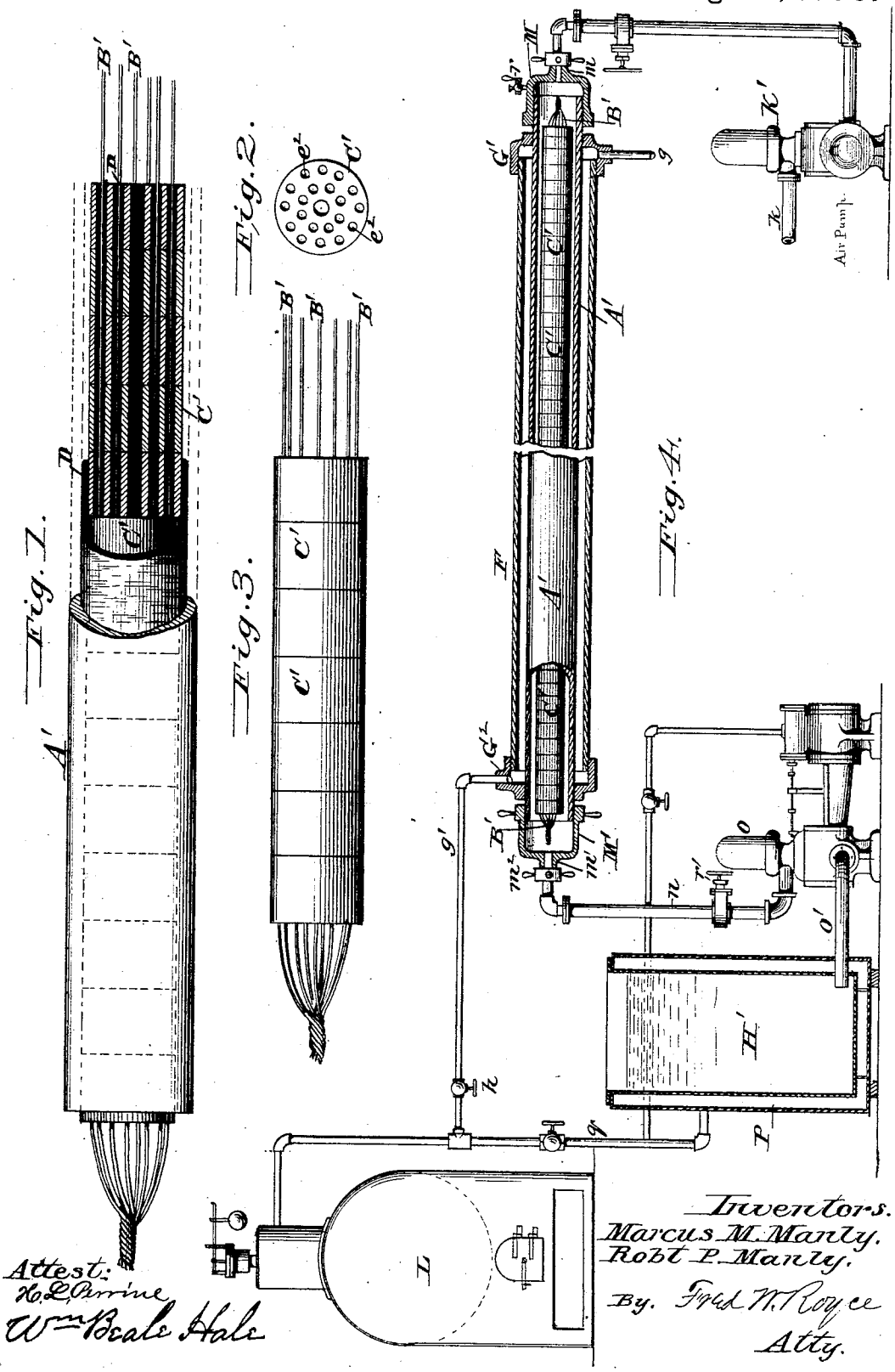
(No Model.)

M. M. & R. P. MANLY.

Insulated Telegraph Conductor.

No. 231,825. Patented Aug. 31, 1880.



Attest:
H. L. Parrine
Wm Beale Hale

Inventors.
Marcus M. Manly.
Robt P. Manly.
By. Fred N. Royce
Atty.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

MARCUS M. MANLY AND ROBERT P. MANLY, OF PHILADELPHIA, PA.

INSULATED TELEGRAPH-CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 231,825, dated August 31, 1880.

Application filed March 22, 1880. (No model.)

To all whom it may concern:

Be it known that we, MARCUS M. MANLY and ROBERT P. MANLY, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Protected and Insulated Telegraph-Cables; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to an improvement in that class of insulated and protected telegraph-cables in which the conducting-wires are inclosed by a protecting-tube and insulated from each other and from the tube by an insulating-filling, which occupies the space within the tube which is not occupied by the wires.

Its object is to enable the manufacture of this class of telegraph-cables in sections of greater length than has heretofore been found practicable, thereby dispensing with a great number of section-joints, which, besides being elements of weakness, are the cause of great expense and loss of time in laying the cables.

It has also for its object to prevent the possibility of crosses or contact between the conducting-wires, and contact of any of the wires with the inclosing-tube.

In the accompanying drawings, Figure 1 is a view, partly in elevation and partly in section, of a portion of a cable constructed according to our invention. Fig. 2 is an end view of one of the core-sections. Fig. 3 is a detail view, showing the core-sections strung upon the wires. Fig. 4 is a view, partly in elevation and partly in section, of apparatus for the manufacture of our improved cable.

The letter A′, Figs. 1 and 2, indicates the inclosing-tube, which is preferably made of lead and flexible, but may be of any other suitable material; B′, the conducting-wires; C′, core-sections, made of absorbent wood or similar absorbent rigid insulating material; and D′, the fusible insulating material, which fills up all interstices between the tube, core-sections, and wires. The core-sections have a diameter to fit loosely in the tube, and are in practice preferably from one to four inches in length, and perforated with as many through-passages c' as there are wires to be used for the cable.

The core-sections, as stated, are formed of wood or similar porous substances, and before being used they are thoroughly baked and seasoned in a suitable oven, and then boiled in rosin or similar insulating material to prevent subsequent absorption of moisture and to render them good insulators.

When ready for use the cores are strung upon the wires, as shown in Fig. 3, care being taken to pass the wires through properly coincident perforations of the core-sections. The wires may be of any desired length, and after being covered by the core-sections, except suitable lengths at their ends left free for making joints and for convenience in manipulation, their ends are knotted to prevent said core-sections slipping off, and the whole arrangement of wires and cores is then drawn into a tube of corresponding length by any suitable means.

In practice it is preferred to twist the wires after the cores have been placed upon them, in order to save strain upon the wires and permit the reeling of the cable without changing the relative positions of the ends of the wires. This tube is then drawn into an iron pipe, F′, of somewhat greater diameter, (sufficient to form a steam-jacket around the tube,) the ends of which should project beyond the ends of said pipe. This pipe F′ is provided with heads G′ and G², screwed upon its ends, and having central apertures for the passage of the ends of the cable-tube, said heads being screwed upon the pipe after the cable-tube has been inserted therein. The central apertures of said heads should be provided with proper packing to make a close joint with the surface of the cable-tube; or said apertures may be provided with stuffing-boxes of any well-known and suitable construction. The head G′ is provided with a small vent-tube, g', leading to a boiler, L, and provided with a suitable cut-off cock, h.

The letter M indicates a cap of a diameter to fit snugly upon one end of the cable-tube and inclose the ends of the wires projecting

from said tube, and said cap is provided with a screw-nozzle, *m*, which is connected by a suitable coupling with the exhaust-pipe of an air-pump, K′, driven by steam in the ordinary manner. The letter *k′* indicates the tube which connects said pump with the boiler. The letter M′ indicates a similar cap fitting upon the other end of the tube, and having at its end a screw-nozzle, *m′*, upon which fits a coupling-ring, m^2, connected with the end of a pipe, *n*, connecting with a force-pump, O, the suction-pipe O′ of which extends into a caldron, H′, surrounded by a steam-jacket, P, to which a tube, *q*, leads from the boiler.

The parts having been arranged, as shown in Fig. 4, the caldron H′ is filled with a sufficient quantity of fusible insulating material, as rosin or other suitable resinous compound, and steam allowed to flow through pipe *q* and jacket P, which will in a short time cause the insulating material in the caldron to melt. The cock *h* should then be turned to permit the steam to flow from boiler L, through pipe *g′* and head G^2, into the pipe F′, surrounding and heating the inclosed cable-tube A. After permitting steam to flow for a time sufficient to heat the tube and inclosed wires and cores, the air-pump should be then set to work to exhaust the air as much as practicable from the tube, after which the stop-cock of the exhaust-pipe should be closed, and the cock *n′* of the pipe *n* should be opened and the force-pump O set to work to force molten insulating material from the caldron H′ into the cable-tube A′, filling all the interstices between the core-sections, the wires, and the tube.

The insulating material should be forced into the tube A′ with as great pressure as the said tube can safely sustain, in order to insure a thorough filling of all interstices.

When the insulating material has been observed to flow freely for five or ten minutes from the vent-tube *r* of head M, the cock of said tube being opened to permit such observation, after the force-pump has lowered the material in the caldron H′ to a point which, from the known capacity of the tube, indicates that the latter is about filled, the action of the pump may cease, the steam should be cut off from the pipe F′ and allowed to escape therefrom through the vent *g′*. The tube may be then left to cool, after which it may be removed from the pipe F′, and may then be used in any well-known or suitable manner.

While we find it advantageous for certain reasons to introduce a molten insulating material into the tube, as above described, it may, if desired, be omitted, and an efficient cable will still be formed by the tube, rigid core, and wires. It is preferable, however, to use the insulating filling for the space within the tube not occupied by the wires and cores, as it prevents the accumulation of water by condensation of moist vapor which finds its way into the tube.

Instead of inclosing the extended tube and inclosed wires and cores in a straight steam jacket or pipe in the process of introducing the molten insulating material, as described, and illustrated in Fig. 4, the tube and its wires and cores may be reeled upon a suitable reel, and placed in a steam-tight tank or casing, with the ends of the tube left projecting and connected to the force and air pumps, as before described.

What we claim is—

1. An insulated and protected telegraph-cable composed of an outer flexible metallic tube and inner sectional cores of rigid material, perforated axially and having the conducting-wires arranged through their perforations, substantially as described.

2. An insulated and protected telegraph-cable composed of an outer metal tube, a series of short rigid core-sections, perforated axially and having the conducting-wires arranged through their perforations, and a filling of fusible insulating material occupying the space within the tube not occupied by the wires and rigid cores, substantially as described.

3. The improved process of manufacturing insulated and protected telegraph-cable herein described, the same consisting in first stringing a series of properly-perforated rigid core-sections upon a suitable number of wires, then introducing the cores and wires into a tube, and then forcing into the remaining space of the tube and interstices of the cores a molten insultating material, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

M. M. MANLY.
ROBT. P. MANLY.

Witnesses:
E. C. COOPER,
JOHN E. THORNTON.