(No Model.) 2 Sheets—Sheet 1.

W. D. SMITH.

METHOD OF LAYING ELECTRIC WIRES.

No. 325,984. Patented Sept. 8, 1885.

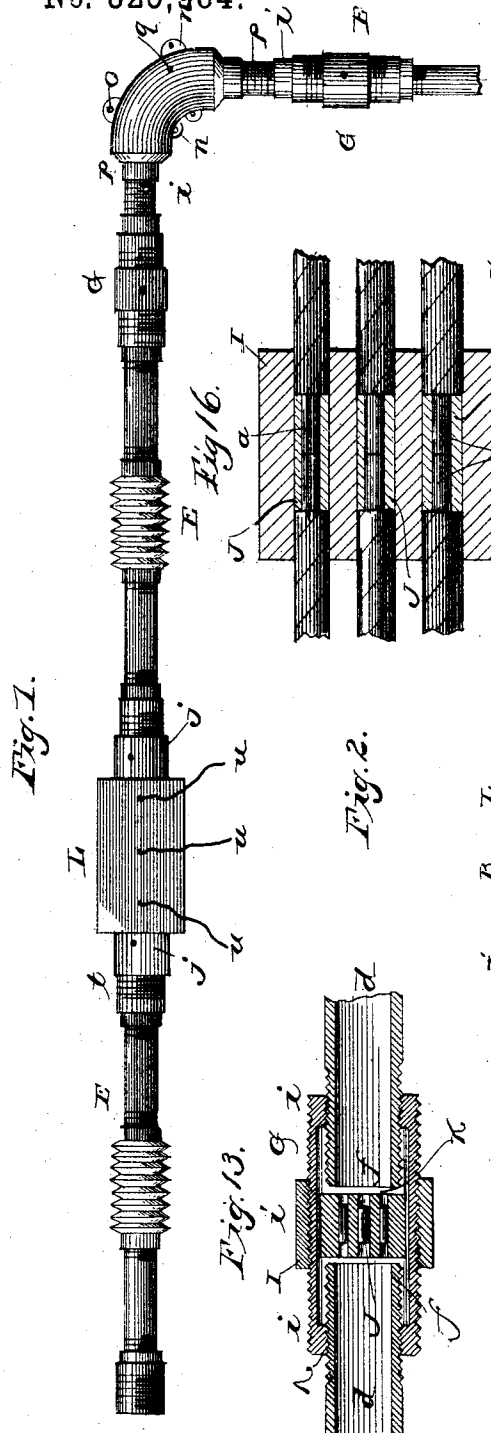


Fig. 1.

Fig. 1b.

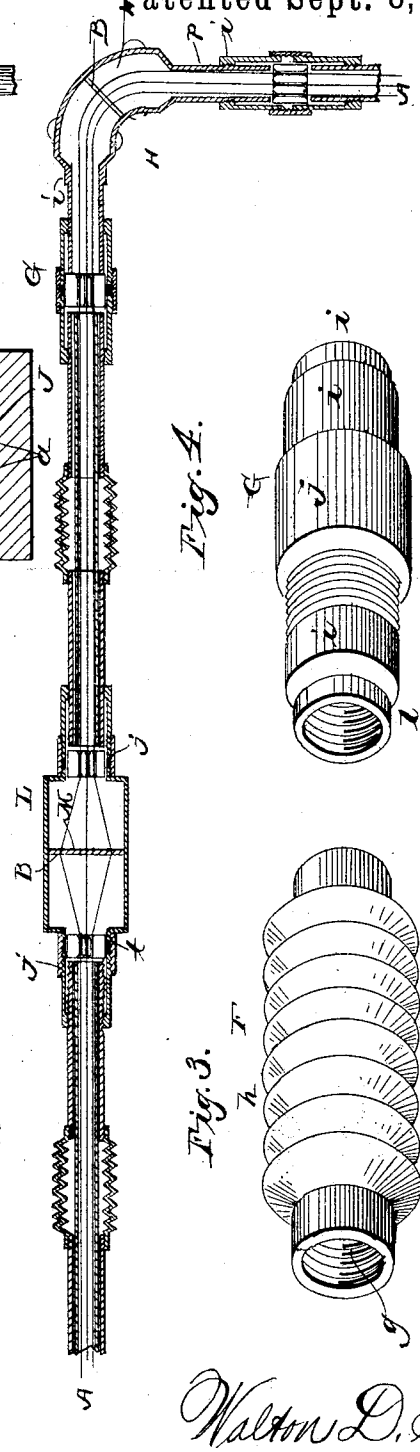


Fig. 2.

Fig. 1a.

Fig. 4.

Fig. 3.

WITNESSES

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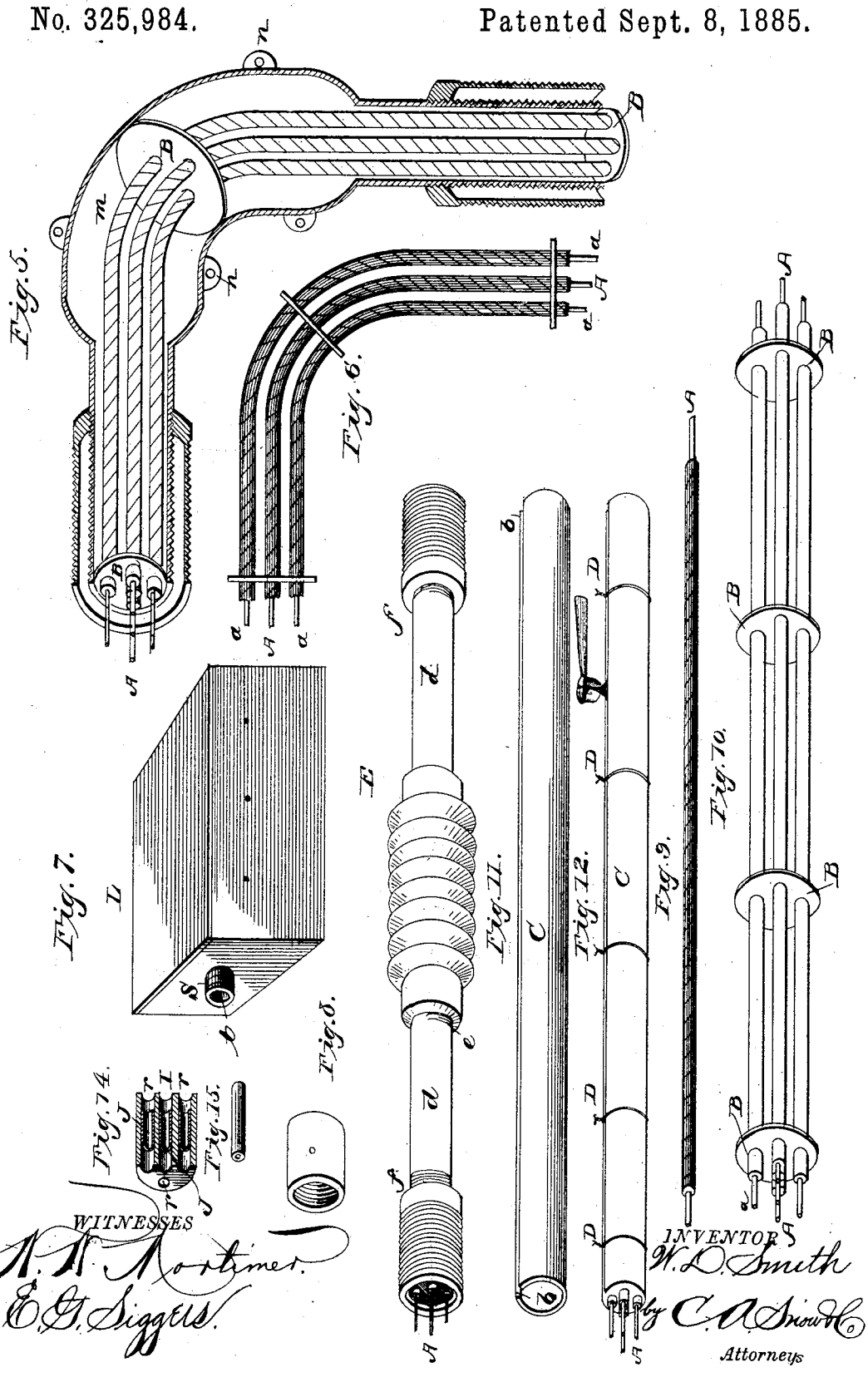
N. PETERS, Photo-Lithographer, Washington, D. C.

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UNITED STATES PATENT OFFICE.

WALTON DUANE SMITH, OF PROPHETSTOWN, ILLINOIS, ASSIGNOR OF THREE-FOURTHS TO CYRUS EMERY, CHARLES E. EMERY, AND CORA L. EMERY, OF SAME PLACE.

METHOD OF LAYING ELECTRIC WIRES.

SPECIFICATION forming part of Letters Patent No. 325,984, dated September 8, 1885.

Application filed September 13, 1884. (No model.)

To all whom it may concern:

Be it known that I, WALTON D. SMITH, a citizen of the United States, residing at Prophetstown, in the county of Whiteside and State of Illinois, have invented a new and useful Improvement in Methods of Laying Telegraph, Telephone, and Electric Wires, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to an improved method of laying telegraph, telephone, and electric wires; and it consists in the following steps, viz: first, cutting the wires to proper and convenient lengths, insulating or covering the wires except at the ends, and then connecting them together in a bunch or series; second, incasing the said bunch or series in a shell and insulating them therein to complete the connection; third, placing this shell containing the wires in a section of pipe, the uncovered ends of the wires protruding beyond the sections; fourth, coupling the uncovered ends of the wires together; fifth, coupling the sections of the pipes together and insulating the wires at each joint to form an unbroken connection, and, sixth, attaching the service-boxes and elbow-joints at the various points desired.

The invention also consists in an improved sub-method of insulating the wires preparatory to their reception into the pipes; also, in an improved sub-method of coupling together each section of the entire system; and, finally, in an improved sub-method of forming each section of the whole system, all as hereinafter set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view showing a portion of my improved system of pipes in which the wires are incased, the parts being joined together. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is an enlarged view of the expansion-joint for the metallic pipes. Fig. 4 is an enlarged view of the coupling-joint. Fig. 5 is an enlarged sectional view of the elbow-joint. Fig. 6 is a detail view of the insulated wires bent previous to insertion in the elbow. Fig. 7 is a detail view of the service-box. Fig. 8 is a detail view, enlarged, of one section of pipe and its coupling-piece which connects it with the adjoining section. Fig. 9 is a side view of a length of wire which is insulated or covered, except at the ends. Fig. 10 is a perspective view showing the wires connected together by perforated disks. Fig. 11 is a detail perspective view of the paper shell in which the insulated wires are placed. Fig. 12 is a perspective view showing the manner in which the wires are secured in the shell. Fig. 13 is an enlarged sectional view of the connection which holds each section together. Fig. 14 is an enlarged sectional view of the cylindrical disk which receives the ferrules for covering the protruding ends of the wires. Fig. 15 is a detail view of one of the ferrules. Fig. 16 is an enlarged sectional view of the cylindrical disk, showing the protruding ends of the wires fitting in the ferrules.

Like letters are used to indicate corresponding parts in the several figures.

Referring to the drawings, A designates the wires, which are cut and straightened to proper and convenient lengths—say twelve, fourteen, or sixteen feet—and covered with insulating material, except about one-half inch at each end, which is left bare or uncovered. This insulating of the wires may be performed in any suitable manner and with any well-known material; but I prefer the following method, viz: The wires are first given a heavy coat of shellac, except the ends *a a* thereof, and allowed to dry, when a ribbon of moist paper is wound spirally the whole length, with the exception of the aforesaid ends *a*. When the paper is perfectly dry, one or two coats of shellac are applied to the outside of the same, thus forming a perfect insulating-case for the wire, as seen more clearly in Fig. 9.

B designates perforated disks made of heavy paper, wood, rubber, or other suitable material, and slipped along the wires at suitable intervals, said disks serving to keep the insulated wires at an equal distance apart. In Fig. 10 I have shown the disks perforated with five holes to carry a corresponding number of wires; but it will be apparent that I may increase the number of wires and correspondingly increase the number of holes in the disks, as may be found desirable.

C designates a paper shell or case slotted longitudinally along its top, as at *b*, (see Fig.

11,) and arranged to receive the series of wires when connected together, as in Fig. 10. When the wires have been placed therein, some suitable liquid insulating material is poured into the shell or case through the narrow opening *b*, filling all the spaces between the wires, (see Fig. 12,) and when hardened forming a perfect connection with the shell or case. This melted insulating material may be asphaltum, sealing-wax, paraffine-wax, or any other suitable material, and is poured therein from a ladle.

Wire bands D D are employed to encircle the shell or case at suitable intervals to hold the latter and the inclosed wires firmly together. When this has been completed, the wires are in condition to be placed into the sectional inclosing-pipes, which I will now proceed to describe.

E E designate the several sections which when joined compose the conduit or system. Each of these complete sections, as shown in Fig. 8, is composed of two lengths of metallic pipe, *d d*, externally threaded at the ends *e f*.

F designates an expansion-joint, (see Fig. 3,) which connects the inner ends, *e*, of the lengths of pipe *d*. This joint may be a slip-joint, and for that reason I do not wish to be restricted to any particular construction of the same. However, I prefer the construction shown, which consists of a short length of pipe internally threaded at each of its ends for a small space, as at *g g*, the portion of the pipe between the threaded ends being raised and formed with corrugations *h h*. As seen, the threaded ends *g* of the expansible pipe are arranged to engage with the externally-threaded inner ends, *e*, of the lengths of pipe *d*, and connect the latter together, the corrugations *h* serving to accommodate the expansion and contraction of the same. When the two lengths *d* are connected together they complete one section, E, of the conduit or system, so that the paper shell or case containing the insulated wires (seen in Fig. 12) may then be placed into the section, the uncovered ends of the wires projecting outwardly at each end of the same. (See Fig. 8.)

G designates the coupling-joint for connecting the ends of the sections E E together to complete the system. This coupling-joint (seen clearly in Fig. 4) consists of three pieces—viz., the end pieces, *i i*, and the middle connecting-piece, *j*. The end pieces, *i*, are internally threaded at the outer end, *k*, for a short distance to engage with the externally-threaded outer ends, *f*, of the lengths of pipe *d*, the remainder of the piece *i*, from where the threads *k* terminate to the opposite end, being provided with a swell or shoulder, *l*. The latter is externally threaded nearly its whole length, and the middle connecting-piece, *j*, is internally threaded to engage with the external threads of each of the end pieces, *i*. In putting up the sections E of the system I prefer to attach the end pieces, *i*, to each end of the same, as seen in Fig. 8, so that when it comes to applying the sections together it will not be necessary to screw the pieces *i* over the threaded ends *f*, since they will be in their proper position to receive the central coupling or connecting piece, *j*. By screwing the latter over the end pieces, *i*, the sections E E are drawn together to complete the system, the expansion-joint in the center of each section allowing for the necessary contraction and expansion.

To enable the system to turn corners, I employ elbow-joints. (Shown in detail, Fig. 5.) These elbow-joints H are formed in half-sections *m m*, each provided with lugs *n n* for the passage of screws or rivets *o o*, which serve to secure the sections *m* together. The ends of each half-section *m* are externally threaded at *p p*, to receive the end pieces, *i i*, of the coupling-joint G, the connecting-piece *j* serving as a means of attachment to the sections of the system. The insulated wires which pass through the elbow-joints are first bent and then placed in three perforated disks, B, as shown in Fig. 6, and then inserted in one half-section of the elbow. The reason these elbow-joints are made in half-sections is so that the short lengths of bent insulated wires and the disks may be placed in one half of the shell of the elbow and then the other half riveted to it, which could not be done were the joint made in a single piece. The elbow-joints H are enlarged at the bend, for the purpose of holding insulating material, which is poured in through the hole *q* after the sections *m* are riveted together, the hole *q* being for the same purpose in all the figures. The two half-sections are united by the screws or rivets, and the insulating material is then poured in at the hole *q*, so as to fill the enlargement at the bend and protect the wires and disks B from displacement. I now have a series of sections, E, with the insulated wires fitted therein and arranged to be coupled together, and elbow-joints with the wires also placed in position and in condition for coupling to form the complete system.

In order to make the connection between the wires continuous the whole length of the system, I propose to insulate and connect the uncovered projecting ends of the said wires. To this end I employ a coupling cylindrical receptacle or disk, I, (shown in enlarged section, Fig. 14,) having a series of perforations or holes, *r*, formed therein for the reception of cylindrical ferrules J. The latter are embedded in the holes *r* of the disk, and in practice would be about one inch in length. The disks are made of paper, rubber, wood, or other suitable material, and to be about two inches long, the holes *r* therein registering exactly with the protruding wires on the ends of each section of the conduit or system. In applying the disks or receptacles I the protruding uncovered ends of the wires of the two meeting sections E E are thrust through the

holes *r* of the receptacles I so as to meet together in the ferrules J, as shown clearly in Fig. 2. The connecting or coupling piece *j* is then applied to draw each section together and complete the system. Holes or perforations are formed in each connecting or coupling piece *j*, similar to the holes *q* in the elbow-joints, so that melted insulating material may be poured through said holes to fill the space K between the adjoining edges of the sections E. When the uncovered ends of the wires come together end to end in the ferrules J, they occupy the whole length of the ferrules, a short portion of the insulated or covered wire occupying the space between the end of the ferrule and the end of the disk. Thus, when the coupling-joint G or the space K within the same is filled with insulating material, the connection of the wires will be unbroken and complete from one end of the system to the other. It will be seen that the metallic shell may expand or contract without in any way interfering with the insulating material, while the individual wires can expand and contract without interfering with the insulation.

L designates service-boxes connected at intervals along the system, and provided at each end with holes *s s*, from which threaded pipes *t t* project, the connecting-pieces *j* screwing onto the threaded pipes and connecting with the end pieces, *i*, of the adjacent section E. A diaphragm, M, is arranged centrally across the service-box, so as to support the short sections O O of insulated wire, which are united to the meeting sections E E by the disks I and ferrules J, before described. The short sections O are spread out laterally in the service-box, so as to be handy to scrape away the insulating material on said short sections when making connection with other wires leading to telegraph-instruments, telephones, &c. The connection with such wires is shown by the letters *u u*, Fig. 1.

It will readily be seen that another line of this same system may be connected at the service-boxes and run into or through buildings.

The operation and advantages of my invention will be readily understood from the foregoing description, taken in connection with the annexed drawings.

In preparing and laying down my improved system I first insulate the wires and arrange them in a series, and connected by the perforated disks B. The wires are then placed in the paper shell or case, Fig. 11, and held firmly therein, the insulating material being poured into the shell or case to complete the connection. When thus incased, the wires are placed in each of the sections E E of the system. The protruding uncovered ends of the wires are coupled by the disks I and ferrules J, and the sections E are then coupled by the joints G. In turning corners the elbow-joints H are employed, the protruding wires of the same being coupled to the wires of the sections in the manner described, and the elbow-joint itself coupled to the sections E by the joint G. The service-boxes are connected, and the system is then complete.

As before stated, cross systems may be connected to the service-boxes to run into or through buildings, &c. My improved system or conduit is applicable for telegraph, telephone, and electric wires, and several of the systems of metallic pipes may be carried through a large conduit of brick or stone work.

Each of the sections E and the elbow-joints H have the wires insulated or fitted therein, and the end pieces, *i*, attached to the ends, so that it will be a very easy matter to couple the wires and sections together in forming the system.

The system above described is simple in construction and convenient to apply. It is not expensive to manufacture, and will prove of great utility and benefit for the purposes intended.

Having described my invention, I claim—

1. The herein-described method of laying telegraph, telephone, and other wires to form the entire system, consisting in the following steps, viz: first, insulating or covering the wires, except the ends thereof, and then connecting the wires together in a bunch or series; second, incasing the bunch or series in a shell or case and insulating them therein to complete the connection; third, placing this shell containing the wires in a section of pipe, the uncovered ends of the wires protruding beyond the sections; fourth, coupling the uncovered ends of the wires together; fifth, coupling the sections of the pipe together and insulating the wires at each joint to form an unbroken connection, and, sixth, attaching the service-boxes and elbow-joints at the various points desired, as set forth.

2. The herein-described sub-method of insulating the wires, preparatory to their reception into the pipes, of each section of the entire system, consisting in the following steps, viz: first, insulating or covering the wires, and then connecting them together in a bunch or series; second, incasing the bunch into a shell; third, pouring insulating material through the shell around the wires, and, finally, binding the shell and wires together, as set forth.

3. The herein-described sub-method of coupling together each section of the entire system, consisting in, first, passing the uncovered ends of the wires projecting from the pipes into perforated disks in which they meet; second, coupling the sections of pipe together, and, finally, pouring insulating material through the coupling-joints around the wires and disks to form an unbroken connection, as set forth.

4. The herein-described sub-method of forming each section of the entire system, consisting in the following steps: first, cutting the wires to proper lengths, insulating

them, and connecting them together in a bunch or series; second, incasing the bunch or series in a cylindrical shell and insulating it therein to complete the connection; third, binding the shell and bunch together, and, fourth, placing this shell with its wires in a section of pipe, the uncovered ends of the wires projecting beyond the pipe, as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

WALTON DUANE SMITH.

Witnesses:
JAMES SCARRITT, Jr.,
H. F. BROWN.