

(No Model.)

G. RICHARDSON.

UNDERGROUND ELECTRIC CONDUCTOR.

No. 259,044.

Patented June 6, 1882.

Fig. 1.

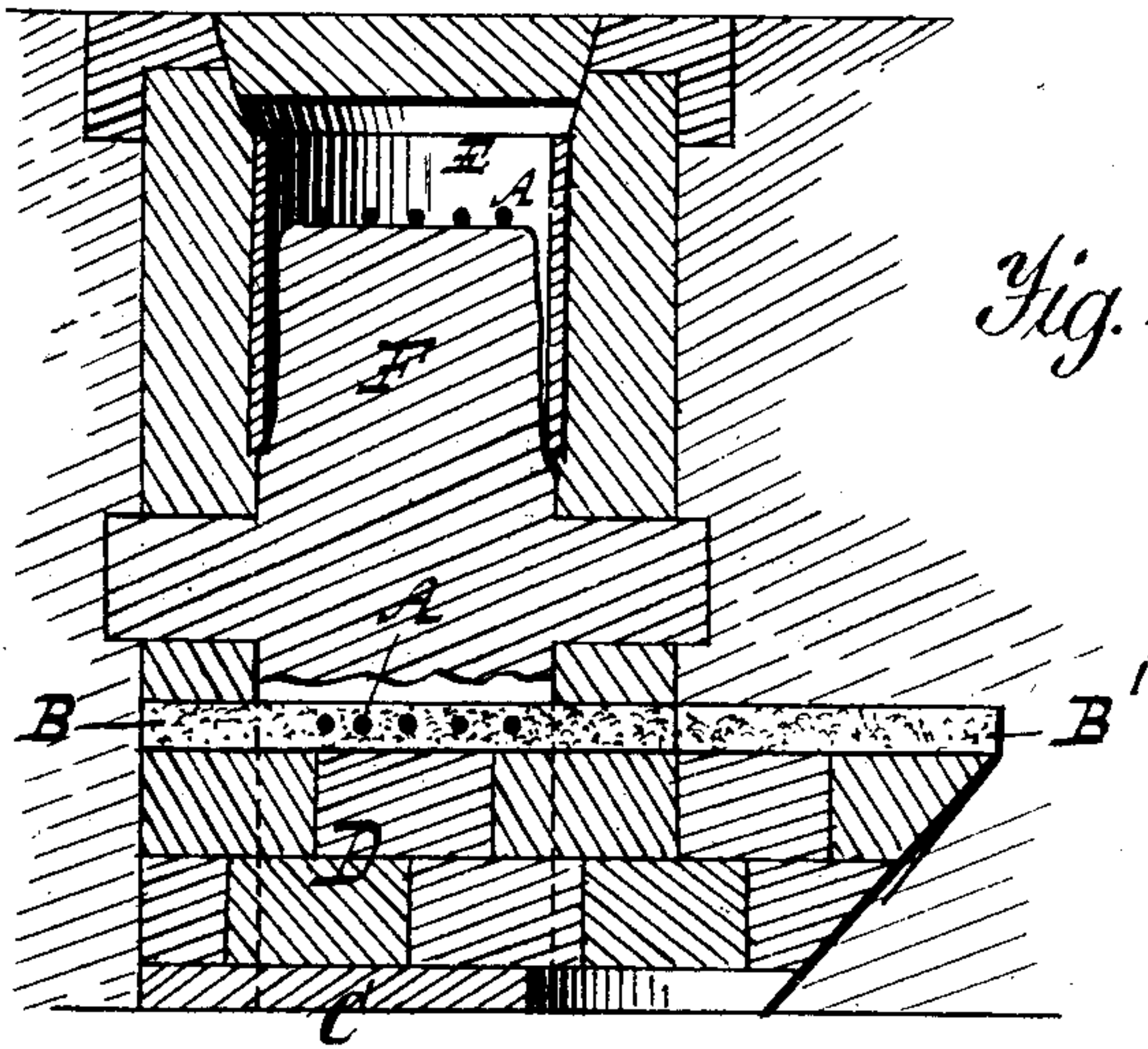
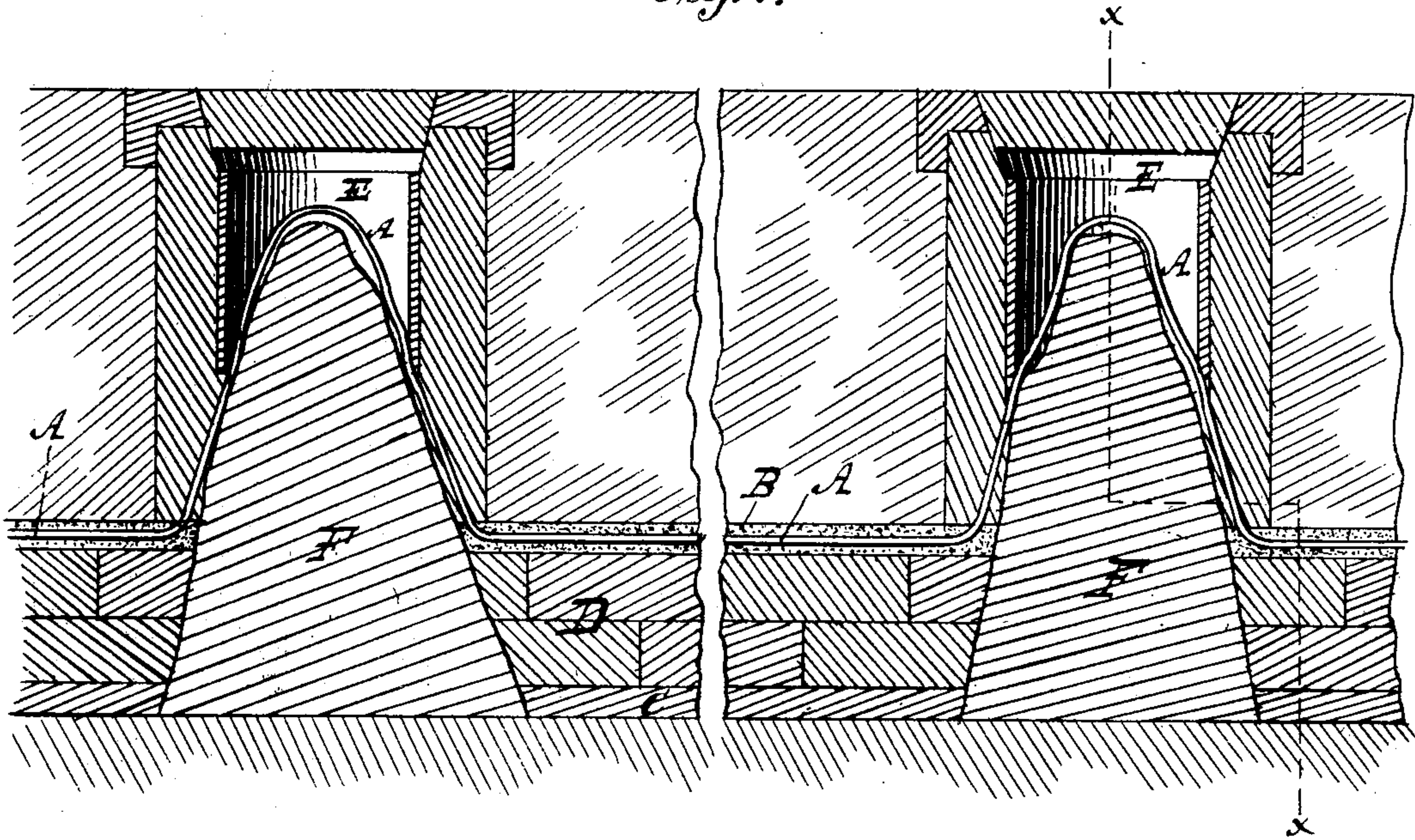


Fig. 2.

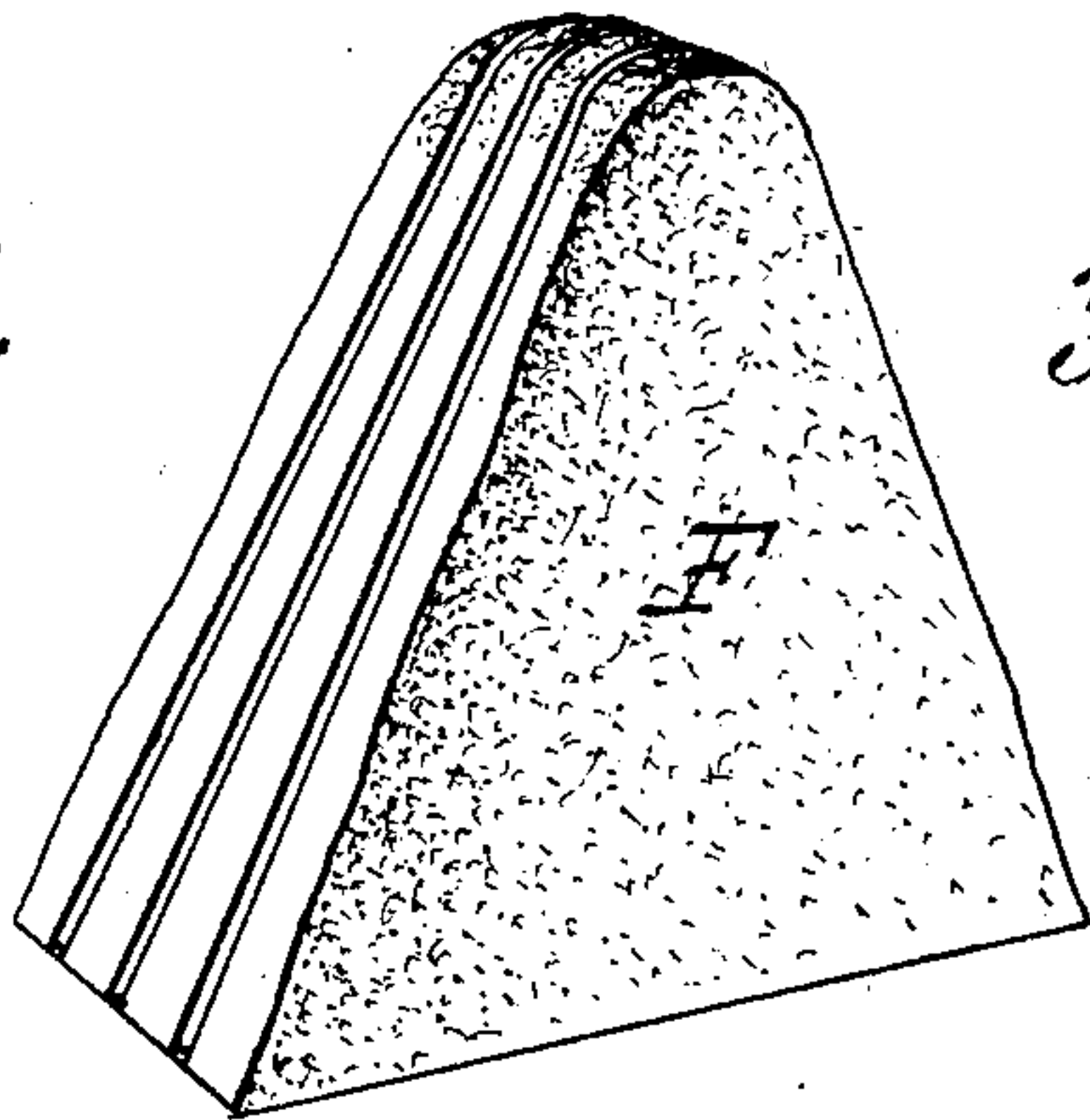
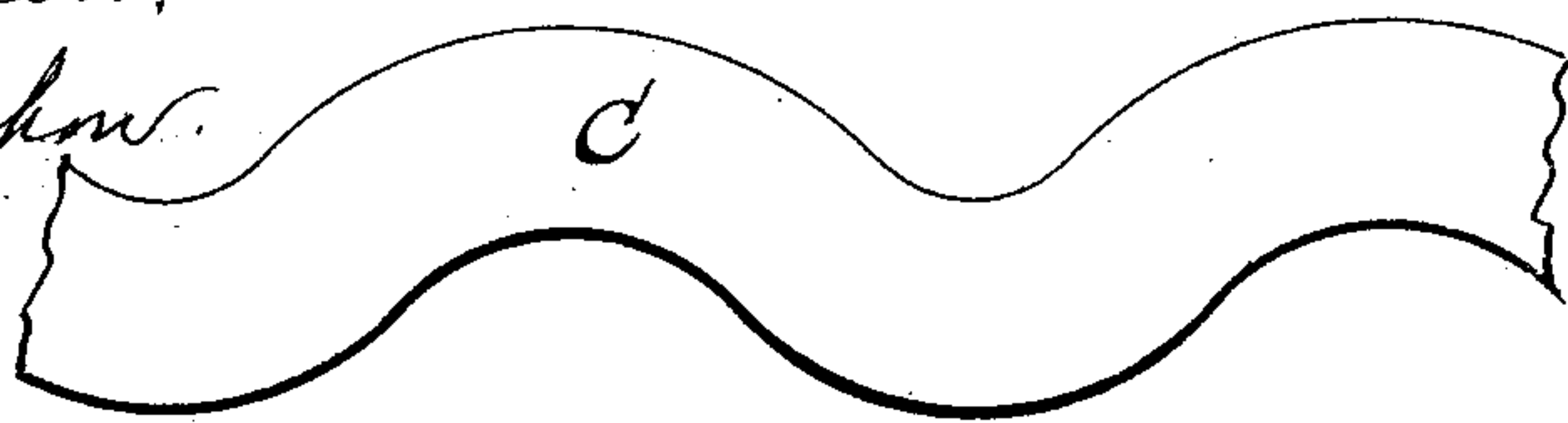


Fig. 3.

Witnesses.
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Fig. 4.



Inventor.
George Richardson
by his attorney
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UNITED STATES PATENT OFFICE.

GEORGE RICHARDSON, OF PHILADELPHIA, PENNSYLVANIA.

UNDERGROUND ELECTRIC CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 259,044, dated June 6, 1882.

Application filed April 5, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE RICHARDSON, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Underground Electrical Conductors; and I 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.

The leading feature of my invention consists of incasing underground electrical conductors in pure hydraulic cement for the purpose of insulating them and protecting them from moisture and corrosion.

I am aware that heretofore previously-insulated conductors have been embedded in cement. My invention differs therefrom in that I incase the bare wire or electrical conductor directly in the hydraulic cement without any interposed insulating material. I have ascertained by actual test that the hydraulic cement alone is an insulator of great non-conductivity, sufficient for all practical purposes to thoroughly and effectively insulate electrical conductors. Pure hydraulic cement is also impervious to moisture and indestructible.

My invention also consists of minor details of construction and arrangement of an underground conduit of electrical conductors, to provide for ready access to the wires or conductors at certain points along such conduit, to disperse surplus electricity, to guard against the settling of the foundation, and to provide for superposing one or more rows of wires or conductors on the lowest row whenever it may become desirable or necessary to do so.

In order that my invention may be clearly understood, I have illustrated in the annexed drawings and will proceed to describe an underground row of electrical conductors laid in hydraulic cement in accordance with my improved method, all the other features of the invention above referred to being also illustrated.

Figure 1 is a longitudinal section of my improved underground conduit. Fig. 2 is a transverse section thereof, taken in the planes indicated by the irregular line X X of Fig. 1.

Fig. 3 is a perspective view of a porous block for permitting surplus electricity to pass from the wires to earth. Fig. 4 is a plan view of a portion of the foundation-board.

The same letters of reference are used in all the figures to designate identical parts.

The electrical conductors or wires A A are incased in pure hydraulic cement B. The time and mode of incasing such wires will depend upon the particular construction of the underground conduit, and the mode of incasing them may vary very greatly; but in all cases the hydraulic cement is applied to and around the bare wire or wires without any interposing insulator. Pure cement must be used and carefully applied so as to hermetically incase the wire or wires. The preferable method of incasing wires in such hydraulic cement is to stretch the wires over a solid surface at some little distance therefrom—say an inch or more—and then apply the plastic cement so as to cover the wires and separate them by interposed portions of the cement, so that each wire will be thoroughly incased.

In laying a row of wires in accordance with the second part of my invention I proceed as follows: A trench of suitable depth and width is dug in the earth, the bottom thereof being properly leveled. A foundation-board, C, of wood, having the wave-like contour shown in Fig. 4, is then embedded in the bottom of the trench so as to be flush therewith, the width of the board at any one point being less than the width of the proposed foundation which is to be built upon it, but wide enough to reach with its curved edges to the edge of such foundation.

The foundation D, which may consist of bricks or broken stone grouted with cement or other suitable material, is made of substantially even width throughout, so as to alternately overlap the inwardly-curved portions of the foundation-board C and extend over upon the adjacent earth. If the foundation-board should rot, the foundation D will still have supports at intervals upon the earth underneath it, so that the settling of the foundation will be prevented notwithstanding the rotting of the foundation-board. Were the board made of the same width as the foundation, and should

it then rot, the foundation would inevitably settle, which it is very desirable to prevent.

The foundation D having been properly laid and leveled, the wires A A are stretched over it lengthwise, so as to be about an inch or more above the top of the foundation, and are held firmly in that position by any suitable means. The hydraulic cement is then poured around and over the wires to the proper thickness, and, if necessary, thoroughly troweled, so as to make it solid and compact at all points. After the cement has set the trench may be filled up with earth.

In order that access may be had to the wires at certain points along the conduit, I provide traps or man-holes E, which may consist of vertical circular tubes reaching from the top of the cement casing to the surface of the ground, and may be made of cement or any other suitable material, and should be provided with suitable covers or caps. At the points where these traps are located the wires are exposed, and are preferably bent upward so as to reach to near the cover or cap of the trap, so that they may be readily reached for the application of testing-instruments. These exposed portions of the wires should be galvanized, though the incased portions need not necessarily be galvanized, and may be imperfectly insulated. The bottom of the trap should be made tight, and in order to further protect the exposed portions of the wires some non-conducting fluid or other suitable non-conducting material may be put in the trap to cover the wires.

For the purpose of discharging surplus electricity due to atmospheric or earth currents or other causes, I provide each trap with a porous block, F, which I have shown in this instance as resting upon the earth at the bottom of the trench, passing through the foundation-board, foundation, and cement casing, and reaching up some distance into the trap. This block is made of hydraulic cement mixed with more or less of sand and broken stone or gravel, so that it will act in a degree like a sponge, retaining more or less moisture according to its greater or less porosity. The exposed portions of the wires are bent over the top of this porous block, so as to be in contact, or very nearly in contact, with the material of said block, which may be grooved, as shown in Fig. 3, a wire being laid in each groove. These porous blocks constitute leaks for carrying off surplus electricity and discharging it into the earth. Instead of extending the blocks through the cement casing and foundation of the conduit, the foundation and cement casing may be continuous and the porous blocks set on the top of

the cement casing, in which case one or both sides of the block should be constructed with projecting portions extending laterally through the man-hole or trap into the earth, as shown in Fig. 2.

In order to provide for the ready subsequent laying of one or more additional rows of wires on top of the incased first row, I form a shelf, B', around each man-hole or trap. The upper surface of each shelf should be on about a level with the top of the cement casing B, as clearly shown in Fig. 2. This shelf rests upon an extension of the foundation of the conduit. The second row of wires may thus be laid around instead of through the man-holes of the first-laid row, separate man-holes being provided for the second row of wires. Thus access may be had to the individual wires of each row by means of the separate man-holes.

I am aware that bare wires or electrical conductors have heretofore been insulated in asphaltum and various compounds of cements, and do not therefore claim broadly the insulation of bare wires in cement of whatever kind, but only claim such wire or wires insulated in pure hydraulic cement, which, so far as I know, has never before been used for such purpose.

Having thus described my invention, I claim—

1. An insulated electrical conductor consisting of the conductor proper and an insulating-casing of pure hydraulic cement, substantially as before set forth.

2. The combination, substantially as set forth, of an underground conduit, and a wood foundation board or plank of curved or wave-like contour.

3. The combination, substantially as before set forth, of the foundation D, the wire or wires A, and the hydraulic cement in which said wire is embedded.

4. The combination, substantially as set forth, of the underground electric wire or wires, the man-hole or trap E, and the porous block F, constructed as described, and in contact with the earth.

5. The combination, substantially as before set forth, of a conduit for electrical conductors, a foundation for the same, and a man-hole or trap, said foundation being constructed with a projection or shelf around the man-hole.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE RICHARDSON.

Witnesses:

B. E. J. EILS,
C. A. NEALE.