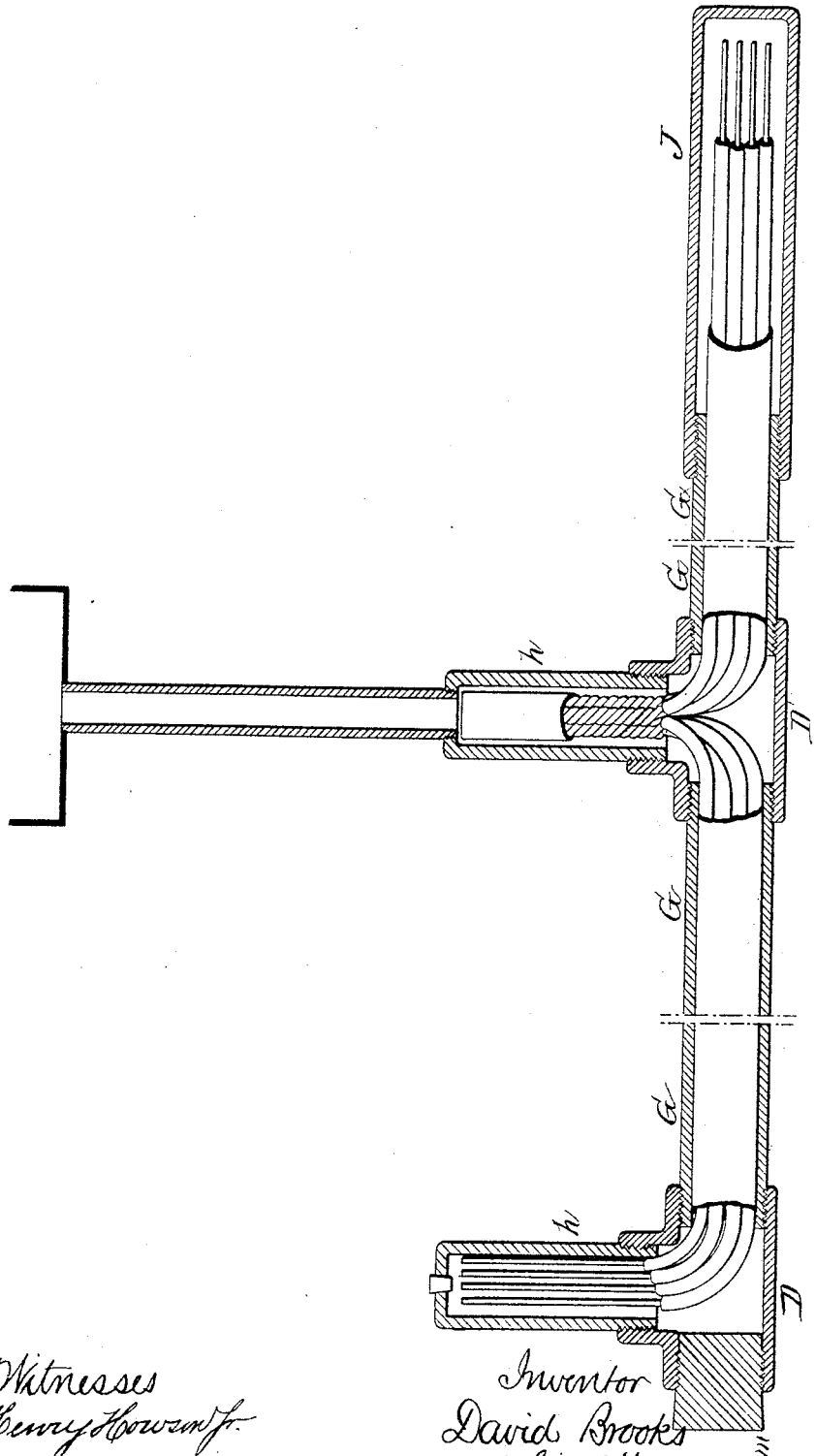
D. BROOKS.

Insulating Telegraphic-Conductors.

No. 210,986. Patented Dec. 17, 1878.



Witnesses
Henry Howson Jr.
Harry Smith

Inventor
David Brooks
by his attorney
Howson and Son

UNITED STATES PATENT OFFICE.

DAVID BROOKS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE BROOKS UNDERGROUND TELEGRAPH CONSTRUCTION COMPANY, (LIMITED,) OF SAME PLACE.

IMPROVEMENT IN INSULATING TELEGRAPHIC CONDUCTORS.

Specification forming part of Letters Patent No. **210,986**, dated December 17, 1878; application filed December 2, 1878.

To all whom it may concern:

Be it known that I, DAVID BROOKS, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Insulating Telegraph-Wires, of which the following is a specification:

My invention relates to an improvement in the mode of insulating telegraph-wires for which Letters Patent No. 165,535 were granted to me July 13, 1875, my present improvement consisting in keeping a clothed wire or wires contained in pipes in a constantly-insulated condition by maintaining within the said pipes, and under pressure, a supply of insulating-liquid, which is in direct contact with the said clothed wire or wires, as explained hereinafter.

In carrying out my said patented invention, I first clothed a wire with cotton, hemp, jute, or other cheap absorbent material, and then insulated one or more of these clothed wires by saturating them with melted paraffine. I then placed the covered and insulated wire or cable of wires in a tube, and maintained within the latter a constant supply of paraffine-oil.

I have ascertained that this preliminary insulation of the clothed wires with paraffine is not essential to their complete insulation, and that, if the fibrous material with which the wires are clothed be entirely deprived of moisture and gases in the first instance, ordinary petroleum and other liquids, after they are rendered anhydrous, may be used as insulating mediums, providing they are maintained in constant and intimate contact with the clothed wires.

The preliminary heating of the clothed wires or cable of wires may be effected in different ways. They may, for instance, be subjected in an oven to about 300° to 320° Fahrenheit for a sufficient length of time to insure the evaporation of all the moisture contained in the fibrous wrapping and the evolving of all the gases generated by subjecting the fibers to heat, and then (preferably while it is hot) steeping the cable in heated petroleum or other insulating-liquid.

Another plan is to first steep the clothed wires or cable of wires in oil—petroleum or linseed oil, for instance—or other liquid which will not evaporate at a temperature of 350°, for the bath should be maintained at about that temperature. After this has been done the cable may be boiled in water in which chlorine or bleaching-powder has been dissolved, so that all traces of acids or gases may be removed. As the clothing of the wires is made somewhat tender by the above treatment, the cable may be wrapped with hemp, jute, or other cheap fibrous strands. The cable is then placed in a bath of any liquid insulating medium—common petroleum, for instance—the said bath being maintained at a temperature of about 230° Fahrenheit, and this steeping is continued until insulation ceases to increase. The cable, being now deprived of all moisture and gases and thoroughly insulated, is pulled through a pipe—an ordinary lap or butt welded iron tube, for instance—in doing which the fibrous clothing of the wires is protected by the above-mentioned wrapping.

Before the cable is pulled into the pipe the interior of the latter is deprived of all moisture. This may be done by heating the pipe or by introducing into it pulverized quicklime, which absorbs the moisture.

The manner of connecting the pipes containing the cables and maintaining the wrappings in a proper insulated condition after the pipes are laid will be best explained by reference to the accompanying drawing, in which—

G G represent the ends of two adjoining pipes, both containing cables similar to that above described. D is a T-piece, to which the pipes are secured, and into a branch, *h*, of this T-piece the ends of the wires of the cable in each pipe are turned up, after being deprived of the wrapping, so that they may be twisted together, metal to metal, after which the twisted wires are again securely wrapped with fibrous material and the branch *h* closed by a suitable screw plug or cap. Before the latter is tightly secured, however, I pour the liquid insulating material into the T-piece and branch, and apply heat to the same, so as to expel all moisture, after which the branch is closed by a screw-plug.

The cap at each end of the line of pipes should have a branch, through which the wires may be conveyed to the instrument or instruments at the station where they terminate; and there may be branches at intervals for the same purpose, these branches being filled with resin, pitch, or other solid insulating substance which will prevent the escape of the insulating-liquid. The fibrous wrapping and covering of the wires is thus maintained in a constantly-saturated condition, which insures complete insulation.

During transportation the projecting wires at one end of each pipe G may be protected by a cap, J, and the wires at the other end of said pipes turned up into the branch *h* of the T-piece, secured to said end, the third branch of the T-piece being closed by a plug, *m*.

The insulating-liquid to which I have referred above may be paraffine-oil, petroleum, or its products. I have ascertained, for instance, that refined petroleum, such as is employed for illuminating purposes, may be used. Even benzine may be employed; but this is not so perfect an insulating medium as refined oil when it is properly prepared.

Whatever liquid insulator be used, it is essential that it should be deprived of all water, which may be done by simply heating the liquid until all watery particles have evaporated.

The supply of liquid insulating material may be contained in any suitable reservoir or reservoirs communicating with one or more of the branches *h*, the reservoir or reservoirs being at such an altitude above the cable that the liquid insulating material therein will be under constant pressure, to secure the best insulation, and to effectually seal the interior of the pipes and protect the cable from moisture.

I claim as my invention—

The mode herein described of maintaining a clothed wire or wires contained in pipes in an insulated condition by keeping the fibrous covering of the wires in the pipes constantly saturated with an insulating-liquid under pressure, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DAVID BROOKS.

Witnesses:
ALEX. PATTERSON,
HARRY SMITH.