D. D. PARMELEE.

COATING THE INTERIOR OF PIPES, TUBES, &c., WITH SILVER OR OTHER METALS BY THE ELECTRODEPOSITING PROCESS.

No. 108,510. Patented Oct. 18, 1870.

FIG. 4.

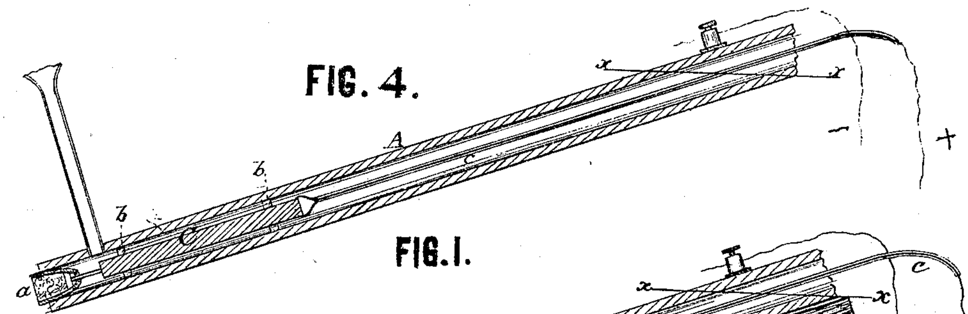


FIG. 1.

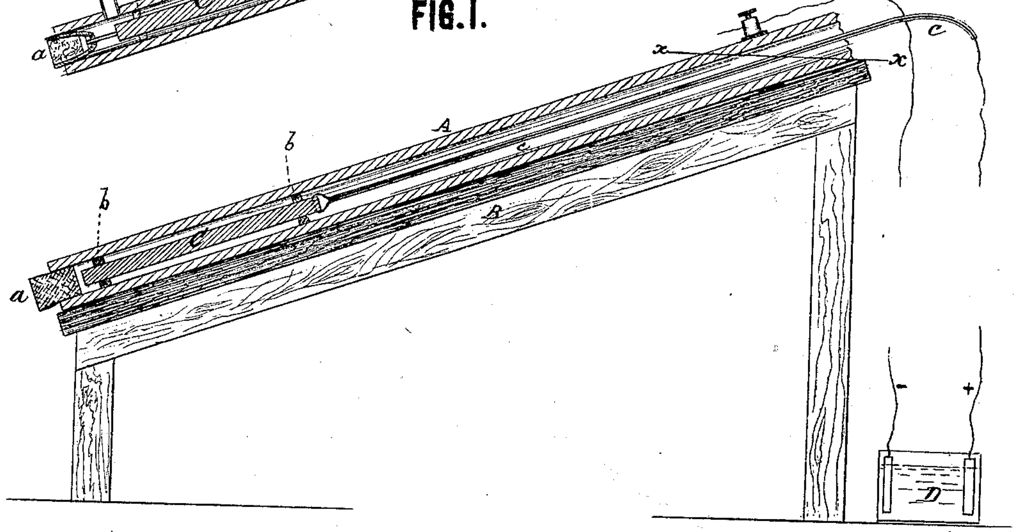


FIG. 3.

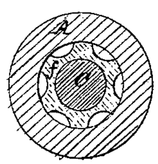
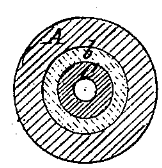


FIG. 2.



Dubois D. Parmelee
by his attorney
A Pollok

WITNESSES.
Jm Bailey
Wm H. McCabe

United States Patent Office.

DUBOIS D. PARMELEE, OF NEW YORK, N. Y.

Letters Patent No. 108,510, dated October 18, 1870.

IMPROVEMENT IN COATING THE INTERIOR OF PIPES, TUBES, &c., WITH SILVER OR OTHER METAL, BY THE ELECTRO-DEPOSITING PROCESS.

The Schedule referred to in these Letters Patent and making part of the same.

To whom it may concern:

Be it known that I, DUBOIS D. PARMELEE, of the city, county, and State of New York, have invented a new and useful Improvement in Coating the Interior of long lengths of Pipe or Tubes with Silver or other Metals, which are deposited from solutions of their various respective salts.

The following is a description of my invention, and of the manner in which it is or may be carried into effect, which will enable others skilled in the art to which it relates to understand and use the same.

To coat or line a long length of lead or other pipe with silver, the pipe is first made straight, or nearly so, and placed on a table inclined at an angle of about twenty or more degrees; an anode, of peculiar construction, which will be presently described, is next inserted within the pipe at the lower end; the negative pole of a galvanic battery is attached to the pipe, and the positive pole to the interior anode of silver. The pipe is next filled with a solution of silver, (cyanide of silver in a solution of cyanide of potassium, for example,) at the lower end, so that it will not quite reach to the upper end of the anode; the anode is then slowly drawn forward, as will be described, and the lead pipe is occasionally jarred or rolled over, so as to bring its sides alternately uppermost. The time required to complete the coating will depend upon the thickness of the coating desired, the electrical force of the battery, and the character of the solution employed.

The anode, if silver is to be deposited, is made of silver, and consists of a rod of the metal, or a tube insulated by washers of India rubber, gutta-percha, glass, porcelain, or other suitable material, so as to keep the metal ingot at about equal distances in every part from the lead pipe. Attached to the lower end of the anode or ingot is an India rubber hollow cone, filled with dry sponge, which, when dipped in water, expands and forces the sides of the rubber against the pipe sufficiently tight to prevent any of the solution from leaking past it as it is carried forward with the anode. A copper wire, insulated with gutta-percha or otherwise, is attached to this ingot or anode, for the double purpose of conveying the electrical current, and to move the anode within the bore of the pipe. The washers should not fit the pipe closely, but a little space, whether the ingot be solid or tubular, should be above them. The precise length of the anode or ingot is not material. For a pipe of five-eighths of an inch diameter of bore, I prefer to employ an anode or ingot not more than two feet long and three-eighths of an inch diameter. When the pipe is of larger caliber, the diameter is proportionally increased.

When the anode is properly adjusted, the attachment to the battery made, and the pipe around the anode filled with the solution through a small aperture, just forward of the rubber cone, to which a gutta-percha tube has been attached, the ingot is moved forward within the pipe, by means of the insulated wire at a uniform rate of speed, depending upon the condition of the battery, the solution employed, and the thickness of the coating desired. The forward motion of the anode may be made by the hands of the operator directly, or by means of pinching or drawing rollers, actuated by clock-work or other suitable machinery.

By this arrangement pipes of fifty or more feet long may be uniformly coated.

In the accompanying drawing, which is added in order to more fully illustrate my invention—

Figures 1 and 4 represent a longitudinal sectional view of the pipe, the anode, the supporting table, and the battery connection.

The pipe A, to be coated, is placed upon the inclined bed B, and its lower end is closed by the India-rubber cone-attachment or stopper *d*.

The anode C, insulated and kept at an equal and uniform distance from the pipe, by washers *b* of rubber, or other suitable material, is within the pipe, and is fastened to an insulated wire, *c*, which places it in connection with the positive pole of a galvanic battery, D, and also serves as a cord by which the anode can be drawn gradually forward.

The level of the solution of silver is represented at *x*. The negative pole of the battery is connected with the pipe A, as shown.

Figure 2 represents a transverse section of the pipe, anode, and washer, shown in fig. 1. The anode, in this instance, is tubular.

Figure 3 represents a like view of the same parts, the construction of the anode and washer being modified. In this case the anode is solid, and the washers are grooved or star-shaped. Many other modifications, in the form of both the washer and the anode, to accomplish the same result, may be made.

From the foregoing, the mode of coating the pipe with other metals than silver will be readily understood, for the process is the same, the only difference being in the nature of the solution and the anode employed to coat with any particular metal, all of which is well understood by those familiar with the art to which this invention relates.

The uses for pipes so coated are various. A very important one, for example, is for conveying water for domestic use, and in the construction of soda-water fountains and apparatus for drawing beer, and pipes in the laboratory of the pharmaceutist.

It has not before been practicable to plate pipes of any length, *i. e.*, more than four or five feet long, by electrical precipitation. If a long wire were stretched through the whole length of the pipe, it would be likely to touch the walls somewhere, and, if it did not, it

would necessarilly present but a small area of surface compared with the walls of the pipe to be plated.

The same objections are true also of a jointed anode.

By my invention, the difficulties formerly met with have been removed; the anode is comparatively short; the electricity is brought it by an insulated wire; moreover, it is insulated so as to be held at an equal distance on every side from the walls of the pipe to be coated, and it is caused to travel gradually through the pipe by means of the insulated wire, which serves the double purpose of conveying the current to the anode, and also of moving it forward. The anode will thus cause the deposition of a coating of metal to take place opposite to it in a uniform manner of thickness, corresponding precisely with its motion through the pipe.

The machinery moving the anode forms no part of this patent, as it is obvious that motion may be imparted and regulated by many machines now in common use; for example, by a clock-movement, the strokes of a steam-piston, &c.

Having now described my invention, and the manner in which the same is or may be carried into effect,

What I claim, and desire to secure by Letters Patent, is—

1. The method herein described, for the local and progressive electro-plating of the interior of pipes, as and for the purposes set forth.

2. An anode, held concentrically within the pipe by suitable insulating devices, so as to be propelled or moved by hand or machinery, substantially as and for the purposes set forth.

3. Lead or other metal pipe or tubing, the interior of which is coated or lined, in the manner and by the means, substantially as herein described, with silver, nickel, or other metal suitable for protecting the pipe from oxidation, and for other purposes.

In testimony whereof, I have signed my name to this specification before two subscribing witnesses.

DUBOIS D. PARMELEE

Witnesses:

A. POLLOK,

W. A. SHAW.