

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN METAL PIPES AND TUBES FOR CONVEYING WATER, GAS, AND OTHER FLUIDS.

Specification forming part of Letters Patent No. 123,166, dated June 18, 1872.

To all 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 "Metal Pipes and Tubes for Conveying Water, Gas, and Other Fluids; and I do hereby declare the following to be a full and exact description of the same.

My invention consists in making a nickel-lined pipe or tube. It is especially applicable to tubes made of lead, iron, or of brass, since they are more commonly used on account of their strength and cheapness; but of themselves they are objectionable on account of their liability to be corroded by air and moisture. In the case of lead pipes, when used for conveying water, the corrosion produces poisonous compounds very injurious to the health of men and animals; and in the case of iron, the corrosion soon destroys the pipe.

The art of nickel-plating is a new one so far as regards any practical use, though the properties of nickel in regard to hardness, toughness, and its freedom from corrosion have been well known for many years. It was also known that a thin film could be deposited on the surface of other metals, but not in such form as to be available for producing articles by the electroplating process. Recently, however, successful methods have been invented by Adams, Remington, and others, and the electroplating process has gone into extensive use for coating many useful articles with nickel. These methods were not, however, available for coating the inside of metal tubes.

In my patents Nos. 108,510, dated October 18, 1870, and 114,191, dated April 25, 1871, I have described methods and apparatus for depositing in an effective manner any of the metals capable of being deposited by the electroplating process on the inside of long tubes, such as are generally used for conveying water, &c. By employing these methods and apparatus for depositing metals on the inside of tubes, together with any of the practical methods of nickel-plating, I have produced a new article of manufacture—viz., a nickel-lined pipe of lead, iron, brass, or other metals or alloy capable of receiving a coating of nickel—and this new article constitutes my invention.

Lead pipe prepared by my process is equal,

in a sanitary point of view, to similar pipe lined with tin or silver, and is superior in smoothness, hardness, and durability, and is much cheaper.

I do not confine myself to the precise methods of constructing the "anodes" described in my patents referred to, as there are other methods which, in some cases, may be practiced, and which I have found to answer the purpose well. One of these is to cast a number of nickel buttons or disks, slightly convex on each side, and each having a hole through its center. The buttons are passed over a silver or other wire, so as to make a long flexible anode of good conducting capacity. This anode has, at suitable intervals, rings of gutta-percha or vulcanite to insulate it from the walls of the pipe, or it may be inclosed throughout its whole length with cloth or small cord, wound in opposite directions. Instead of cast-nickel I have also substituted an anode constructed in the same manner of iron buttons heavily coated with nickel by electrical precipitation. An anode has also been constructed by me consisting of short tubes inclosed at each end by convex heads, having holes in their centers for the wire to pass through. In other respects this anode is made as described when buttons are employed. An anode may be constructed by sewing a ribbon of cloth into a tube, passing a wire through it, and packing around the wire, so as to bring the wire in contact therewith, small grains of nickel. In very small pipe a wire of nickel, or of other metal coated with nickel suitably insulated, may be employed as an anode.

The first operation in using these anodes is to straighten the pipe. If of lead, it is reeled into a straight gutter (with an inclination of a few degrees) of the required length. A small light "shuttle-cock" consisting of a conical cork with bristles or feathers projecting from it, so that a current of air forced against it will drive it through the pipe, is inserted in one end. To this is attached a fine twine wound on a delicate reel. At the opposite end of the pipe an air-pump is attached. On exhausting the air the shuttle-cock is forced through the pipe with its attached thread. A stronger cord is attached to this thread, and to the stronger cord the anode, which can then be drawn through the pipe. From the ends

of the pipe the ends of the wire project about three feet. Over these flexible tubes are passed, so as to form water-tight connections of the ends of the lead pipe with reservoirs holding the plating solution, and at the same time allow the wire to pass through the solution to and beyond the surface, with a curve of long radius. To both ends of the pipe the negative wire of the battery is attached, and to either or both ends of the anode the positive wire is attached.

At short intervals it is well to move the anode a few inches in one direction and then again in the opposite direction. The level of the surface of the solution in the reservoir at the lower end of the pipe is higher than that of the upper end, so that by gravitation a circulation of the liquid up the tube is kept up. I have also found it advantageous to make the lower reservoir with an air-tight cover, so that by forcing air into the chamber above the solution it may be forced till its surface is near the connection with the pipe.

The lead pipe employed for these processes is manufactured in the ordinary manner, except that in the process of forcing it out over the steel mandrel in the cylinder of the press the mandrel is made slightly tapering, so that no oil is used for lubricating it, as is usually the custom. When pipes of iron, brass, and other metals are to be coated they are cleaned by any of the known processes for this purpose.

Some of the advantages of the nickel-lined pipe over those lined with other metals consist in the well-known non-corrosive qualities of nickel, it not being affected by water, air, salt water, lime, hydrosulphuric acid, and other salts and acids whose action pipe is frequently required to resist. Its physical properties are of a marked superiority for the purpose. Its fusing-point is as high as that of cast-iron; and while it resists abrasion equal to iron its ductility is so great that it may be drawn into wire one fifty-sixth of an inch in diameter, and beaten into leaves one one-hundredth of an inch in thickness. A pipe lined with this metal sufficiently heavy to answer every purpose is cheaper than tin, while it is as well adapted for hot water as for cold; and it is therefore well adapted for coating the tubes of the surface-condensers of marine engines.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

The new article of manufacture herein described—viz., a nickel-lined pipe of lead, iron, brass, or other suitable metal or alloy—substantially as described.

DUBOIS D. PARMELEE.

Witnesses:

Z. WILBER,

F. W. RITTER, Jr.