

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN THE MANUFACTURE OF NON-CORROSIVE PIPES AND PLATES.

Specification forming part of Letters Patent No. **155,170**, dated September 22, 1874; application filed September 1, 1874.

To all whom it may concern:

Be it known that I, WILLIAM ANTHONY SHAW, of the city, county, and State of New York, have invented certain new and useful Improvements in the Manufacture of Non-Corrosive Pipes and Plates, of which the following is a specification:

The object of this invention is to protect tubes or metal plates from corrosion by associating with them other metals or alloys, the presence of which render the entire combination passive.

It is known that the presence of platinum protects iron from corrosion, and that zinc will partially protect iron and copper. An instance of the last-named fact is the well-known application by Sir Humphrey Davy, in sheathing vessels.

One method of carrying out my invention is to make a pipe or tube of any one or more of the ductile metals by drawing, rolling, or by pressing said metals out of a cylinder through a die. At the same time this operation is being performed a ribbon, band, or wire of a protecting metal or metals is drawn through the die with the tube under treatment emerging therewith, either wholly or partially inlaid within the inside surface of the tube. One or more such bands may be thus inlaid, and they may be alike, or of different metals.

To illustrate this invention we will take the manufacture of lead pipe by any of the presses commonly employed.

A reel or reels of, say, platinum or other metal, in strips or wires, is provided. An opening is made adjoining the core into the lead-cylinder. The said core has a groove or grooves extending lengthwise, and the end or ends of the platinum are introduced into these grooves. The cylinder is then filled with lead or tin, or both. When pressure is applied, the pipe will issue from the die with the platinum or other protecting metal inlaid along its interior surface.

The inlaid bands may be embedded in the shell of the pipe, so as to be flush with the surface thereof, or they may be allowed to project, so as to present a greater amount of protecting-surface.

After the pipe is thus made, it may be filled with water, steam, gas, or other fluid, and left at rest for a short time, if considered necessary. The projecting bands may also be introduced through a hollow core or core-bore, and thus conveyed to the interior of the tubes.

It has been ascertained that when strips of lead and tin are simultaneously exposed to the action of water the presence of the tin effectually protects the lead from corrosion, and there is practically no corrosive action upon these metals when associated in this manner.

Another method of carrying out this invention is as follows: A charge of any suitable metal or metals or alloys is cast either within the cylinder of a pipe-press or in a mold constructed for the purpose. In the latter event it will be placed within the press-cylinder in a solid condition. This charge has a stave or staves of tin, or other ductile metal or alloy, inserted or inlaid within its inner circumference. These staves are introduced by providing cores of suitable size and shape, which are placed in the mold around the core or core-bar. When the cast metal has set, these are removed, and their spaces filled with the protecting metal or metals either in a molten or solid condition.

When the charge thus made and constructed is worked through the pipe-press, pipes or tubes are made with longitudinal bands or staves inlaid within their interior surfaces. By grooving the core around which the pipe is made these protecting bands will be formed in relief, and thereby expose a greater surface.

When pipes are constructed of tin and lead, and one of the metals melted in juxtaposition to the other, a film of solder is formed intervening between the tin and the lead.

This constitutes a very serious objection to such pipes, as is well known in the case of tin-lined pipes.

In applying heat, in order to solder these pipes, the intervening solder becomes melted, and causes the linings and other portions of the pipe to melt and obstruct the bore, either wholly or partially.

This difficulty is overcome in the new pipe,

and more especially when staves of tin and lead are employed by uniting them together by pressure while in a solid state. The ridges of lead constitute a framing to hold the tin staves in their places, or the two metals may be tongued and grooved, or locked together by any equivalent device.

Alternate staves of tin or its alloys, or of any other of the ductile metals or alloys, may be built up into a tube.

The order of making these tubes, as hereinbefore described, may be reversed—that is to say, an inner core or charge is made with spokes or flanges lengthwise of its exterior. These flanges may be beveled, and staves of a metal or alloy differing from the interior core placed between said flanges. The passage of such a charge through the pipe-press will produce a tube with exterior bands of a metal or metals differing in character from the interior thereof, and firmly bound to the inside tube by means of its spokes or radiuses.

Platinum wires may be inserted in such tubes, in manner before described, as an additional safeguard. They may also be used with block-tin, or tin-lined lead-pipes.

The advantages of these improved pipes consist in the economy of their cost over other non-corrosive pipes, and the facility with which they can be plumbed and worked. They are, likewise, safe for hot water, and for other liquids are much more flexible than tin-lined or composition pipes, and can be made with greater rapidity.

The staves or bands of which it is proposed to make the pipes, or which are to be inlaid into the shell of the latter, can be made previously by means of a pipe-press by forcing strips of metal through a die or dies by pressure.

It is obvious that these pipes can be made upon any pipe-press, whether the dies thereof be placed at the top or bottom of the cylinder or in the face of the plunger, or in the die-holder at the bottom of the cylinder.

Where the pipe is taken off at the top of the cylinder openings may be provided at the bottom thereof for the escape of surplus metal, or to reduce the pressure in the cylinder, operating as safety-valves. This arrangement is equally applicable to all pipe-presses for making lead, composition, or other pipes.

The charges may be made directly in the press-cylinders; or they may be previously prepared in molds arranged with the necessary cores, and afterward be heated in boiling oil, water, or by other means, and worked through the press; or, the charges can be worked cold by using greater pressure upon the pipe-machine.

Where these principles are to be applied to plates or sheet metal a slab or plate of the latter is to be cast within a mold or pan. Cores of appropriate patterns are placed in these pans, and the plates cast. After the

metal has set or consolidated the cores are removed, and the spaces which they have occupied filled with the desired protecting metal or metals, by either casting the latter into such spaces or by inlaying various patterns in solid condition. The channels into which these are inlaid may be beveled or grooved, so that the different pieces may be bound or locked firmly together.

The plates thus prepared are then to be rolled or reduced by any of the well-known methods. Plates of this description may be pressed out of a cylinder around a core through a die, and cut by a stationary or revolving knife as they issue from the die. They are then further reduced by rolling, if required.

Another mode by which they can be made is in accordance with processes described in my Letters Patent dated June 16, 1874.

Any of the operations herein described may be accomplished by means of presses having two or more retaining cylinders, dies, and plungers.

This invention may be applied with great advantage to the pipes known as suction-pipes, designed for pumps, rams, &c. Such pipes are made with very thin shells, and are often collapsed by the pressure of the atmosphere. By introducing spirals, or wire, or bands of an electro-positive metal or metals the pipes will be strengthened to resist external pressure; at the same time they are secured against corrosion.

In the event it is required to apply this protection to pipes, or to tanks, or reservoirs in use, wires or strips of tin, or its alloys, or of other protecting metals, may be pushed into the pipes, or placed in the tanks, and may be left therein, or afterward removed. Currents from batteries or other apparatus can be used to assist the operations.

In manufacturing lead or other pipes, after they are formed a wire tube, strip, or rod, of any section, is prepared. These are of tin, zinc, antimony, iron, copper, or alloys of either of them, or of any other metal electro-positive to the pipes. In the case of lead pipes impure commercial tin will answer, or an alloy of tin with either of the above-named metals. Such rods are introduced into the pipes, and the latter filled up with water or other fluid, charged with salts, gases, or other suitable elements. After the pipes are brought into a passive or non-corrosive condition, the rods are removed, and the pipes are ready for use. In carrying out this operation heat may be applied, and electric currents made use of from batteries or electrical machines. The rods are occasionally rotated to bring new surfaces into action.

Sheets of metal are prepared by placing them in vats, and treating them in a similar manner.

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

1. The method of protecting pipes and plates of ductile metals or alloys from corrosion by the application to the same of electro-positive metals, substantially in the manner set forth.

2. Electro non-corrosive pipes and plates made of the ductile metals with incorporated electro-positive protecting bands or strips of metal, substantially as set forth.

3. The method of incorporating said protecting metallic bands, with the metal of which the body of the pipe or plate is composed by pressing the two simultaneously and

together through the die or dies by which the article is formed, substantially as set forth.

4. As a new manufacture, metallic pipes with protecting bands inlaid in whole or in part within their internal surfaces, as described.

In testimony whereof I have hereunto signed my name this 15th day of August, A. D. 1874.

WILLIAM ANTHONY SHAW.

Witnesses:

WILLIAM T. GRAFF,
GEO. H. YEOMAN.