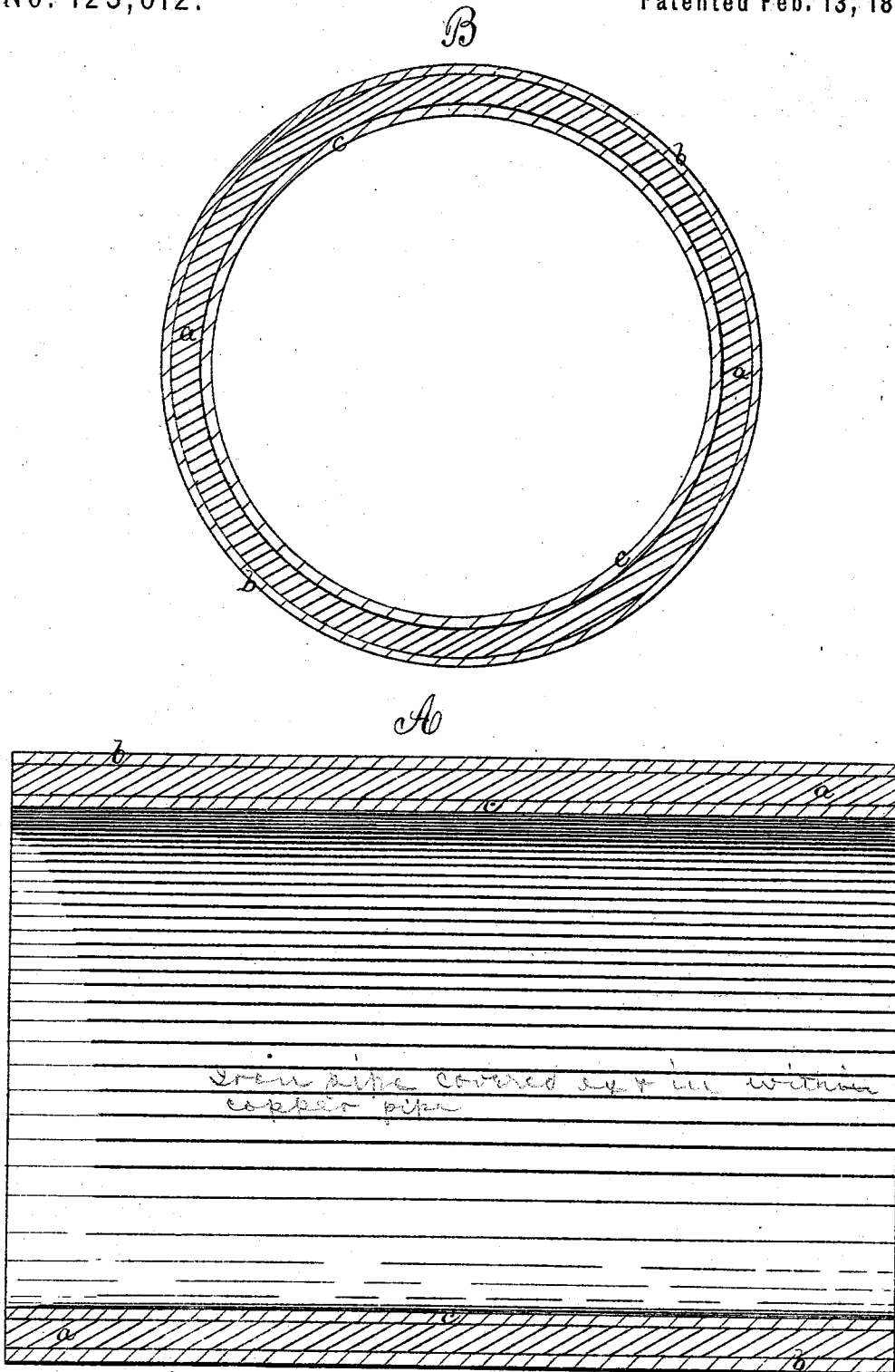


E. B. BUCKINGHAM.

Improvement in Compound Pipe for Conveying Steam, etc.

No. 123,612.

Patented Feb. 13, 1872.



Witnesses { W. B. Lewisby
J. H. Lattimer.

E. B. Buckingham

UNITED STATES PATENT OFFICE.

EDWIN B. BUCKINGHAM, OF SOMERVILLE, MASSACHUSETTS.

IMPROVEMENT IN COMPOUND PIPES FOR CONVEYING STEAM, &c.

Specification forming part of Letters Patent No. 123,612, dated February 13, 1872.

To all whom it may concern:

Be it known that I, EDWIN B. BUCKINGHAM, of Somerville, in the county of Middlesex and State of Massachusetts, have invented an Improved Steam-Conveying Pipe; and I do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

Such pipes have heretofore been made, so far as I am informed, wholly of copper, or of brass, or of wrought-iron, and in some cases of cast-iron, when not subject to vibration and extraneous strains. Pipes wholly of copper or of copper alloys are expensive. Pipes of wrought-iron oxidize both externally and internally, and the steam-current conveys the internally-formed oxide to the valve-faces and seats and into the steam-cylinders, where it acts as an abrader; besides this, the oxidation constantly diminishes the strength of the pipe. All of the objections arising against wrought-iron and steel pipe obtain against cast-iron pipe, with the addition thereto of greater liability to the existence of flaws and defects, and of inherent brittleness and low degree of tensile strength. The object of my invention is to produce a pipe for conveyance of steam that shall be as practically free, both outside and inside, from corrosion as are pipes of copper or of copper alloys, and that shall unite with this freedom from the action of oxygen the strength of iron or steel, and that can be produced and sold more cheaply than pipes of copper or of copper alloys.

My improved steam-pipe is constructed by covering both the outside and inside of a wrought-iron or steel pipe with pipes (preferably drawn and seamless) of copper or of copper alloy, the iron or steel being thick as compared with the pipes which cover it, for the purpose of giving the requisite degree of strength; all three of the pipes being so treated as that each shall be brought into close and intimate contact with the next adjacent, and so that each takes its proportion of the bursting or rupturing strain exerted by the pressure of the steam within.

In uniting the three parts of my compound pipe, I proceed as follows, by preference: The iron or steel pipe (which, to give excess of strength, may be thick enough to resist the pressure to be brought by the steam upon the compound pipe) is covered by a thin pipe, (preferably seamless and drawn,) of copper or copper alloy, fitting the iron or steel pipe as closely as is practicable; and then, by a drawing process, the covering pipe is contracted upon the iron or steel pipe. Then a similar thin pipe of copper, or of an alloy thereof, is placed within the iron or steel pipe, the fit between the two being as close as is practicable, and the thin pipe, being secured from endwise movement by flanging its end outwardly, is expanded by drawing a steel bulb through the pipe, or by drawing the pipe over the bulb. If necessary to repeat the operation, a bulb of slightly increased diameter is employed at each repetition.

This compound pipe is particularly valuable in marine engineering for connecting engines and boilers, inasmuch as there is a liability to relative movement between the parts connected, and to aqueous and saline exposure of the exterior of steam-pipes so used. Even when covered, iron steam-pipes rust on shipboard beneath the covering. In locomotives, when a part of the steam-pipe is surrounded with steam and water, and another part with volatile products of combustion, rendering the use of iron hazardous if not inadmissible, the employment of my improved pipe is specially desirable.

In the drawing is shown, at A, a longitudinal section of my improved steam-pipe, and at B a cross-section thereof, in which *a* represents the iron or steel pipe covered outside with the pipe *b*, of copper or copper alloy, and inside with the pipe *c*, of copper or copper alloy.

I claim—

As a new article of manufacture, a steam-pipe made compound, as described.

E. B. BUCKINGHAM.

Witnesses:

J. B. CROSBY,

M. W. FROTHINGHAM.