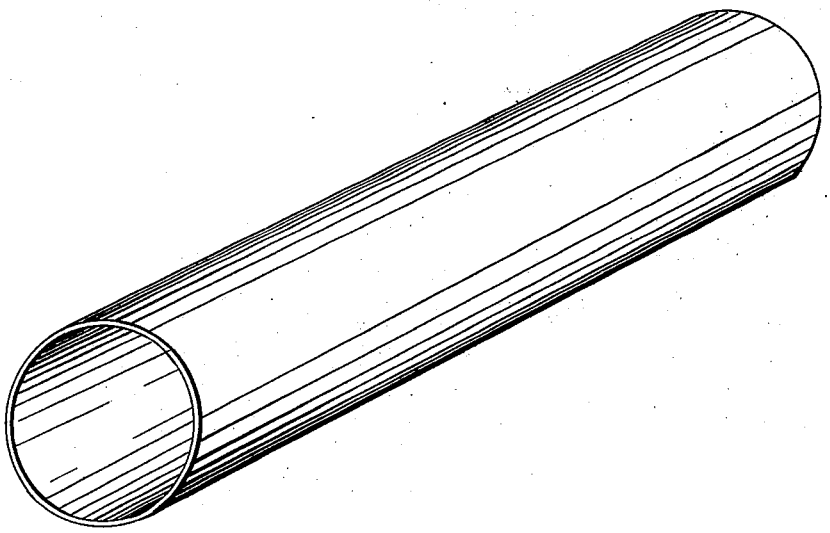
R. BRAYTON, D. JUNE & O. S. FRENCH.

Process for Coating Boiler-Tubes.

No. 205,038. Patented June 18, 1878.



Witnesses.

E. S. Allen

H. D. Coombs

Inventors.

R. Brayton,

D. June,

O. S. French.

Per Burridge & Co.

Attys

UNITED STATES PATENT OFFICE.

ROBERT BRAYTON, DAVID JUNE, AND ORATUS S. FRENCH, OF FREMONT, OHIO.

IMPROVEMENT IN PROCESSES FOR COATING BOILER-TUBES.

Specification forming part of Letters Patent No. **205,038**, dated June 18, 1878; application filed November 21, 1877.

To all whom it may concern:

Be it known that we, ROBERT BRAYTON, DAVID JUNE, and ORATUS S. FRENCH, of Fremont, in the county of Sandusky and State of Ohio, have invented a certain new and Improved Process for Coating Steam-Boiler Tubes; and we do hereby declare that the following is a full, clear, and complete description thereof.

The nature of this invention relates to a process for coating steam-boiler tubing; and the object of the same is to resist the corroding and scaling of the tubes.

A more full and complete description of the invention is as follows, the accompanying drawing making a part of the specification.

It is well known to builders and users of tubular boilers that the iron tubes in steam-boilers, especially vertical ones, are very liable to corrode at and above the water-line, and at the connections with the heads, to such degree that after from two to three years' use said tubes have to be replaced by new ones. This corroding influence depends upon heat and the character of the water.

To avoid the objectionable features of the iron tubes, brass and copper have been used in place thereof; but such tubes are, however, too expensive, and it is found to be almost impossible to set them so that they will not leak, by reason of the unequal expansion of the brass or copper tubes and the iron heads in which they are secured. To avoid these objections and the destruction of the iron tubes, and to render them more durable and reliable in resisting oxidation by heat and corrosion by water than the brass or iron tubes, is the purpose of this invention, and at the same time to give the improved tube all the valuable features and advantages of a copper or brass with the strength and stiffness of the iron tube combined in one. This result is effected by combining the tube of iron or steel, from below and above the water-line, (or, if needful, the whole of the tube,) with copper or spelter, or a compound of such metals, or other equivalent metal or metals that will produce the same result. To this end the tube is first cleaned of scales, rust, &c., and is then brought to about a red heat, more or less. The tube is then treated with a coating of pulverized borax, or its equivalent, and again heated to a bright yellow, and is then immediately immersed in a bath of molten brass, copper, spelter, or a combination of such metals. The heated condition of the tubes permits the molten metal to penetrate the tubes, filling and closing up cells, pores, and cracks therein, and forming upon it a coating of the metal, rendering the tubes capable of resisting the corroding action of the heat and water, to which they are subjected to a greater extent than are the ordinary iron tubes, which, from the peculiar method of their manufacture, are rendered more or less imperfect, owing to the cellular and seamed condition of the tube thus made. Finished and used in this state, they are readily destroyed when acted upon by the heat and water in a steam-boiler; but after the tube has been treated or coated by the process set forth, it is rendered more dense and compact, and is a better conductor and radiator of heat, and at the same time the tube is less liable to form scale or incrustations of lime or impurities of the water, as in the case of ordinary tubes.

The iron tubes thus treated are found to be toughened, and not liable to crack and split in setting them, as their softened and toughened condition allows them to readily expand; hence there occurs no loss by ruptures in this operation.

It will be obvious that tubes made or treated in the mode above described add to the durability and safety of a boiler or steam-generator using them, without adding materially to its first cost.

Iron tubes treated by the process set forth have all the material advantages of those made of brass or copper, being less corrosive and more durable than iron, without the disadvantage of being affected by an unequal expansion of tubes and heads, peculiar to copper and brass tubes when used in connection with iron heads.

It is not new to coat metallic sheets and tubes with a non-corroding metal by first applying a suitable flux and then immersing in a bath of molten metal, and this forms no part of our invention.

What we claim as our invention, and desire to secure by Letters Patent, is—

The within-described process for coating boiler-tubes of iron or steel, consisting in first heating them to a red heat, then covering them with pulverized borax, again heating them to a yellow heat, and finally subjecting them to a bath of non-corroding metal, for the purpose of saturating as well as coating them, all substantially as and for the purpose described.

ROBERT BRAYTON.
DAVID JUNE.
ORATUS S. FRENCH.

Witnesses:
M. E. TYLER,
FRANK BRAYTON.