(No Model.)

H. SEE.

Tube for Surface Condensers.

No. 231,501. Patented Aug. 24, 1880.

FIG. 1.

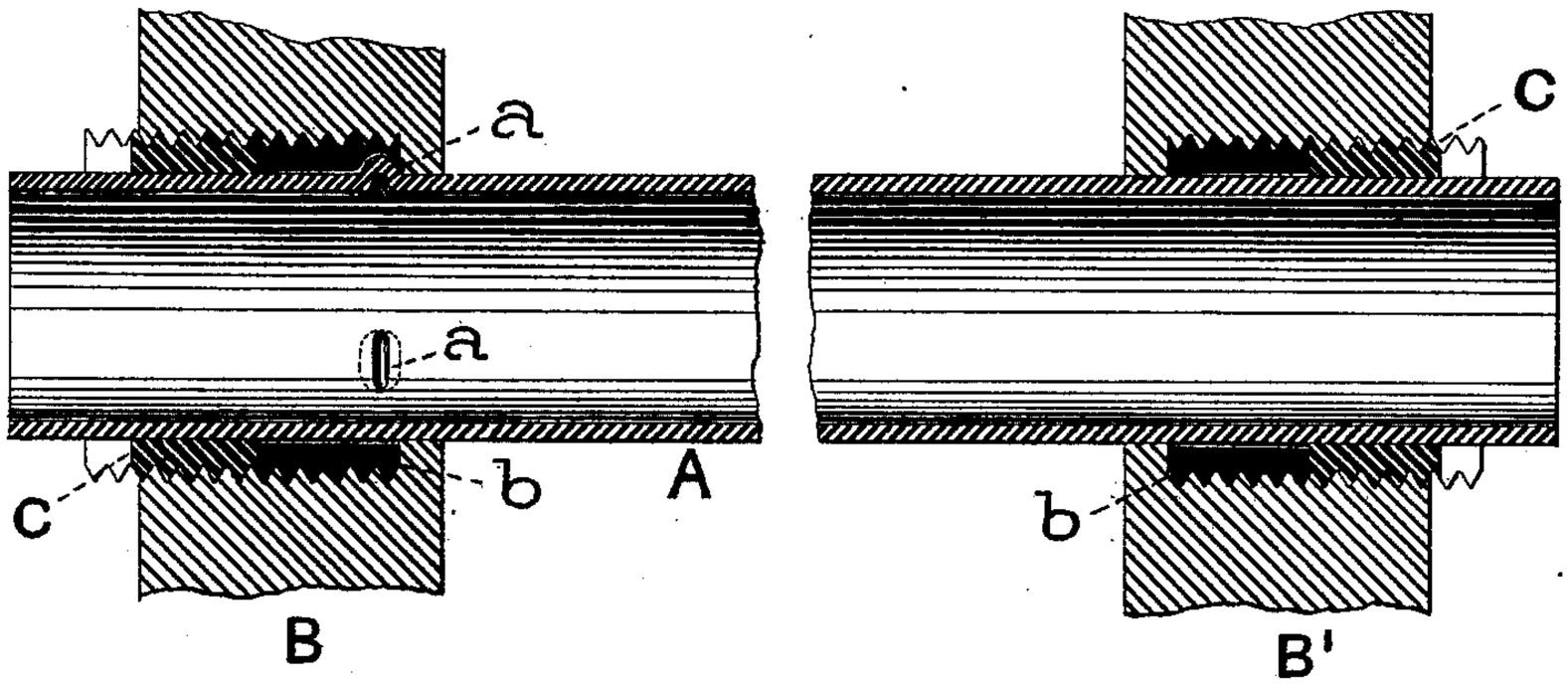
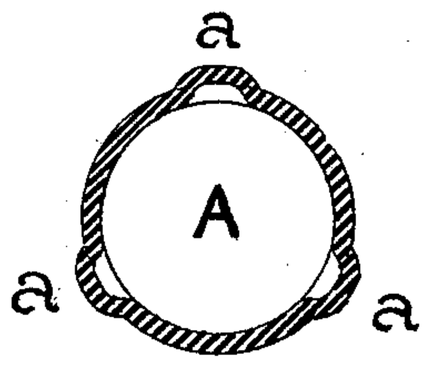


FIG. 2.



WITNESSES.

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Geo. B. Collier.

INVENTOR.

Horace See,

by Collier & Bell,

Attys.

UNITED STATES PATENT OFFICE.

HORACE SEE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO THE WILLIAM CRAMP & SONS SHIP AND ENGINE BUILDING COMPANY, OF SAME PLACE.

TUBE FOR SURFACE-CONDENSERS.

SPECIFICATION forming part of Letters Patent No. 231,501, dated August 24, 1880.

Application filed June 5, 1880. (No model.)

To all whom it may concern:

Be it known that I, HORACE SEE, of the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Tubes for Surface-Condensers, of which improvement the following is a specification.

My invention relates particularly to means for preventing the "creeping" or longitudinal displacement of tubes in surface-condensers of the system originated by Samuel Hall in 1831, (subsequently perfected in construction by E. Humphreys,) and is an improvement upon those for which Letters Patent of the United States No. 143,314 were granted and issued to Samuel Archbold under date of September 30, 1873, and other Letters Patent to C. B. White, May 4, 1880, No. 227,142, in which patents the tubes are retained in position by means, respectively, of collars and of continuous circular beads or swells, the collars and the beads being in each case confined between shoulders in the tube-sheet and nuts or followers screwed down upon packing which surrounds the tubes.

It is the object of my invention to overcome the objections which obtain in practice to the use of tubes of this character, the same consisting, in the first case, in the necessity of brazing or soldering the collars to the tubes, and the consequent expense of manufacture, insecurity of attachment, and difficulty of obtaining bearing-surfaces truly at right angles to the axes of the tubes, and, in the second case, in the substantial impossibility, as demonstrated by practical tests, of forming continuous circumferential beads upon brass tubes of small diameter, which are ordinarily employed in surface-condensers.

To this end my improvement consists in a condenser-tube having two or more circumferential ridges or projections formed upon it in one piece with the metal of which it is composed and adjacent to one of its ends, as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a longitudinal central section through a condenser-tube embodying my improvement in position in the tube-sheets of a surface-condenser, and Fig. 2 a transverse section through the ridges or projections of said tube.

The tubes A, ordinarily of brass, pass freely through holes in the tube-sheets B B′ of the condenser, and are secured therein by glands C C, each of which has a thread upon its periphery engaging a corresponding thread formed in an enlarged recess surrounding the tube, and extending part way through the sheet, said recess serving as a stuffing-box for the reception of the packing *b*, by which the joint between the tube and sheet is made steam and water tight. The glands C may be screwed as tightly as desired in their respective recesses, so as to compress the packing between their inner faces and the shoulders formed by the metal of the tube-sheets surrounding the tubes at the inner sides of the sheets.

For the purpose of preventing the displacement of the tubes, and at the same time affording proper facilities for their expansion and contraction under the influence of changes of temperature, I form upon each tube, adjacent to one of its ends, two or more (preferably three) circumferential ridges or projections, *a*, said projections being formed in a plane at right angles to the axis of the tube and in a single piece with the metal thereof by swelling or expanding said metal outward by the introduction of a corresponding expanding-tool. The projections *a* are located at such distance from the end of the tube as that when the latter is in position they will bear against the shoulder at the bottom of the recess or stuffing-box in the tube-sheet B, and, being clamped between the same and the packing *b* when the latter is compressed by screwing in the gland C, will hold the tube securely in the sheet B, while the opposite end of the tube being plain, free expansion and contraction are permitted and displacement and leakage prevented.

In the practice of my invention the projections are readily and economically formed and without injury to the tubes, are not subject to displacement, and provide bearing-surfaces at right angles to the axes of the tubes, thus insuring the application of the clamping action of the glands uniformly around the same.

Disclaiming, broadly, a condenser-tube held

in position by a collar or an external bead and packing,

I claim as my invention and desire to secure by Letters Patent—

A tube for surface-condensers having two or more circumferential ridges or projections formed upon it by swelling or expanding the metal of which it is composed in a plane at right angles to its axis, and at such distance from one of its ends as to adapt the projections to be clamped between a shoulder in the tube-sheet and packing compressed by a gland in said sheet, substantially as set forth.

HORACE SEE.

Witnesses:
C. WESLEY RUFFELL,
MATHIAS SEDDINGER.