No. 32,522. PATENTED JUNE 11, 1861.

W. A. LIGHTHALL.

CONSTRUCTION OF TUBE SHEETS.

Fig. 1.

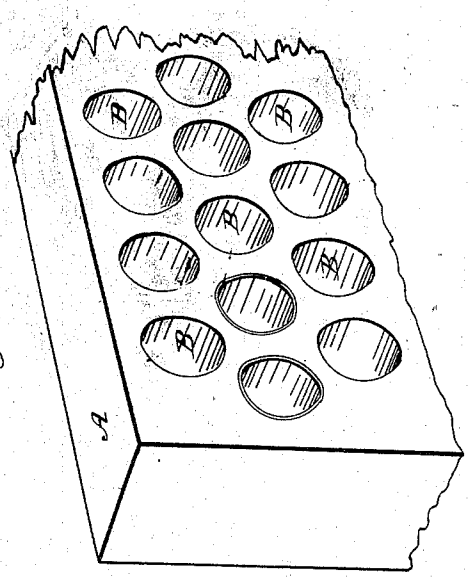
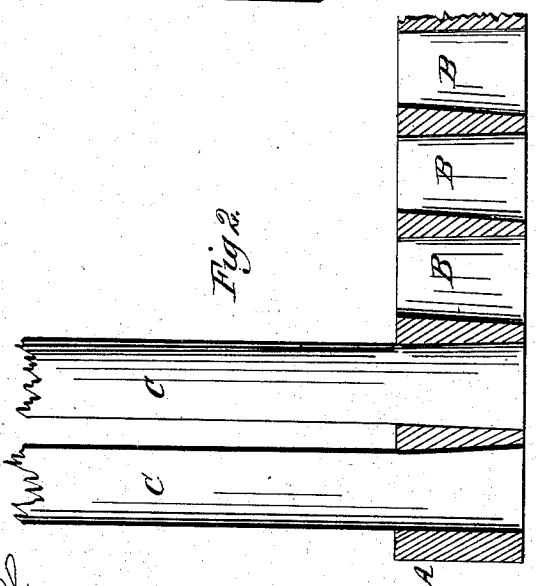


Fig. 2.



Witnesses.

W. B. Shaw.

John F. Rodman

Inventor.

Wm. A. Lighthall

by Francis S. Low
atty

UNITED STATES PATENT OFFICE.

WILLIAM A. LIGHTHALL, OF NEW YORK, N. Y.

TUBE-SHEET FOR COOLERS AND CONDENSERS.

Specification of Letters Patent No. 32,522, dated June 11, 1861.

To all whom it may concern:

Be it known that I, WILLIAM A. LIGHTHALL, of the city, county, and State of New York, have invented certain new and useful Improvements in the Construction of Tube-Sheets for Tubular Coolers and Condensers; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawing and to the letters of reference marked thereon, in which—

Figure 1 is a perspective, and Fig. 2 a sectional view of a section of a tube sheet.

The present method of constructing tube sheets for tubular coolers and condensers is to form them from a solid sheet or plate of wrought or cast metal in which the apertures for the reception of the tubes are drilled or bored out. This method requires a considerable period of time to complete a tube sheet of the size ordinarily required (say two feet or more in diameter) and involves a great expense, from the great number of apertures of small diameter required to be drilled to receive the necessary number of small tubes in the apparatus named, and from the care and attention required on the part of the workmen engaged in drilling the apertures to get them in their exact position—the wrong drilling or misplacement of a single aperture being sufficient to render the sheet valueless, and to cause the time and money spent upon it to be lost.

My improvement is intended to produce these tube sheets with perfect exactness and accuracy and at limited expense (compared with the plan above named) by casting them of iron or other metal or composition of metals in proper green or dry sand molds with the holes or apertures for the tubes cast in them, either by setting "dry sand" cores of proper size in the mold, or by "green sand" cores left in the mold by the withdrawal from it of the pattern; the holes or apertures thus formed in the cast plate being ready for the reception of the tubes as soon as the sand adhering to them has been removed by the use of a common "reamer."

A is a broken section of the cast sheet, showing the apertures B for the reception of the tubes C—the latter being secured in place and made water or steam tight by any desired process. The head A can be cast in either dry or green sand molds and be made of any metal or composition that may be preferred, but for most purposes cast-iron is preferable on account of its cheapness and strength.

The apertures B may be made by "green sand" cores left in the mold by the withdrawal of the pattern from the mold—the apertures in the pattern being made in the usual manner—or by "dry sand" cores set in the mold in holes or depressions left by "prints" placed on the pattern; the latter mode being preferable for heads of an inch or more in thickness, having apertures in them of less than an inch in diameter, on account of the green sand cores of the diameter and length required to form such apertures, being destitute of the necessary strength to withstand the flow of metal into the mold in the process of casting the sheet.

I am aware that it is common in the art of founding to cast plates with apertures in them made by green or dry sand cores, and I do not therefore broadly claim casting such plates, but

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

Constructing tube sheets for tubular coolers and condensers in the manner herein set forth.

WM. A. LIGHTHALL.

Witnesses:

FRANCIS S. LOW,

JOHN S. HOLLINGSHEAD.