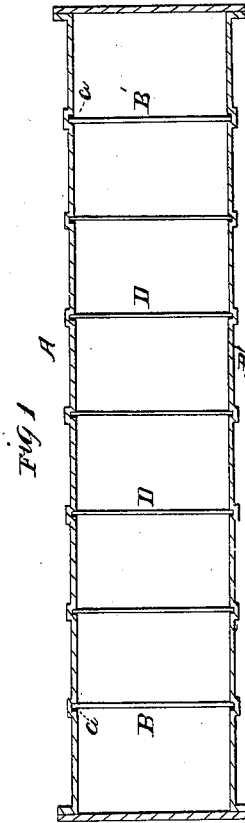
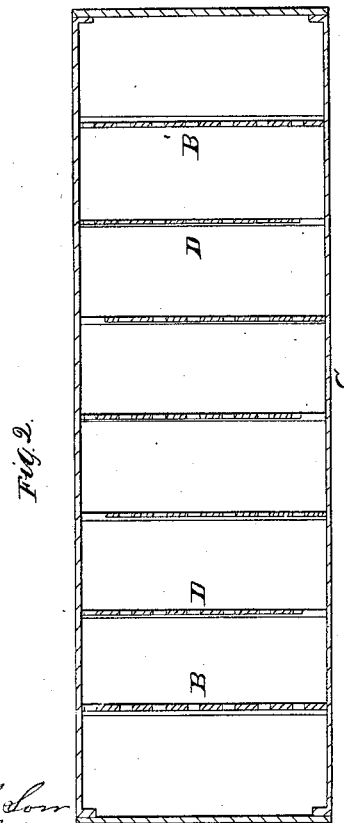
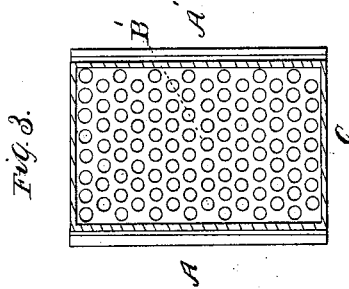


W. A. Lighthall,
Steam-Boiler Condenser.

N^o 46,253.

Patented Feb. 7, 1865.



Witnesses:
Francis S. Lorr
Joseph C. Gilbert.

Inventor:
Wm. A. Lighthall.

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN CONDENSER-CASES.

Specification forming part of Letters Patent No. 46,253, dated February 7, 1865.

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 Cases for Condensers and Refrigerators; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, in which—

Figure 1 is a plan or top view; Fig. 2, a side view with the near side of the case removed; and Fig. 3, a transverse section taken through the line *x x*, Fig. 1.

My improvement is applicable to the cases of condensers for condensing the steam exhausted from a "low-pressure" steam-engine, where it is intended to create a vacuum in the condenser by the condensation of the steam exhausted into it from the engine; to condensers for condensing the steam exhausted from "high-pressure" steam-engines, where it is intended simply to condense the steam to be returned as fresh water to the boilers; to condensers for making potable water from salt or other unpotable water, where it is intended to take and carry away the product—fresh water—to be used for potable purposes, and to refrigerators for cooling the injection-water of condensing steam engines, to be reused in the condenser of the engine.

The present method of making these cases is to secure the tube-sheets or heads and the plates (through which the tubes pass) to divide up the space between the tube-sheets—if such plates are used—by securing them to the sides of the case by flanges fastened by screw-bolts or other analogous means. This method not only involves considerable expense, from the nicety required for the fitting of the heads and plates to the case and from the time devoted to the drilling of the holes in the flanges and sides of the case for the reception of the screw-bolts, (besides the cost of the screw-bolts,) but is further subject to the objection that the flanges by which the head-sheets and division-plates are secured to the side plates of the case occupy so much space that the outer rows of tubes adjoining each side plates require to be placed so far from the side plates as to be productive of a great loss

of the useful effect of the condensation or refrigeration.

My improvement is intended to obviate these defects; and it consists in casting or otherwise forming apertures in the side plates of the apparatus for the reception of the ends of the tube-sheets and division-plates, in which the said sheets and plates are secured in place by packings of metal or wood, (as shown in the drawings and hereinafter described,) by which means the expense is greatly decreased, while the outer rows of tubes can be placed as near to the side plates of the case as they are to each other throughout the apparatus, thus rendering the action of the same perfect and complete.

A A' are the sides of a condenser or refrigerator, having depressions or apertures *a* cast or otherwise formed in them for the reception of the ends of the tube-sheets and division-plates.

B B' are the head or tube sheets, which are made of sufficient length to fill up the space in width from the end of one aperture to that of the other and opposite one, when the sides are secured in place on the bottom plate, C. These sheets are set in proper position, and are then packed between their front edges and the sides of the apertures named by any suitable packing—that which I prefer being lead—cast into the space between the two and afterward "calked," in the manner employed for analogous purposes, and well known to engineers.

D D are the division-plates, which are secured in place and packed similar to the tube-sheets, except that I prefer for economy to employ strips of wood for the packing, which answers every purpose and is much cheaper and sooner applied.

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

The manner of constructing the sides A A' of the case with the apertures *a*, combined with the manner of securing the tube-sheets B B' and division-plates D D, or either of them, in place, as herein set forth.

WM. A. LIGTHALL.

Witnesses:

FRANCIS S. LOW,
JOSEPH BISHOP.