J. HOUPT.

Surface Condensers or Refrigerators for Marine Steam Engines.

No. 150,952. Patented May 19, 1874.

Fig. 1.

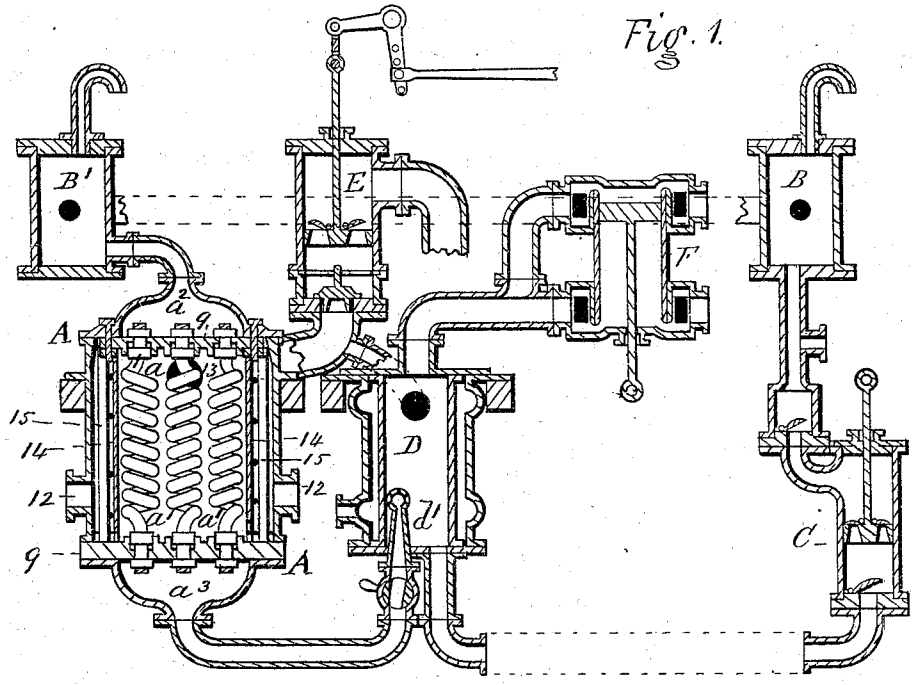
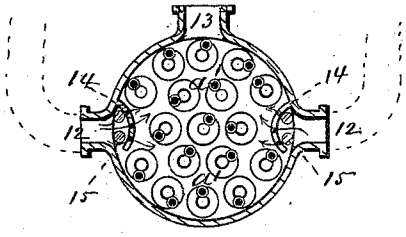


Fig. 2.



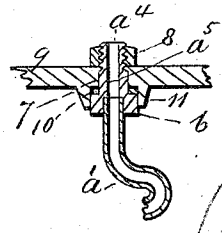


Fig. 3.

Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN HOUPT, OF SPRINGTOWN, PENNSYLVANIA.

IMPROVEMENT IN SURFACE-CONDENSERS OR REFRIGERATORS FOR MARINE STEAM-ENGINES.

Specification forming part of Letters Patent No. **150,952**, dated May 19, 1874; application filed February 12, 1874.

To all whom it may concern:

Be it known that I, JOHN HOUPT, of Springtown, in the county of Bucks and State of Pennsylvania, have invented an Improved Surface-Condenser or Refrigerator for Marine Steam-Engines, of which the following is a specification:

The object of my invention is to produce a more rapid and effective cooling-down of the fresh water from the hot-well at any point of its passage from said well to the jet-condenser of the engine, in order that the said fresh water may be used over and over again for condensing the exhaust steam as it reaches the said condenser; and my invention consist in the peculiar construction of the surface-condensers or refrigerators, as will be fully described with reference to the accompanying drawings, in which—

Figure 1 is a vertical central section of the surface-condenser or refrigerator, arranged between the hot-well and the jet-condenser, and in communication with both, and also in connection with the circulating-pump, whereby cold sea-water is drawn out of the said refrigerator and discharged overboard. Fig. 2 is a horizontal section of the surface-condenser or refrigerator, shown in Fig. 1. Fig. 3 is an enlarged sectional representation of the mode of fastening the ends of the spiral tubes in the end-plates of the surface-condenser or refrigerator, shown in Fig. 1.

In Fig. 1, the hot-well B is represented as being connected with the air-pump C through an intermediate reservoir or hot-well, B′, at some distance from the refrigerator A, for the purpose of showing it more distinctly; but it is intended that the said pump C and the hot-well B shall be close to the reservoir B′, or that the hot-well be made large enough to serve as both reservoir and hot-well. D is the jet-condenser; E, the circulating-pump; and F the steam-cylinder of the engine. The surface-condenser or refrigerator A consists of a large cylindrical case containing numerous spiral tubes, a^1 a^1, secured therein in a water-tight manner, as will be immediately described herein, and communicating at their upper ends with a single pipe, a^2, which enters the reservoir B^1, and at their lower ends with a single pipe, a^3, which enters as a jet-sprinkler, d', into the jet-condenser D. The spiral tubes a^1 are each made of very thin sheet copper or other suitable sheet metal, and their upper and lower ends, respectively, left straight and then inserted and soldered fast and water-tight in juxtaposition with a corresponding longitudinal hole, a^4, in a casting, a^5, of brass or other suitable metal. (See Fig. 3.) This casting a^5 has a cylindrical flange, 6, around the end which receives the spiral tube a^1, and a square or hexagonal stem, 7, the outer end of which is made cylindrical and screw-cut to fit a screw-nut, 8, whereby the said casting a^5 can be drawn so as to bring its flange to bear tightly against an elastic packing between it and the thick brass end plate 9, which forms its respective end of the surface-condenser case, thus making a water-tight joint thereat. The said plate 9 is cast with numerous square or hexagonal holes, corresponding with the diameters of the castings a^5, respectively, and also with surrounding flanges 11 on the inner sides of the plates 9 9, corresponding in diameters with the flanges 6 for the purpose of preventing the elastic packings 10 from being expanded in their respective diameters.

By this simple mode of fastening the ends of the spiral tubes a^1 to the upper and to the lower plates 9 of the surface-condenser or refrigerator A, a perfectly tight and secure joint will be produced with facility thereat, and the tubes a^1 being of very thin sheet metal and of spiral form there will be no liability to crack or split in tightening up the drawing screw-nuts, nor from changes in their temperature by contact with the hot and cold water. Cold water from the sea is introduced into the case of the surface-condenser or refrigerator A through the side of the ship, as indicated by the dotted lines of Fig. 2, the said sea-water entering A, at 12 12, from the supply-pipes, which are intended to be in a horizontal plane below the surface of the sea, at about the depth of the said condenser or refrigerator, or so that the upper end of A will be nearly in the same horizontal plane as the surface of the sea, and consequently the circulating-pump E will not require the power for working it to be much above or greater than will be required to overcome friction and lift the water drawn thereby from the said

condenser or refrigerator from a greater depth than the outlet-opening 13 near the top of the latter, and to discharge the said water overboard. Opposite to each of the inlet-openings 12 12, for the entrance of the cold sea-water into A, there is fixed a curved deflector, 14, which is perforated and secured in place by means of two posts, 15 15, the said deflectors being arranged, respectively, so as to leave an open space between one side edge of the same and the side of the case, so that the entering sea-water may be mainly directed away from the outlet-opening 13, and also generally diffused, at the same time, among the tubes a^1 a^1 for the purpose of more equally and effectually cooling them. The hot fresh water passes from the reservoir B′ by gravitating down through all the spiral tubes a^1 a^1, and thence through a^3 into the jet-spreader d', from which it issues in a copious jet-spray of cold fresh water into the surrounded chamber of the said jet-condenser D. The hot water of condensation, together with the condensing spray-water, then passes to the air-pump C, which again discharges the same into the hot-well B, which communicates directly with the reservoir B′, and thus the same fresh water is used over and over again in the condenser D, without mingling with any saline water whatever.

It will be understood, without any further description, that, as the surface-condenser or refrigerator A is arranged between or in immediate connection with the hot fresh-water reservoir B′ and the jet-condenser D, and also in near communication with the sea through the circulating-pump E, a comparatively much smaller space will be required in the ship for locating and securing the same; that much less expense will be incurred in connecting the said surface-condenser or refrigerator A to the hot-water reservoir B′ and to the jet-condenser D, because of the lesser length of the communicating-pipes for the purposes, and that the powerful refrigerating character of A will render it fully adequate to the purpose intended, especially in view of the fact that the spiral tubes a^1 a^1 are to be made of very thin sheet metal, and therefore best suited for the rapid transmission of the cooling effect of the cold sea-water to the fresh water passing through the said tubes a^1 a^1. It will also be seen that the construction of the surface-condenser or refrigerator A, especially in regard to the mode of securing the said spiral tubes a^1 to the end, or top and bottom, plates 9 9 of the same, will more effectually prevent leaking and cracking open of the tubes in tightening-up the screw-nuts, or in changes from temperature, than any other mode heretofore used.

I claim as my invention—

The surface-condenser or refrigerator A, constructed of a plurality of spiral tubes, a^1, open at both ends, and arranged and secured in the end, or top and bottom, plates of the containing-case, by means of the castings 7 and screw-nuts 6, as set forth and described, for the purpose specified.

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Witnesses:

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