(No Model.)

T. L. & T. J. STURTEVANT.

WATER JACKET AND CONDENSING APPARATUS FOR MARINE BOILERS.

No. 481,379. Patented Aug. 23, 1892.

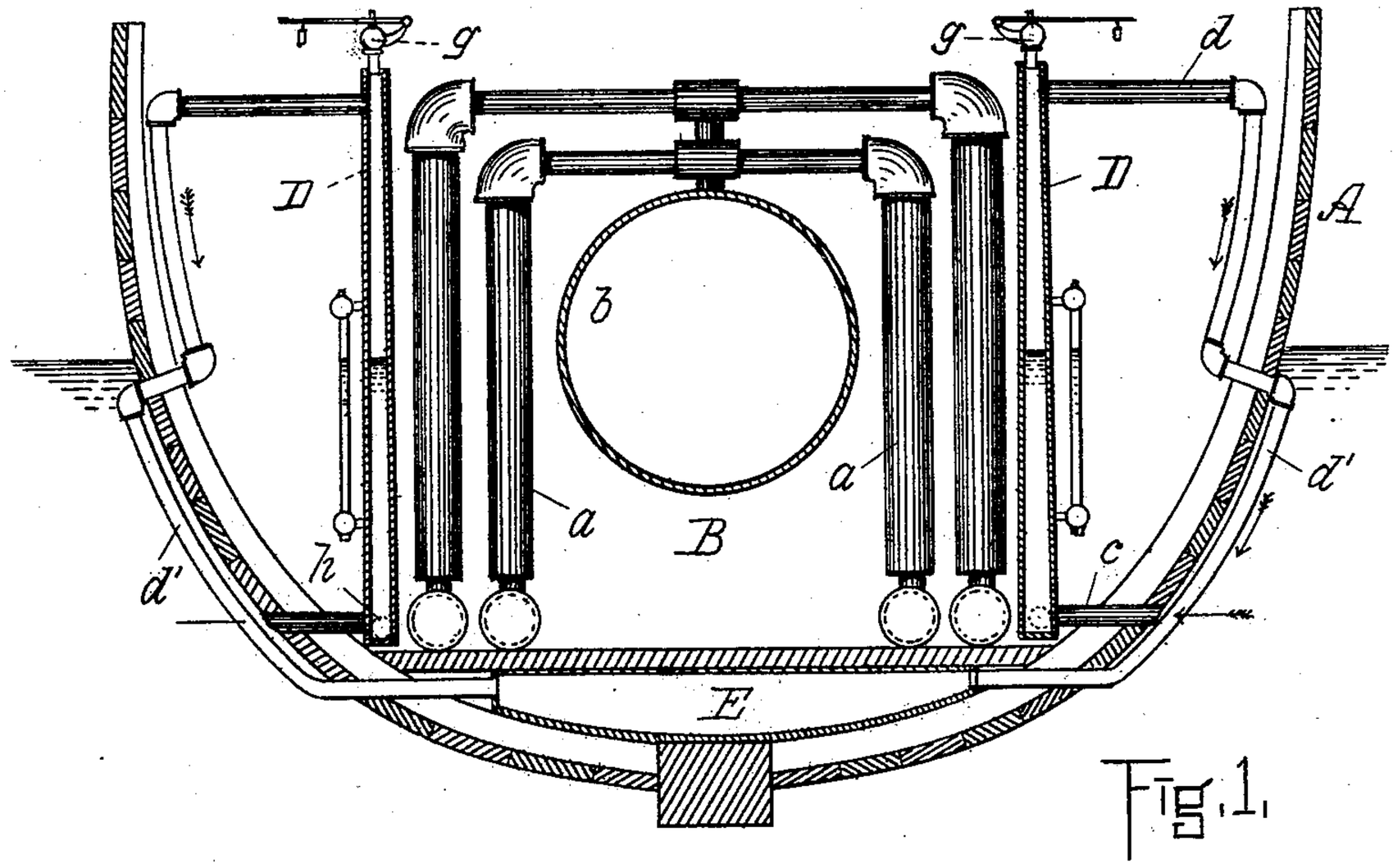

Fig. 1.

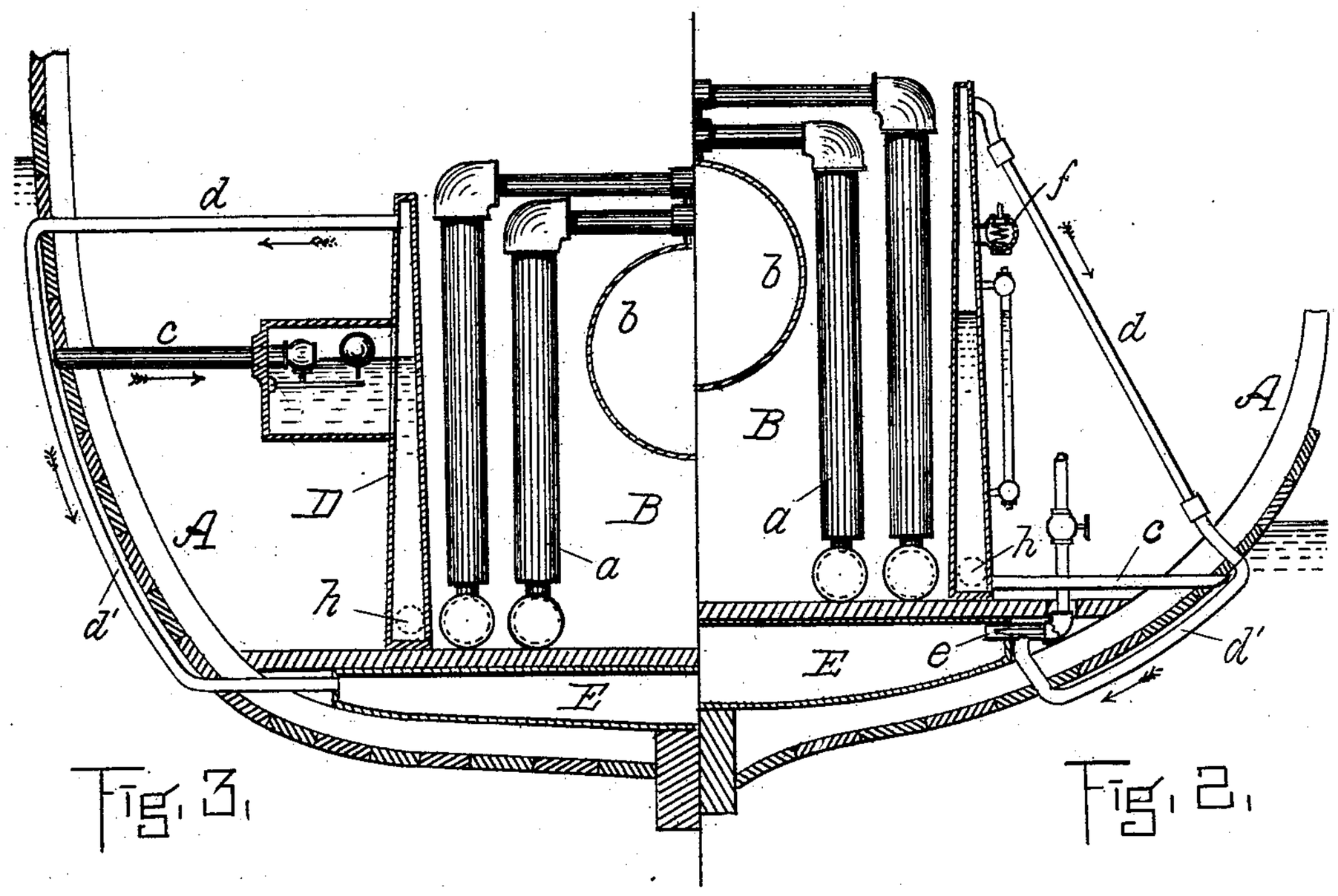

Fig. 3.

Fig. 2.

Witnesses.

Francis E. Stanwood

John A. Dougherty

Inventors.

Thomas L. Sturtevant.

Thomas J. Sturtevant.

by H. E. Lodge Atty.

UNITED STATES PATENT OFFICE.

THOMAS L. STURTEVANT AND THOMAS J. STURTEVANT, OF FRAMINGHAM, MASSACHUSETTS.

WATER-JACKET AND CONDENSING APPARATUS FOR MARINE BOILERS.

SPECIFICATION forming part of Letters Patent No. 481,379, dated August 23, 1892.

Application filed August 21, 1891. Serial No. 403,309. (No model.)

To all whom it may concern:

Be it known that we, THOMAS L. STURTEVANT and THOMAS J. STURTEVANT, citizens of the United States, residing at Framingham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Water-Jackets and Condensing Apparatus for Marine Boilers; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to water-jackets, particularly those for marine boilers. The purpose of this water-jacket is to prevent the harmful effects arising from the convection and radiation of heat, as likewise to provide an evaporator to make use of the heat at present lost, whereby steam is now created in the water-jacket and then returned after condensation as pure fresh water to a storage-tank. Preferably said water jacket or evaporator has free communication with the water in which the vessel floats and said jacket may partially inclose the steam-boiler or furnace, or it may surround the boiler without any other case intervening. Water may be fed into this jacket by gravity, as in some boats the boiler is placed sufficiently below the load water-line to accomplish this, or it may be forced in, as will be hereinafter explained. The gist of our invention, however, consists in a water-jacket having an open feed-pipe to the water in which the vessel floats, combined with a discharge steam-pipe and a condenser, the condense-water passing to some suitable storage-tank in the boat.

The drawings represents, in Figure 1, a sectional elevation of a water-jacket embodying our invention applied to a vessel in which the water-level in the jacket is coincident with the load water-line. Fig. 2 is a similar view with the water-level of the jacket above, and Fig. 3 is a like view in which the water-level of the jacket is below the load water-line.

In said drawings, A represents the shell of a vessel, in which, for purposes of illustration, is placed a sectional boiler B, composed of the steam-generating pipes *a a* and a steam-separator *b*, suitably connected. Exteriorly of said group of pipes, which rest upon the floor of the boat (here properly protected from heat) and between the sides of the boat is placed a water-jacket D. This is a water-tight tank or case, preferably of a height equal to the length of the pipes *a* and to partially or entirely inclose the boiler. Said jacket may be rectangular in cross-section or of inverted-V shape, to more readily heat the water contained in it.

In Fig. 1 the water-level in the boiler is coincident with the load water-line. An open feed-pipe *c* connects with the water-jacket at the bottom and permits the water-level in said jacket to stand, as shown. From the top of the tank is led a steam-discharge pipe *d*, which extends down inside the boat and then emerges below the load water-line, passing outside of the boat until opposite the storage-water tank E, with which it connects or is led to other sources where wanted. This exterior portion *d'* acts as a condenser and is so termed in the explanation which follows. However, it is evident that in lieu of this simple arrangement a special condensing apparatus may be employed. The orifice of the feed-pipe should be small, when gravity forces the water into the water-jacket. Hence water is free to enter; but there will be little or no circulation or movement of the water back and forth in the feed-pipe to the manifest loss of heat. When the water-level in the jacket is above the load water-line, which is usually the case in steam-launches, the feed-water must be forced in. Our arrangement for so doing is shown in Fig. 2 and is preferably accomplished by air-pressure—that is, by creating a partial vacuum within the water-jacket. Such arrangement consists in an injector *e*, connected with the boiler, while the delivery end of the steam-pipe *d* is united with said injector. A relief-valve *f* is placed in the upper part of the jacket. In this manner the suction-steam jet in the delivery end of the steam-pipe *d* produces removal of air and steam from the jacket. Such partial vacuum causes a flow of water inwardly through the agency of external atmospheric pressure. In this way the water-

jacket is kept constantly supplied. Should the steam and air be exhausted too rapidly, the relief-valve opens and excessive inflow of water is avoided. A safety-valve *g'* prevents sudden collection of steam, from any cause whatsoever, bursting the jacket. Should the boiler be placed in a boat and much below the load water-line, as in Fig. 3, a valve and float are employed. Thus the proper water-level for the water-jacket is secured for any position of the boiler in the vessel. As before stated, this arrangement is especially adapted for small steam-launches which are unable to carry a large supply of water, while the objectionable and frequently-dangerous effects arising from the convection of heat is obviated. This heat is now utilized and the steam so generated affords a constant supply of fresh pure water to the boiler or for other purposes, as may be desired.

In the use of salt-water the saline deposits are readily removed by means of a hand-hole *h* at the bottom of the jacket at one end. In the operation of said water-jacket the steam formed by heat from the boiler passes upwardly and escapes into the steam-delivery pipe *d*, thence through that portion outside the boat termed the "condenser" *d'*, while the water of condensation is led back by its pipe into the boat and delivered into the storage-water tank E.

It will be observed that with all the different forms of our invention above described the feed-pipe *c* is below the load water-line of the vessel all the way between the outside of the vessel and the water-jacket, so that water is free to flow inward to the said jacket to supply the waste in steam making and condensing, while as soon as the fire is out and the water cooled the concentrated saline water inside of the jacket being heaver than the exterior water runs out. When the vessel rises and falls with the waves, more or less water is constantly passing back and forth from the water-jacket, thereby changing its contents (but not so rapidly as to prevent steam-making) and thus preventing the accumulating of saline deposits within. It will therefore be apparent that the location of the feed-pipe and a portion of the water-jacket somewhat below the water-line of the vessel forms an important necessary and novel feature of this part of our invention.

What we claim is—

1. The combination, with a marine boiler, of a water-jacket placed closely adjacent thereto and between said boiler and the shell of the vessel, said water-jacket being provided with a feed-pipe passing from said jacket all the way to and through the shell of the vessel below the load water-line for the free passage of water in and out and with a suitable steam-discharge.

2. The combination, with a marine boiler, of a water-jacket placed closely adjacent thereto and between said boiler and the shell of the vessel, said water-jacket being provided with a feed-pipe passing from said jacket all the way to and through the shell of the vessel below the load water-line for the free passage of water in and out, a water-storage reservoir, and a steam pipe and condenser forming a communication between said jacket and said reservoir.

3. The combination, with a marine boiler, of a water-jacket placed closely adjacent thereto and between said boiler and the shell of the vessel, said water-jacket being provided with a feed-pipe passing from said jacket all the way to and through the shell of the vessel below the load water-line for the free passage of water in and out, a water-storage reservoir, and a steam pipe and condenser forming a communication between said water-jacket and said reservoir, said condenser being arranged exteriorly of the shell of the vessel.

4. The combination, with a marine boiler, of a water-jacket placed closely adjacent thereto and between the said boiler and the shell of the vessel, said water-jacket being provided with a feed-pipe opening through the shell of the vessel, a water-storage reservoir, a vacuum-forming apparatus, a steam pipe and condenser forming a communication between said water-jacket and said reservoir, and a relief-valve to regulate the passage of steam through said steam-pipe.

5. The combination, with a marine boiler, of a water-jacket placed closely adjacent thereto and between said boiler and the shell of the vessel and provided with a feed-pipe opening through the shell of the vessel, a water-storage reservoir, a steam pipe and condenser forming a communication between said water-jacket and said reservoir, and an injector for producing a partial vacuum in said water-jacket.

In testimony whereof we affix our signatures in presence of two witnesses.

THOS. L. STURTEVANT.
THOMAS J. STURTEVANT.

Witnesses:
H. E. LODGE,
FRANCIS C. STANWOOD.