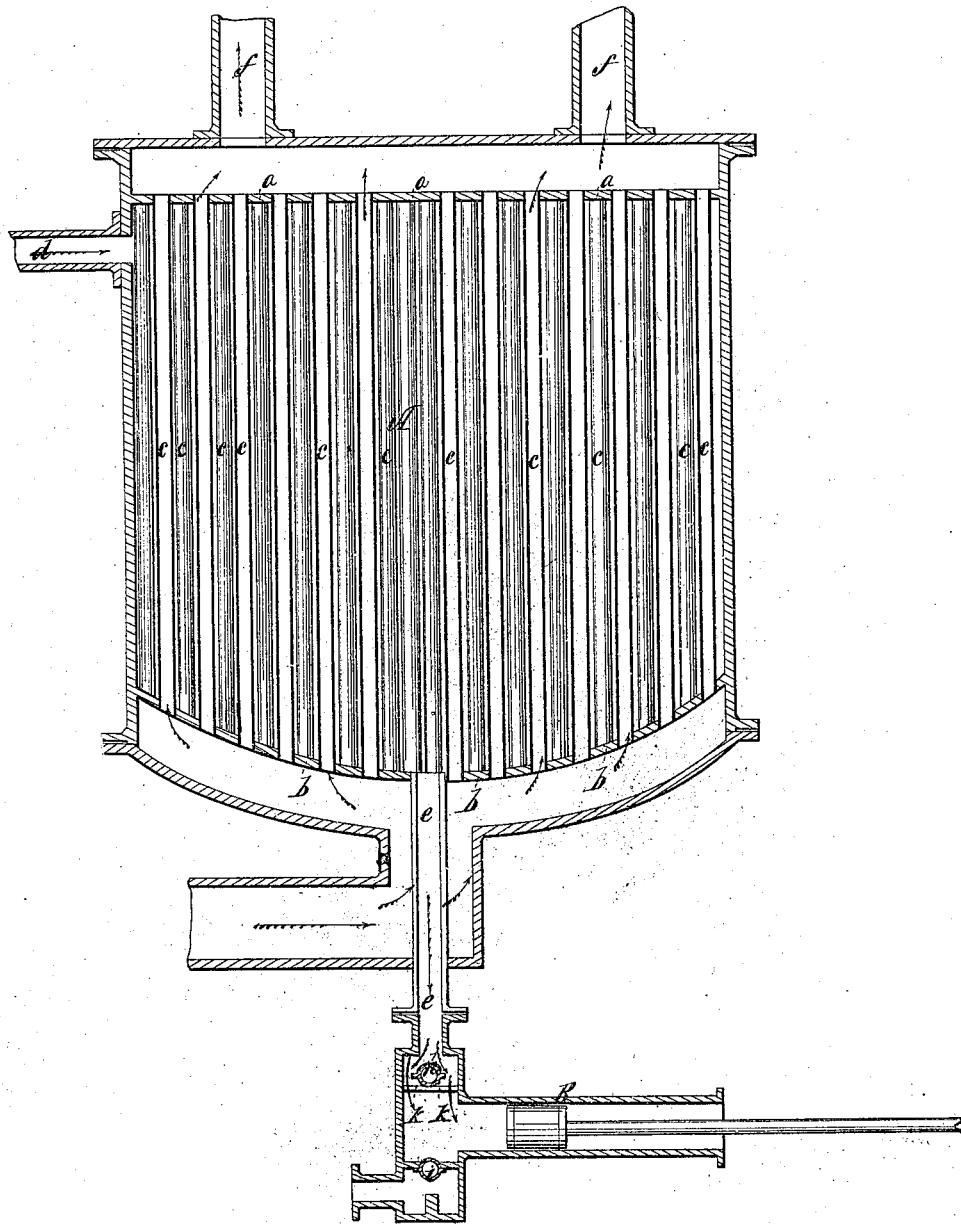


S. W. Rogers,
Steam-Boiler Condenser.

N^o 6,761.

Patented Oct. 2, 1849.



UNITED STATES PATENT OFFICE.

S. W. ROGERS, OF BALTIMORE, MARYLAND.

FOOT-VALVE OF STEAM-ENGINES.

Specification of Letters Patent No. 6,761, dated October 2, 1849.

To all whom it may concern:

Be it known that I, S. W. ROGERS, of the city and county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Condensing Steam-Engines, of which the following is a full, clear, and exact description, reference being made to the accompanying drawing, which represents a vertical section of my condenser and pump.

In marine engines especially it is important that the condenser should occupy the least possible space compatible with the requisite amount of steam room and refrigerating surface to produce a perfect condensation. I have endeavored to accomplish this object by connecting a tubular condenser with the engine in such manner that the steam from the cylinder shall be admitted into the space between the tubes, while the condensing water shall be passed through the tubes. I have likewise so improved the valves of the pump, which draws the water of condensation from the steam space, that this water shall flow freely into the pump when the piston is withdrawn in the barrel.

In the drawing A is the condenser consisting of a tight vessel closed at top and bottom, and having within it an upper (a) and a lower diaphragm (b), the former at a short distance from the top, and the latter at a short distance from the bottom, the two diaphragms are connected by tubes c c c c. The space between the two diaphragms and through which the tubes pass, communicates with the side pipe of the cylinder by a passage (d) through which the exhaust steam passes into the condenser; it also communicates by a pipe (e) proceeding from the lowest part of the lower diaphragm, with the pump (B) for the withdrawal of the water of condensation. The condensing water is admitted between the lower diaphragm (h) and the bottom, and passing through the tubes is received into the space between the upper diaphragm and the top of the condenser, from which it is discharged through suitable passages (f f). The water resulting from the condensation of the steam flows by its gravity through the pipe (e) into the pump (B); the valves of which are constructed on a new principle: In the usual construction of pumps when the piston is withdrawn in the barrel, a sufficient force must be exerted to open a solid valve before

the water can enter the barrel, in my pump the entry valve (h) is made hollow so as to be of less than half the specific gravity of water, and is supported against its seat by its own buoyancy. The valve h which is a hollow belted ball shows one of the forms in which this principle is carried into effect. The operation of this pump is as follows—the piston being withdrawn the water of condensation depressing the valve h flows into the barrel, as soon as the progressive motion of the piston ceases, the valve h floats upward in the water and closes the opening, then as the piston returns in the barrel the water is discharged through the lower valve i. The form of the latter is unimportant as the water is propelled by the piston with sufficient force to open a heavy valve. The floating valve (h) should be prevented from opening too far by a stop (k) or cage.

In the usual construction of pumps a considerable force must be exerted to open the entry valve which must be raised to admit the water; and, as the pressure in a good condenser is excessively small, the whole force required must be exerted by the column of condensed water, which must be of a considerable height before the valve can open; hence a large quantity of water must always remain in the condenser, which not only heats the condensing water, but renders the vacuum less perfect. By making the valve of less than half the specific gravity of water, and arranging it to open downward, it is only held against its seat by its buoyancy; the moment the piston is withdrawn the water in the valve chest follows, and the valve, being left unsupported, drops and allows the water above it to flow by its gravity into the vacant space left by the retreat of the piston; thus the smallest quantity will open the valve and flow into the pump, and the steam space of the condenser will be perfectly evacuated of the water of condensation. As water is drawn off as fast as it is condensed, it is returned to the boiler at a much higher temperature than if it had remained some time in contact with the cooling surface of the condenser.

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

Constructing the entry valve of a pump which draws water from a condenser of less specific gravity than water, and arranging it, substantially in the manner herein

set forth, beneath the valve seat, against which it is supported by the water in the valve-chest; so that when the pump piston is withdrawn in the barrel and the water in
5 the valve-chest recedes from the valve, the latter, being unsupported, will fall and allow the water in the condenser to flow into the pump through the opening in the valve

seat; but when the water fills the valve-chest, the valve, being lighter than the water, will float upward and close the opening.

S. W. ROGERS.

Witnesses:

E. S. RENWICK,
P. H. WATSON.