J. B. HERRESHOFF.

WATER-TUBE STEAM-GENERATOR.

No. 190,857. Patented May 15, 1877.

Fig. 1.

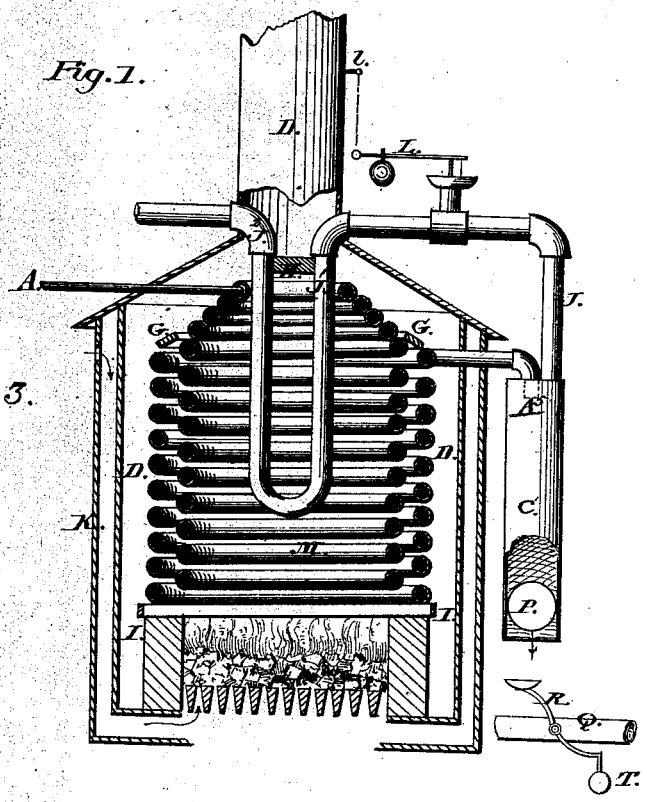


Fig. 3.

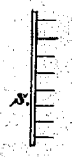
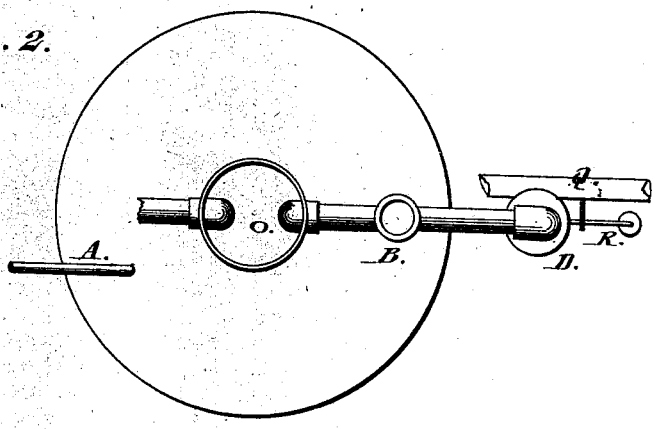


Fig. 2.



Witnesses:

Bennett & Merriam
Nath. S. Crane

Inventor:

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UNITED STATES PATENT OFFICE.

JAMES B. HERRESHOFF, OF BRISTOL, RHODE ISLAND, ASSIGNOR TO HIMSELF AND SARAH L. HERRESHOFF, OF SAME PLACE.

IMPROVEMENT IN WATER-TUBE STEAM-GENERATORS.

Specification forming part of Letters Patent No. **190,857**, dated May 15, 1877; application filed May 3, 1877.

To all whom it may concern:

Be it known that I, JAMES B. HERRESHOFF, of Bristol, in the county of Bristol and State of Rhode Island, have invented certain Improvements in Steam-Generators, of which the following is a specification:

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical section illustrative of my invention; Fig. 2, a plan view, and Fig. 3 a view of the scraper.

I have succeeded in devising a light, safe, and economical steam-generator. I arrange the tube around the fire, forming a large combustion-chamber, M.

In locations where fuel is very cheap, and it is desired to avoid the trouble of brushing the soot from the coil, I lower the ring I and allow the products of combustion to escape up the annular space thus formed, or I open cover H for the same purpose.

When great economy rather than efficiency is required, I close, or nearly close, H and I, and oblige the hot products of combustion to pass out through the narrow passages between the tubes. When very great economy of fuel is required, or when it is desirable to make the least extent of heating-surface evaporate the greatest amount of water, I make those passages so narrow that flame cannot pass out; also sparks are arrested. It is preferable to make the spaces or passages between the tubes narrower at the top than at the bottom of the coil, to attain a more uniform heating.

In this last arrangement it is necessary to clean off the soot often, and I use the scraper S, Fig. 3, the teeth fitting between the tubes, so that one movement of the handle scrapes a number of tubes.

D represents the smoke-jacket.

When it is desired, I control the draft by a fire-regulator, L, connected to and moving a damper, *l*. The ring G is removable to allow a brush to be used in cleaning between the coils.

Water is forced into the top of the coil at A, and steam issues at the other end at A^5. The pipe is preferably made small enough to induce a current of steam and spray of sufficient velocity to sweep out scales as fast as formed, or to prevent its adhering to the pipe. In order to prevent this salt-scale and water from passing through the engine, I attach a drum, C, which is provided with an orifice to let off the water, and a steam-trap, P, or its equivalent.

When it is required to regulate the feed-water automatically, I connect a valve, Q, or its equivalent, to the trap, so that the escape of too much water will slow the feed-pump or diminish the feed-water. Valve Q is turned by water falling upon the lever R from trap P.

When the feed-pump (not represented) is not supplying water enough, and nearly all is evaporated in traversing the coil, water will cease to flow out from the vessel C, and the valve Q will be opened by the action of the weight T. On such opening the water from the feed-pump will traverse the coils more actively, and soon be discharged more freely from vessel C by the action of the trap P. When, on the contrary, too much water is thus received from the feed-pump, a large excess will remain unevaporated, and will be trapped out of the vessel C. This large quantity of water will act more forcibly than usual on the lever R, and will partially close the valve Q in opposition to the force of the weight T, thus compelling the feed-pump to slow, if it is capable of slowing, or to discharge a portion through a relief-valve, or the like, if not so capable, in either case reducing the quantity of feed to the proper amount.

The lever R may turn by mere force of impact of the water falling from P, or it may be retained in the cup-like vessel on its end, provided with a limited orifice for escape, and may act by its gravity as well as the force of impact, or by gravity alone.

If the steam is to be superheated, it passes from the drum C through the superheater J J^1 J^2.

In certain places, as in steamboats, I inclose the generator within an outer casing, K, leaving an air-passage extending quite around between it and the casing D. Through this the fire draws a supply of warm air, as shown by the arrows. This casing may be continued farther up, and the air received through holes around the chimney. The casing K and the

descending current of cold air within it protects persons and objects near the boiler from the heat, and utilizes the heat in warming the blast for the fire.

It will be evident that it is not necessary to have the coils double, (one or more within the other,) or that it be round or vertical, and the water or liquid may enter at the bottom.

I claim as my invention—

1. In combination with a coil-boiler and separating-vessel, a steam-trap adapted to trap out the water from such separating-vessel, as herein specified.

2. The combination of the trap P, vessel C, and coil A′ with a device, R, for regulating the quantity of water fed to the coil, as herein specified.

JAMES B. HERRESHOFF.

Witnesses:
BENNETT J. MUNRO,
NATH. S. GREENE.