(No Model.)

2 Sheets—Sheet 1.

G. W. BAIRD.

STEAM GENERATOR.

No. 368,642. Patented Aug. 23, 1887.

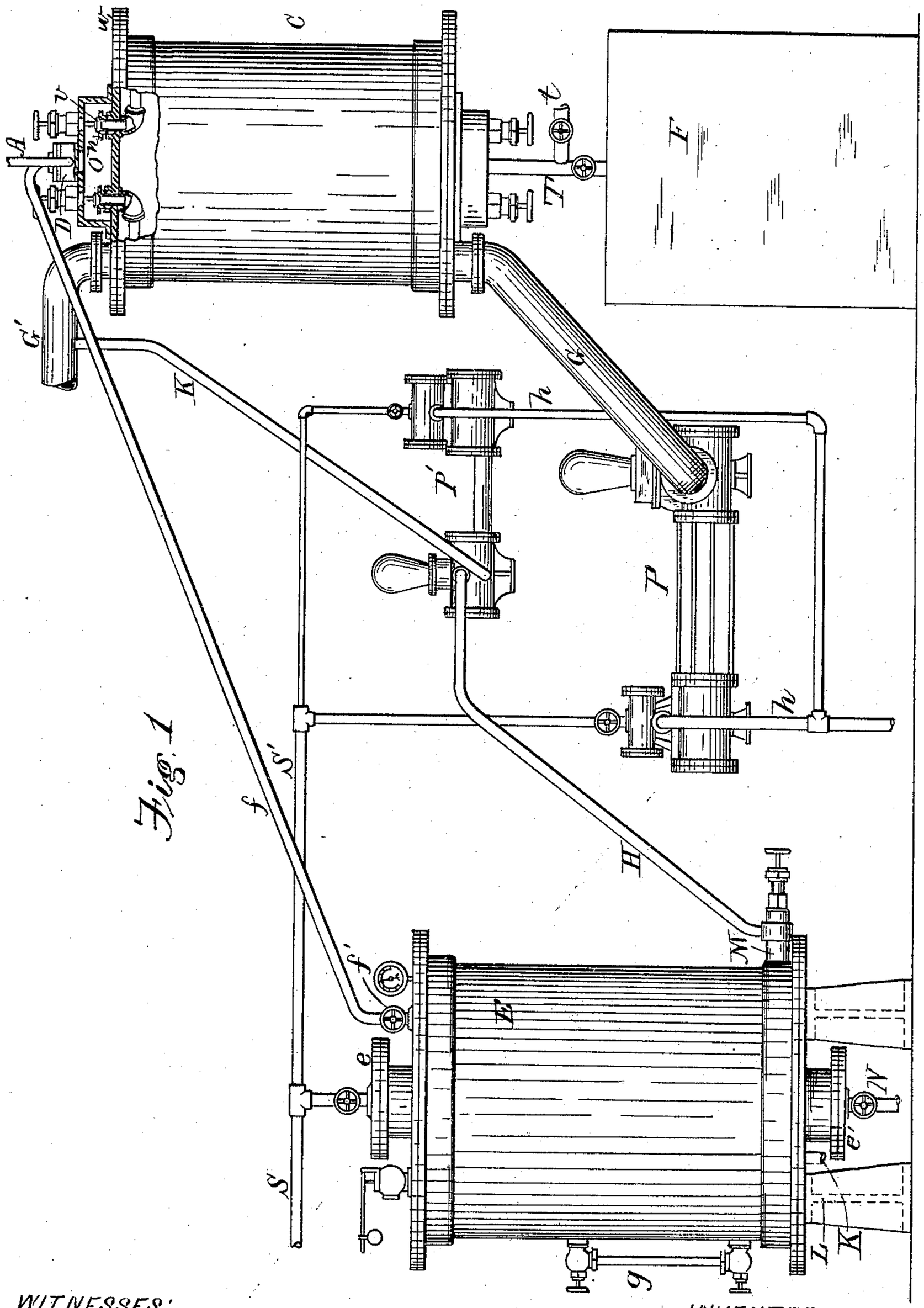

Fig. 1.

WITNESSES:

Schuyler Duryee

W. Gardner

INVENTOR

George W. Baird

(No Model.)

2 Sheets—Sheet 2.

G. W. BAIRD.

STEAM GENERATOR.

No. 368,642. Patented Aug. 23, 1887.

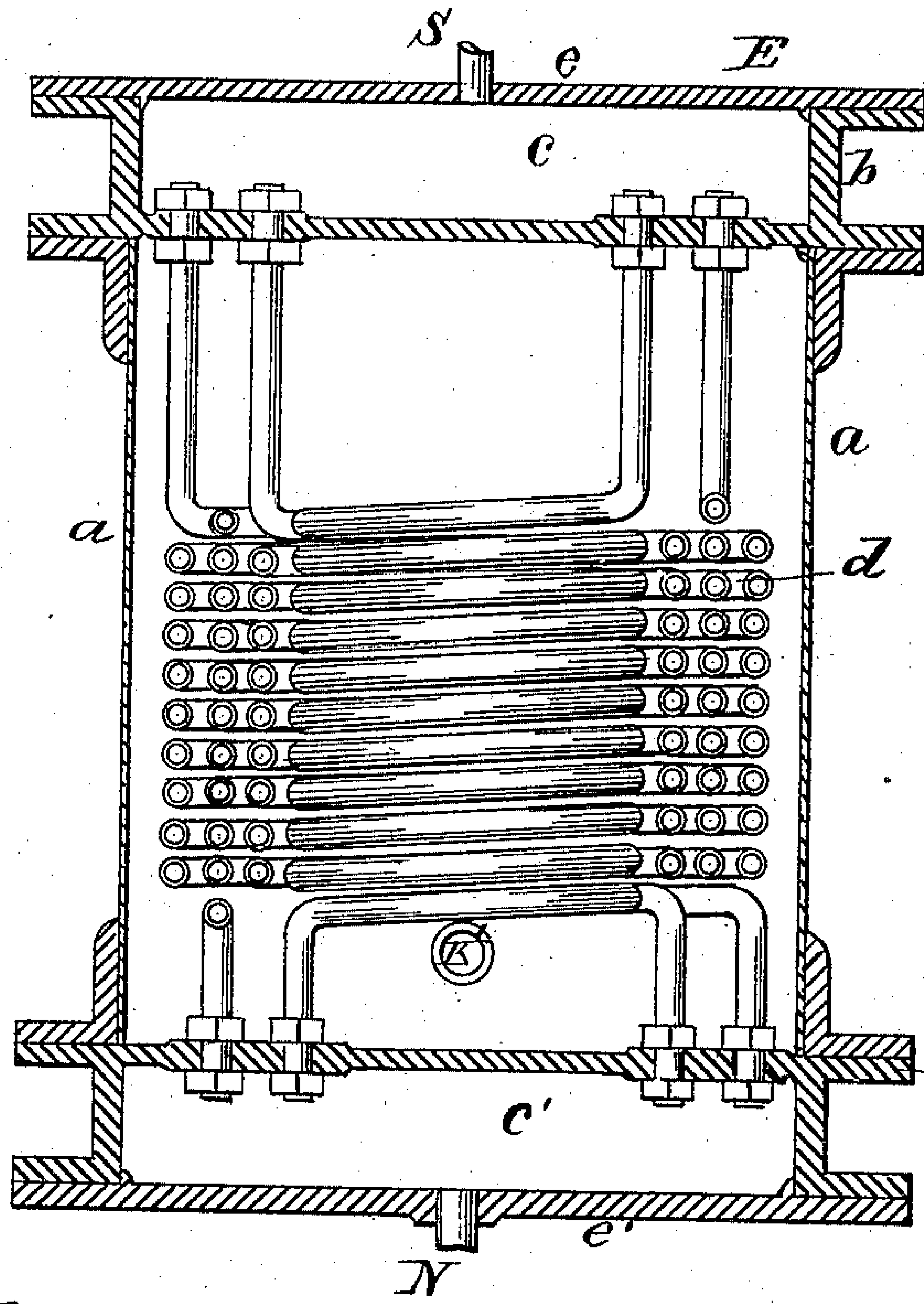

Fig. 2

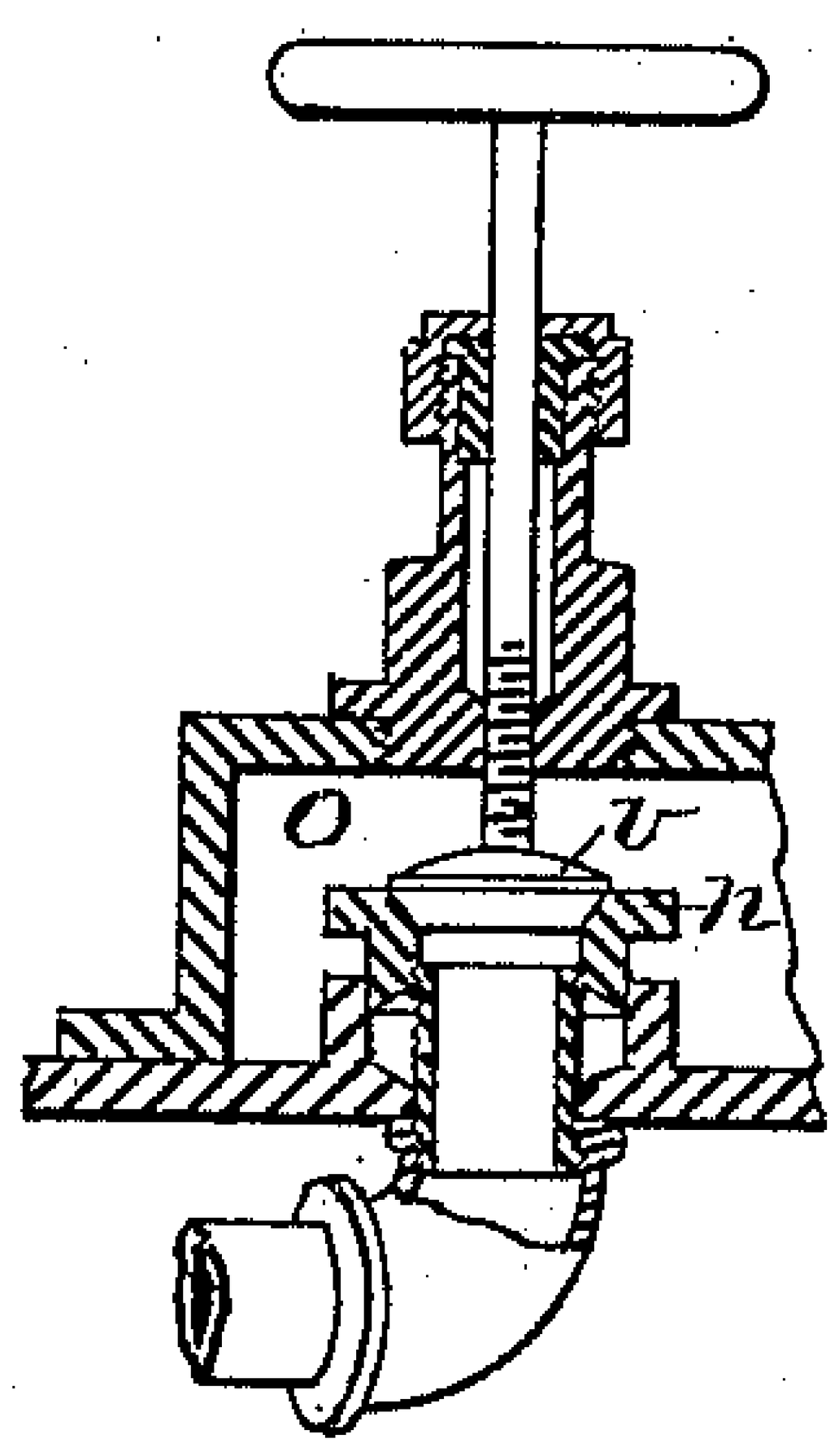

Fig. 4

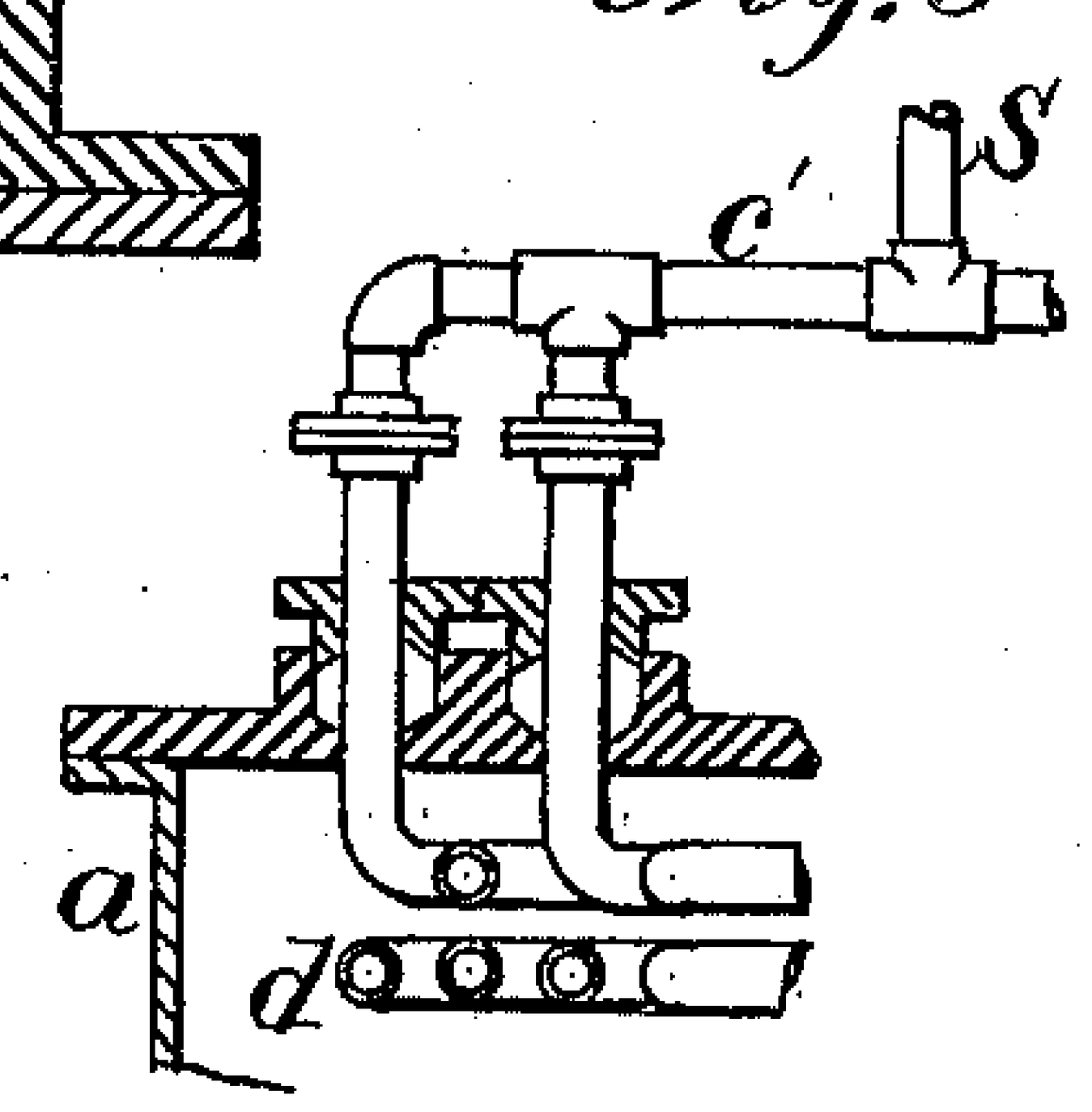

Fig. 5

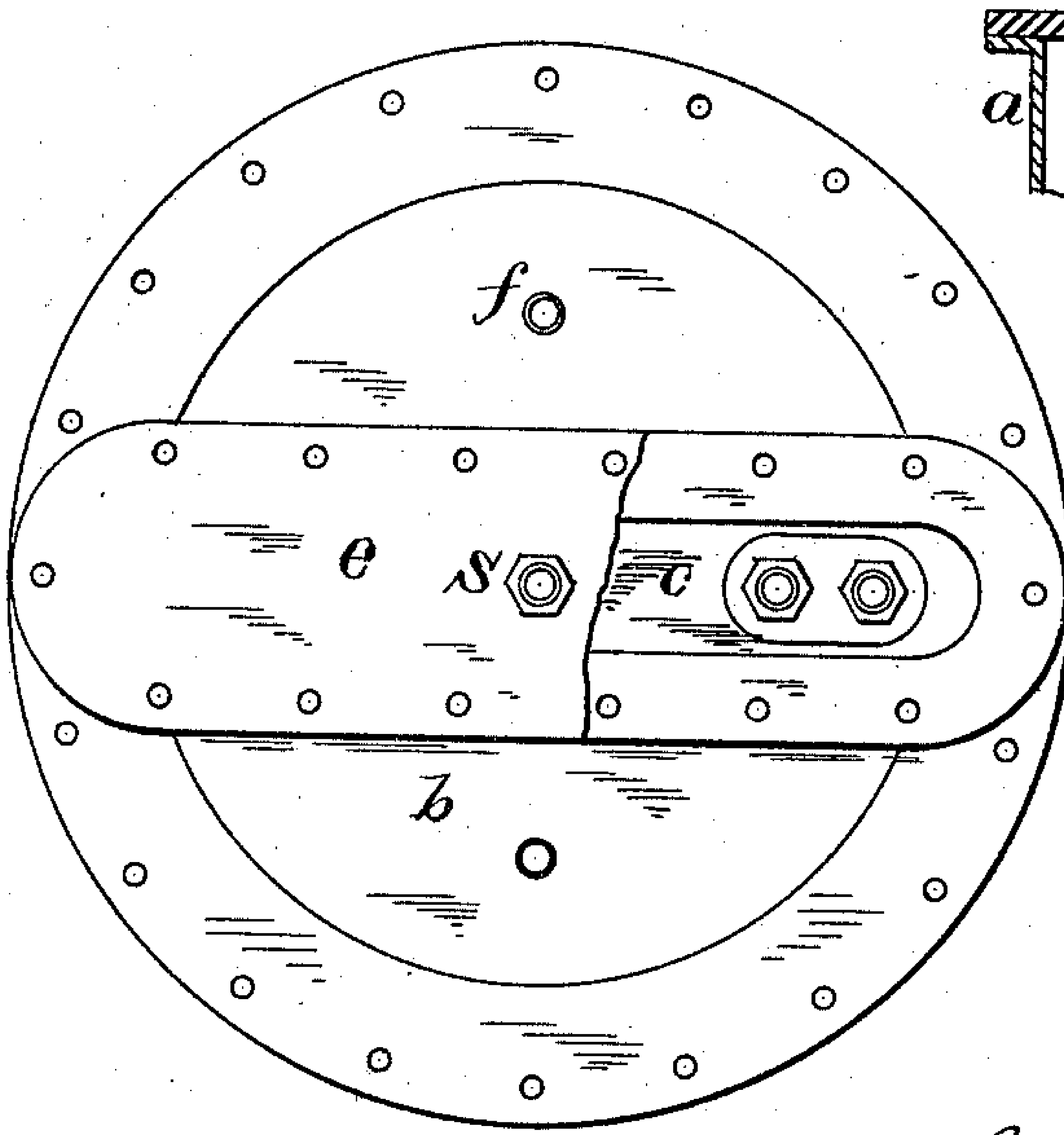

Fig. 3

WITNESSES
Schuyler Duryee
[signature]

INVENTOR
G. W. Baird.

UNITED STATES PATENT OFFICE.

GEORGE W. BAIRD, OF UNITED STATES NAVY.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 368,642, dated August 23, 1887.

Application filed April 21, 1887. Serial No. 235,682. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. BAIRD, an engineer officer in the United States Navy, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Steam-Generators for Making Pure Water at Sea and Elsewhere, of which the following is a specification.

The object of my invention is to supply marine or other steam-boilers with pure water, and also to make potable water for drinking. The difficulties encountered from the use of mineral oils in the steam-cylinders in the distillation from the main boilers on board of ships are aggravated more and more as the boiler-pressures are increased; and the same may be said of all classes of boilers where the water condensed from the exhaust of the engine is fed to the boilers. The oil finds its way into the boilers through the condenser, air-pump, and feed-pump. To completely obviate this difficulty a separate boiler has sometimes been employed, in which clean sea-water alone is used; but in ships where it is essential to diminish weights as much as possible all the boilers must be used in order to get the power. Where a quantity of atmospheric air is introduced into the steam before its condensation, much of the organic matter is oxidized and may be removed by a special filter. Much of the volatile portion of the oil escapes with the excess of air which is forced into the water, and the remainder finally vaporizes from the tanks or is precipitated. The higher temperature now used in marine boilers is more destructive to the cylinder-oils, and makes it essential to resort to one of the two alternatives—viz., to use a separate boiler to distill from or use larger storage-tanks, which would give the water more time to "age." The latter process is out of the question, as neither room nor weight can be accorded for that purpose. Another objection to distilling from the main boilers is that the solid matter in the sea-water (which is a non-conductor) precipitated upon the heating-surface of the boilers would soon cause the metal to burn. The thickness of metal in the modern high-pressure boilers is much greater than in the old (low-pressure) boilers, and the transmission of heat is correspondingly retarded. This is aggravated by the more rapid combustion now employed. To meet these requirements I have designed an evaporator to take the place of the boiler for distilling.

Figure 1 is a side elevation of my apparatus, showing the relative position and connections of the different parts. Fig. 2 is a vertical section through the evaporator. Fig. 3 is a top view of the same. Fig. 4 is a detail sectional view of one of the condenser-coil valves, and Fig. 5 is a modification of evaporator head and coils.

Similar letters of reference indicate the same parts in the several figures of the drawings.

E represents the evaporator or generator, which consists of the casing *a*, containing coils *d*, arranged within and independent of one another. The ends of the coils pass through and are made fast to the heads *b* of the casing by nuts upon each side. Upon the heads of the casing and directly over the ends of the tubes are formed narrow steam-chamber *c* and water-chamber *c'*. These chambers are provided with covers *e e'*. To the upper head of the casing, upon the side of the steam-chamber, is connected a pipe, *f*, leading to a condenser, C. This pipe is provided with a valve, *f'*. There is also attached to this head a safety-valve and steam-gage.

Fig. 5 shows another form of head for the evaporator, which is substantially the same as the one just described. The only difference is that the ends of the coils pass through stuffing-boxes in the head of the evaporator and terminate in the pipe or chamber *c'*, which is supplied with steam from the pipe S. A glass water-gage, *g*, is attached to the side of the casing to indicate the height of the water within. To the bottom of the casing and leading from the evaporator feed-pump P' is the water-supply pipe H to the evaporator.

N is a water-pipe leading from the water-chamber *c'* to a tank or the hot well.

S is the steam-pipe leading from the boiler to the steam-chamber *c*, and S' is a steam-pipe leading to the pumps.

h h are the steam-pump-exhaust pipes, but are not shown connected in the drawings.

P is the circulating-pump, having the discharge G connected to the bottom of the condenser C, the water passing through the condenser and out at the pipe G'.

A is an air-pipe leading to the aerator D, by which atmospheric air is mixed with the steam that passes from the evaporator into the condenser-coils. This aerator need not be fully described, as it forms part of subject-matter of patent granted to me October 12, 1880, No. 233,184.

The condenser C is constructed in the same manner as the evaporator, it having two or more independent coils and the two chambers in the heads. I have improved the condenser by controlling the number of coils to be used by placing valves at each end of the coils.

The top of condenser in Fig. 1 of the drawings is part in section to show the valves and their connection with the coils. The bottom chamber is constructed in the same manner.

O is the upper steam-chamber, which is secured to the condenser-cover *w*. The cover *m* is provided with stuffing-boxes *t*, through which the ends of the coils are passed. To the end of the coil is secured the valve seat and gland *n* of the stuffing-box by screwing it to the end of the coil. Upon the chamber is secured, in the usual manner, the stuffing-boxes through which the valve-stems pass. By simply closing the valves at each end of either coil the said coil is thrown out of service.

To operate the apparatus the circulating-pump P is started, thereby circulating water through the condenser C. Pump P′ is then started, taking its water-supply from the discharge-pipe of the condenser C, and then delivering it through pipe H to the evaporator. A valve in the steam-pipe S is then opened, permitting the steam of high temperature to enter the steam-chamber *c* and the coils *d*. The water surrounding the coils is soon converted into steam, which passes through the pipe *f* into the condenser, through the aerator D, where it induces a current of atmospheric air, and thus the mixed air and steam are delivered to the condenser-coils. Sea-water is kept circulating round these coils by the pump P, and is discharged at G′. From this discharge, which is warm, the feed-supply of the evaporator is taken by the pump P′ through the pipe K and delivered through the pipe H. The condensed water is taken from the condenser to the boiler through the pipes *t*, or to the filter F through the pipe T, when it is desired to use the water for drinking. The water condensed in the coils of the evaporator is returned through pipe N to the hot well, to be pumped back into the boiler. The pipe K′ is placed in the bottom of the evaporator to blow out the water when the density gets too high. A constant feed and blow can be so regulated that the apparatus will require but little attention.

By using the evaporator as described, returning the drain-water from the coils to the boiler and feeding the evaporator exclusively with sea-water, no sea-water need be pumped into the boilers, and therefore no scale will appear there. The evaporator is so designed that the coils may be removed separately for scaling.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with the evaporator provided with steam-pipes, of the condenser and the evaporator feed-pump, said pump taking its water from the condenser-overflow, substantially as shown and described.

2. The combination of the evaporator with the boiler steam-pipes and steam-pipes from the evaporator to the condenser, the condenser circulating-pump, the feed-pump for the evaporator, and the supply-pipe for the pump, connected to the overflow-pipe of the condenser, substantially as shown and described.

3. In a condenser, the combination of the casing with the coils, and valves for closing both ends of the coils, substantially as shown and described.

4. The combination, with the head of the condenser provided with a stuffing-box, of the coil passing therethrough, and the gland screwing on the end of the coil, substantially as shown and described.

5. The combination, with the head of the condenser provided with the stuffing-box, of the coil passing therethrough, and the valve-seat and gland screwing on the end of the coil, substantially as shown.

GEORGE W. BAIRD.

Witnesses:
SCHUYLER DURYEE,
M. GARDNER.