(No Model.)

G. W. BAIRD.

STEAM GENERATOR OR EVAPORATOR.

No. 434,972. Patented Aug. 26, 1890.

FIG. 1

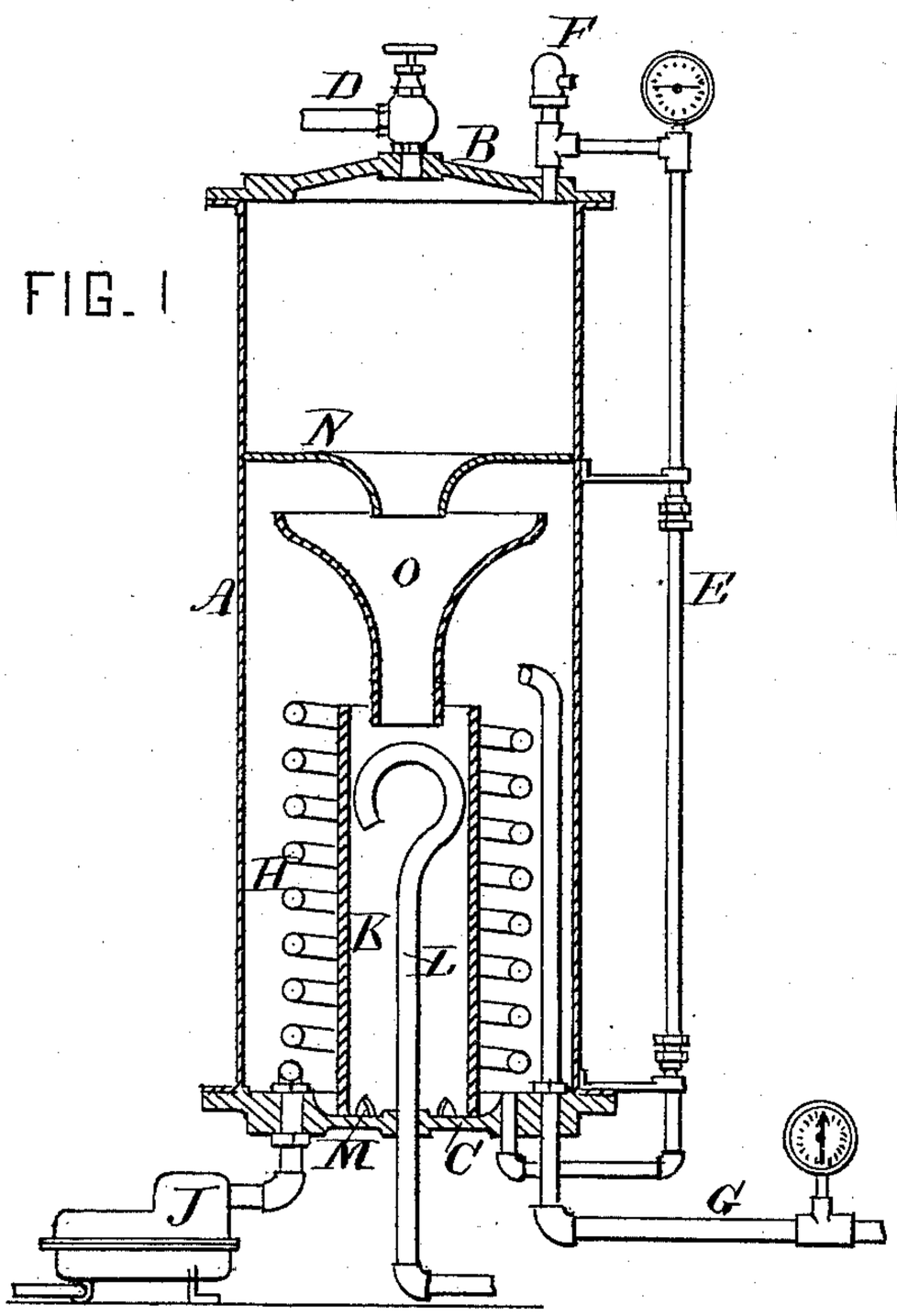


FIG. 3

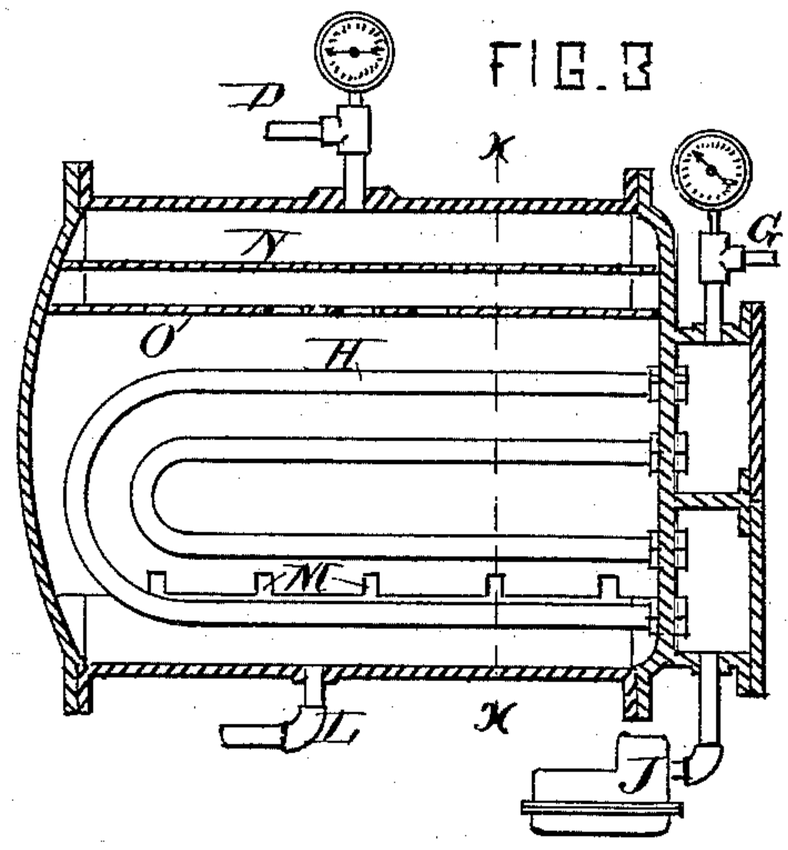


FIG. 4

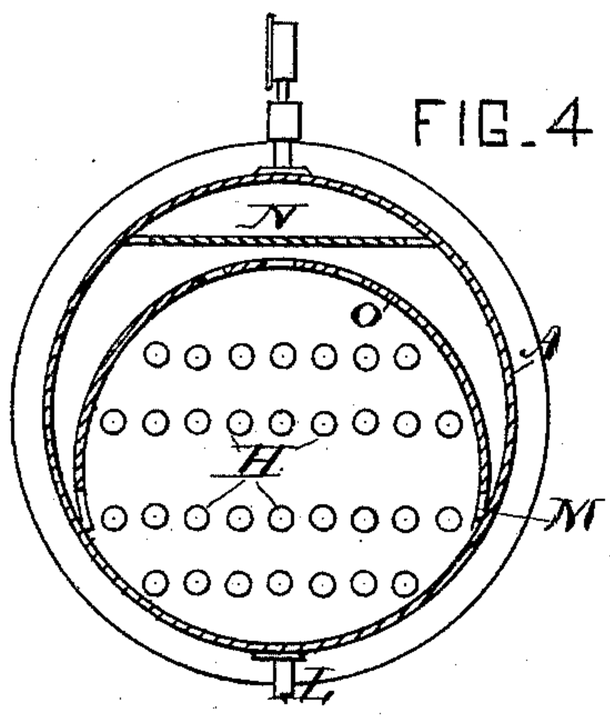


FIG. 2

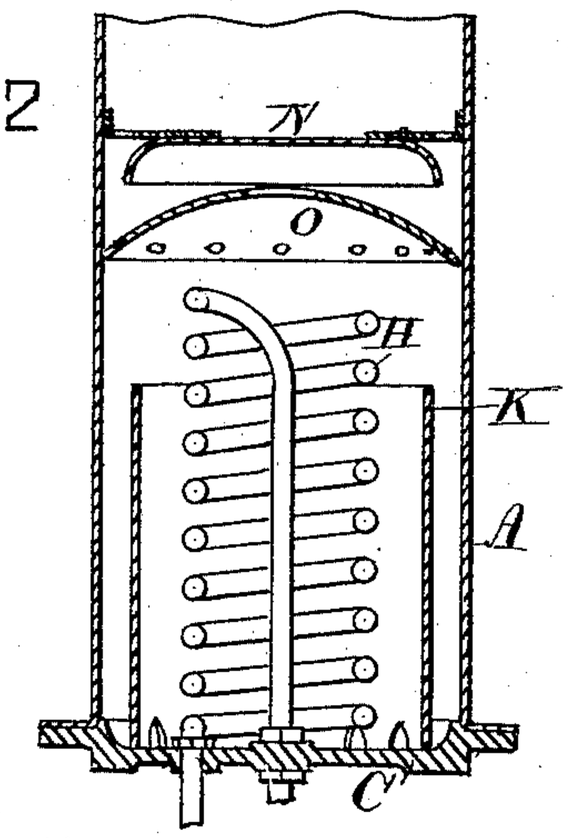
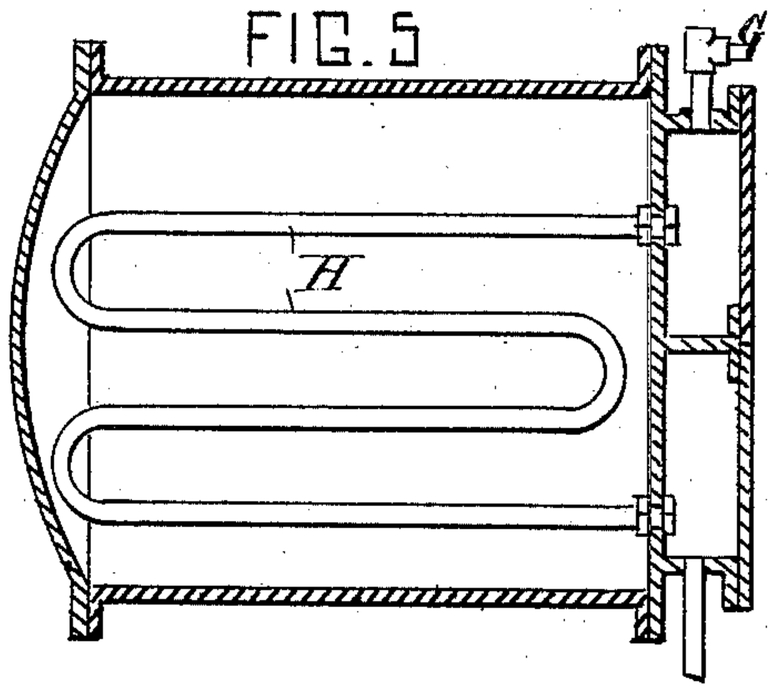


FIG. 5



WITNESSES

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GEORGE W. BAIRD, OF THE UNITED STATES NAVY.

STEAM GENERATOR OR EVAPORATOR.

SPECIFICATION forming part of Letters Patent No. 434,972, dated August 26, 1890.

Application filed May 13, 1890. Serial No. 351,610. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. BAIRD, an engineer officer in the Navy of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Steam Generators or Evaporators, of which the following is a specification.

The object of my invention is to supply pure water for steam-boilers, for drinking purposes, &c., and it is an improvement on my device shown in my patents of August 23, 1887, No. 368,642, and December 24, 1889, No. 417,803, in which the coils passed through both heads, in which no means were provided for promoting the circulation of water, nor the separation of the water from the steam that was generated.

The principal object of my invention is to improve the generator through certain means by which a circulation of water and separation of water from the steam is obtained.

Figure 1 is a vertical section of the same, showing a modification. Fig. 2 is a vertical section of the same, showing a modification. Fig. 3 is a section through a horizontal generator, which is also a modification. Fig. 4 is a section of Fig. 3 taken at $x\,x$, and Fig. 5 shows a modified form of coil for the generator.

A is a cylinder having the upper head B and the lower head C, the former being provided with a steam-pipe D, which leads to the condenser, and the pipe leading to the water-gage E and safety-valve F.

G is a steam-pipe from the main boiler or receiver, which passes up through the lower head into the generator a short distance and returning in the form of a coil H to and passing through the head into the trap J. Within the coil and resting on the lower head is the circulating-cylinder K, the lower end of which has openings M for the passage of the water. L is a feed-water pipe, which also passes through the lower head and into the circulating-cylinder, the end of the said pipe terminating in a return-bend.

Some distance above the coil is a plate N extending across the cylinder A and having a funnel-shaped opening in its center projecting downward. Beneath this plate is secured in any well-known manner another plate or funnel-shaped plate O, the upper end extending out nearly to the cylinder A, and the lower smaller end extends down a short distance into the circulating-cylinder K. These two plates form a separator by which the water that is carried in suspension by the steam on its passage to the outlet-pipe is separated and returned to the body of water by way of the circulating-cylinder.

In Fig. 2 the cylinder K is placed around the coil, and the water is fed between the two cylinders, which in effect is the same as that described in Fig. 1. A separator of different form is also shown.

In operation, the cylinder A having the proper height of water, steam is turned on from the main boiler (not shown) through the pipe G. The water in A boils, and as the steam is generated it passes the separator, and being deprived of the water held in suspension it passes through the pipe D to the condenser. Owing to the violent ebullition the water is carried above the circulating-cylinder, which, with the water from the separator and the feed-pipe L, passes down through the cylinder, out through the openings M, and again comes in contact with the hot steam-coils. The water of condensation in the steam-coil is drawn off automatically by the trap J. It will be seen that by disconnecting the pipe leading to the water-gage the cylinder A can be removed by breaking but one joint, and that between the lower head and cylinder, exposing the whole of the interior, which can be readily cleaned of dirt or scale.

The purpose of the steam-trap is not only to separate the water from the steam and permit the water above to escape, but it is intended to hold the boiler (or receiver) pressure in the coils, to the end that the condensation in the coils may take place at a higher temperature, thus utilizing the latent heat in the steam. By this means a larger per centum of the total heat of the steam in the coils is utilized. When steam from the receiver of a double or triple expansion engine is employed in the evaporator-coils and the vapor from the evaporator be blown into the main condenser of a steamship, where there is a vacuum of, say, twenty-seven inches of mercury,

it will be seen that much greater economy is obtained.

Figs. 3 and 4 show a horizontal generator with U-shaped tubes, with a separator formed by two plates of metal. Fig. 5 shows the tubes in form of a return-bend.

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

1. In a steam-generator, the combination of the outer cylinder with the steam-pipes and the separator, substantially as shown and described.

2. In a steam-generator, the combination of the outer cylinder with the steam-coil and the circulating-cylinder, substantially as shown and described.

3. In a steam-generator, the combination of the outer cylinder with the steam-coil, the circulating-cylinder, and the separator, substantially as shown and described.

4. In a steam-generator, the combination of the outer cylinder with the steam-coil, the circulating-cylinder, and the feed-pipe within the circulating-cylinder, substantially as shown.

5. In a steam-generator, the combination of the outer cylinder with the steam-coil, the circulating-cylinder, and the feed-pipe within and discharging down in the circulating-cylinder, substantially as shown.

6. In a steam-generator, the combination of the outer cylinder with the steam-coil, the circulating-cylinder, the feed-pipe within the cylinder, and the separator, substantially as shown.

7. In a steam-generator, the combination of the outer cylinder with the circulating-cylinder, the feed-pipe, the steam-coil, and the steam-trap at the end of the coil, substantially as shown.

GEORGE W. BAIRD.

Witnesses:
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