

(No Model.)

N. P. TOWNE.
STEAM GENERATOR.

No. 424,514.

Patented Apr. 1, 1890.

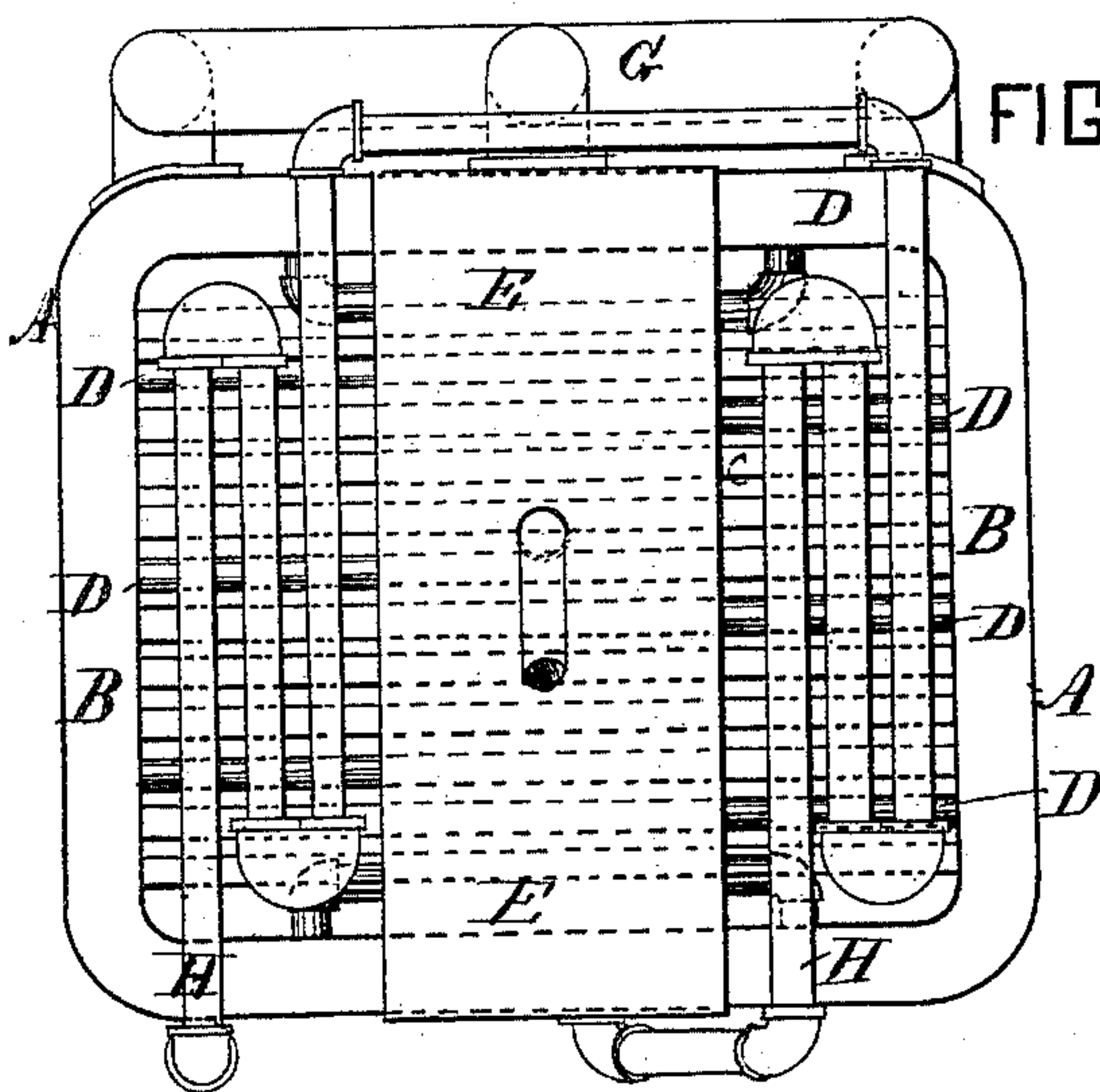
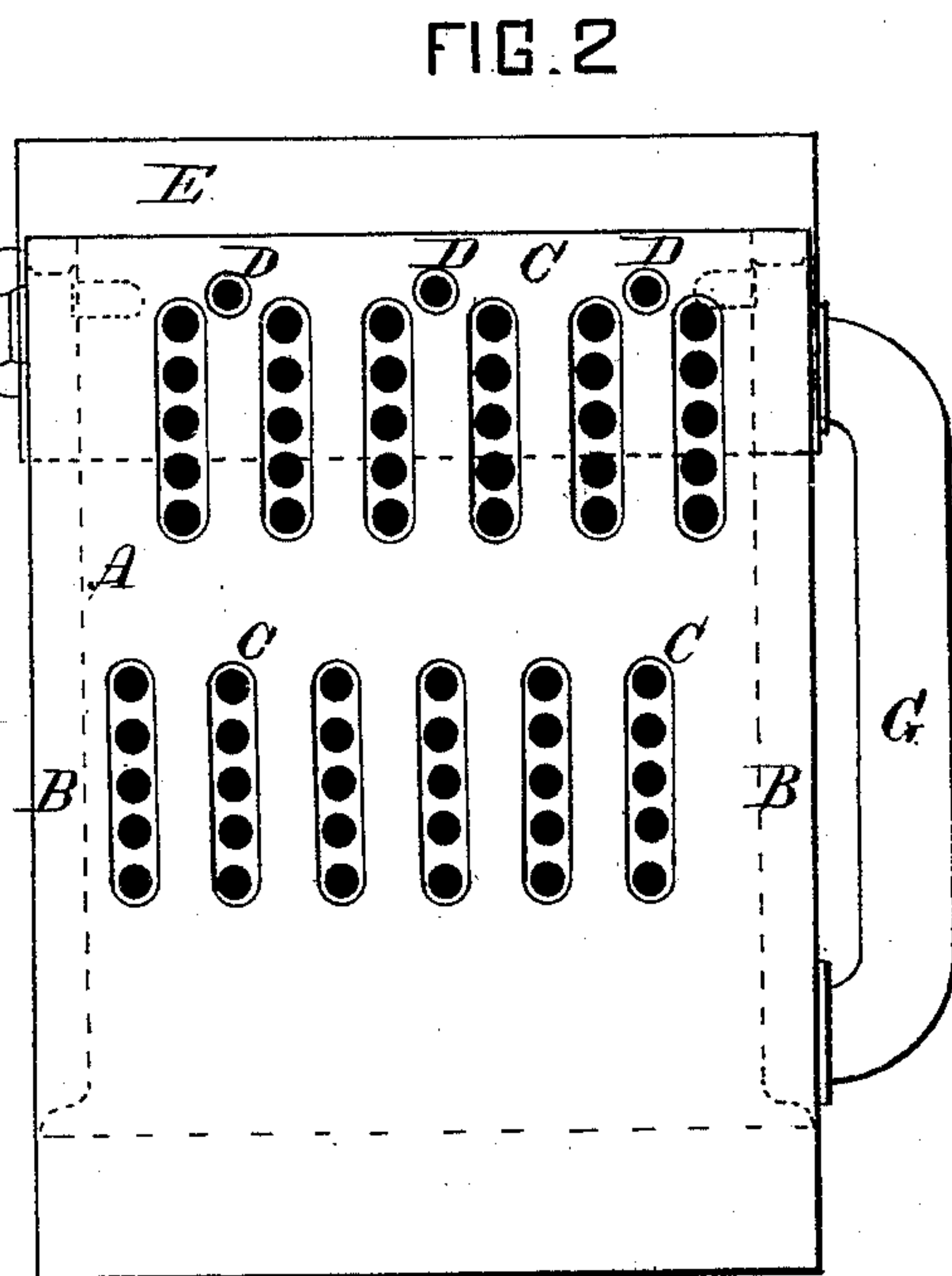
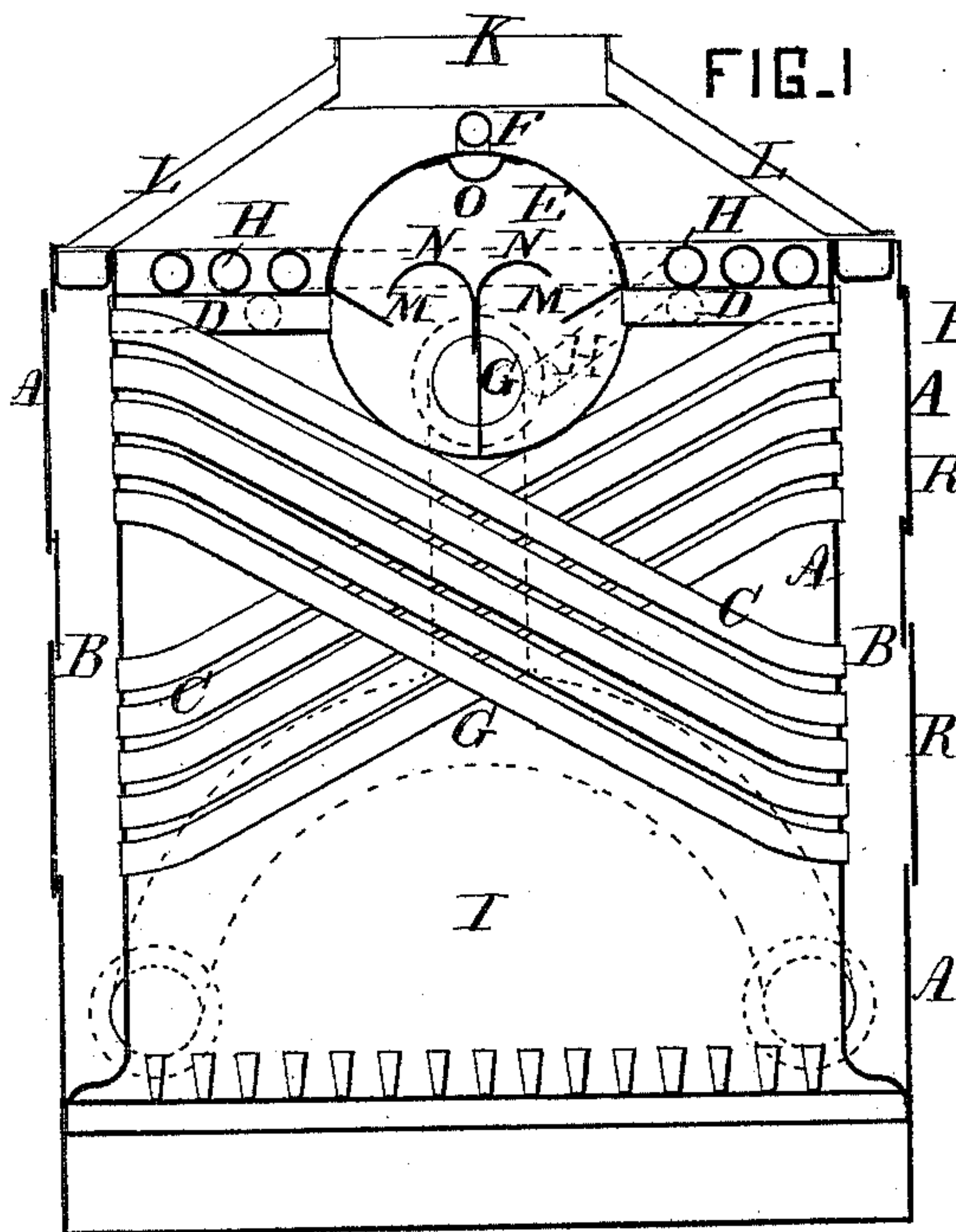


FIG. 3

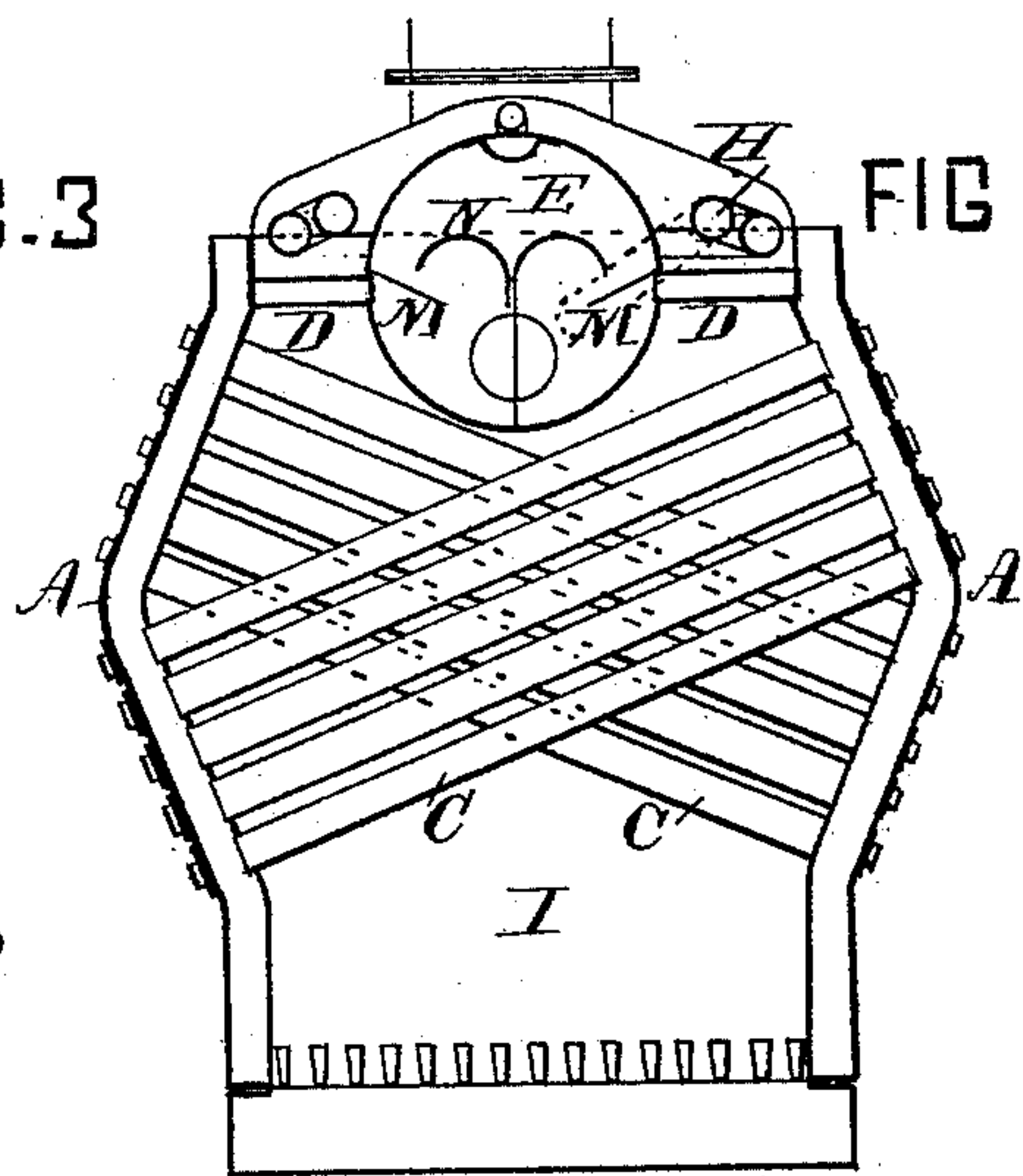


FIG. 4

WITNESSES

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STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 424,514, dated April 1, 1890.

Application filed November 30, 1889. Serial No. 332,156. (No model.)

To all whom it may concern:

Be it known that I, NATHAN P. TOWNE, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

The object of my invention is to combine the good features of a tubular boiler, to produce a light and efficient steam-generator of easy and simple construction, and to produce a good natural water-circulation, taking advantage of the well-known fact that heated currents of water ascend and cooler ones descend. By rapid circulation the most economical evaporation can be maintained.

The detailed description of the boiler is as follows, reference being had to the accompanying drawings, in which like letters apply to like parts.

Figure 1 is a section of the boiler through the tubes; Fig. 2, a side elevation of the boiler with openings opposite the tubes, the plates being removed. Fig. 3 is a plan of the boiler with the uptake removed, showing the arrangement of the piping; and Fig. 4 shows a modification of the boiler.

A A are the outer and inner casings inclosing the water-space B, which is closed, as shown, at the top and bottom, forming a continuous chamber around the fire-box, sides, and front. This may be modified, however, so as to include only the sides.

C C are inclined tubes, which cross the fire-box and are secured at the ends in the inside or furnace sheets by expanding or other method of securing. These tubes are arranged in groups, one end of the tubes of a group being lower than the other end, and the alternate group reversing the angle. The space between the tubes of the groups forms part of the combustion-chamber. These tubes may be as shown in Fig. 1, or straight, as in Fig. 4, which shows a modification of the boiler. The ends of the tubes where they are secured in the inner sheet are got at by removing the plates R on the outer shell, through which the tubes can be passed into position.

Instead of plates, screw-plugs opposite the ends of each tube may be used, as shown in Fig. 4.

From the top of the boiler proper tubes D

D pass to the steam drum or separator E, in which the water is separated from the steam by a series of deflecting-plates and diaphragm, hereinafter to be described.

From the top of the steam drum or separator the steam-pipe F is led, the mouth of the pipe being covered for the whole length of the drum by the perforated sheet O, forming a dry pipe. From the back of the drum a return-pipe G outside of the boiler leads to the lower part of the generator. This pipe may be either back of or at any other part of the boiler.

H H is the feed-pipe, which passes up to the uptake and through it in as many turns as desired, the end of which enters the drum or separator at any convenient point. I have shown it in the drawings entering the end of the drum.

L L is the uptake or covering of the combustion-chamber formed of two thicknesses of metal inclosing some non-conducting material.

K is the hole for the smoke-pipe.

The drum or separator is formed as follows: E is a cylinder, having two heads, connected by pipes D to the water-space. Over the mouths of these pipes are hoods or deflectors M. N N is an upright partition or diaphragm, having two curved flanges at the top. This diaphragm runs from end to end of the drum.

The operation of the generator is as follows: The water within the space around the fire-box is about the height of the tubes D, also filling the tubes C C. The water being heated, it rises through the inclined tubes C C, and, at the front and back of the water fire-box, where it is in contact with the heated plates and, mingled with steam, enters the drum or separator through the pipes D D. These striking the deflecting-plates M it is deflected to the lower part of the drum, its tendency to rise being counteracted by the curved plates N N, which again deflect the water and allow the steam to pass through the space between the plates N and M to the dry pipe O. The water being separated from the steam, enters the return-pipe G, which, being in a cooler place, allows the water to descend naturally to the bottom of the boiler uninterrupted by hot ascending currents. The feed-pipe, in passing through the heated gases in

the uptake, allows a portion of its contents to be converted into steam in its passage to the boiler, and they are discharged into the drum, where they follow the same course as the water and steam from the main boiler. Each boiler may have one or more of these drums, as may be desired. The upper portion of the drum acts as a separator.

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

1. In a steam-generator, the combination of a water fire-box, with inclined tubes crossed in groups with alternate inclinations, and a steam-drum above the tubes and partly within the fire-box, as shown and described.

2. In a steam-generator, the combination of a fire-box surrounded by water, with inclined tubes crossed in groups with alternate inclinations, and a steam-drum above the tubes and partly within the fire-box, substantially as shown and described.

3. In a steam-generator, the combination of a water fire-box, with a steam drum or separator connected to the fire-box at its upper portion and located partly within the fire-box, substantially as shown and described.

4. In a steam-generator, the combination of a steam drum or separator, with pipes connecting it to the fire-box provided with deflecting-plates at the mouth of the pipes, a central curved diaphragm, and a perforated tube or plate located at the top of the drum or separator, substantially as shown and described.

5. In a steam-generator, the combination of

the steam-drum and a return-pipe leading from the steam-drum outside of the boiler to the fire-box, with the feed-water pipe which passes through the upper part of the furnace and discharges its water into the steam-drum, substantially as shown and described.

6. In a steam-generator, the combination of the water fire-box, with the steam drum or separator, and the return-pipe outside of the furnace and leading from the drum into the water-space of the fire-box, substantially as shown and described.

7. In a steam-generator, the combination of the fire-box, the inclined tubes crossing the fire-box in alternate groups, with the steam drum or separator provided with internal deflecting-plates and diaphragm, substantially as shown and described.

8. In a steam-generator, the combination of the water fire-box, with inclined tubes crossing the fire-box, the drum or separator connected to the upper part of the water fire-box, and the return-pipe outside the boiler and connected to the drum and the lower part of the water fire-box, substantially as shown and described.

9. In a steam-generator, the combination of the water-space of the boiler, with inclined tubes crossing the fire-box, the drum or separator, the return-pipe leading from the separator to the water-space, and the feed-pipe leading into the drum.

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Witnesses:

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