

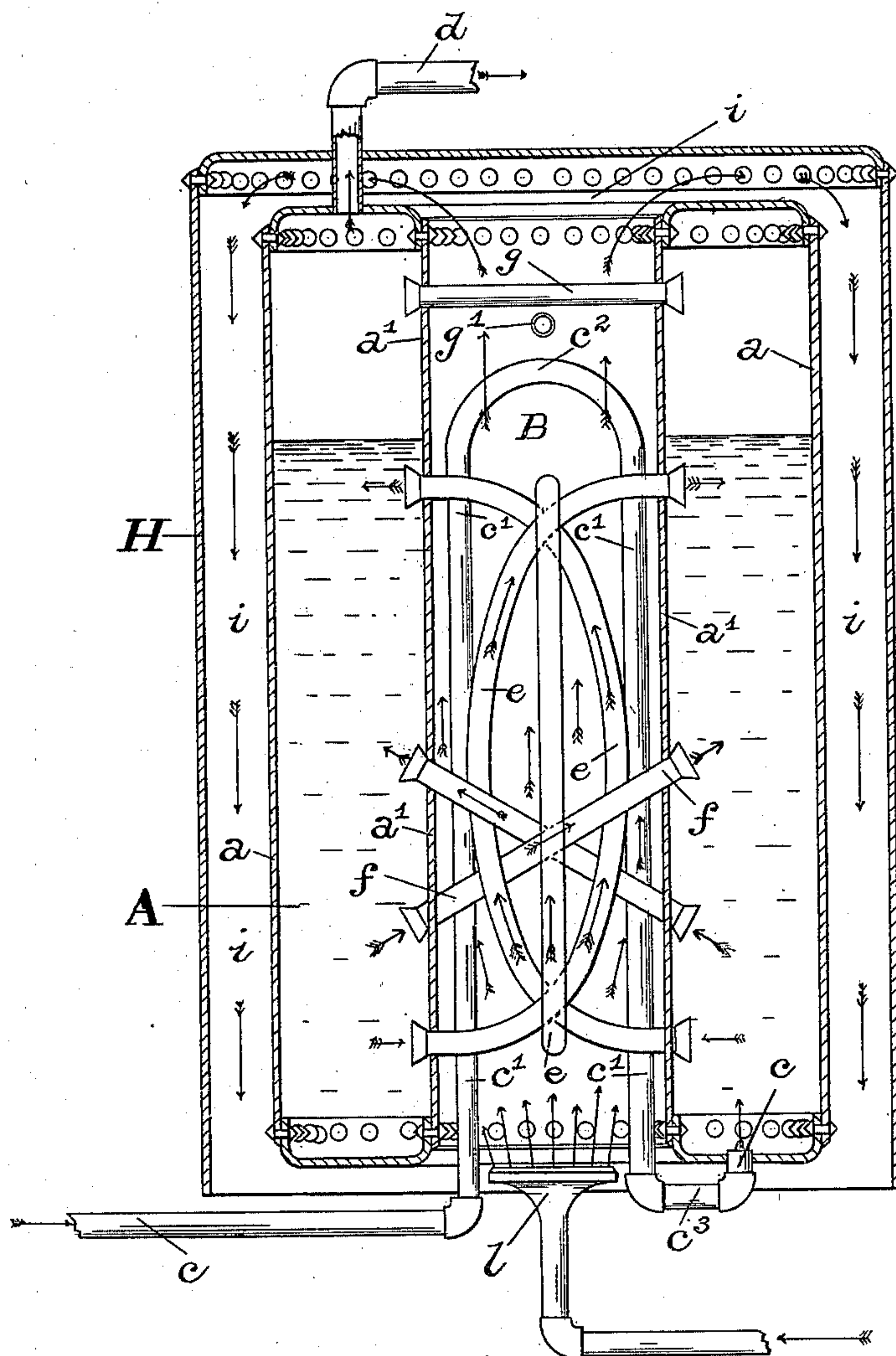
No. 662,472.

Patented Nov. 27, 1900.

R. M. SHAFFER.
STEAM GENERATOR.

(Application filed Mar. 1, 1900.)

(No Model.)



Witnesses:-

Charles B. Mann Jr.,
Charles L. Vietsch.

Inventor:-

Richard M. Shaffer

By

Charles B. Mann

Attorney.

UNITED STATES PATENT OFFICE.

RICHARD M. SHAFFER, OF BALTIMORE, MARYLAND.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 662,472, dated November 27, 1900.

Application filed March 1, 1900. Serial No. 6,912. (No model.)

To all whom it may concern:

Be it known that I, RICHARD M. SHAFFER, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

This invention relates to improvements in steam-generators; and some of its objects are to produce steam quickly, to provide a perfect and rapid circulation, to increase the heating-surface, and to construct the device in a simple and compact form.

The invention is especially adapted for use on automobiles and motor-cycles wherein a minimum of weight and space are among the chief requisites.

With these objects in view the invention is illustrated in the accompanying drawing, in which the device is illustrated by a vertical longitudinal section through my improved generator.

In the drawing, A designates the water-receptacle, which in the present instance is annular in form and having an outer circular wall a and an inner circular wall a' and a central passage B, which extends upward throughout its length. A water-supply pipe c enters the generator at the bottom and a steam-pipe d leads from the generator at the top. The water-supply pipe c , it will be seen, before entering the generator is formed into two vertical parallel pipes c' by being bent double at c^2 , and said parallel pipes extend up in the central passage B nearly to the top of the generator. The lower end of one of these pipes has a connection c^3 with the bottom of the generator. It will thus be seen that before water can enter the generator it must pass up one of the parallel pipes c' in the central passage and down the other, and thereby receives a preliminary heating. A suitable oil or gas burner l is secured at the bottom of the center passage B. This passage therefore is the "fire-box." A number of curved tubes e occupy the center passage. One end of each tube enters the inner wall a' near the bottom and thence curves outward toward the opposite side of said wall and then upward and curves back again and enters the wall a' near the top water-line. It will be seen that a tube e from one side of the wall a' overlaps

in the center passage the tube from the other side of the wall. By this construction it will thus be seen that all the curved tubes e pass each other in a central vertical line in the center passage B. In the present instance I also provide inclined tubes f , which extend crosswise through the passage B and the ends of which pass through the wall a' and project into the generator. All these tubes are circulating-tubes.

Near the top of the generator and above the water-line are horizontal cross-tubes or superheating-tubes g g' , which also extend across the center passage B and enter the wall a' of the generator.

A circular shell H surrounds the sides and covers the top of the generator A and also covers the top of the central passage B and forms a hot-air space i all around the sides and top. The shell H is open at the bottom.

The operation is as follows: The gas or oil from the burner is first lighted to heat the tubes in the central passage B and also to heat the parallel water-pipes c' . The water-supply is then turned on and the water passes through the pipe c and up one of the parallel pipes c' and down the other parallel pipe to the pipe c^3 and thence into the generator. By thus directing the cold feed-water up and then down through the hot pipes in the central passage B the water is delivered into the generator in an already-heated condition, and when the generator is sufficiently filled the water-supply may be shut off. In this condition the curved tubes e and inclined tubes f are all filled with water, and the flame and heat from the burner will play on all the tubes and will be deflected against the wall a' of the generator and continue up through the passage B, and the current of hot air from the flame will be deflected at the top by the shell H and caused to spread over the top and down around the outside of the walls a of the generator in the space i , and finally be carried off at the opening at the bottom. By this construction it will be seen that heat is applied to the water in the generator through the tubes in the center passage and on the inside at top and also on the outside wall a , thus producing a rapid circulation of the water and a quick generation of steam.

Having thus described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. The combination in a steam-generator of an annular-shaped water-receptacle having a central passage; a plural number of tubes in said passage and communicating with the interior of said water-receptacle; and a shell surrounding the sides and top of said water-receptacle and covering the top of said central passage but open at the bottom.
2. The combination in a steam-generator of an annular-shaped water-receptacle having a central passage; a plural number of tubes, *e*, in said center passage and having their ends entered in the inner wall of said receptacle and curved outward toward the opposite side of said wall—said tubes overlapping each other at the center of said vertical passage; and a shell surrounding the sides and top of said water-receptacle and covering the top of said central passage but open at the bottom.
3. The combination of a generator having a central vertical passage; a plural number of tubes in said passage and entered in said generator; a shell surrounding the sides and covering the top and said central passage of said generator but open at the bottom; a water-supply pipe passing through said central passage before entering the generator.
4. In a steam-generator, an annular or cylindrical water-receptacle having a central passage open at the top and bottom, and a shell surrounding the sides and top of said water-receptacle and being closed at its top

and side and open at the bottom, the central passage of the water-receptacle being in communication with the interior of the shell.

5. In a steam-generator the combination with the water-receptacle provided with a central passage extending throughout its length and open at the top and bottom, a water-supply pipe passing upwardly and in a returned direction through said central passage and entering the water-receptacle at the bottom thereof, and a shell surrounding the top and sides of the water-receptacle, the central passage of the water-receptacle being in communication with said shell.

6. In a steam-generator, the combination of a cylindrical or annular water-receptacle provided with a passage extending therethrough, said passage being open at its top and bottom, a series of pipes extending in various directions across said passage and opening into the water-receptacle, a water-supply pipe extending into the said passage at the bottom thereof, up through the passage and in a returned direction down through the same and opening into the water-receptacle at the bottom thereof, and a shell surrounding the water-receptacle at the sides and top and provided with an open bottom.

In testimony whereof I affix my signature in the presence of two witnesses.

RICHARD M. SHAFFER.

Witnesses:

CHARLES L. VIETSCH,
WM. H. JONES.