No. 757,639. PATENTED APR. 19, 1904.

G. L. ROSE.

STEAM GENERATOR.

APPLICATION FILED JUNE 18, 1903.

NO MODEL.

Fig. I

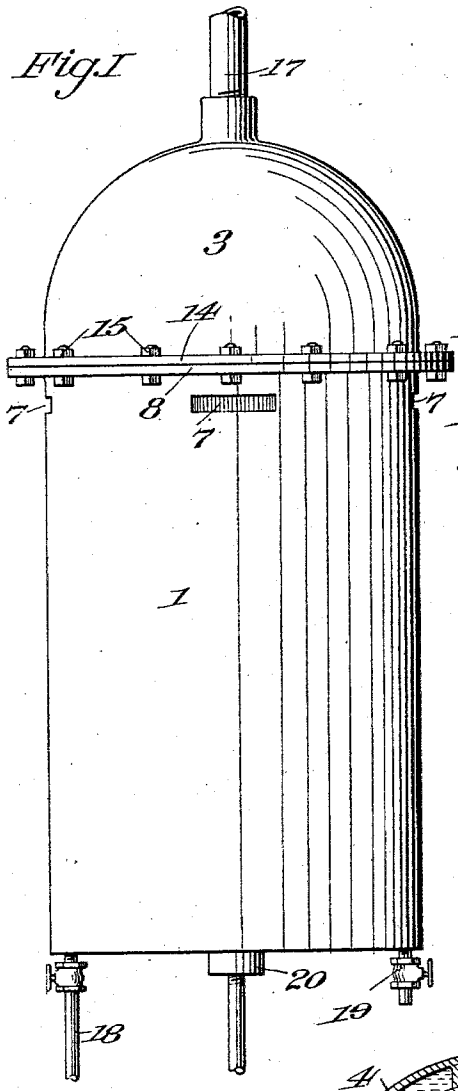


Fig. II

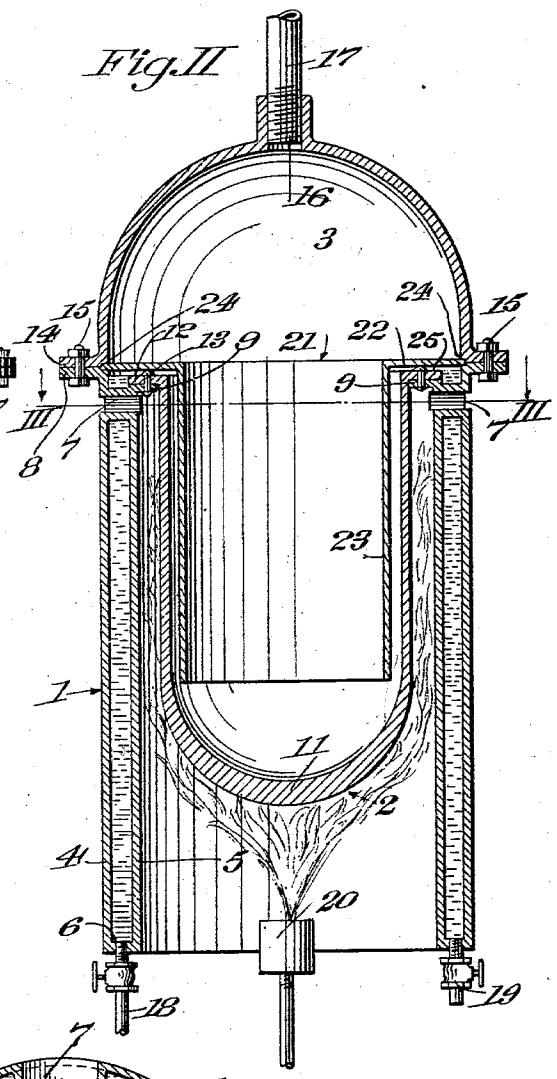
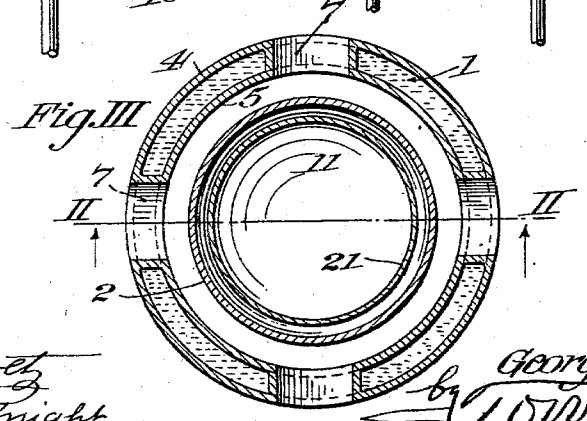


Fig. III



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 757,639. Patented April 19, 1904.

UNITED STATES PATENT OFFICE.

GEORGE L. ROSE, OF PASADENA, CALIFORNIA.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 757,639, dated April 19, 1904.

Application filed June 18, 1903. Serial No. 161,983. (No model.)

To all whom it may concern:

Be it known that I, GEORGE L. ROSE, a citizen of the United States, residing at Pasadena, in the county of Los Angeles and State of California, have invented new and useful Improvements in Steam-Generators, of which the following is a specification.

An object of this invention is to secure the greatest steaming capacity with the greatest economy of heat—that is to say, an object is to construct a steam-generator by which the heat from the furnace or burner will be conveyed in the most direct manner to the engine or place of use. I avoid applying heat to the bottom of any considerable body of water through which the steam might have to force its way. In this respect I wish to distinguish my invention from that class of generators known as "steam-boilers," an object of this invention being to attain an economy and superior action which is impossible with any form of steam-boiler—that is to say, the action known as "boiling," which is simply the rising of generated steam through a body of water, is objectionable in steam generation for several reasons. For instance, the steam thus rising goes from a highly-heated place through water of lower temperature, and thus gives up heat and takes up moisture, at the same time expending energy in forcing its way through the water. It also stirs up the water, thus tending to keep in suspension any solids which may be in the water. This invention is designed to avoid all such objections.

A further object of the invention is to avoid scale.

An object is to provide a steam-generator of extreme simplicity of construction and great evaporative capacity.

A further object is to provide a steam-generator constructed of separable elements which may be readily assembled and taken apart for repairs, cleaning, or inspection, or for renewal of one or more of the elements.

Another object of my invention is to produce dry steam at any pressure; also, to safely generate steam of very high pressure.

The invention relates particularly to a generator for rapid generation of steam, and may be designated as a "semiflash" steam-generator, the amount of water contained in the generator at any one time being comparatively small.

My improved generator comprises an outer water-chamber and an inner chamber communicating at its top with the water-chamber, the heat being applied directly against the inner chamber and also to both chambers in a space between said chambers, the water passing up through the outer chamber and flashing in the inner chamber and the resultant steam passing upwardly from the most highly-heated surface to the steam-outlet without passing through any superposed water.

I do not limit the invention to a particular form of the chambers. The outer chamber may be formed of pipes or a coil of pipe; but preferably an annular outer chamber is used.

The chambers and other parts may be made in any manner and of any material deemed desirable by the constructor without departing from the principle of this invention.

The accompanying drawings illustrate the invention.

Figure I is an elevation of the generator. Fig. II is a vertical section on the line II II in Fig. III. Fig. III is a horizontal section on the line III III in Fig. II.

The generator comprises three main elements or members—namely, a vertical casing member or shell 1, preferably cylindrical, an inner member or vessel 2, supported within said casing member, and a top, dome, or upper member 3. Shell 1 and upper member 3 together form the casing of the boiler. Casing member or shell 1 has concentric outer and inner walls 4 5, connected by a bottom 6, forming an annular chamber adapted to contain water. This casing is open internally at both top and bottom and has passages or conduits 6 formed in hollow bridges 7, connecting its outer and inner walls near the top to serve as outlets for passage of the products of combustion. At its upper end this casing has an outwardly-projecting flange 8, serving for attachment of the cover or dome 3, and an inwardly-projecting flange 9, serving for attachment of the inner evaporating-chamber. The inner chamber or vessel 2 is desirably cylindrical in form, being shorter than casing 1, with a rounded or hemispherical bottom 11 and with outwardly-projecting flange 12 at

the top, which extends over the flange 9 and is secured thereto by rivets or other suitable means 13. The upper member 3 is desirably dome-shaped, having a chamber formed therein extending over the outer chamber and the inner chamber, and has an outwardly-projecting flange 14 at its bottom, which extends over the flange 8 of casing member 1 and is secured thereto by bolts or other suitable means 15. An outlet 16 is provided at the top of this dome, the steam-pipe 17 being connected thereto. Water may be supplied to the boiler by a pipe 18, extending through the annular bottom 6 of the water-chamber, and a blow-off cock 19 may also be provided in this bottom.

The construction as so far described constitutes a practical and efficient boiler for some purposes. The burner 20 is placed in the space within the casing member 1, beneath the inner chamber 2. Water having been supplied to the water-chamber and the burner being set in operation, the water passes up around the inner wall 5, being warmed during such passage, and then flows over the top or rim of the inner vessel or pot 2 and passes down the inside thereof and is converted into steam by the hot walls of the inner chamber.

In order to be perfectly sure to prevent any priming of the steam and to thoroughly dry or even superheat the steam, I prefer to provide a deflector or shield 21, provided with an upper web or flange 22, extending over the casing member 1 and with a cylinder or tube 23, that extends downwardly within the inner vessel 2, sufficiently close to the wall thereof to form a contracted passage for fluid between this tube and the wall of the inner vessel. To fasten the deflector in place, rabbets, seats, or shoulders 24 may be provided in both or either of the members 1 3 at the joint thereof, and the edge or rim of flange 22 may rest therein and be clamped by the fastening of the members 1 3. This flange 22 may also rest on the heads of rivets 13 to further support the deflector.

The fluid that passes over the top or rim of the inner vessel 2, whether it is all liquid or all steam or a mixture of the two, is confined in its downward passage against the wall of such inner vessel and caused to traverse the entire length of the inner vessel and directed against the rounded bottom thereof, which is the hottest portion of the boiler, and is then caused to pass up within the deflector. Under same conditions the fluid that passes over the rim of the inner vessel may be assumed to be partly steam and partly water and in its passage in contact with the hot wall of the inner vessel it will be converted wholly into steam. If the amount of water passing be suitably diminished, the complete conversion into steam may be effected before the fluid reaches the bottom of the deflector, and the subsequent passage of the steam over the hot surface of the inner vessel will result in more or less superheating of the steam. On the other hand, if the water-supply be increased so as to allow liquid to reach the bottom of the inner vessel and evaporation to take place at that point the upward relatively slow passage of the steam from that point almost the whole height of the generator will permit the steam to drop or deposit substantially all contained water or priming. The invention is, however, particularly intended for use as a semiflash-generator, the fluid being supplied at such a rate that it will flash into steam before it reaches the bottom of the inner vessel or immediately upon reaching the same, and this bottom being hotter than the boiling-point of water at the pressure in the generator will cause extremely rapid evaporation and more or less superheating of the steam. The hot products of combustion from the burner first strike the generator at the bottom of the inner vessel, and are thereby deflected, passing up between the inner vessel and the casing 1 and out through the outlets 7, and thence through the usual hood or stack, if such be provided.

In making or setting up the device the inner vessel 2 is first mounted in and fastened to the casing 1 and the deflector-tube 21 is put in place within the inner vessel, with its flange 22 resting on the top of rivets 13 and within the lower rabbet 24. Then the top member 3 is put in place and secured by bolts 15. In separating the parts the reverse order of operation is followed.

The members 1 2 3 may be castings and will be made of material of suitable strength and heat conductivity and of sufficient thickness to stand the internal pressure. Member 2 is, however, desirably of copper or similar material to enable it to withstand the high heat without oxidation or cracking. Deflector-tube 21 may be made comparatively thin, as it does not have to withstand any substantial pressure.

My invention is not limited to the precise construction shown, as various modifications in the shape of the parts may be made without departing from the essential features thereof.

The outer chamber extends considerably below the inner chamber to form a receptacle for any solids which will separate from the heated water.

In Fig. II the fire is shown applied directly to the bottom of the inner chamber and not at all to the bottom or lower part of the outer chamber. By this arrangement and construction of this generator the water ascends with but little current in the outer chamber except near the upright or vertical inner wall thereof, thus allowing the solids which are in the water to drop down through the outer colder jacket of water down to the lower part of the outer chamber, where it is not subject to any

temperature sufficient to cause scale to form. By opening the blow-off valve 19 at any time the sediment may be blown off. The steam which may be generated in the outer chamber is formed against the hot inside vertical wall and has a free passage up along such wall, so that any water which may reach the inner chamber will have to pass out in a thin sheet over such generated steam except at the flues 7. The deflector-flange 22, lying comparatively close to the top flange 12 of the inner chamber 2, provides a contracted or restricted outlet 25 from the outer chamber to the inner chamber above the bottom of both said chambers, thus insuring that there will be no sudden discharge of a large mass of water into the hot inner chamber, and the baffle or deflector tube 23 further restricts the passage of the fluid so as to insure its distribution over the wall of the steam-chamber. Furthermore, this baffle extends between the water-outlet 25 and the steam-outlet 16, so that any steam which may be formed at such water-outlet cannot pass directly to the steam-outlet, carrying with it more or less water, but is forced to pass downwardly and then upwardly, and consequently dried and superheated, as above stated.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. A steam-generator comprising a casing formed with an annular water-chamber, having outlet at the top and lateral passage-way through the chamber non-communicating with the interior thereof, an upper member forming a closure over said outlet and provided with a steam-outlet, and an open-topped chamber connected at its top with said water-chamber and extending downwardly within the water-chamber and opening into said upper member.

2. A steam-generator comprising a casing formed with a water-chamber, open at the top, an upper member forming a closure over said water-chamber and provided with a steam-outlet, and an open-topped chamber connected at the top with the water-chamber and extending downwardly within and separated from the water-chamber and opening into said upper member; a fire passage-way being provided through the generator between said chambers.

3. A steam-generator comprising a casing formed with an annular water-chamber open at the top, an open-topped chamber connected at the top with the annular water-chamber and extending downwardly within and separated from the water-chamber, and a top chamber over both of said chambers.

4. A steam-generator comprising a casing formed with an annular water-chamber open at the top, an open-topped inner chamber connected at its top with the water-chamber and extending downwardly within the water-chamber but separated therefrom, and an upper chamber over both of the aforesaid chambers, and bridges extending across the annular water-chamber and formed with passages extending from the space between the inner chamber and the water-chamber and the outside of the water-chamber.

5. A steam-generator comprising a casing formed with an annular water-chamber, open at the top, an open-topped inner chamber connected at the top with the water-chamber and having a rounded bottom, and an upper chamber over both the water-chamber and the inner chamber.

6. A steam-generator comprising a casing formed with an annular water-chamber, open at the top, an open-topped inner chamber connected at the top with the water-chamber, and extending downwardly within the water-chamber, a chamber extending over both the aforesaid chambers, and a deflector extending from over the water-chamber downwardly within the inner chamber.

7. A steam-generator comprising an outer casing member formed with an open-topped annular water-chamber, an inner member formed with an open-topped chamber, the said members having flanges, and means fastening said flanges together and an upper member fastened to the water-chamber and forming a closure over both said chambers, and being provided with a steam-outlet.

8. A steam-generator comprising an outer casing member formed with an annular open-topped water-chamber and having inner and outer flanges, an inner chamber formed with an outwardly-extending flange secured to the aforesaid inner flange, and an upper member extending over both of the aforesaid chambers and having an outwardly-extending flange secured to the aforesaid outer flange.

9. A steam-generator comprising a casing member formed with an annular water-chamber, an inner member formed with an open-topped chamber connected at its top with the water-chamber, an upper member secured to the said casing member and formed with a chamber extending over both the aforesaid chambers, and a deflector member having a flange secured between the upper member and the said casing member, and a tubular portion extending downwardly within the inner member.

10. A water-chamber having a substantially upright water-heating wall, means for supplying water to such chamber, a steam-chamber having a steam-outlet and connected intermediate its top and bottom to receive water from the water-chamber, and means for applying heat to said chambers; said steam-chamber being inclosed at the top by an upper member which extends over and incloses the water connections which communicate between said chambers.

11. A water-heating chamber having an upright heating-wall, means for supplying water

thereto, a steam-chamber having a steam-outlet, means for conducting water or steam from the water-chamber to the lower part of the steam-chamber, and means for heating the chamber; said steam-chamber being inclosed at the top by an upper member which extends over and incloses the water connections which communicate between said chambers.

12. A water-chamber having a substantially vertical heating-wall, means for supplying water to such chamber, a steam-chamber connected with the top of the water-chamber to receive water therefrom, and means for applying heat to said chambers, the water-chamber extending below the level at which the heat is applied, and said steam-chamber being inclosed at the top by an upper member which extends over and incloses the water connections which communicate between said chambers.

13. A steam-chamber having an outlet, a water-chamber having a contracted outlet to the steam-chamber, above the bottom of both the chambers, and a burner arranged in heating relation with both of said chambers; said steam-chamber being inclosed at the top by an upper member which extends over and incloses the water connections which communicate between said chambers.

14. An inner steam-chamber having an outlet in its upper part, a water-chamber inclosing the steam-chamber and having a contracted outlet to the steam-chamber, above the bottom of both the chambers, and a burner arranged in heating relation with both of the chambers; said steam-chamber being inclosed at the top by an upper member which extends over and incloses the water-chamber outlet.

15. A steam-chamber having an outlet, a water-chamber having an outlet to the steam-chamber above the bottom thereof, and a baffle extending downwardly into the steam-chamber between the water-outlet and the steam-outlet; said steam-chamber being inclosed at the top by an upper member which extends over and incloses the water-chamber outlet.

16. A steam-chamber having an outlet, a water-chamber having an outlet to the steam-chamber, above the bottom of both chambers, and a baffle extending in the steam-chamber between the water-outlet and the steam-outlet; said steam-chamber being inclosed at the top by an upper member which extends over and incloses the water-chamber outlet.

17. A steam-generator comprising an inner steam-chamber member, a hollow water-chamber member surrounding and opening at the top into the same, a baffle extending over the opening between the chambers formed by said members, into the steam-chamber, an upper member fastened to the water member, extending over and inclosing said opening and inclosing the top of the chamber formed by the inner member, means for supplying water to the water-chamber, means for emitting steam from the steam-chamber and means for applying heat between the water and steam chambers.

18. A steam-generator comprising a steam-chamber member, a water member surrounding the same and communicating therewith, a dome or upper member fastened to the water member and inclosing open tops of both chambers, means for supplying water to the water-chamber and means for emitting steam from the steam-chamber.

19. A steam-chamber member open at top, a dome member inclosing the open top of the steam-chamber member means for applying heat to the external walls of the steam-chamber member and means for supplying a thin sheet of water or steam around the upper edge of the wall of the steam-chamber member.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, in the county of Los Angeles and State of California, this 12th day of June, 1903.

G. L. ROSE.

Witnesses:
ARTHUR P. KNIGHT,
JAMES R. TOWNSEND.