

M. L. STANARD.
 STEAM GENERATOR.
 APPLICATION FILED FEB. 19, 1917.

1,313,963.

Patented Aug. 26, 1919.
 4 SHEETS—SHEET 1.

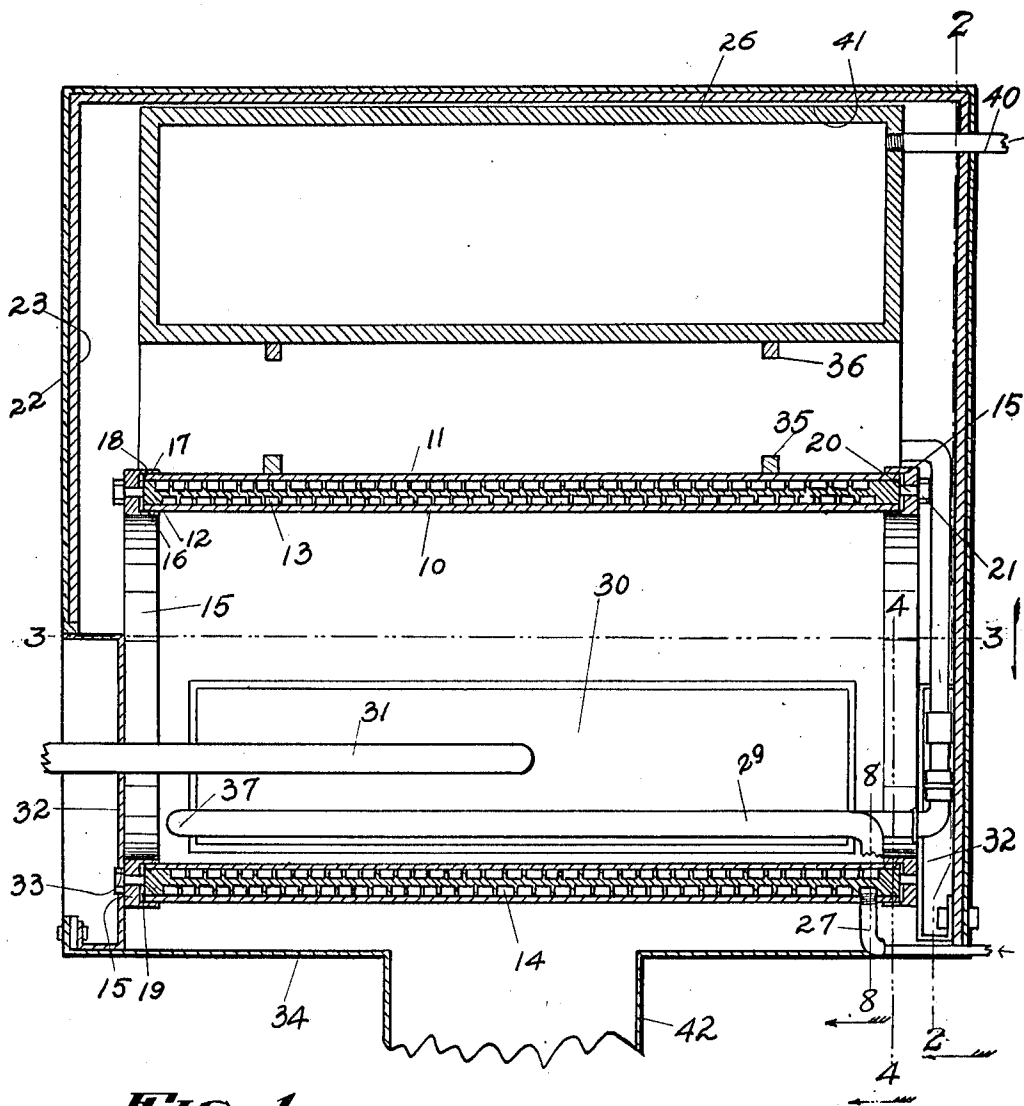


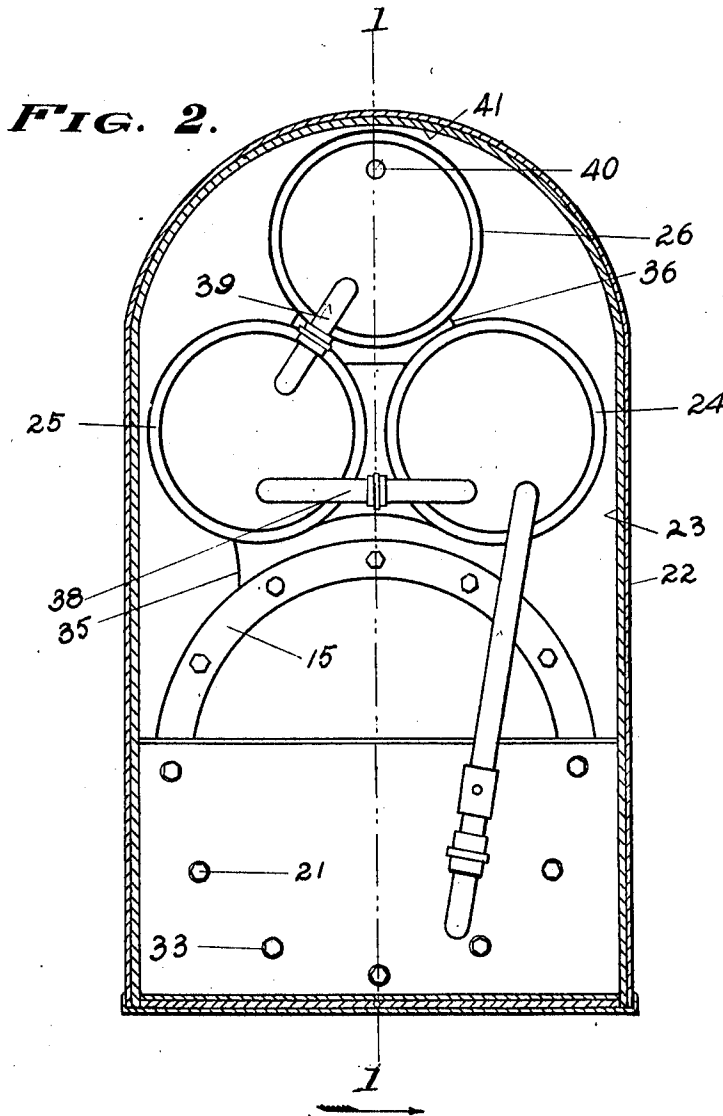
FIG. 1.

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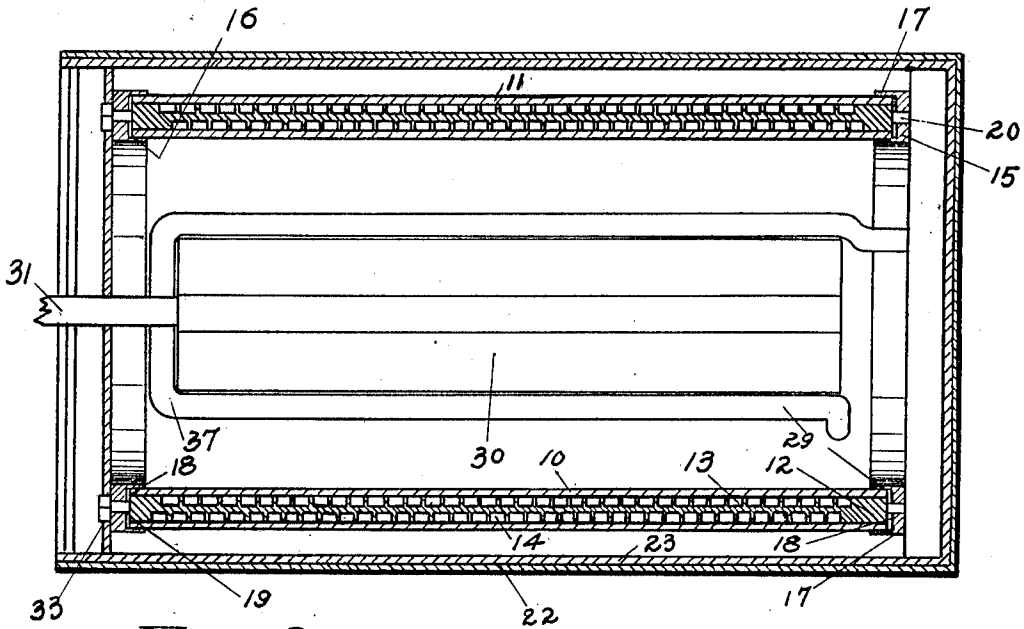


FIG. 3.

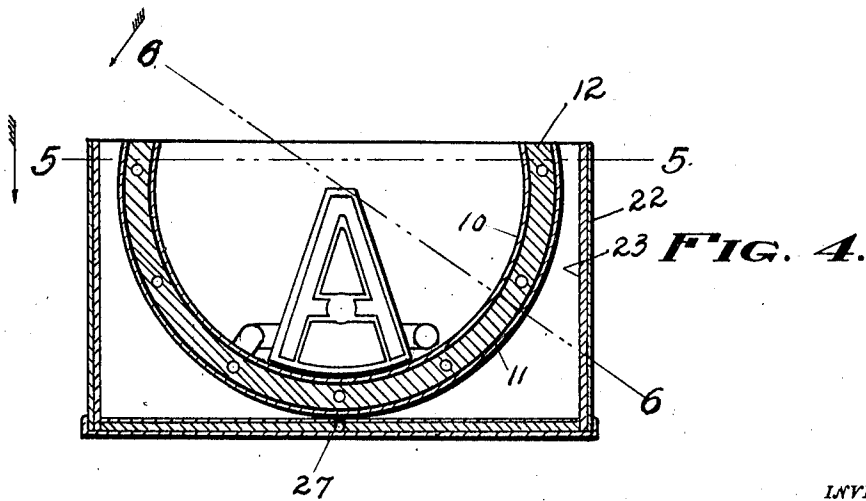
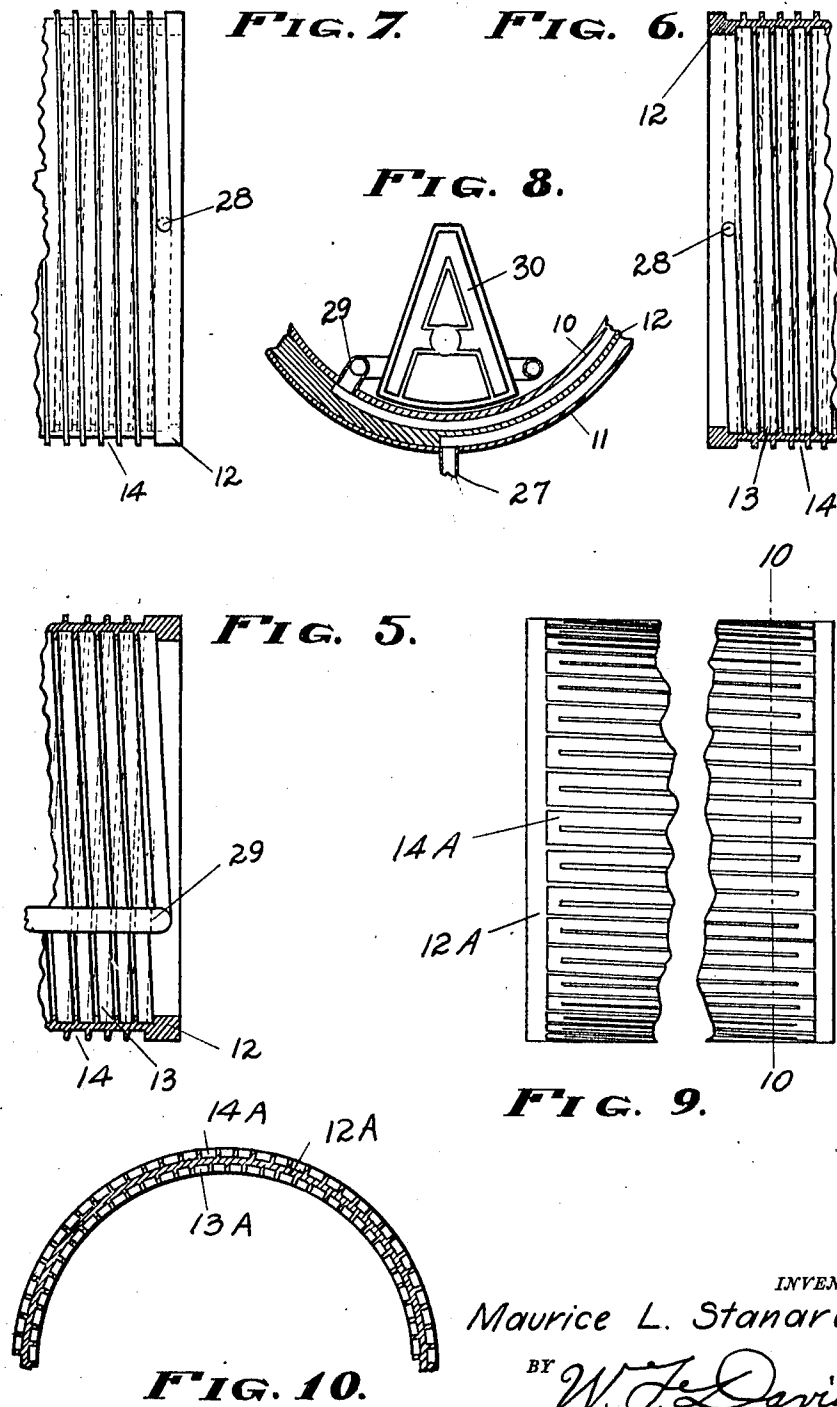


FIG. 4.

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UNITED STATES PATENT OFFICE.

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STEAM-GENERATOR.

1,313,963.

Specification of Letters Patent.

Patented Aug. 26, 1919.

Application filed February 19, 1917. Serial No. 149,394.

To all whom it may concern:

Be it known that I, MAURICE L. STANARD, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Steam-Generators, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to steam generators and seeks to provide a simple, efficient and economical form of high pressure steam generator in which the water is evaporated as it is passed through a long passageway of usual area surrounded by heated walls, and then dried or superheated in drums heated by the same fire that heats the evaporating walls.

The evaporation of water has been heretofore accomplished by passing it through heated pipes and tubes and in some other crude forms of generators, and superheating as a function is old. Pipes and tubes are very expensive and require frequent renewals that often cost more than the first cost owing to the compulsory expense of connecting them without proper equipment, away from the place of manufacture.

It is well known that a steam generator that will evaporate the water while passing through a long passageway of small area will produce steam of a much higher pressure and of many times the volume of that produced from the same weight and dimensioned generator of other forms, as the usual cylindrical and tubular boiler.

The present invention seeks to provide an improved steam generator that will evaporate the water as it is passed through a long passageway of small area surrounded by heated walls and produce a large volume of high pressure dry steam comparative to the weight and dimensions of the generator.

A further object of the invention is to form the generator of simple construction so that it will be inexpensive in first cost and easily and cheaply repaired even though far removed from the place of manufacture.

With these and other objects in view, the invention consists in the features of construction, combinations and arrangements

of parts hereinafter set forth and more particularly pointed out in the appended claims, the accompanying drawings illustrating a form of the invention.

In the drawings:—

Figure 1 is a sectional view of the improved steam generator taken on line 1—1 of Fig. 2, with certain pipes and the burner shown in full view.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is a fragmentary sectional plan view of the circuitously grooved member of the generator taken on line 5—5 of Fig. 4.

Fig. 6 is a fragmentary sectional view of the circuitously grooved member taken on line 6—6 of Fig. 4.

Fig. 7 is a fragmentary plan view of the grooved member.

Fig. 8 is a fragmentary sectional view taken on line 8—8 of Fig. 1.

Fig. 9 is a fragmentary view of a modified form of the grooved intermediate member.

Fig. 10 is a fragmentary sectional view taken on line 10—10 of Fig. 9.

The initial generator is formed of the inner tube 10, the outer tube 11 and the intermediate circuitously grooved tubular member 12 preferably spirally grooved, the tubes and grooved member being fitted together approximately water and steam tight to prevent any excessive leakage so as to compel the water and steam to follow the inner groove 13 and the outer 14 groove in the grooved member 12.

The grooved tubular member is preferably cast of steel with the grooves cast therein and then turned true and smooth after which it is heated and expanded and placed in any manner over the inner tube 10, allowing it to cool and shrink to a tight fit.

The outer tube 11 is then preferably heated and expanded and placed over the grooved tubular member and allowed to cool and shrink to a tight fit thereon. It is understood, however, that the method of assembling the tubes is no part of the invention and that good results can be secured

by simply slipping or pressing the tubes together as shown.

The duplicate cap rings 15 are provided with the annular flanges 16 and 17 which fit closely within the inner tube 10 and over the outer tube 11 respectively, the inner face 18 of each of the rings bearing against the adjacent gasket 19 and clamping it tight against the corresponding end of the tubes 10 and 11 and intermediate grooved member 12 so that in the event that the tubes and intermediate grooved member should be imperfectly fitted or become so by expansion and contraction there can be no leakage from between the tubes 10 and grooved member or from between the tube 11 and the grooved member, the rings being secured in position and clamped against the gaskets by the steel bolts 20 and nuts 21.

The annular flanges 16 and 17 support the respective tubes 10 and 11 and prevent buckling and warping of the tubes in case of overheating.

The initial generator is inclosed by the casing 22, which is lined by the heat insulator 23, and incloses the steam drying drums 24, 25 and 26, the water being forced through the pipe 27 to the outer groove 14. The water follows the spiral groove 14 to the hole 28, passes through the hole to the inner spiral groove 13 which it follows to the pipe 29, it being understood that the water is usually evaporated and converted or generated to steam while passing along the grooves and that it is in the form of steam when entering the pipe 29.

Resting within the inner tube 10 is the burner 30 supplied with combustible gases by the tube 31, the burner is not a part however of the present invention.

The tubes 10 and 11, grooved member 12 and rings 15 are supported by vertically disposed plates 32 which are provided with the holes 33 in which rests the nuts 21 of the stud bolts 20, the plates resting on the bottom wall 34 of the inclosing casing 22. These plates also serve to confine the flames from the burner to the interior of the tube 10 until after the flames have reached a height of more than one half the diameter of the tube.

The steam drying drums 24, 25 and 26 are of closed cylindrical shape and may be supported in any manner above the tubes 10 and 11 and within the casing 22, but as shown the drums 24 and 25 are supported by the brackets 35 which rest upon the tube 11 and the drum 26 is supported from the tubes 24 and 25 by the bracket 36, these brackets being mere supporters.

The pipe 29 connects to the tube 10 and communicates with the spiral groove 13, passing alongside the burner 30 and forming a U band at 37, returning along the opposite side of the burner and passing through

the adjacent vertically disposed plate 32, and then upward and connecting to and communicating with the steam drying drum 24. The steam drying drums 24 and 25 being connected by the pipe 38, and the drums 25 and 26 connected by the pipe 39, the steam pipe 40 connecting to the drum 26 and passing outward through the casing 22 as shown, this pipe being broken away, as it is understood that it can be connected to any form of apparatus requiring or using steam.

In operation the heating medium is introduced into the tube 10 in any convenient manner, but preferably by a burner as burner 30, the heating medium passing upward and filling the tube 10 and then passing out of both ends of the tube over the vertically disposed plates 32 and upward around the ends of the steam drying drums 24, 25 and 26, and contacting with upper wall 41 of the line 23 of the casing 22, the heating medium then passing downward over the central portions of the steam drying drums and around the tube 11 and out through the spent heat pipe 42, it being obvious that the heating medium contacts with all parts of the initial generator and the steam drying drums.

The water being forced through the feed pipe 27 to the outer groove 14 begins to evaporate immediately on entering the grooves 14 and 13, the water usually being practically all evaporated while passing through the grooves so that only steam enters the pipe 29 and drums 24, 25 and 26. It is understood however that some moisture will be carried by the steam to the drums and the latter will evaporate the moisture and dry and superheat the steam so that only dry superheated steam is delivered through the steam pipe 40.

In Figs. 9 and 10 is shown a modified form 12^A of the intermediate grooved member in which the grooves 13^A and 14^A are disposed longitudinally and form in connection with the tubes 10 and 11 a circuitous passageway for the evaporation of the water.

It is understood that the steam generator is employed, usually to supply steam of a high pressure and that the drier the steam the more effective it will be.

The improved steam generator is of chief importance in connection with steam flying machine and automobile engines but can be advantageously employed in connection with the engines of steam locomotives and all apparatus requiring a high pressure dry steam especially where the room and carrying capacity is cramped and high efficiency is necessary.

It is obvious that numerous changes can be made in the details as set forth without departure from the essentials of the invention.

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

1. In a steam generator, a tubular structure open at both ends thereof, means to circulate fluid in a circuitous direction through the walls of said structure, means to apply a heating medium to the interior of said structure, a casing inclosing said structure, and means by which the heating medium must pass outward from both ends of said structure and upward, and means by which the heating medium will pass downward around the outside of said structure.

2. In a steam generator, a horizontal tubular structure open at both ends, a casing inclosing said structure, the walls of said casing spaced from said structure,

means to circulate fluid in a circuitous direction between the outer and inner walls of said structure, steam drying and superheating drums within said casing above said structure, a burner within said tubular structure, a space between said tubular structure and said casing at each end of said tubular structure and an exit pipe in the bottom wall of said structure approximately in the center thereof whereb the heating medium is compelled to pass out at both ends of said tubular structure and upward and around said superheating drums and then down and out through said exit pipe.

MAURICE L. STANARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."