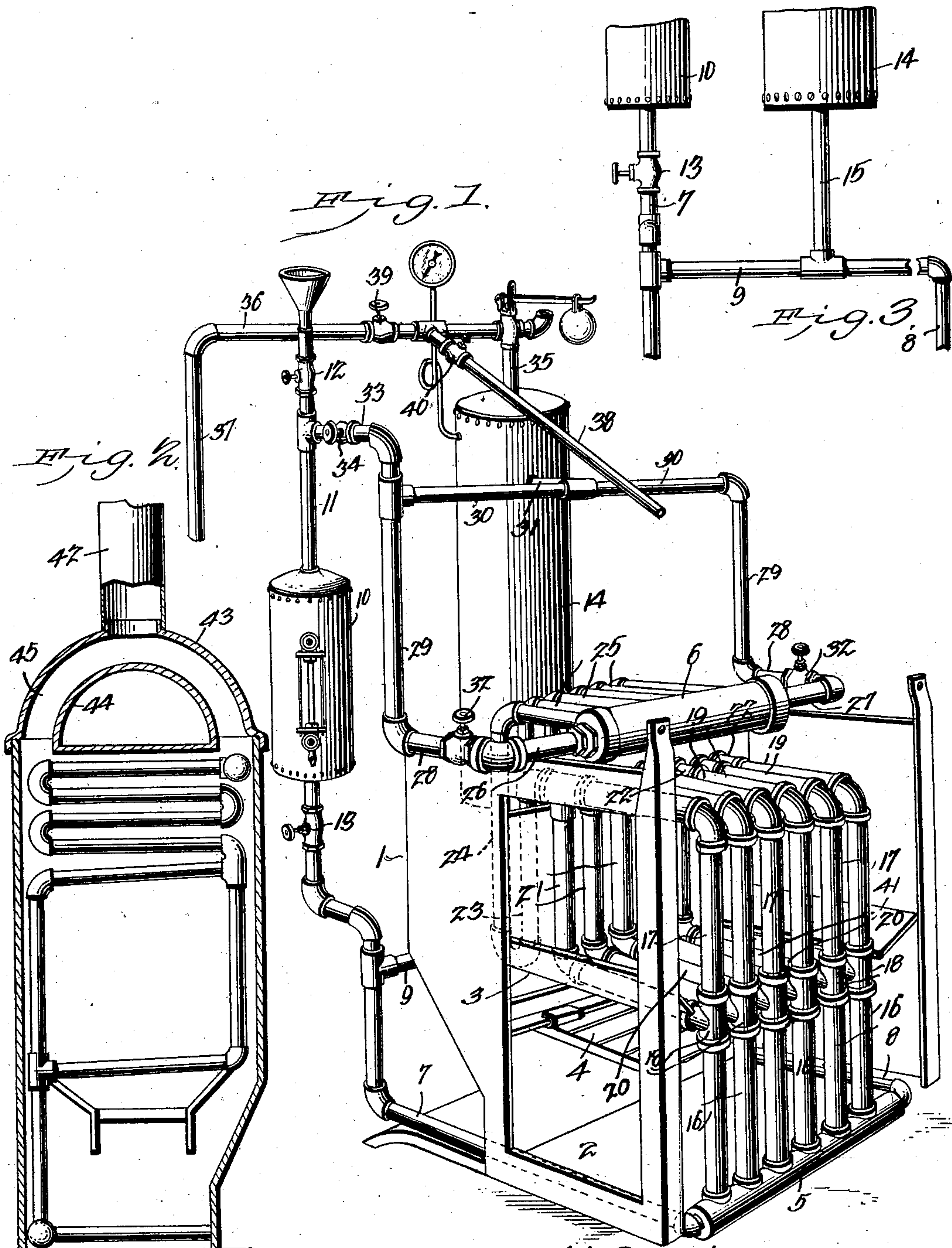


No. 724,960.

PATENTED APR. 7, 1903.

H. SINCLAIR.  
STEAM GENERATOR.  
APPLICATION FILED APR. 17, 1902.

NO MODEL.



Witnesses  
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# UNITED STATES PATENT OFFICE.

HENRY SINCLAIR, OF RIDGELY, MARYLAND.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 724,960, dated April 7, 1903.

Application filed April 17, 1902. Serial No. 103,389. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY SINCLAIR, a citizen of the United States, residing at Ridgely, in the county of Caroline and State of Maryland, have invented a new and useful Steam-Generator, of which the following is a specification.

This invention relates to a steam-generator for cannery and cooking purposes.

10 The object of the invention is to provide an apparatus of the character specified which in operation with the consumption of a minimum of fuel will rapidly generate the maximum of steam.

15 A further object is to provide an apparatus of the character specified in which circulation may be maintained throughout the night when the fire is banked within the fire-box, thereby adapting the apparatus for use in supplying steam to the heating-coils of houses.

20 As will hereinafter appear, the steam-generator constituting the subject-matter of this invention while adapted for use in any position where the rapid generation of steam is desired is peculiarly adapted for use in canneries for supplying dry steam to the processing-kettles.

With these and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel construction and combination of parts of a steam-generating apparatus, as will be hereinafter fully described and claimed.

30 In the accompanying drawings, forming a part of this specification, and in which like numerals of reference indicate corresponding parts, there are illustrated two forms of embodiment of the invention, each capable of carrying the same into practical operation, it being understood that the elements therein exhibited may be varied or changed as to shape, proportion, and exact manner of assemblage without departing from the spirit thereof, and in these drawings—

35 Figure 1 is a view in perspective of one form of steam-generator adapted more particularly for use in canneries or for heating buildings. Fig. 2 is a view in vertical longitudinal section through a generator adapted more particularly for domestic purposes, although it may be used for either of the purposes above stated. Fig. 3 is a fragmentary

detail view of certain parts hidden from view in Fig. 1.

Referring to the drawings and to Fig. 1 55 thereof, 1 designates generally the casing, which may be made of any suitable material, preferably of sheet-steel, lined with asbestos or any other suitable refractory substance. For the purpose of exhibiting the steam-coils 60 or steam-generating portion of the apparatus the back of the casing is removed, as well as the doors closing the openings to the ash-pit 2 and fire-box 3. Arranged within the casing is a shaking or sliding grate 4, adapted to 65 catch and retain not only the ashes, but the smaller glowing embers that escape from the fire-box above, for a purpose that will presently appear.

The steam-generating system comprises in 70 part two manifolds 5 and 6, and connecting with the ends of the manifold 5 are two pipes 7 and 8, the pipe 8 being extended rearward back of the casing and connected by a pipe 9 with the pipe 7, the latter communicating 75 with a suitable source of water-supply—as, for instance, with an expansion-chamber 10, the upper portion of which latter has connected with it a pipe 11, leading to or adapted to receive the supply of water, a valve 12 80 on the pipe serving normally to cut off communication between the water-supply and the expansion-chamber. The pipe connecting the lower portion of the expansion-chamber with the pipe 7 is provided with a valve 85 13 for controlling the supply of water to the steam-generator. The pipe 9 is connected with the lower portion of a steam-dome 14 through the medium of a pipe 15, whereby the water is constantly fed from the boiler 90 back to the system.

Communicating with the manifold 5 is a series of vertical pipes, each consisting of two sections 16 and 17, connected by a T-joint 18. The upper ends of the pipes 17, as also the 95 T's 18, have associated with them pipes 19 and 20, the terminals of the latter pipes being connected by vertical pipes 21, the rectangular chamber formed by the aggroupment of pipes 17, 19, 20, and 21 constituting a fire- 100 box, whereof the series of pipes 20 operate as grate-bars and are spaced apart a proper distance to permit the requisite draft through the system. As is well known, it is necessary,



in order to secure rapid circulation, to avoid horizontal disposition of the pipes in systems of this character as far as possible, and to these ends the pipes 20 are pitched at an inclination sufficient to bring their rear terminals about an inch higher than their forward terminals. The union between the pipes 19 and 21 is through the medium of T's 22, with the third member of which is connected a series of pipes constituting return-bends, these bends comprising each two vertical pipes 23 and 24 and horizontal pipes 25, the latter pipes connecting with the manifold 6. By the arrangement shown it will be seen that the water entering the manifold 5 is caused to circulate entirely around the fire-box before it escapes through the return-bends, thereby causing its rapid heating and conversion into steam, which latter passes off through pipes 26 and 27, connecting with the ends of the manifold 6, and thence to horizontal pipes 28, vertical pipes 29, a horizontal pipe 30, and a branch pipe 31 into the steam-dome 14, where separation of the steam from the hot water takes place, the latter passing down through the pipe 15 and through the pipe 9 into the pipes 7 and 8 and thence to the manifold 5, thereby securing constant and rapid circulation, as will be apparent. The pipes 28 are provided with valves 32, by which to cut off passage to the dome when desired, and the pipe 29 has a branch 33 connecting with the supply-pipe 11 of the expansion-chamber, the branch pipe being provided with a valve 34, by which to permit passage of steam through the pipe 11 when it is desired to supply the steam-generator with water from the expansion-chamber when necessary, thereby obviating the necessity of the employment of an injector for the purpose. To feed water to the steam-coils, the valve 12 is closed and the valves 34 and 13 are opened, whereupon steam will pass to the expansion-chamber, and thus force water into the steam-coils irrespective of the steam-pressure in the dome, after which the said valves are closed. To supply water to the expansion-chamber, the valve 12 is opened and water allowed to pass thereto. Connecting with the top of the steam-dome is a pipe 35, having associated with it a branch 36, with which are connected two pipes 37 and 38, which connect with the processing-kettles, the pipes 36 and 38 having associated with them valves 39 and 40, respectively, by which to control the escape of steam through the said pipes.

The shaking-grate 4, to which reference has been made, is disposed but a short distance below the grate proper, formed by the series of pipes 20, in order that the smaller embers that escape thereto will be held close to the under sides of these pipes, thus to effect their heating, utilizing thereby fuel that would otherwise be wasted, and operating after the fire is banked for the night to generate sufficient heat to cause circulation through the system. To direct the falling embers from

the upper grate to the lower, inclined plates 41 are employed, as clearly shown in Fig. 1.

Owing to the large grate-surface utilized there will be no appreciable diminution of the temperature of the water in the coils when cold water is supplied thereto, thereby obviating interference with the generation of steam from the feed-water.

An important feature of this invention to be observed is that practically all of the heat units of the fuel are utilized for doing effective work, the smaller particles of fuel that escape from the upper grate being caught and retained by the lower or shaking grate and are thus utilized to heat the pipes 20 on their under sides, so that with a minimum of fuel the maximum of steam may be generated.

As a means for conveying off smoke and other unconsumed products of combustion from the casing, a stack 42 is associated with the top thereof, as shown in Fig. 2.

In the form of embodiment of the invention exhibited in the last-named figure provision is made, in addition to utilizing the steam for any of the purposes above named, to employ the heat both from the fire-box and from the coils for cooking purposes, and to effect this the top of the casing is provided with an arched top 43, inclosing a semicircular oven 44, the space 45 between the walls of the oven and the arch presenting a passage way for the escape of the unconsumed products of combustion to the stack or chimney. This latter form of embodiment of the invention may be made portable, so as to be adapted for removal from place to place, thus in winter to serve as a cooking-stove and a steam-generator for steam-radiators and in summer to serve as a steam-generator for processing-kettles in canneries.

All of the parts of both forms of embodiment of the invention are simple of construction and such as may readily be procured at any plumbing establishment, so that in the event of breakage of one or more of the parts repairs may readily be effected.

By reason of the rapid circulation of the water secured by this system and the immediate contact with the coils of the highly-heated products of combustion the employment of a feed-water heater to obviate lowering of the temperature of the water in the coils is rendered unnecessary, and this, together with the lack of necessity of employment of an injector or force pump, will render the employment of this steam-generator highly advantageous in rural districts where water under pressure is not obtainable.

Instead of arranging the steam-dome as shown, this may be placed directly over the coils, either in perpendicular or in horizontal position, as desired, and as this will be readily understood detailed illustration is thought to be unnecessary.

Where a high pressure of steam is required, the water may be turned in at the top of the coil in a fine stream, and the coil being highly



heated the water will instantly be converted to steam and thrown back into the dome. Under these conditions the pipes or boiler is not filled with water, but only a small amount  
 5 will pass therethrough, and this will be instantly converted into steam, as above stated.

It is to be understood that this invention is not to be limited to the precise forms of casings herein shown or to the exact arrangement of the parts of the steam-coils, as these  
 10 may be made in designs different from those shown and still be within the scope of the invention.

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

1. A steam-generator, comprising upper and lower manifolds, coils of pipe connecting the manifolds and disposed to present a four-walled fire-box, a steam-dome, connections  
 20 between the upper portion of the steam-dome and the upper manifold and between the lower portion of the dome and the lower manifold, and an expansion-chamber included in the system.

2. A steam-generator, comprising upper and lower manifolds, coils of pipe, including return-bends, connecting the manifolds and arranged to present a four-walled fire-box, a  
 30 shaking-grate disposed adjacent to the floor of the fire-box to catch and retain glowing embers escaping therefrom, and a steam-dome connecting with the manifolds.

3. A steam-generator, comprising upper and lower manifolds, coils of pipe connecting the manifolds and disposed to present a four-

walled fire-box the bottom of which is inclined from the front to the rear of the box, a steam-dome in communication with the manifolds to trap the steam and return the water to the  
 40 lower manifold, an expansion-chamber in communication with the lower manifold, and a connection between the expansion-chamber and the upper portion of the dome.

4. In a steam-generator, the combination  
 45 with heating-coils including return-bends, and arranged to present a four-walled fire-box, upper and lower manifolds in communication with the terminals of the coils, and a shaking-grate disposed adjacent to the floor of the  
 50 fire-box, of a steam-dome connecting with the manifolds, controllable steam-discharge means connecting with the upper portion of the dome, and an expansion-chamber included in the system.

5. A steam-generator, comprising an upper and a lower manifold, coils of pipe, including return-bends, connecting the manifolds and arranged to present a four-walled fire-box,  
 60 the bottom of which is inclined from the front to the rear of the generator, a shaking-grate arranged close to the bottom of the fire-box, and a steam-dome and expansion-chamber connecting with the manifold.

In testimony that I claim the foregoing as  
 65 my own I have hereto affixed my signature in the presence of two witnesses.

HENRY SINCLAIR.

Witnesses:

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HOWARD D. ADAMS.