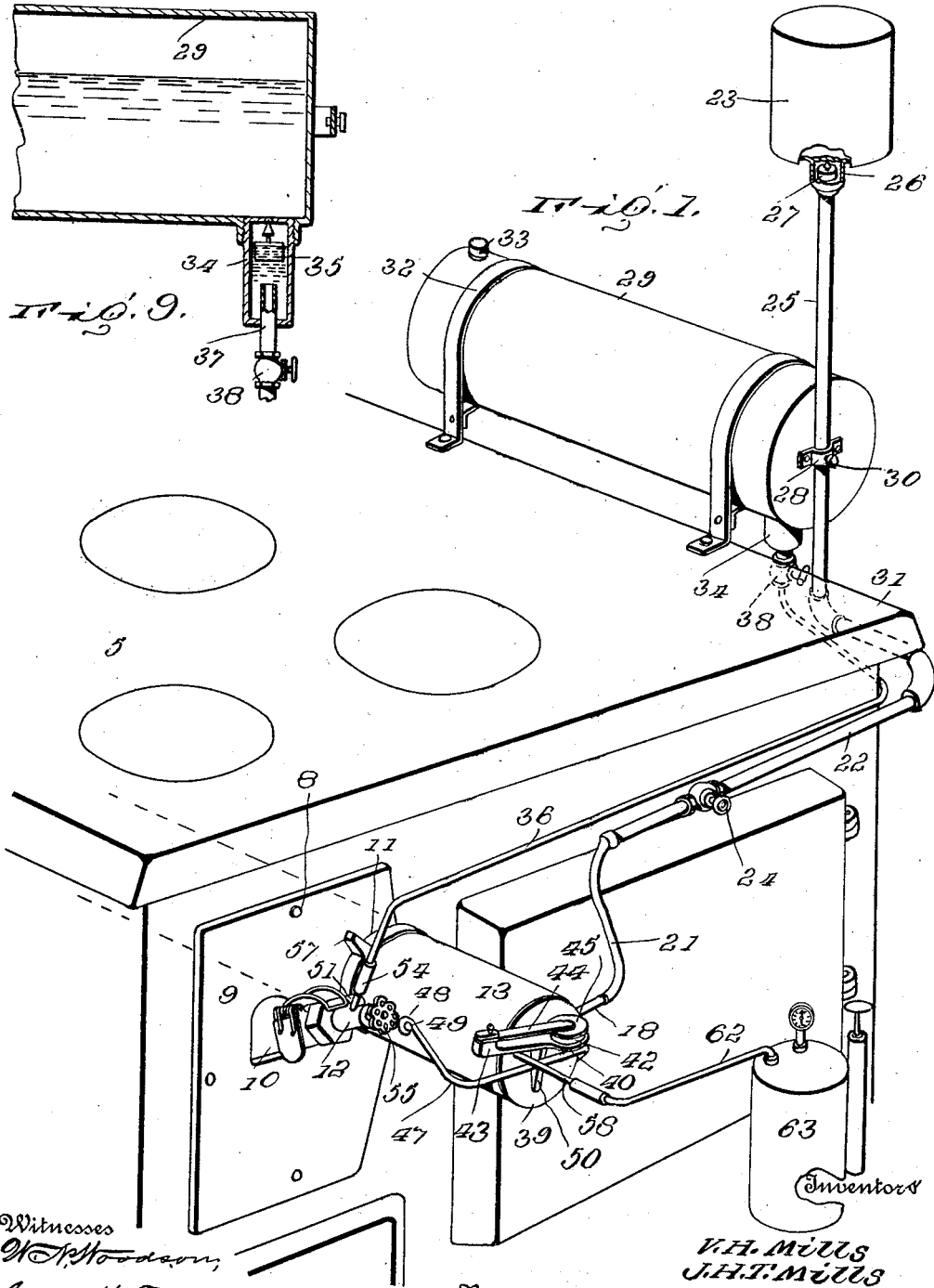


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 STEAM GENERATOR.  
 APPLICATION FILED OCT. 5, 1910.

1,024,521.

Patented Apr. 30, 1912.

3 SHEETS-SHEET 1.



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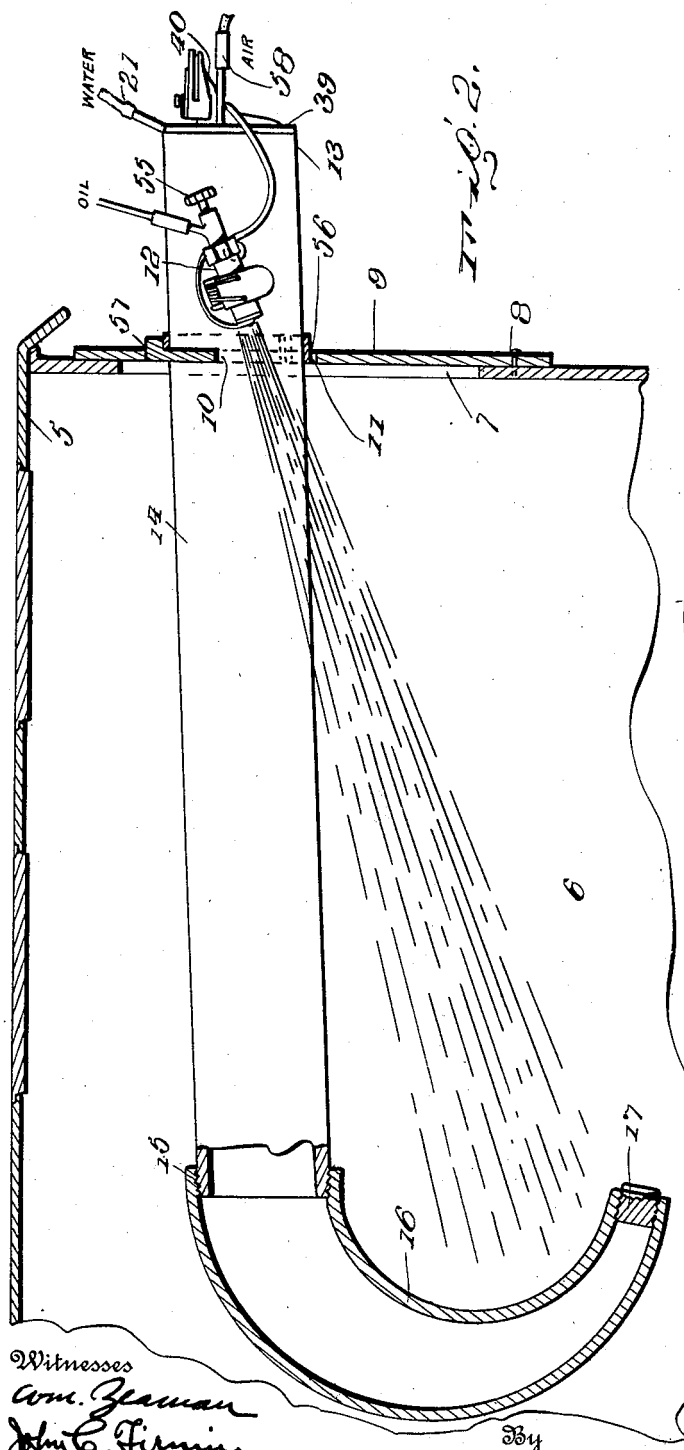
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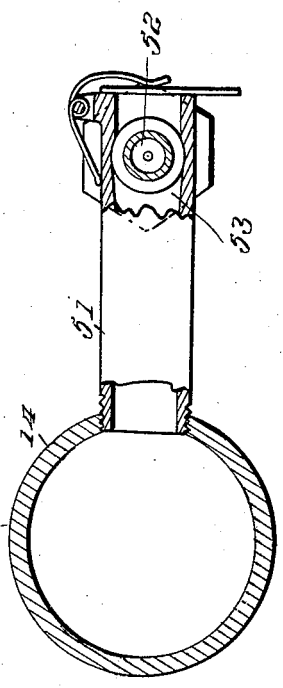
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*Fig. 2.*



*Fig. 3.*

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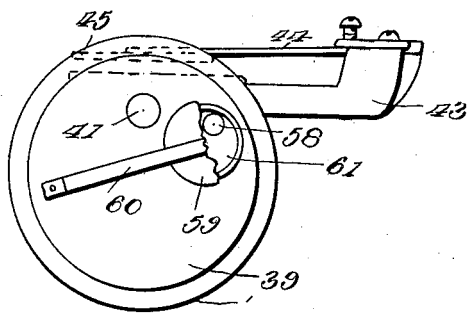
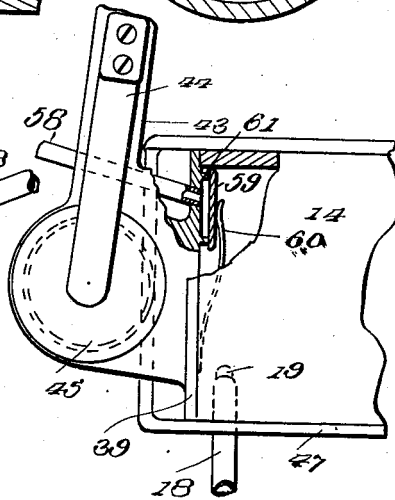
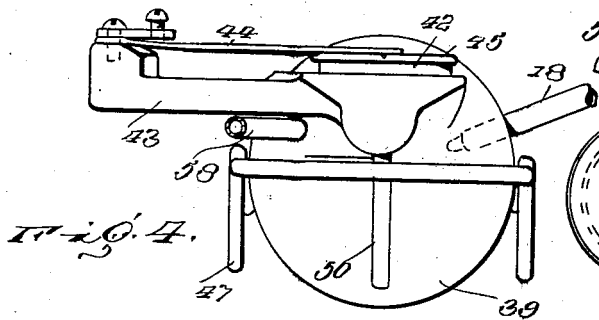
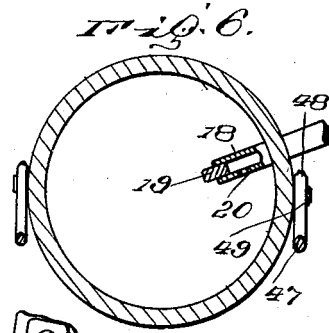
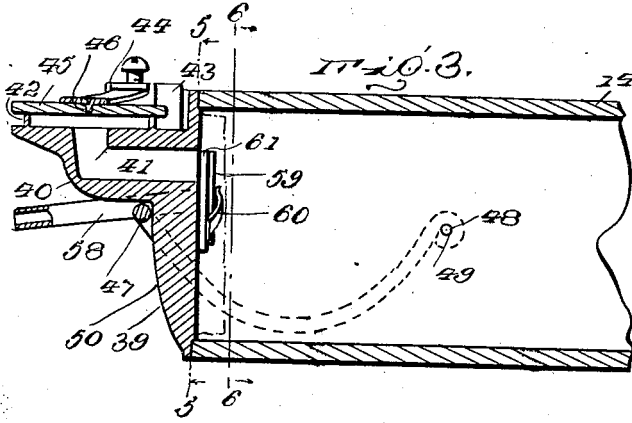
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# UNITED STATES PATENT OFFICE.

VIRGIL H. MILLS AND JOHN H. T. MILLS, OF HUBBARD, TEXAS.

## STEAM-GENERATOR.

1,024,521.

Specification of Letters Patent.

Patented Apr. 30, 1912.

Application filed October 5, 1910. Serial No. 585,415.

*To all whom it may concern:*

Be it known that we, VIRGIL H. MILLS and JOHN H. T. MILLS, citizens of the United States, residing at Hubbard city, in the county of Hill and State of Texas, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

This invention relates to steam generators and more particularly to that class of generators especially designed for use in connection with hydrocarbon burners.

The object of the invention is to provide a generator of simple and durable construction for supplying steam to the burner tip, thereby to atomize the oil and effect perfect combustion of the latter.

A further object is to provide a generator, the water supply nozzle of which extends within the generator and is provided with a relatively small discharge orifice so as to prevent flooding of the generator or wasting of the water in the form of steam.

A further object is to provide the generator with a detachable cap or closure to facilitate cleaning the interior of said generator when necessary.

A further object is to provide a novel form of safety valve for permitting the escape of steam from the generator in case the pressure becomes excessive.

A further object is to provide means for supplying air through the generator to the burner tip, preparatory to lighting the burner to effect the initial heating of the generator.

A still further object of the invention is to provide means for insuring a uniform flow of water under constant pressure to the discharge nozzle, and means whereby said nozzle may be readily cleaned, when necessary.

Further objects and advantages will appear in the following description, it being understood that various changes in form, proportions and minor details of construction may be resorted to within the scope of the appended claims.

For a full understanding of the invention and the merits thereof, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a perspective view of a generator constructed in accordance with our invention, showing the same applied to an ordinary cooking stove; Fig. 2 is a detail ver-

tical sectional view, showing the generator extending within the fire box; Fig. 3 is a detail vertical sectional view of one end of the generator; Fig. 4 is an end elevation of the generator; Fig. 5 is a vertical sectional view taken on the line 5—5 of Fig. 3 and looking in the direction of the arrow; Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 3; Fig. 7 is a top plan view of the generator, a portion of the cap being broken away to more clearly illustrate the construction of the air valve; Fig. 8 is a transverse sectional view, showing the connection between the generator and burner. Fig. 9 is a vertical sectional view of one end of the oil tank showing the construction of the float.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The improved steam generator forming the subject matter of the present invention is principally designed for use in connection with heating and cooking stoves and by way of illustration is shown applied to a cooking stove of the ordinary construction, in which 5 designates the body of the stove, 6 the fire box and 7 the opening through which access may be had to said fire box.

Detachably secured to the front of the stove, as by bolts or similar fastening devices 8, is a removable plate 9, which latter forms a closure for the opening 7 and is pierced by spaced openings 10 and 11, one of which is adapted to receive a burner 12 and the other the generator, indicated at 13. The generator 13 comprises a downwardly inclined tube 14 having its outer end projecting through the recess 11 and its inner end threaded at 15 for detachable connection with a downwardly and forwardly curved pipe section 16, the lower or free end of the pipe section 16 being normally closed by a removable plug 17.

Extending through one wall of the generator at the outer end thereof, is a nozzle 18 having its inner end provided with a removable plug 19 and one wall thereof formed with a relatively small discharge orifice 20, through which the water passes into the generator to be converted into steam.

Secured to the outer end of the nozzle, is one end of a tube 21, the opposite end of which is connected to a pipe 22 leading

to a water supply tank 23, there being a valve 24 connected in the pipe 22 for controlling the flow of water to the generator. The pipe 22 is provided with a vertical extension 25, the upper end of which is enlarged at 26 to form a chamber or compartment for the reception of a float valve 27, which latter insures a uniform flow of water under constant pressure to the generator.

The vertical pipe 25 is slidably mounted in a guide or keeper 28 secured to the end of an oil tank or receptacle 29 and is secured in adjusted position by a set screw 30, there being a flexible connection 31 between the extension 25 and pipe 22 to permit vertical adjustment of the water tank 23, as will be readily understood.

The oil receptacle or tank 29 is supported on the stove by suitable strap irons 32, one end of said tank being provided with a filling orifice 33 and the other end thereof formed with a depending chamber 34 in which is mounted a float valve 35, similar in construction to the float valve 27, for the purpose of maintaining the oil in the tank at the proper height and also to insure a uniform supply of oil through the pipe 36 to the burner 12.

Extending upwardly within the chamber 34, is one end of a tube or conductor 37 having a valve 38 connected therein and to which is detachably connected the pipe or conductor 36, said chamber 34 forming in effect a trap for the collection of sediment and water from the oil, thus to prevent foreign particles in the oil from being fed to the burner and clogging or otherwise obstructing the same.

In order to clean the chamber or trap 34, it is merely necessary to close the valve 38 and detach the member 34 from the oil tank, as will be readily understood.

The outer end of the generator 13 is provided with a removable cap or closure 39 having a lateral extension 40 provided with a passage 41 leading to the interior of the generator, there being an annular flange 42 projecting vertically from the upper face of the extension 40 and constituting a valve seat. Secured to and extending laterally from the extension 40, is an arm 43, to one end of which is secured a flat spring 44, the opposite end of said spring bearing against a flat disk or valve 45. The upper surface of the valve 45 is provided with a depression 46 adapted to receive a corresponding lug formed on the free end of the spring 44 so as to retain the spring in engagement with the valve, while at the same time permitting said valve to be readily removed and re-ground, when necessary. The member 45 forms in effect a safety valve to permit the escape of steam from the generator should the pressure in said generator become excessive.

As a means for detachably securing the cap 39 in position on the generator, there is provided a locking bail 47 having its opposite ends provided with terminal eyes 48 adapted to receive pivot pins or lugs 49 extending laterally from the exterior walls of the generator.

The side walls of the clamping member are curved longitudinally, while the closed end of said clamping member is adapted to engage an inclined rib 50 secured to the exterior face of the cap or closure. Thus it will be seen that by swinging the locking bail 47 downwardly, the cap or closure 39 may be removed from the generator when it is desired to clean the interior thereof. By the casing of the burner for regulating the closed end thereof will engage the rib 50 and thus effectually clamp the cap in position on the end of the generator.

The burner 12 is connected to the generator by means of a short pipe section or conductor 51, said burner being provided with concentric chambers 52 and 53, one of which is adapted to receive the oil through a nipple 54 and the other the steam from the generator, there being a needle valve 55 threaded in the casing of the burner for regulating the quantity of oil discharged at the burner tip.

As the burner forms the subject matter of a separate application, a detail description thereof is deemed unnecessary.

A clamping band 56 encircles the projecting end of the generator 13 and is provided with a laterally extending lug 57 which enters a correspondingly shaped opening in the face plate 9 and serves to prevent rotation of the generator.

Projecting laterally from the outer face of the cap or closure 50, is a tube or conductor 58, the inner end of which is closed by a valve or disk 59, similar in construction to the valve 45, there being a spring 60 secured to the inner face of the cap or closure and resting on the valve 59 for retaining the latter to its seat 61. The pipe 58 is designed for attachment to a flexible conductor 62 leading to a pump 63 of any suitable construction so that air may be forced through the generator to the burner tip when lighting the burner.

It is well known that crude and other heavy hydrocarbon oils become much heavier in cold weather, and by forcing the air through the generator, the air is heated before delivery to the burner tip which thins the oil passing through the burner and causes it to gasify quicker and thus prevents smoking and insures perfect combustion. Moreover, by attaching the air conductor to the generator and allowing the air to pass through said generator to the burner tip, the employment of auxiliary valves or cocks on the burner for controlling the flow of air to the tip, is entirely dispensed with,

the conductor 51, in the present case, serving the dual function of conducting the air to the burner when starting the generator and for conducting the steam to the burner tip when the generator is in operation.

In operation, a small quantity of paper is placed in the fire box and lighted, after which the valve 38 is opened and a quantity of oil admitted to the burner tip and adjusted by regulating the valve 55. The pump 63 is then connected with the tube 58 and operated to force air through the generator to the burner tip for the purpose of atomizing the oil, the flame from the burner being directed downwardly through the opening 10 to the extension 16 of the generator, thereby to heat the latter. The pump is then disconnected and the valve 24 moved to open position which allows the water to flow through the discharge orifice 20 in the nozzle 18 into the generator, where it is converted into steam and conducted through the pipe 51 to the burner tip, as will be readily understood.

By removing the plug 19, the nozzle 18 and orifice 20 may be readily cleaned, when necessary, while by detaching the cap 39, lime scales, or other impurities in the water deposited on the interior walls of the generator may be removed.

It will here be noted that the construction of the valve 59 is such that when the pump is detached from the conductor 58, the pressure or steam in the generator will retain the valve in closed position so as to effectually prevent the escape of steam.

The curved extension 16 of the generator is arranged in the path of the flame from the burner thereby causing the instantaneous generation of steam and consequently requires less time or labor on the part of the operator in starting the device with the pump.

While the generator is principally designed for use in cooking and heating stoves, it will of course be understood that the same may be used with equally good results on hot air furnaces, steam boiler furnaces and the like, without departing from the spirit of the invention.

Having thus described the invention, what is claimed as new is:

1. In a device of the class described, a steam generator, a burner connected with the generator, means for feeding water to said generator, and means for forcing air through the generator to the burner.

2. In a device of the class described, a steam generator, a burner connected with the generator, a removable cap forming a closure for one end of said generator, and means for supplying air through the cap and generator to the burner.

3. In a device of the class described, a steam generator, a burner connected with

the generator, a water supply tank, a conductor connected with the water supply tank and provided with a nozzle extending within said generator and having a discharge orifice, and means for forcing air through the generator to said burner.

4. In a device of the class described, a steam generator, a burner connected with the generator, a removable cap forming a closure for one end of said generator and provided with a safety valve communicating with the interior of the generator, means for feeding water to said generator, and a locking bail pivotally mounted on the generator and adapted to engage the cap for holding the latter in closed position.

5. In a device of the class described, a steam generator, a burner connected with the generator, means for feeding water to the generator, a cap forming a closure for one end of said generator and provided with an inclined rib, there being a passage formed in the cap and communicating with the interior of the generator, a safety valve normally closing said passage, and a locking bail pivotally mounted on said generator and adapted to engage the rib of the cap for holding said cap in closed position.

6. In a device of the class described, a steam generator, a burner connected with the generator, means for feeding water to the interior of said generator, a cap forming a closure for one end of the generator and provided with a passage, a safety valve forming a closure for the passage, a tube extending through the cap for connection with an air pump for forcing air through the generator to the burner, a valve normally closing the inner end of the tube, and a locking member pivotally mounted on the generator and adapted to engage the cap for retaining the latter in closed position.

7. In a device of the class described, a steam generator, a burner connected with the generator, means for feeding water to said generator, a cap forming a closure for one end of the generator and provided with a lateral extension having a passage formed therein leading to said generator, an arm carried by the extension, a safety valve mounted on the arm and serving to normally close the passage in the cap, an air tube extending through said cap for forcing air through the generator to the burner, a valve forming a closure for the inner end of the air tube, and means for holding the cap in closed position.

8. In a device of the class described, a steam generator having lugs extending therefrom, a burner connected with the generator, means for feeding water to said generator, a cap forming a closure for one end of the generator and provided with an inclined rib, a locking bail having eyes pivotally mounted on the lugs and provided

with a cross bar adapted to engage the rib for retaining the cap in closed position, and means extending through the cap for supplying air through the generator to the burner.

9. In a device of the class described, a steam generator having a portion thereof threaded, a downwardly and outwardly projecting extension engaging the threaded portion of the generator, a cap forming a closure for the outer end of said generator, a burner connected with the generator, means for feeding water to the interior of the generator, means carried by the cap for attachment to a source of air supply for forcing air through the generator to the burner, and means mounted on the generator and adapted to engage the cap for holding the latter in closed position.

10. In a device of the class described, a steam generator, a burner connected with the generator, a water supply tank, a conductor having a terminal nozzle extending within said generator and provided with a discharge orifice, a removable plug forming a closure for the inner end of the nozzle, a cap piece detachably secured to one end of the generator and provided with a passage communicating with the interior of the generator, a safety valve normally closing said passage, an air tube extending through the cap for forcing air through the generator to the burner, an inwardly opening valve disposed at the inner end of the air tube, and means mounted on said generator and adapted to engage the cap for holding the latter in closed position.

11. In a device of the class described, a supporting plate having an opening formed therein, a steam generator seated in said opening, a clamping band secured to the generator and provided with a lug engaging a corresponding opening in the plate, a burner connected with said generator, a water supply tank, a conductor connected with the water supply tank, and provided with a nozzle extending within the generator and having a discharge orifice formed therein, a removable cap forming a closure for one end of said generator and provided with a steam passage, a safety valve carried by the cap and normally closing said passage, a tube for conducting air through the cap and generator to the burner, and a valve for normally closing the inner end of the tube.

12. In a device of the class described, a steam generator, a burner connected with the generator, a water tank having a depending chamber, a float arranged in said chamber, a pipe for conducting water from the tank to the generator, an oil supply tank, means for conducting the oil from the last mentioned tank to the burner, and means for forcing air through the generator to said burner.

In testimony whereof, we affix our signatures in presence of two witnesses.

VIRGIL H. MILLS. [L. s.]  
JOHN H. T. MILLS. [L. s.]

Witnesses:

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THOMAS E. FARMER.