

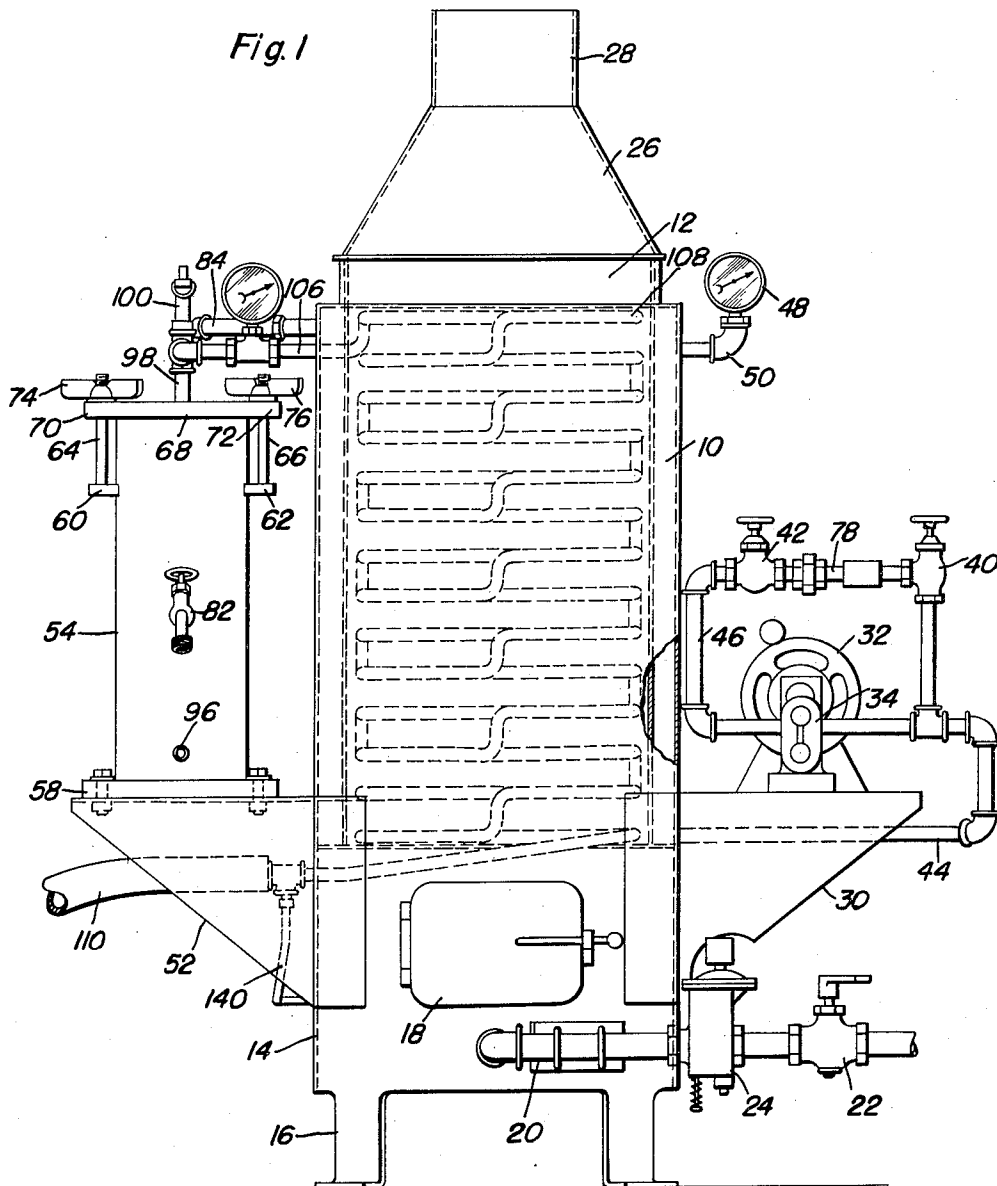
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J. E. HARTZLER ET AL  
STEAM CLEANING DEVICE

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3 Sheets-Sheet 1



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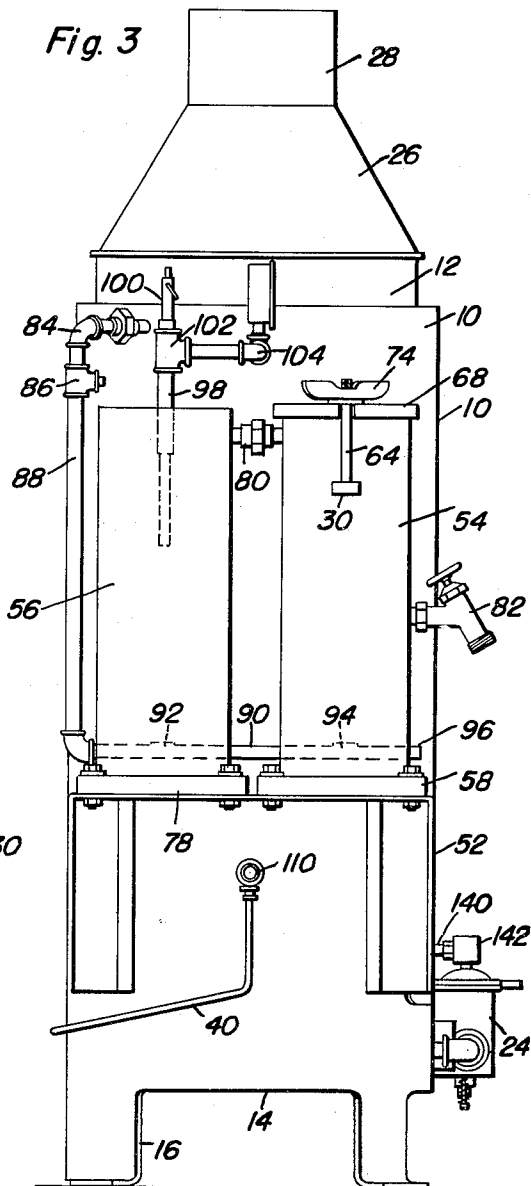
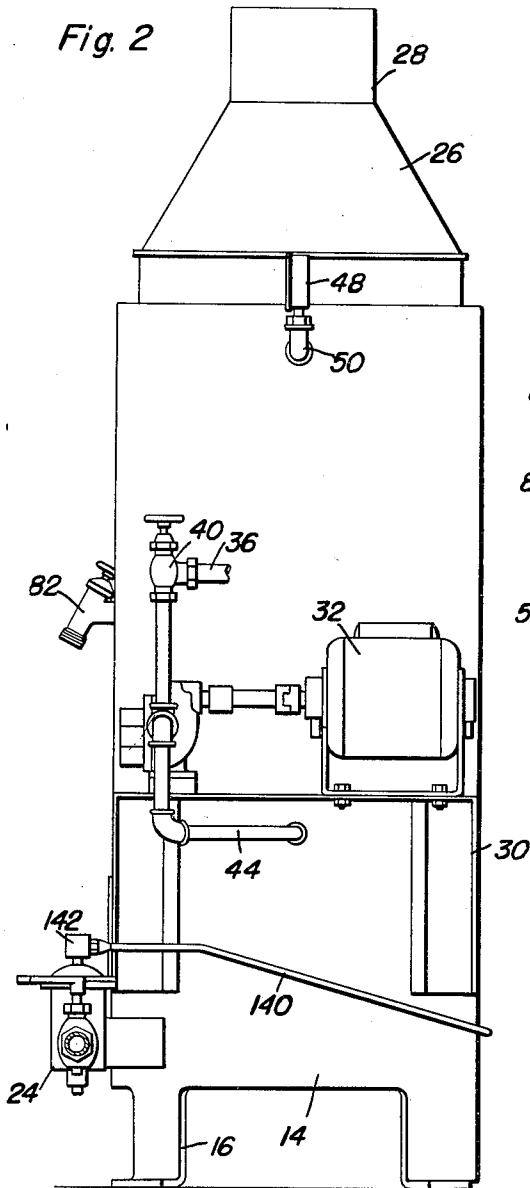
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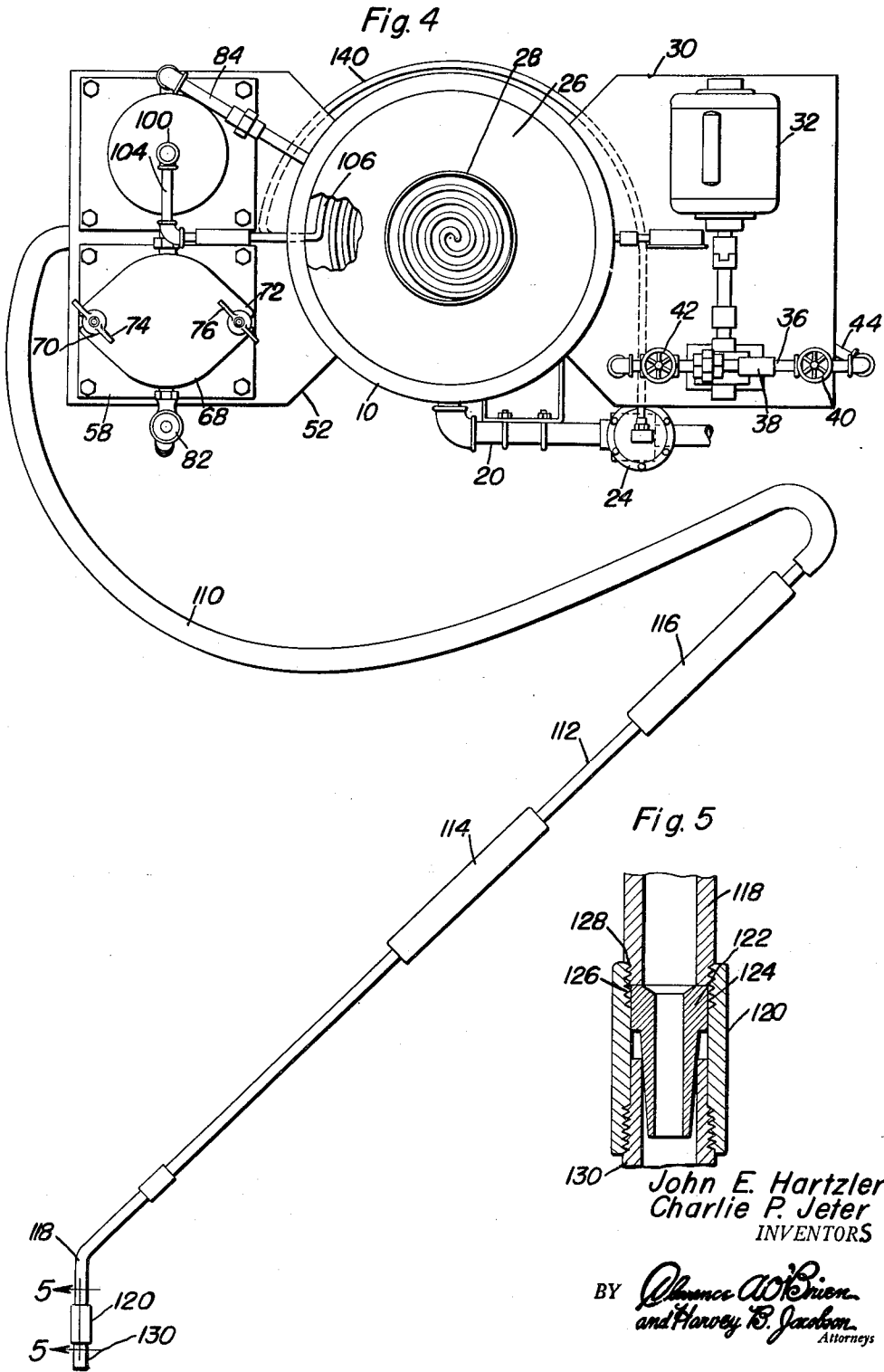
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2,733,101

## STEAM CLEANING DEVICE

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3 Claims. (Cl. 299—84)

This invention relates to a steam cleaning device and particularly to a system for generating soap laden steam and applying it in a cleaning gun. In the utilization of steam cleaning systems it is desirable to produce a detergent fluid in the nature of steam laden with soap or other cleaning material. It has heretofore been exceedingly difficult to provide the necessary high temperature steam laden with the necessary cleaning material such as soap or other detergent material.

The present invention provides a simple compact and relatively inexpensive easily used steam generator with a gun for applying the steam produced by the generator.

In the steam generator according to the invention a water jacket or annular chamber has water forced thereinto either by means of a suitable pressure supply or by means of a pump taking the water from a supply of less pressure than is in the generator. A soap chamber and a mixing chamber mounted adjacent to the annular chamber and water from the annular chamber is circulated through the soap chamber and the mixing chamber to deliver a flow of soap laden water to a superheating coil mounted on the interior of the annular chamber and communicating with the gun and having a space heater provided in the interior of the chamber.

The gun according to the invention is a substantially elongated tubular device having a shielded nozzle at the far end thereof and an insulated handle so that the operator may operate the device without being burned or otherwise injured thereby.

It is accordingly an object of the invention to provide an improved steam cleaning system.

It is a further object of the invention to provide an improved steam generator.

It is a further object of the invention to provide an improved steam gun.

It is a further object of the invention to provide a device for producing a soap laden steam and delivering it to the article to be cleaned.

It is a further object of the invention to provide a steam generator having a fuel supply controlled in accordance to the output pressure of the device.

Other objects and many of the attendant advantages of the present invention will be apparent from the following detailed description taken in conjunction with the accompanying drawing in which:

Figure 1 is a front elevation of the steam generator according to the invention;

Figure 2 is a right side elevation of the generator;

Figure 3 is a left side elevation of the generator;

Figure 4 is a top plan view of the steam cleaner; and

Figure 5 is a longitudinal section through the nozzle of the steam gun taken substantially on the plane indicated by the line 5—5 of Figure 4.

In the exemplary embodiment according to the invention an annular chamber 10 is mounted in upright position and has a central stack or passageway 12 there-through. The annular chamber 10 is mounted on a suitable base 14 having feet 16 and a fire door 13. A suitable

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fluid fuel burner (not shown) is mounted inside of the base 14 and preferably is accessible through the door 13. A fuel conduit 20 extends into the burner (not shown) and is controlled by means of a hand valve 22 and an automatic control valve 24.

A suitable flue 26 leading to a chimney 28 may be mounted at the top end of the stack 12. A laterally extending bracket 30 is mounted on one side of the steam generator and has mounted thereon a suitable driving motor such as an electric motor 32 driving a pump 34 which is in communication with a water supply line 36 which communicates with a conduit 38 the opposite ends of which are controlled by valves 40 and 42. When the valve 40 is open the conduit 36 is directly connected to a conduit 44 which enters the lower end of the annular chamber 10 so that when the pressure in the conduit 36 is above the pressure in the chamber 10 the fluid from the line 36 may flow directly through the valve 40 and the conduit 44 into the annular chamber 10. The opposed valve 42 connects through a conduit 46 to the pump 34 so that when the pressure in the line 36 is below the pressure in the chamber 10 the pump 34 will deliver fluid through the line 44 into the interior of the chamber 10, it being understood that the valve 40 is closed when the valve 42 is open.

Preferably a water gauge 48 is mounted on a suitable conduit 50 adjacent the top of the chamber 10 so that the condition of the water therein may be determined.

Oppositely disposed shelf 52 also mounted on the steam generator tank 10 has mounted thereon a soap chamber 54 and a mixing chamber 56. The soap chamber 54 is substantially cylindrical in formation and has a solid base 58 secured on the bracket 52 and is provided adjacent the top thereof with ears 60 and 62 in which are pivotally mounted tension rods 64 and 66. A top 68 is provided with laterally extending ears 70 and 72 for receiving the rods 64 and 66 which are provided with wing nuts 74 and 76.

The mixing chamber 56 is mounted on the bracket 52 adjacent to the soap chamber 54 by means of a base 78. A tubular connection 80 communicates the soap chamber 54 and the mixing chamber 56 substantially adjacent the top thereof.

A drain cock 82 is preferably provided on the soap chamber 54 so that water may be drained therefrom to admit renewal of the soap in the chamber 54.

A conduit 84 extends out of the annular chamber 10 adjacent the top thereof and is provided with a control valve 86 which connects the conduit 84 to a further conduit 88 which extends parallel to the bottom of the chambers 54 and 56 and is provided with a plurality of openings 92 and 94 so that the conduit 90 is connected to the interior of the mixing chamber 56 and the interior of the soap chamber 54. The open end of the conduit 90 is provided with a plug 96 so that the conduit 80 may be opened and cleaned.

Preferably the openings 92 are greater in number or in extent than the openings 94 so that only a minor portion of the water will be delivered into the soap chamber 54 and the major portion will be delivered into the mixing chamber 56. A conduit 98 extends into the top of the mixing chamber 56 and extends to a point adjacent the central portion thereof. A safety valve 100 is mounted on the top of the conduit 98 while a T 102 connects the conduit 98 to a conduit 104 which extends into the stack 12 where it is connected to a complex coil 106 which extends substantially the full length of the stack 12. The conduit 106 connects with the top end of the coil 108 which extends downwardly through the stack 12 and at the bottom end communicates with an output conduit 110. The outlet conduit 110 is connected to the body 112 of the cleaning gun which has a pair of insulated

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handles 114 and 116 mounted thereon so that the operator may handle the gun 112 without being burned. A laterally extending tip 118 is mounted on the gun barrel 112 and is provided adjacent the outer end thereof with a collar-like member 120 in which is mounted a reduced cylindrical nozzle 122. Preferably the member 122 is provided with threads 124 which engage the threads 126 in the collar-like member 120 and the member 118 is likewise provided with threads 128 which likewise engage the threads 126 to lock the collar, nozzle and the body 112 in firm fluid tight relation with each other. The outer end of the collar member 120 is also threaded and a tubular guard 130 is threadedly connected to the inner portion of the outer end of the member 120 with the guard 130 extending in spaced longitudinal relation with respect to the nozzle 122. A pressure conduit 140 is connected between the coil 106 and the output conduit 110 so as to be directly responsive to the pressure in the gun nozzle 120. Pressure line 140 is connected to a pressure chamber 142 on the fuel control valve 24 so that the valve 24 is controlled directly by the pressure in the gun nozzle 122.

In the operation of the device water is pumped into the annular chamber 10 and delivered into the mixing chamber and the soap chamber where the soap is carried into the mixing chamber and when perfectly dissolved will be delivered through the conduit 98 into the steam generating coils 108 where the soap laden steam will be delivered through the output conduit 110 to the steam cleaning gun. The fuel valve 22 will be adjusted to control the maximum flow of fuel into the burner (not shown) but the actual control of fuel will be controlled by the pressure regulated valve 24 so that the heat generated in the stack 12 will be directly responsive to the pressure in the gun nozzle 122. The flow of hot water through the apertures 94 into the soap chamber 54 will carry soap through the passage into the mixing chamber where it will be dissolved and carried out by the excessive water delivered through the apertures 92. However, the heavier soaps will tend to float or sink to the bottom of the tank 56 so that only dissolved soap will pass through the conduit 98 into the steam heating coils 103.

It will thus be apparent that the present invention provides a simple contact and easy to operate steam generator for providing a soap laden steam for delivery through an improved gun to any article to be cleaned.

While for purpose of exemplification a presently preferred embodiment of the invention has been shown and described according to the best present understanding thereof, it will be apparent that changes and modifications may be made in the construction and arrangement of parts thereof without departing from the true spirit and purpose of the invention.

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

1. In a steam cleaner having a substantially cylindrical, vertically disposed annular chamber with a central stack

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extending therethrough, and means including a pump for introducing water into said annular chamber, a cleaning fluid generator comprising a soap chamber, a mixing chamber, a conduit communicating with said annular chamber and extending through said soap chamber and said mixing chamber, there being perforations in said conduit for delivering water under pressure from said annular chamber into said mixing chamber and said soap chamber, the perforations in said conduit being adapted to deliver a greater quantity of water to said mixing chamber than said soap chamber, a passage between said soap chamber and said mixing chamber, a coil disposed within said stack, a conduit communicating said mixing chamber with said coil, an outlet conduit communicating with said coil.

2. A steam cleaner comprising a closed annular water chamber, heating means for the interior of said annular chamber, means for introducing water under pressure into said annular chamber, a soap chamber, a mixing chamber, a passage between said soap chamber and said mixing chamber, a conduit for delivering water under pressure from said annular chamber into said mixing chamber and into said soap chamber with the water delivered under pressure to said soap chamber forcing soap through said passage into said mixing chamber, a coil disposed within said annular chamber, a conduit interconnecting said coil with said mixing chamber, and an outlet conduit connected to said coil.

3. A steam cleaner comprising a closed annular water chamber, heating means for the interior of said annular chamber, means for introducing water under pressure into said annular chamber, a soap chamber, a mixing chamber, a passage between said soap chamber and said mixing chamber, a conduit for delivering water under pressure from said annular chamber into said mixing chamber and into said soap chamber with the water delivered under pressure to said soap chamber forcing soap through said passage into said mixing chamber, a coil disposed within said annular chamber, a conduit interconnecting said coil with said mixing chamber, and an outlet conduit connected to said coil, said heating means including a fuel burner, and valve means associated with said outlet conduit responsive to fluid pressure in said outlet conduit controlling flow of fuel to said fuel burner.

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