

Oct. 25, 1927.

1,646,746

E. J. CARROLL

ELECTRIC STEAM GENERATOR

Filed July 3, 1922

2 Sheets-Sheet 1

FIG. 1.

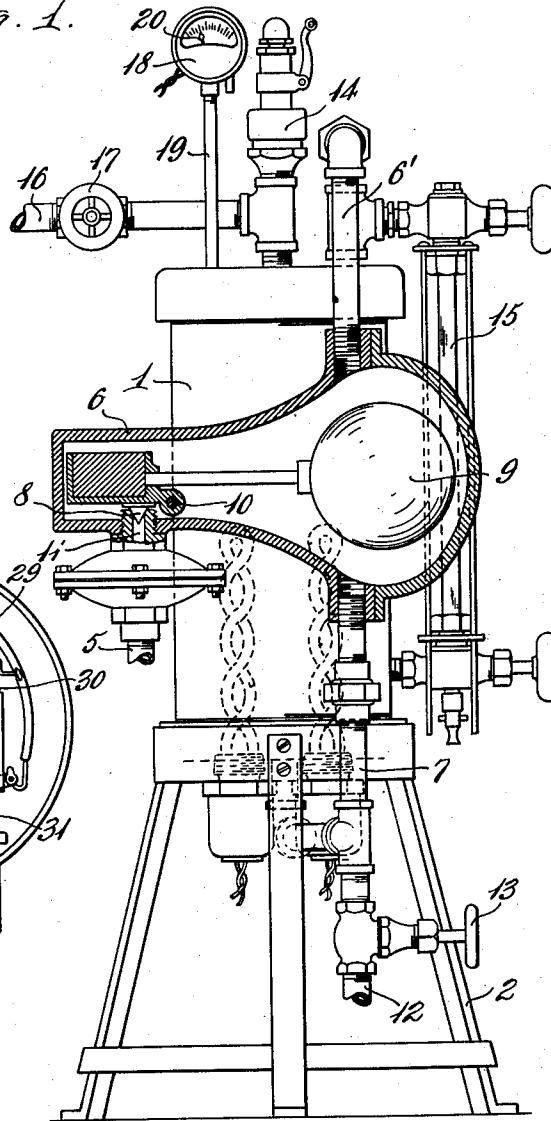
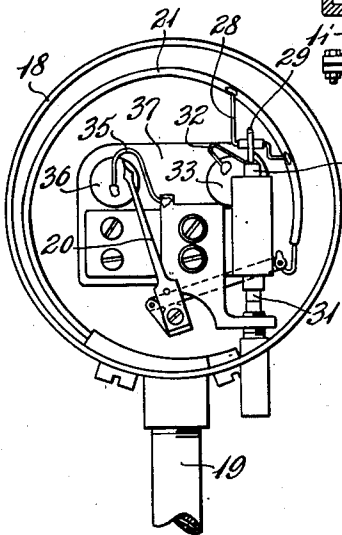


FIG. 2.



INVENTOR
Emil J. Carroll
BY
Brockett & Hyde
ATTORNEYS

Oct. 25, 1927.

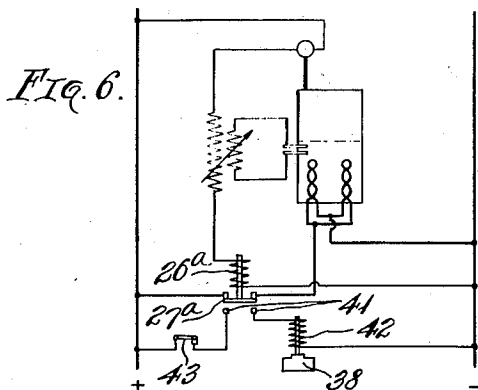
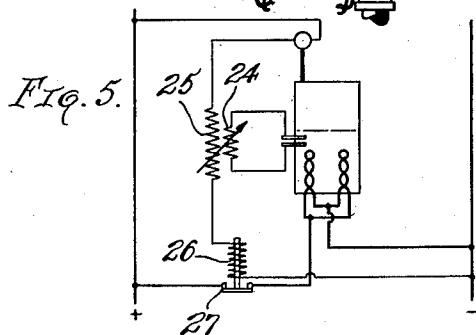
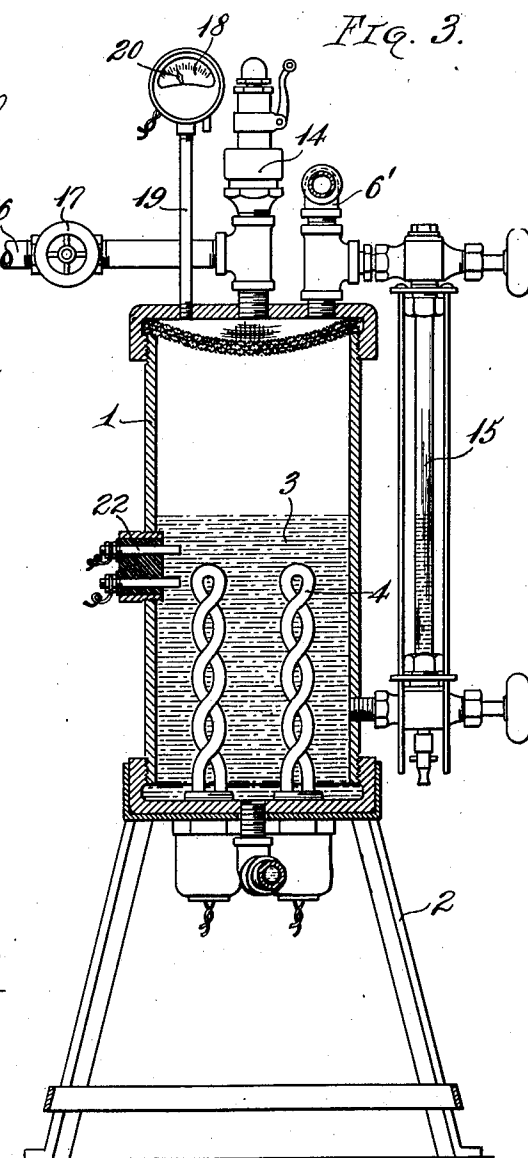
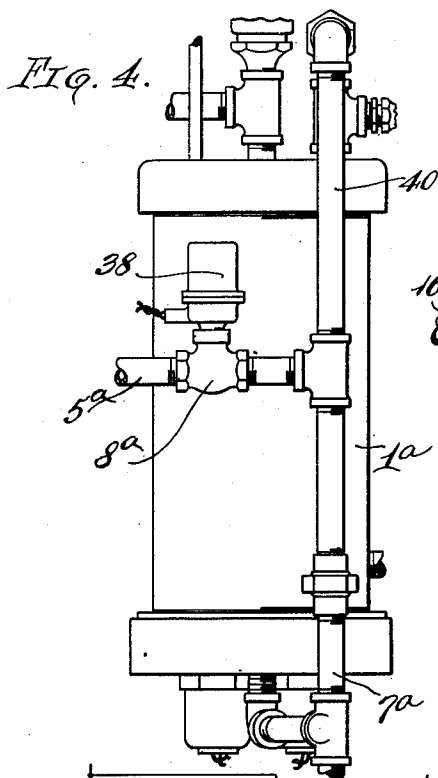
1,646,746

E. J. CARROLL

ELECTRIC STEAM GENERATOR

Filed July 3, 1922

2 Sheets-Sheet 2



INVENTOR
Emil J. Carroll
BY
Brockett & Hyde
ATTORNEYS

UNITED STATES PATENT OFFICE.

EMIL J. CARROLL, OF NORWOOD, OHIO, ASSIGNOR TO THE AMERICAN LAUNDRY MACHINERY COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

ELECTRIC STEAM GENERATOR.

Application filed July 3, 1922. Serial No. 572,576.

This invention relates to improvements in steam generating devices for use in connection with garment and laundry presses.

The objects of this invention are to provide a steam generator with electric heating elements together with mechanical means for automatically regulating the water level in the generator; to provide means for automatically cutting out the heating elements according to the quantity of water in the generator; to provide means for insulating the boiler of the generator from the high voltage of the main line current; to provide means for automatically regulating the heat and water supply according to the steam pressure generated; and to provide also electric means for controlling the water supply to the generator.

Other objects of the invention will be apparent from the following description and claims when considered together with the accompanying drawings.

Fig. 1 shows my improved device in elevation with the float chamber shown in section; Fig. 2 shows the pressure gauge in elevation with the cover removed; Fig. 3 is a vertical section of the generator; Fig. 4 shows in elevation a modified form in which a solenoid valve is substituted for the float valve; and Figs. 5 and 6 are electrical diagrams of the control systems for the two forms of my device embodying the float valve and the solenoid valve respectively.

The cylindrical boiler 1 of the steam generator is suitably supported upon the frame 2 and the water contained therein as indicated by reference numeral 3 is adapted to be heated by means of the electric coils 4. These coils are arranged in parallel in the main line A. C. circuit, as indicated in the electric diagrams, Figs. 5 and 6. The water is supplied through pipe 5 by way of the float chamber 6 which has communication through the pipe 7 with the boiler 1. The valve 8, which is controlled by the float 9, is pivotally mounted at the point 10 and is adapted to close the opening 11 of the water supply. A blow-off or drain 12 is provided and is controlled by means of the valve 13 for purposes of draining the boiler. I have provided a safety valve 14 and the water gauge 15. The steam outlet is indicated at 16 and is controlled by the valve 17. The indicator 18 is operated through the connection 19 so as to indicate the steam

pressure upon the dial, the indicator finger being indicated by reference numeral 20 and being operated by the Bourdon tube 21, which serves also as a means for automatically controlling the energization of the heating elements according to the steam pressure as will be later explained.

When the water level in the boiler falls below a certain point, the valve 8 will be opened by the lowering of the float so as to permit replenishment of water in the boiler. This float normally maintains a level of water in the boiler above both of the electrodes 22, to be described, so that said electrodes are always normally immersed in the boiler water and function to open the circuit in case the water level drops below the level maintained by the float.

The electrodes 22 extend inside of the steam boiler and are so positioned in the wall of the boiler that the circuit will be closed through them by means of the water in the boiler which is indicated at high level in Fig. 3 of the drawings. Referring now to the electrical diagram shown in Fig. 5 and assuming the water to be at the level indicated at Fig. 3, the circuit will be closed through the electrodes 22 and hence through the secondary coil 24 of the transformer, the primary coil of which is indicated by reference numeral 25. The closing of the circuit through the secondary coil will cause more current to flow through the transformer so as to be sufficient to energize the relay coil 26 which closes the circuit through the contacts 27 included in the same circuit as the heating elements 4. Thus it will be seen that when the water is at the level indicated in Fig. 3 the heating elements will be energized so as to generate steam which will occupy the disengagement area above the water in the boiler.

Now when a certain pre-determined pressure of steam has been generated and accumulated in the area in the top part of the boiler, the Bourdon tube will be caused to straighten to sufficient extent to cause the wire 28, the two ends of which are soldered or otherwise secured to the Bourdon tube, to engage and raise the loop 29 secured to the sliding switch member 30 which cooperates with the adjustable switch member 31. The slidable switch member 30 is connected by means of the wire 32 to its contact plate 33 while the adjustable switch member 31 which

has electric connection with the plate 33 is provided with the wire 35 affording connection to the contact plate 36. The contact plates 33 and 36 are suitably mounted on the insulating member 37. With this arrangement it is possible to set the adjustable switch member 31 according to the degree of steam pressure desired, so that when such pressure has been attained the action of the Bourdon tube will cause the sliding switch member 30 to be raised and to break contact with the adjustable switch member 31. Since this automatic switch control is located in the same circuit with the primary coil of the transformer and also in circuit with the relay coil 26, the contacts 27 will be opened and the circuit through the heating coils will be broken so as to automatically discontinue further generation of steam until the pressure in the disengagement area falls below the pre-determined point; whereupon the circuit through the heating coils will be again closed by return of the sliding contact 30 so as to close the circuit through the relay coil 26 and hence through the contacts 27.

In case the float valve should fail to function in the manner above described, the electric means just described can be depended upon to automatically cut out the heating coils.

I have provided also a modified form in which an electro-magnetic valve is substituted for the float valve, this form being illustrated in Fig. 4 in which the valve 8^a is controlled by the electro-magnet 38, the other connections with the boiler and water supply being the same as in the first form. That is, water inlet is through the pipes 5^a and 7^a to the boiler 1^a. The pipe 40 in the second form of device corresponds to the steam pipe 6' in the first form leading from the top of the boiler to the float chamber 6. In this second form of device the breaking of the circuit at the point of the Bourdon tube will cause the relay coil 26^a to be de-energized, permitting the contact member 27^a to fall and close the circuit through contacts 41, thereby closing the circuit through the coil 42 for opening valve 8^a so as to permit replenishment of the water in the boiler 1^a. Likewise, upon breaking the circuit of the secondary coil by the lowering of the water level below the electrodes, the same automatic opening of valve 8^a takes place. When magnet 38 is de-energized,

valve 8^a is closed by water pressure, as for instance when the water in the boiler reaches sufficient level to close circuit through the electrodes so as to close circuit through contacts 27^a.

In either form of device the boiler can be drained and cleaned out by opening valve 13. In the first form, the float will descend and the valve 8 will open to permit flushing of the boiler. In the second form, the valve 8^a will be opened, in the manner above described, upon lowering of the water in the boiler, and the solenoid valve can be closed by opening switch 43.

As a means of removing moisture from the steam before it leaves the boiler, I have provided a plurality of screens of fine mesh extending across the top of the boiler. They are held in place by means of the cap of the boiler, as clearly shown in the drawing, or may be secured in any other suitable manner, and are dished in the present form of device so as to be spaced from the cap or head of the boiler. Thus only dry steam is permitted to be discharged through the outlet.

What I claim is:

1. A steam generator, comprising a boiler, electrical heating members therefor normally immersed in the boiler water, and a controller for said heating members, including a control circuit having a primary coil, and a secondary therefor having electrodes so located as to be normally immersed in the boiler water to close the secondary circuit and to open said circuit when the water level lowers and exposes said heating members to the steam space.

2. A steam generator, comprising a boiler, electrical heating members therefor normally immersed in the boiler water, and a controller for said heating members, including a control circuit having a primary coil, and a secondary therefor having electrodes so located as to be normally immersed in the boiler water to close the secondary circuit and to open said circuit when the water level lowers and exposes said heating members to the steam space, a valve for controlling the supply of water to said boiler, and means whereby said control circuit controls said valve to supply boiler water when said electrodes are uncovered.

In testimony whereof I hereby affix my signature.

EMIL J. CARROLL