

Sept. 14, 1926.

1,599,544

J. H. REED

ELECTRIC STEAM GENERATOR

Filed Oct. 7, 1924

2 Sheets-Sheet 1

Fig. 1.

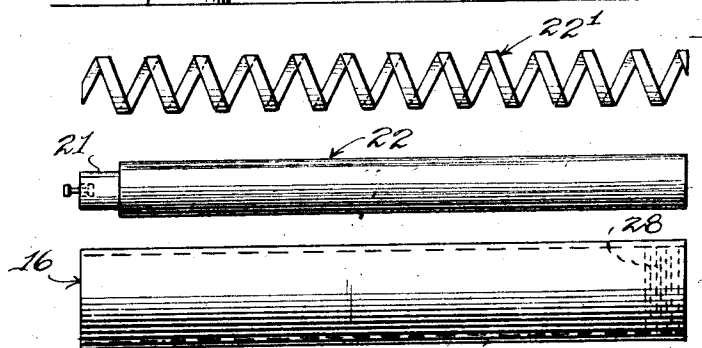
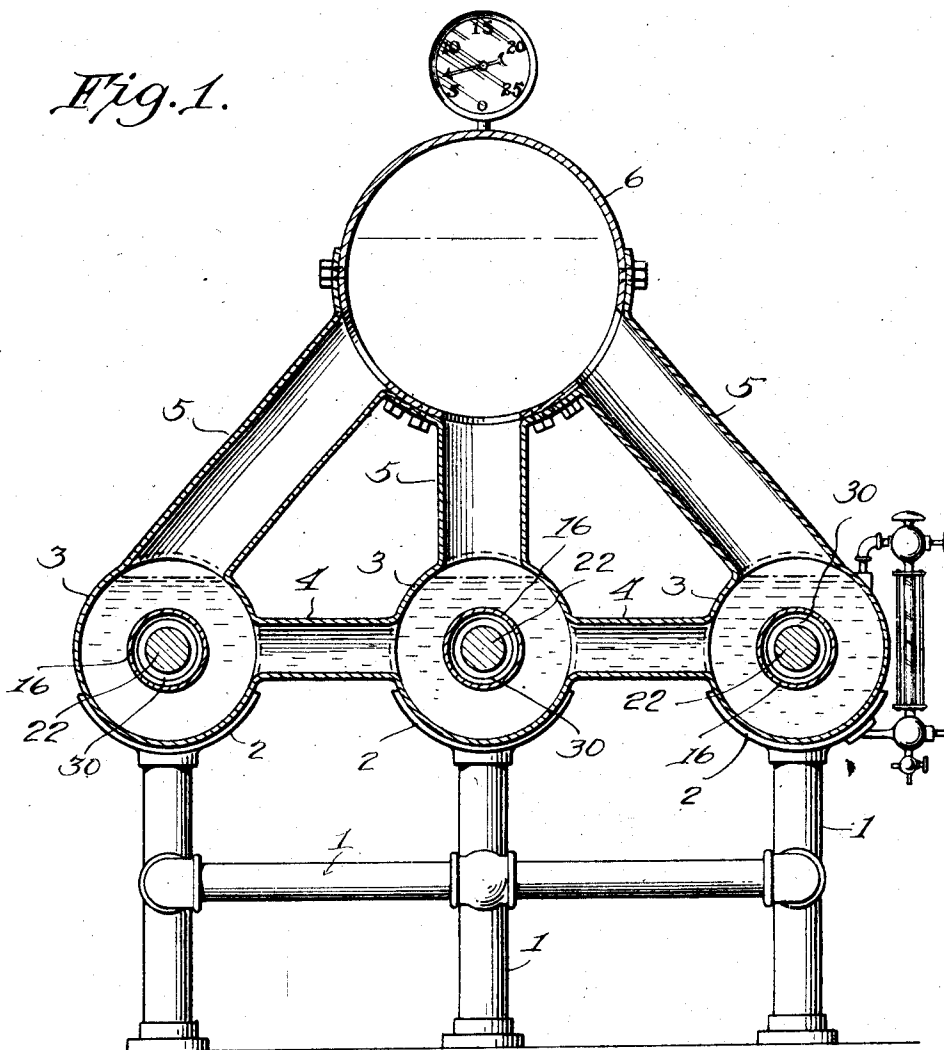


Fig. 3.

Inventor
James H. Reed
By
Shaw, Crow & Gordon
Attorneys

Sept. 14 , 1926.

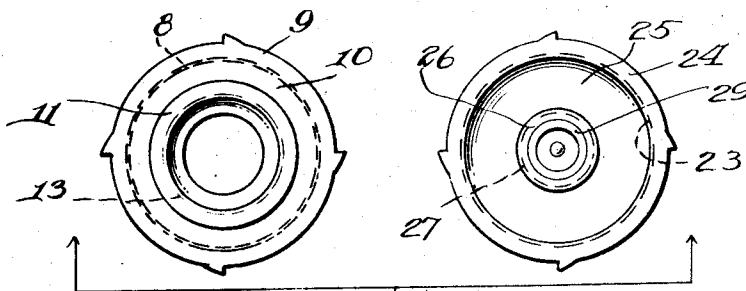
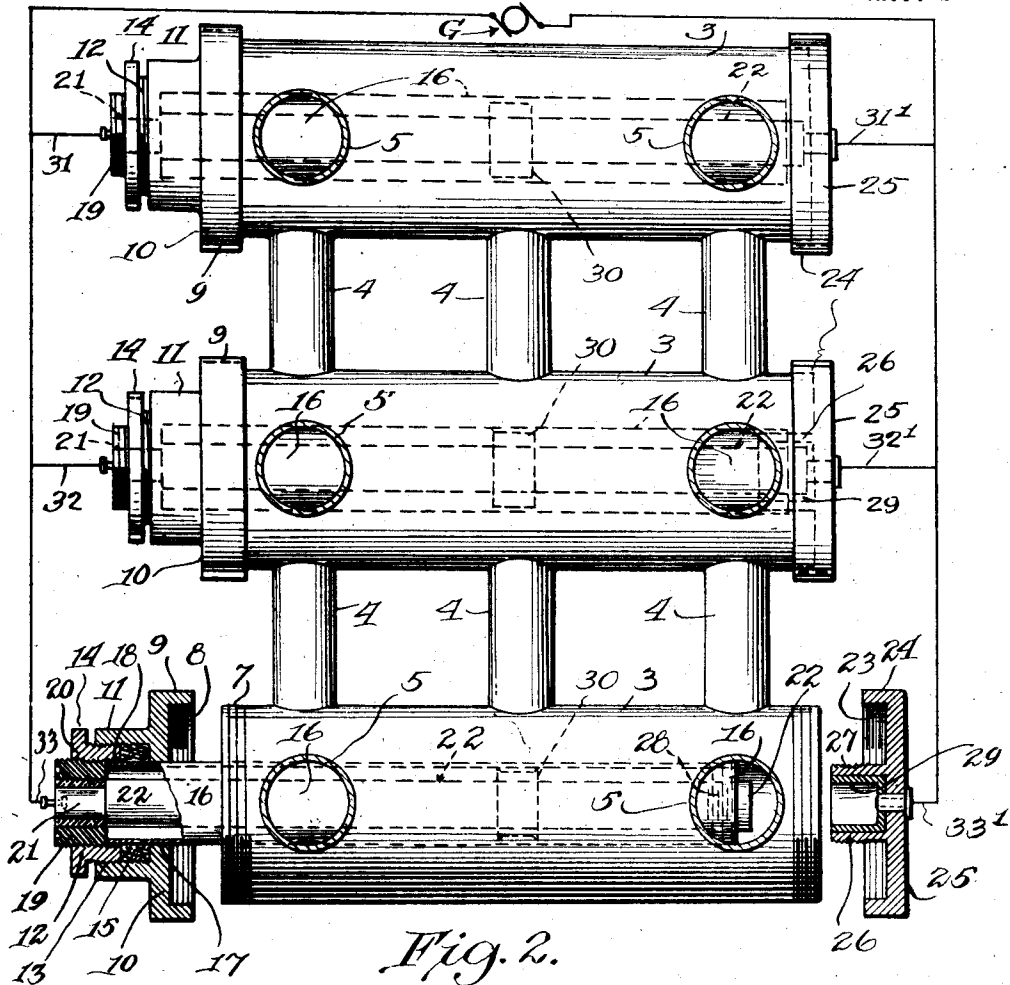
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

JAMES HARTLEY REED, OF DETROIT, MICHIGAN.

ELECTRIC STEAM GENERATOR.

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Generically this invention relates to steam boilers, but it more especially comprehends the type in which steam is generated by electrical current.

5 One object of this invention is to provide a boiler unit of this type of simplified construction so designed as to be efficiently and economically operated.

10 Another object of this invention is to provide an electric steam boiler embodying a plurality of interconnected water tubes having a common steam reservoir.

15 A further important object of this invention is to provide novel means for housing and supporting electric heating elements within the water tubes.

A still further object of this invention is the provision of simplified means for holding and insulating the heating elements.

20 With these and other objects in view, which will become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which like characters of reference indicate like parts throughout the several figures, of which:—

25 Fig. 1 is a cross section of my improved electric steam boiler;

30 Fig. 2 is a top plan view of the water tubes showing the heating element and casing in dotted outline, the end closures and heating element supporting means on two of the tubes in operative position, and with the end plates and heating element supports detached from one of the tubes, and showing the circuits to the heating elements; and

35 Fig. 3 is a detailed view of the heating bar, bar casing, front and rear end plates, and modified form of heating element or coil.

40 Fig. 4 is a face view of front and rear end plates 10 and 25, respectively.

45 I am aware that many attempts have been made to perfect electric steam generators, but for the most part they have, owing to a multiplicity of parts, non-economical heating structures and for other reasons, proven more or less unsatisfactory, and it was to overcome such deficiencies and to provide an electrical steam generator, simple in construction, comprising few parts, embodying heating units comprising novel supporting means and economically operat-

ed, that I designed the boiler structure forming the subject matter of this invention.

In the illustrated embodiment characterizing this invention there is shown a supporting frame 1 the upper end of which terminates in a plurality of U-shaped supporting members 2 adapted to be placed under each end of the parallelly extending spaced water tubes 3. The said tubes 3 are connected by a plurality of spreader or cross tubes 4 so that water may freely circulate between the said tubes

60 Projecting upwardly from water tubes 3 are a plurality of outlet or steam tubes 5 discharging into and forming a support for a steam dome or reservoir 6 positioned above the water tubes 3 and in vertically spaced parallelism with respect to the center tube 3.

65 The front ends of water tubes 3 are externally threaded as at 7 to engage the internal threads 8 of flanges 9 integrally formed on end plates 10 which are formed with integral outwardly extending flanges 11 of smaller diameter than the said plates 10 and internally threaded to engage the external threads of the packing nuts 12 as at 13, the said nuts 12 are formed with integral flanges 14 adapted to seat against the flanges 11 to limit the inward or tightening movement of the said nuts against the packing 15, for a purpose which will hereinafter more fully appear.

70 The heating element casings 16 are adapted to extend through the tubes 3 and beyond the front ends thereof, through end plates 10 as at 17 and partially within packing nuts 12 as at 18. The porcelain collar 19 is adapted to threadedly engage the packing nuts 12 as at 20 and to receive, support and insulate the reduced end 21 of heating element 22 extending through and housed by casing 16, thereby insulating and forming a closure for said casing.

75 The rear ends of water tubes 3 are externally threaded to engage the interior threads 23 of flanges 24 integrally formed on rear end plates 25, which is also formed with an integral outstanding flange 26 externally threaded as at 27 to engage the interior threads 28 of casing 16 to support and form a waterseal connection therewith. A porcelain collar or insulating member 29 is adapted to seat within and form a lining for the flanged portion 26, and is primarily designed to receive, support and insulate the rear end of the heating element or bar

22, and is centrally apertured to receive a lead wire as hereinafter more fully explained. When operatively positioned the heating element 22 is further supported by a porcelain or similar insulating collar 30 centrally disposed within the casing 16.

It is to be understood that wherever desirable, coil 22' may be employed as a resistance or heating element in the place of bar 22 above described.

The manner of heating the water in the tubes 3 is as follows:

Electrical energy derived from the generator or other suitable source of power G is fed into the bus line 31—33 from which it is led through the heating elements or resistances 31—31', 32—32', and 33—33' to the return bus line 33'—31' and thence back to the source of energy or generator G.

The heating mediums or resistances convert the electrical energy into heat which is transferred through the casings 16 to the water in the tubes 3 and the resultant steam or vapor is conducted through the tubes 5 to the reservoir or dome 6 for utilization as desired. It is thought that the operation of the device is clear from the above description, and that further explanation is unnecessary.

In practice, I have found that the form of my invention illustrated in the accompanying drawings and referred to in the above description as the preferred embodiment, is the most efficient and practical, yet realizing the conditions concurrent with the adoption of my device will necessarily vary,

I desire to emphasize that various minor changes in details of construction, proportion and arrangement of parts, may be resorted to within the scope of the appended claims without departing from or sacrificing any of the principles of my invention.

Having thus described my invention, and without enumerating variations and equivalents, what I desire protected by Letters Patent is as set forth in the following claim:

In an electrically heated boiler, the combination, with a plurality of spaced parallel water tubes in the same longitudinal plane, a plurality of pipes interconnecting said tubes, a reservoir centrally and vertically spaced with respect to said tubes, a plurality of outlet pipes connecting said tubes with said reservoir, a heating element extending through each of said tubes and beyond one end thereof comprising a casing and resistance medium, a closure assembly for one end of each tube comprising an end plate having a flange at right angles thereto of less diameter than said plate, a packing nut adapted to engage said flange and a supporting collar engaging said packing nut for insulating and supporting said heating element, a closure for the other end of each of said tubes comprising an end plate formed with an outstanding cylindrical projection adapted to receive, support and insulate the other end of said heating element, and means transmitting electric current to the heating medium.

JAMES HARTLEY REED.