Dec. 25, 1934. W. NOSARZEWSKI 1,985,546

ELECTRIC STEAM GENERATOR

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Fig. 1

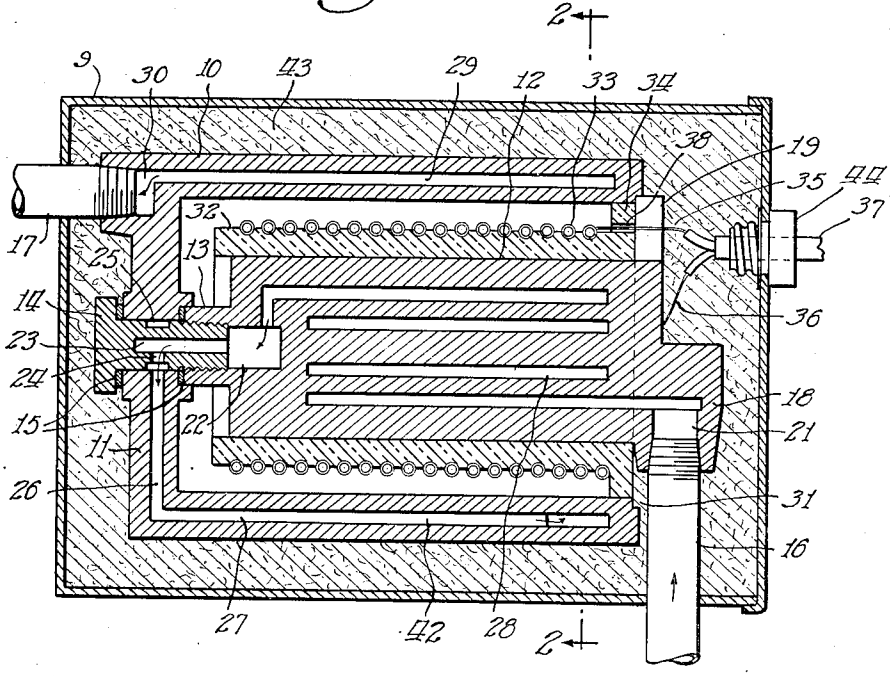
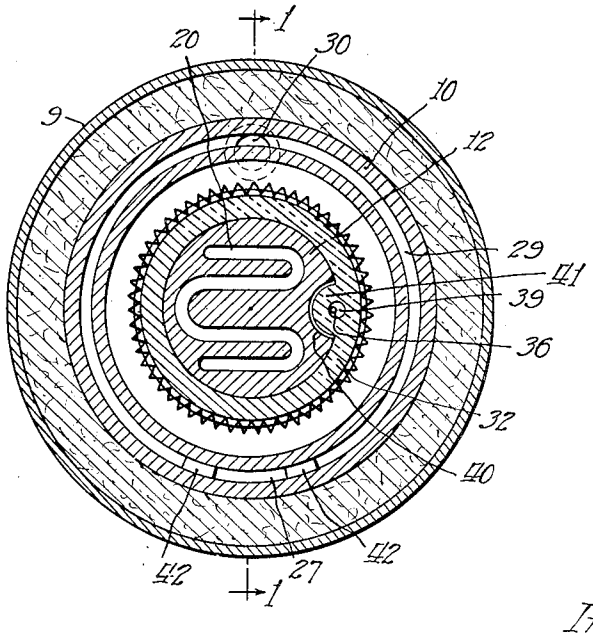


Fig. 2



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ELECTRIC STEAM GENERATOR

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6 Claims. (Cl. 219—39)

The invention relates to electric steam generators adapted to generate steam without providing the conventional type of boiler and which is especially adapted to supply steam in small quantities for toy machines and the like, and in numerous other devices wherein it is desirable to have available small quantities of steam, such for example as in steaming fine fabrics or garments. The device may also be manufactured in large sizes to provide steam in sufficient volume to motivate factory and other equipment and meet the usual commercial requirements for steam power where steam is preferable to electricity as power.

The invention has among its objects the provision of an improved steam generator of the kind described which is capable of generating steam at high temperature in either large or small quantities with a minimum loss of heat energy.

Another object of the invention is the provision of a device of the kind described which is simple, compact, durable, reliable, efficient and satisfactory for its intended purpose.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described and more particularly pointed out in the claims.

In the drawing, wherein like reference characters indicate like or corresponding parts,

Fig. 1 is a longitudinal sectional view through the device taken along the line 1—1 of Fig. 2; and

Fig. 2 is a transverse sectional view taken along the line 2—2 of Fig. 1.

Referring now more particularly to the drawing, the device comprises an outer steam chest taking the form of a hollow cylindrical shell 10 having a closed end 11 and the other end open and an inner steam chest taking the form of a cylindrical member 12 positioned within and concentric with the shell 10. The member 12 has an interiorly threaded axial stem 13 at its inner end by means of which it is fastened to the closed end 11 of the shell by a bolt 14.

A sleeve 32, preferably of porcelain or other heat conducting and electrical insulating material, is mounted on the member 12 and has a flange 34 fitting the inner periphery of the shell 10 and closing the space between the shell and member. The cylindrical member 12 is held against movement relative to the shell 10 by the bolt 14 which is threaded to clamp a pair of gaskets 15 against the end 11 of the shell. A segmental flange section 19 on the outer end of the member 12 is positioned in an annular groove 31 formed in the end of the shell 10. The groove 31 extends entirely around the shell 10 and provides a guide for the member 12, permitting the member 12 to be mounted in any desired rotative position relative to the shell 10 with the flange section 19 positioned in the groove. The outer steam chest or shell 10 and the inner steam chest or chamber 12 are quickly and easily disassembled by manipulation of the bolt 14. The outer end of the member 12 is also provided with a projecting lug 18 having an opening 21 with which an inlet pipe 16 has a threaded connection.

The opening 21 is connected with a channel 20 providing a steam chamber or chest in the member 12. The channel 20 extends substantially the full length of the member 12, and, as shown in cross section in Fig. 2 comprises a plurality of sinuous overlapping portions. A chamber 22 connects the inner end of the channel 20 with an axial bore 23 in the bolt 14. An annular recess 25 in the outer periphery of the bolt 14 and a radial duct 24 in the bolt connects the axial bore with a duct 26 in the closed end 11 of the shell 10.

The side wall of the shell 10 is apertured to provide a cylindrical chamber or steam chest 29 extending substantially the full length of the shell. A pair of closely spaced ribs 42, projecting from the closed end of the shell 10, form a narrow passage 27. The ribs 42 stop short of the opposite end of the cylindrical chamber or steam chest 29 thereby providing outlets or ports on each side connecting the passage 27 with the main body of the cylindrical steam chest. The duct 26 opens into the closed end of the passage 27 and thereby permits the contents of the steam chest or channel 20 to flow into the cylindrical chamber 29 of the shell 10. A pipe 17 connected with the steam chest 29 by a recess 30 formed in the closed end of the shell 10, permits the steam generated in the steam chests 20 and 29 to be drawn off as needed for doing work or to be discharged into a steam storage chamber, not shown.

Water entering the device through the inlet pipe 16, is quickly changed to steam by an electric heating unit comprising a coil 22 wound about the sleeve 32. A cord 37 provides a pair of conductors 35 and 36 which are connected with a source of electrical energy not shown. The coil 33 is connected at one end with the conductor 35, the latter extending through an aperture 38 in the flange 34 of the sleeve 32. The other end of the coil 33 is

connected with the conductor 36, the latter being positioned in an aperture 39 extending the full length of the sleeve 32. A convex projection 41 on the sleeve 32 is positioned in a cooperating concave groove 40 in the member 12 thereby preventing rotation of the sleeve relative to the member and permitting the sleeve to be easily mounted upon or removed from the member by longitudinal movement thereof.

The shell 10 and the member 12 are mounted in a housing 9, the latter having apertures adapted to register with the inlet opening 21 and the discharge opening or recess 30 and permit the pipes 16 and 17 to be respectively connected therewith upon assembly of the device and mounting it on the housing. The cord 37 projects through the housing 9 and is fastened by means of a well known fastening device 44 as shown in Fig. 1. The space between the housing 9 and the shell 10 is filled with any suitable insulating material 43 such as asbestos or the like.

In operation the inlet pipe 16 may be connected with any suitable source of water supply and the coil 33 is heated by connecting the conductors 35 and 36 with any suitable source of electrical energy. The sinuosity of the steam chest 20 is adapted to rapidly heat the liquid contents as it provides a relatively large contact area of the low temperature steam with the heated member 12. The fluid contents of the steam chest 20 in the form of steam passes into the cylindrical chamber 29 where the steam is superheated and is discharged through the outlet pipe 17. The member 12 thereby generates steam at a low temperature and the shell 10 serves as a superheater. The construction is such that the advancing steam is constantly subjected to direct contact with the heated surface of steam chests 12 and 10. The wet steam generated at the inlet end of the member 12 flows the full length of the member, then in the opposite direction through the passage 27, and again in the opposite direction through the cylindrical steam chamber 29 where it is superheated.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same and that any type of electric unit may be used without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. A boilerless steam generator of the kind described comprising a shell having its side walls apertured to provide a closed chamber extending around and substantially the full length of the shell, a member positioned within and extending longitudinally of the shell, an electrical heating unit positioned within the shell and surrounding said member in closely spaced relation to the shell and member, said member providing a closed chamber extending substantially its full length, a pipe providing an inlet for said member at one end of the generator, a pipe providing an outlet for said shell at the other end of the generator, and a conduit connecting the end of said member opposite to its inlet end with the end of said shell opposite to its outlet end.

2. A boilerless steam generator of the kind described comprising a shell having its side walls apertured to provide a closed chamber extending around and substantially the full length of the shell, a member positioned within and extending longitudinally of the shell, an electrical heating unit positioned within the shell and surrounding said member in closely spaced relation to the shell and member, said member providing a closed chamber extending substantially its full length and comprising a shallow aperture having a laterally undulating tortuous cross-section, a pipe providing an inlet for said member at one end of the generator, a pipe providing an outlet for said shell at the other end of the generator, and a conduit connecting the end of said member opposite its inlet end with the end of said shell opposite its outlet end.

3. A boilerless steam generator of the kind described comprising a shell having one closed end, and its side walls apertured to provide a closed chamber extending around and substantially the full length of the shell, a member positioned within and extending longitudinally of the shell with its inner end abutting the closed end of said shell, an electrical heating unit positioned within the shell and surrounding said member in closely spaced relation to the shell and member, said member providing a closed chamber extending substantially its full length, a pipe providing an inlet for said member at its outer end, a pipe providing an outlet for said shell adjacent its closed end, means connecting the closed end of said shell with the adjacent end of said member, said means providing a longitudinal bore connected with the chamber in said member and a transverse aperture providing an outlet for said bore, the end wall of said shell providing a closed duct connected with said transverse aperture, the side walls of said shell providing a closed duct having one end opening into its chamber adjacent the open end of said shell and the other end connected with said duct in the closed end.

4. A boilerless steam generator of the kind described comprising a shell having one closed end, and its side walls apertured to provide a closed chamber extending around and substantially the full length of the shell, a member positioned within and extending longitudinally of the shell with its inner end abutting the closed end of said shell, an electrical heating unit positioned within the shell and surrounding said member in closely spaced relation to the shell and member, said member providing a closed chamber extending substantially its full length, a pipe providing an inlet for said member at its outer end, a pipe providing an outlet for said shell adjacent its closed end, means connecting the closed end of said shell with the adjacent end of said member, said means providing a longitudinal bore connected with the chamber in said member and a transverse aperture providing an outlet for said bore, the end wall of said shell providing a closed duct connected with said transverse aperture, the side walls of said shell providing a closed duct having one end opening into its chamber adjacent the open end of said shell and the other end connected with said duct in the closed end, and means closing the space between said shell and member at the open end of said shell.

5. A boilerless steam generator of the kind described comprising an outer cylindrical shell having one closed end and its side walls apertured to provide a closed chamber extending around and substantially the full length of the shell, a cylindrical member positioned within and extending longitudinally of the shell with its inner end abutting the closed end of said shell, an electrical heating unit positioned within the

shell and surrounding said member in closely spaced relation to the shell and member, said member providing a closed chamber extending substantially its full length and comprising a shallow aperture having a laterally undulating tortuous cross-section, an inlet pipe connected with the chamber in said chamber adjacent its outer end, a pipe connected with the chamber in said shell adjacent its closed end, a bolt extending through the closed end of said shell and threaded into the adjacent end of said member, said bolt providing a longitudinal bore connected with the chamber in said member and a radial aperture providing an outlet for said bore, the end wall of said shell providing a closed duct connected with said radial aperture, the side wall of said shell providing a closed duct having one end opening into its chamber adjacent the open end of said shell and the other end connected with said duct in its closed end.

6. A boilerless steam generator of the kind described comprising an outer cylindrical shell having one closed end and its side walls apertured to provide a closed chamber extending around and substantially the full length of the shell, a cylindrical member positioned within and extending longitudinally of the shell with its inner end abutting the closed end of said shell, an electrical heating unit positioned within the shell and surrounding said member in closely spaced relation to the shell and member, said member providing a closed chamber extending substantially its full length and comprising a shallow aperture having a laterally undulating tortuous cross-section, an inlet pipe connected with the chamber in said member adjacent its outer end, a pipe connected with the chamber in said shell adjacent its closed end, a bolt extending through the closed end of said shell and threaded into the adjacent end of said member, said bolt providing a longitudinal bore connected with the chamber in said member and a radial aperture providing an outlet for said bore, the end wall of said shell providing a closed duct connected with said radial aperture, the side wall of said shell providing a closed duct having one end opening into its chamber adjacent the open end of said shell and the other end connected with said duct in its closed end, and means closing the space between said shell and member at the open end of said shell.

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