Dec. 7, 1926. 1,609,661

M. E. QUINN ET AL

STEAM GENERATOR

Filed Oct. 7, 1924 2 Sheets-Sheet 1

Fig. 1.

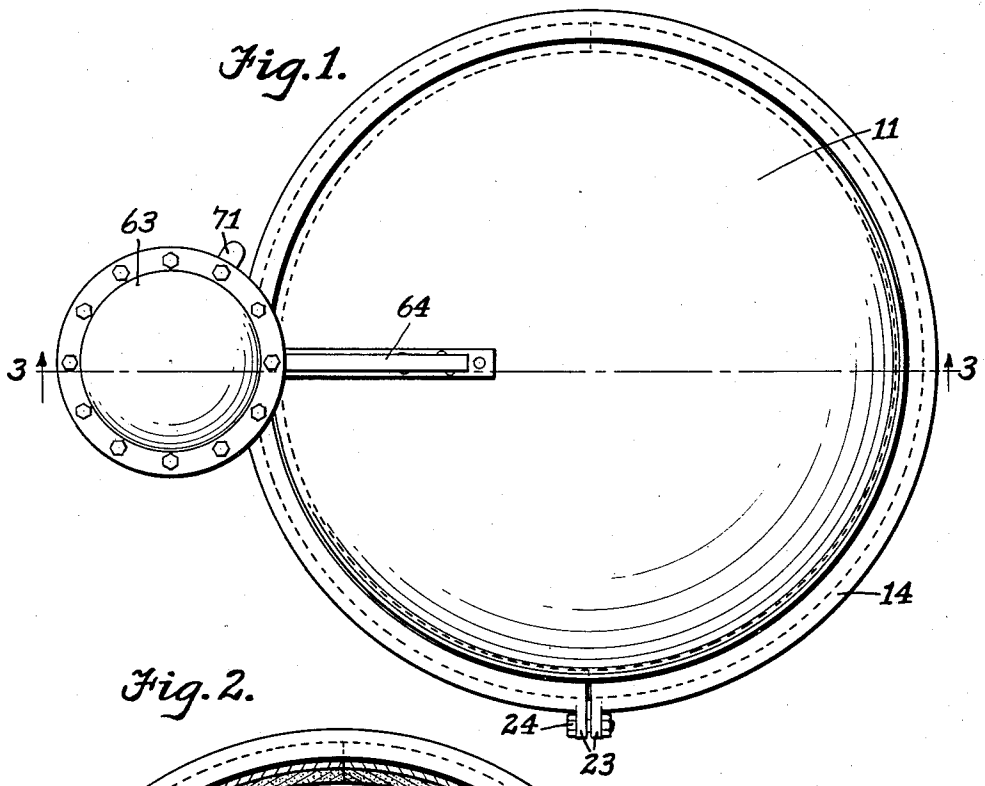
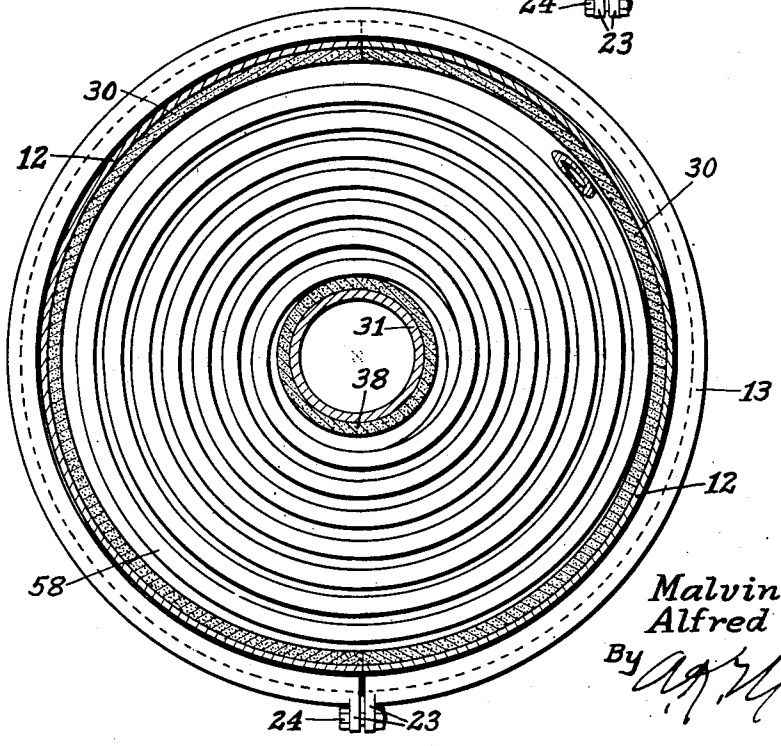


Fig. 2.



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Fig. 3.

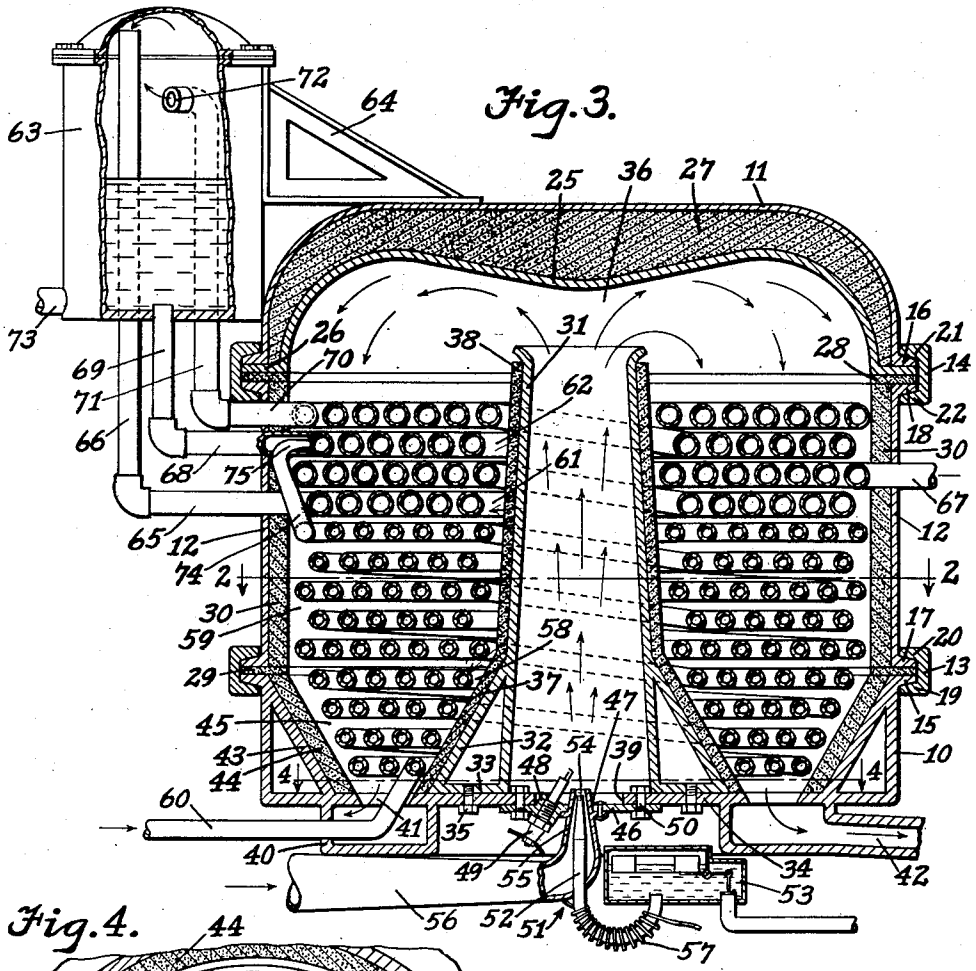
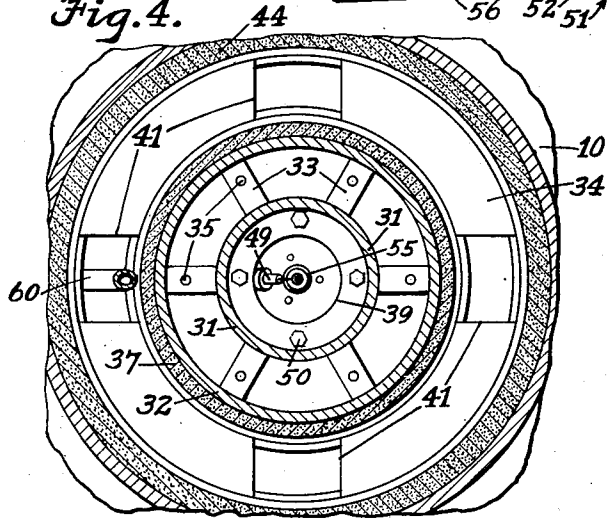


Fig. 4.



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UNITED STATES PATENT OFFICE.

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STEAM GENERATOR.

Application filed October 7, 1924. Serial No. 742,158.

Our invention relates to steam generators and more particularly to a type of steam generator which will produce steam quickly and which may be regulated easily and closely.

The main object of our invention is to provide an instantaneous steam generator especially adapted for small engines, such as are used in automobiles, motor boats and the like.

Another object is to provide a steam generator of the kind described which is simple in construction and which may be quickly assembled and disassembled so that its inner parts are readily accessible.

Another object is to provide a generator of the kind described which will produce steam at a minimum of cost and which is at the same time highly efficient.

Other objects and advantages will appear hereinafter and while we show herewith and will describe a preferred form of construction, we desire to be understood that we do not limit our invention to such preferred form but that various changes and adaptations may be made therein without departing from the spirit of our invention as hereinafter claimed.

Referring to the drawings which accompany this specification and form a part thereof:

Fig. 1 is a plan view of the preferred form of our steam generator.

Fig. 2 is a horizontal section of the generator shown in Fig. 1 taken on line 2—2 of Fig. 3.

Fig. 3 is a vertical section of the generator taken approximately on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary horizontal section of same taken on line 4—4 of Fig. 3.

As shown in Figs. 1 and 2, the generator is circular in plan. The casing is made in three parts, a bottom unitary casting 10, a unitary top piece 11 and a two piece cylindrical wall section 12 clamped between the bottom casting and the top piece by split clamping rings 13 and 14. The bottom casting has a beveled flange 15 around its upper margin; the top piece has a similar but oppositely beveled flange 16 around its lower margin and the wall pieces have lower and upper marginal flanges 17 and 18 oppositely beveled to flanges 15 and 16, respectively.

The inner side of clamping ring 13 is channeled to form beveled flanges 19 and 20, adapted to engage flanges 15 and 17 respectively, and clamping ring 14 is similarly channeled to form flanges 21 and 22 adapted to engage flanges 16 and 18, respectively, of the top piece and wall sections. The clamping rings have lugs 23 on their split sides through which clamping bolts 24 extend in the usual way.

An arcuate dome shaped lining piece 25, with a marginal flange 26 adapted to support flange 16 of the top piece, is held in position by clamping ring 14, there being a space 27, between lining piece 25 and top piece 11, which is filled with asbestos or other heat insulating material. A gasket 28, preferably of asbestos, is placed between flanges 18 and 26 and a similar gasket 29 is placed between flanges 15 and 17. The inner sides of wall section 12 are lined with asbestos or other refractory material as shown at 30.

A central flue 31, tapering slightly from the bottom toward the top, and having an external flaring base wall 32, with radial bars 33 extending between it and the flue wall, is secured to the bottom plate 34 of casting 10 by cap screws 35, screwed through the bottom plate into radial bars 33. The upper end of flue 31 terminates somewhat below lining piece 25 so that a space 36 is left therebetween, to allow free circulation of the heated air and gases which pass upwardly from the burner. Base wall 32 and the upper part of flue 31 are lined with asbestos as shown at 37 and 38 respectively.

Bottom plate 34 of casting 10 has a circular opening 39, the center of which coincides with the axis of flue 31. An annular channel 40 is formed on the under side of plate 34, and openings 41 are made in the latter through which the air and gases pass downwardly into channel 40 in their movement toward an exhaust outlet 42, on one side of the annular channel. A diagonal wall 43 oppositely inclined to flaring wall 37 of flue 31, is formed around the inner angle of bottom casting 10. This diagonal wall, which is also lined with asbestos as at 44, cooperates with flaring wall 37 to produce a downwardly tapering annular space 45 within bottom casting 10, the taper being toward openings 41 in bottom plate 34.

A supporting plate 46 with a central

opening 47 and a screw threaded boss 48, adapted to receive a spark plug 49, is secured to the under side of plate 34 by bolts 50.

A burner 51, extending through opening 47 from below is supported by plate 46, said burner consisting of a feed-pipe 52 leading from a fuel supply tank 53 and terminating in a nozzle 54 fixed in the tapering end 55 of an air supply pipe 56, through which air is forced by a fan not shown. A heating coil 57, adapted to heat the fuel when starting the operation of the generator, is wound upon feed pipe 52.

A spirally wound water tube coil 58 is supported in the lower part of the annular space 59 which is formed between the generator walls and central flue 31, a water supply pipe 60 being connected to the lower end of the coil. A spirally wound steam tube coil 61 is supported in space 59 above water tube coil 58 and a second water tube coil 62 is similarly supported above steam tube coil 61.

A condensing cylinder 63 which also serves as a steam dome is supported adjacent the top of the generator by a bracket 64 attached to top piece 11 and cylinder 63. A steam pipe 65 with a vertical extension 66 passing through condensing cylinder 63 and terminating within its upper end is connected to the lower end of steam coil 61, the upper end of which is connected to a steam outlet pipe 67 which leads to the engine, not shown. A water pipe 68 having a vertical extension 69 passing through the bottom of cylinder 63 and terminating slightly thereabove, is connected to the lower end of water coil 62 and the upper end of the latter is connected to a steam pipe 70 which has a vertical extension 71 bent to enter the side wall of cylinder 63 near its upper end where it forms a steam inlet 72 into the latter. A drain pipe 73 is fixed in the side of the cylinder.

A connecting pipe 74, having its upper end formed into a bent nozzle 75, which is fixed in water pipe 68 so that its opening coincides with the junction of the latter with the lower end of water coil 62, has its lower end connected to the upper end of water coil 58. Nozzle 75 is appreciably smaller than the internal diameter of pipe 68 and is directed toward coil 62 so that water may flow from cylinder 63 through pipe 68 past nozzle 75 into coil 62 along with water flowing through pipe 74 from coil 58.

It being understood that the burner is operated by forced draft, produced by an electrically driven fan, and that the heat coil and spark plug are connected in the electrical circuit so that they will be automatically cut out after the burner is properly started. The operation of the steam generator is as follows:

The heated air and gases, passing upwardly through flue 31 strike the center of lining piece 25 and are deflected outwardly and downwardly between the turns of coils 62, 61 and 58 successively, and through openings 41 into channel 40, finally passing out through exhaust outlet 42.

The water in coil 62, which is in the direct path of the highly heated gases is immediately converted into steam and the steam passes through pipes 70 and 71 into cylinder 63. Here part of the steam is condensed into water and part passes through pipes 66 and 65 into coil 61 where it is superheated by the downwardly passing gases and whence it passes out through pipe 67. The water in cylinder 63, formed by the condensed steam being under the pressure of the steam, is forced to flow through pipes 69 and 68 into coil 62 and in so doing causes water, which is also heated by the downwardly passing gases, to flow from coil 58 through pipe 74 into coil 62. It will be seen that with this arrangement a continuous upward flow through the generator of water meets a continuous downward flow therethrough of heated gases; so that the hottest gases act upon the hottest water to convert it into steam and the gases pass out of the generator only after their heat has been absorbed almost entirely by the water in its lower coils.

Having thus illustrated and described our invention, we claim:

In a steam generator, a lower water tube coil, an intermediate steam tube coil, and an upper water tube coil, said lower water tube coil having its lower end connected to a water supply pipe and said intermediate steam tube coil having its upper end connected to a steam outlet pipe, a condensing cylinder above said coils, a connecting pipe between said condensing cylinder and the lower end of said steam tube coil, connecting pipes between said condensing cylinder and both ends of said upper water tube coil, a connecting pipe between the upper end of said lower water tube coil and the lower end of said upper water tube coil, said connecting pipe terminating at its upper end in a bent nozzle to provide for the delivery of water through said nozzle into said upper water tube coil, and a burner located beneath said coils to heat the same.

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