J. BUCKLEY.

STEAM GENERATOR.

APPLICATION FILED APR. 12, 1909.

958,358.

Patented May 17, 1910.

2 SHEETS—SHEET 1.

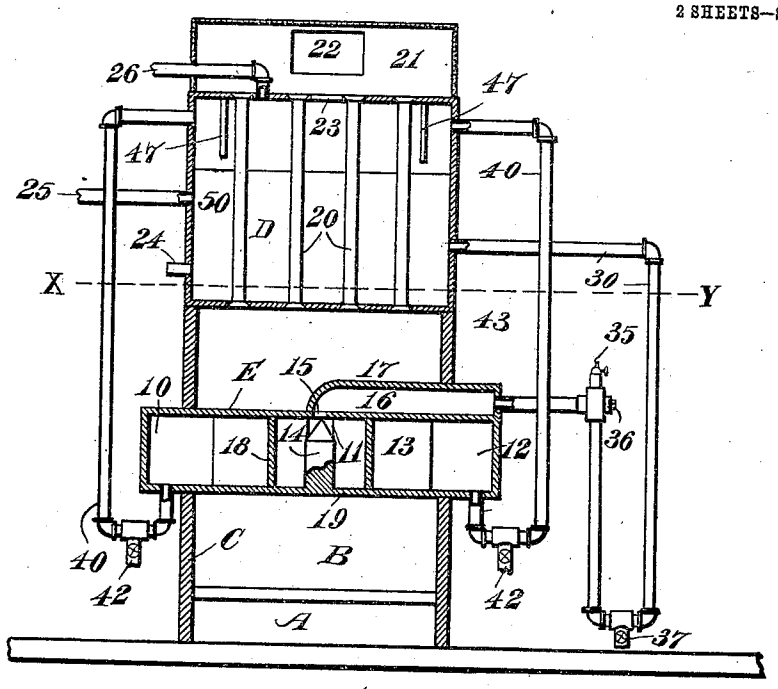

Fig. 1.

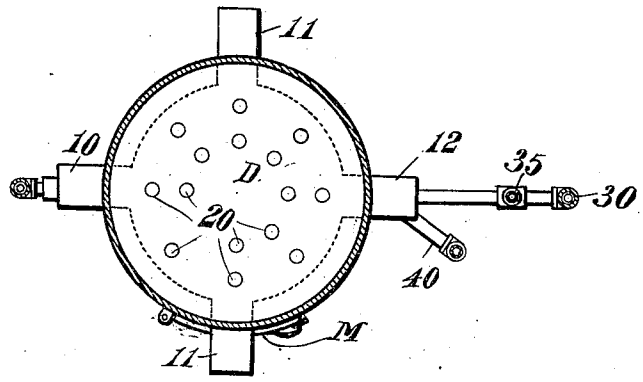

Fig. 2.

WITNESSES:

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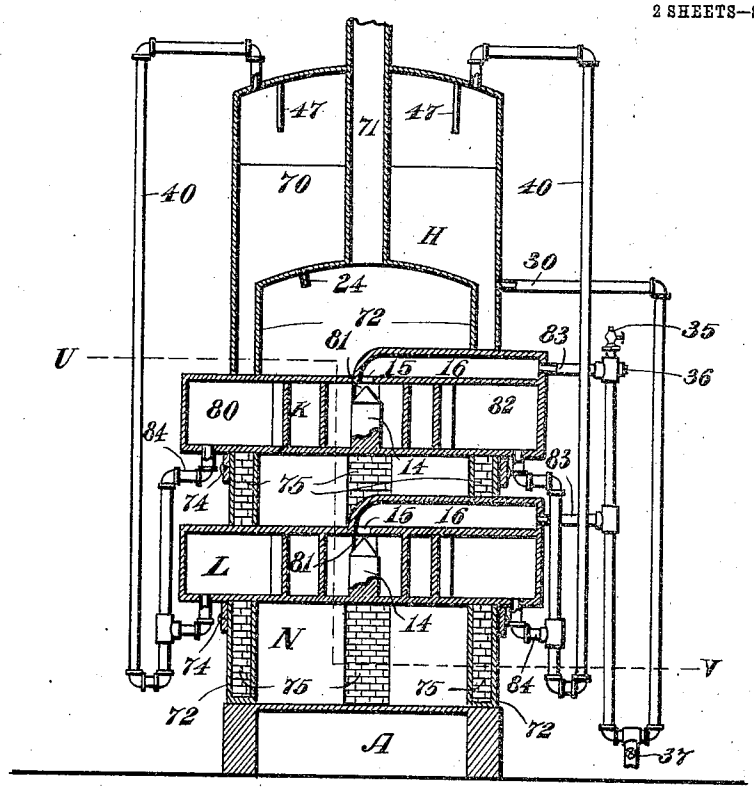

Fig. 3.

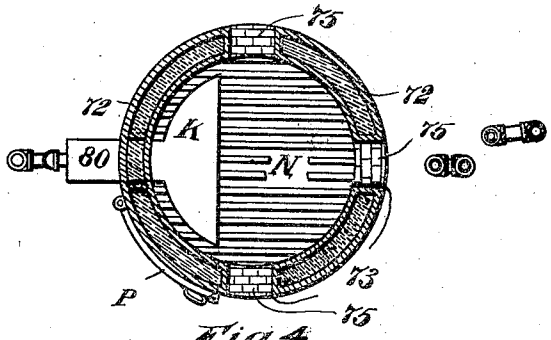

Fig. 4.

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STEAM-GENERATOR.

958,358. Specification of Letters Patent. Patented May 17, 1910.

Application filed April 12, 1909. Serial No. 489,503.

To all whom it may concern:

Be it known that I, JOSEPH BUCKLEY, a citizen of the United States, residing at Methuen, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

My device relates to steam boilers. Its purpose is to economize fuel and to provide for producing steam quickly and economically by means of an auxiliary generator in connection with the main steam boiler.

In the drawings, Figure 1 shows a sectional elevation of the preferred form of my device in connection with a vertical tubular boiler. Fig. 2 is a section of Fig. 1 on line X Y. Fig. 3 shows two of my generators applied to an ordinary house heating boiler which has a water leg or water jacket. Fig. 4 is a section of Fig. 3 on the line U V.

In Figs. 1, 2, A represents the ash pit, B represents the fire pot, C represents the brick wall, stack or supporting metal shell of the heating apparatus which incloses the fire box and supports the boiler, and M represents the fire box door.

D represents an ordinary vertical tubular boiler which rests upon top of shell C.

The main feature of my device is the generator E. This generator E is a round drum 19 from which extend four ears 10, 11, 11 and 12. The whole drum and ears may be cast together and may be strengthened by ribs 18. The drum 19 should be somewhat smaller than the inside of shell C as shown by the dotted lines in Fig. 2. The ears 10, 11, 11 and 12 are integral with drum 19 and are hollow. They project out through wall C through suitable openings therein and thereby support the drum. In the center of the drum rises a sprayer 14 which is substantially a solid cylinder terminating in a cone which rises close to or into an opening 15 at about the center of the top of the drum. Opening 15 connects with the feed water pipe 30 by a passage 16 through a member 17 which may be cast on top of generator E over drum 19 and out over ear 12 as shown.

The hot air and gases from fire box B pass up and around drum E, thence through tubes 20 of boiler D, thence into hood 21 and out through smoke pipe 22. I may provide a man-hole 23 in the top of boiler D and a fusible plug 24 therein if desired. Boiler D is fed with cold water through the main feed pipe 25 and the steam therefrom passes out through the main steam pipe 26.

Near the bottom of boiler D, I connect a generator feed pipe 30 which is bent downward well below the generator E, thence upward forming a trap and into the end of passage 16. I prefer to provide an air cock 35, a clean out plug 36, and a clean out valve 37 in the positions shown in this generator feed pipe.

From the bottom part of ears 10 and 12, outside of stack C, I drop the pipes 40, 40 and continue them in horizontal sections in which are clean out valves 42, thence upward and over into the side of the top of boiler B. Where pipes 40 enter boiler D from the side, I prefer to rivet a splash plate 47 to the top of the boiler in front of each such inlet pipe. This is to break the force of the steam or water which passes into boiler D through said pipes.

The operation of the device is as follows. When starting, boiler D is filled to a point above the fusible plug and above generator feed pipe 30 with water 50 which runs out through pipe 30 into passage 16 and through hole 15, which is made relatively small as compared with the generator outlet pipes 40. This water is distributed by sprayer 14 over the bottom surface of generator E. The small quantity of water in generator E is rapidly converted into steam and passes down and out through steam outlet pipes 40 forcing any surplus water which may collect in the pockets of outlet pipes 40 ahead of it and up into the top of boiler D. As soon as the fire is started in fire box B, on account of the relatively small size and capacity of generator E, steam is rapidly created therein and forces the water down through the pipes 40, 40, and up into the top of boiler D. Generator E thus clears itself and thereafter a relatively small quantity of water passes into it through hole 15 and is distributed by sprayer 14 in a comparatively minute and divided condition. As generator E is directly over the fire, it gets rapidly very hot and the water through hole 15 is instantly converted into steam which passes down through steam outlets 40, 40, and into the top of main boiler E, from whence it passes

out through main steam outlet 26. As soon as steam begins to be created in boiler D, the steam from both boilers mixes and passes out through main steam outlet 26. When generator E is once cleared, it continues to act as a flash boiler and main boiler D can be filled as full as desired and kept full, as generator E will be automatically fed only a relatively small quantity of water as described.

Figs. 3 and 4 show two of the first forms of generators applied to a water jacket boiler or water leg boiler. The main boiler H is formed with a large compartment 70 at the top through which passes the smoke pipe 71 from fire box N which has a fire door P. The sides extend downward and form the water legs 72. Between these water legs are four vertical slots 73 of just the width of the ears 80, 81, 81 and 82 of the generators K and L. The ears of generators K and L are slid into slots 73 and are then held in place at short distances apart therein by plates 74, 74 which are secured in place by bolts as shown. The rest of the slots is then filled up with brick 75. Generators K, L are thus held in place within the legs as shown. Each generator K and L has a sprayer 14, opening 15, and passage 16. Each passage 16 connects by way of a separate feed pipe 83 with the main generator feed pipe 30 which is attached in the same way, and bent in the same way as the one shown in Fig. 1. It has an air cock 35, clean out plug 36, and clean out valve 37 as shown. Each generator K and L has two steam outlet pipes 84, 84 dropped from ears 80 and 82 outside the water legs which connect with main outlet pipes 40, 40, as shown. These outlet pipes 40, 40, run as do those shown in Fig. 1 except that they enter the top of main boiler H instead of the side. Boiler H is provided with splash plates 47 as shown.

The principle of my device is to allow a small amount of water to enter slowly into a small, very hot generator which is close to the fire, whereby the water will be turned to steam very rapidly and will be rapidly available, while the larger volume of water in the main boiler is being heated through. Besides this, I utilize the radiant heat from the fire and thereby save a large amount of heat which would otherwise be wasted.

What I claim as my invention and desire to cover by Letters Patent is:—

1. In a steam producing apparatus, a main boiler, a generator below the main boiler and closer to the fire, combined with a generator inlet water pipe which leaves the main boiler and extends downward and upward in U shape and enters the generator at the top, and steam outlet pipes from the bottom of the generator which enter the main boiler at the top.

2. In a steam producing apparatus, a main boiler, a water inlet and a steam outlet therefor, and a cylindrical shell by which the main boiler is supported, combined with an auxiliary generator which comprises a central drum of a size smaller than the shell and is formed with hollow supporting ears extended through said shell, a generator feed water pipe which leaves the main boiler near the bottom and extends below the generator in U shape and enters the top of the generator through a relatively small opening, a sprayer inside the generator, and generator steam outlet pipes which leave the ears at the bottom form U shaped bends and enter the main boiler at the top as shown.

3. In a steam producing apparatus, the combination of a shell, a main boiler supported thereby, a generator with a flat bottom smaller than the shell and located inside thereof and below the main boiler and provided with hollow ears which project through the shell, steam outlets from the bottom of the ears of the generator which extend out through the shell, said steam outlets being formed with dependent U bends and extended into the top of the main boiler, together with a water inlet pipe which extends from near the bottom of the main boiler and downward forming a U bend below the U bends of the steam outlet pipes, thence upward and over into the top of the generator as described.

4. In a steam producing apparatus, the combination of a shell, a main boiler supported thereby, a generator with a flat bottom smaller than the shell and located inside thereof and below the main boiler and provided with hollow ears which project through the shell, a plurality of steam outlets from the bottom of the ears of the generator outside the shell, said steam outlets being formed with dependent U bends and extended into the top of the main boiler, and a water inlet pipe which extends from near the bottom of the main boiler downward forming a U bend below the U bends of the steam outlet pipes, thence upward and over into the top of the generator as described.

5. In a steam producing apparatus, the combination of a shell, and a main boiler supported thereby, with a plurality of generators each of which has a flat bottom, is smaller than the shell and is located inside the shell below the main boiler and is provided with hollow ears which project through the shell, a plurality of steam outlets from the bottom of the ears of each generator outside the shell, the adjoining steam outlets from each generator being joined and formed with a dependent U bend below the bottom of the lowest generator and extended into the top of the main boiler, a main steam outlet at the top of

the main boiler, and a water inlet pipe which extends from near the bottom of the main boiler forming a U bend below the U bends of the generator steam outlet pipes, thence upward and over in a plurality of branches one branch into the top of each generator as described.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

JOSEPH BUCKLEY.

Witnesses:
ARTHUR M. BUTTERFIELD,
ETHEL ORMROD.