

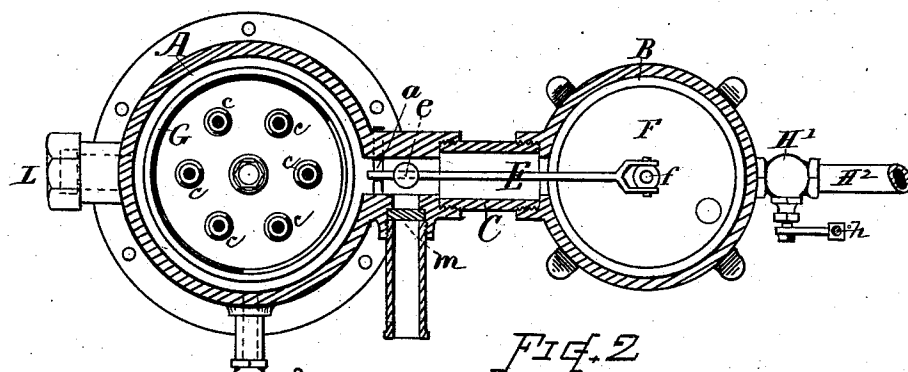
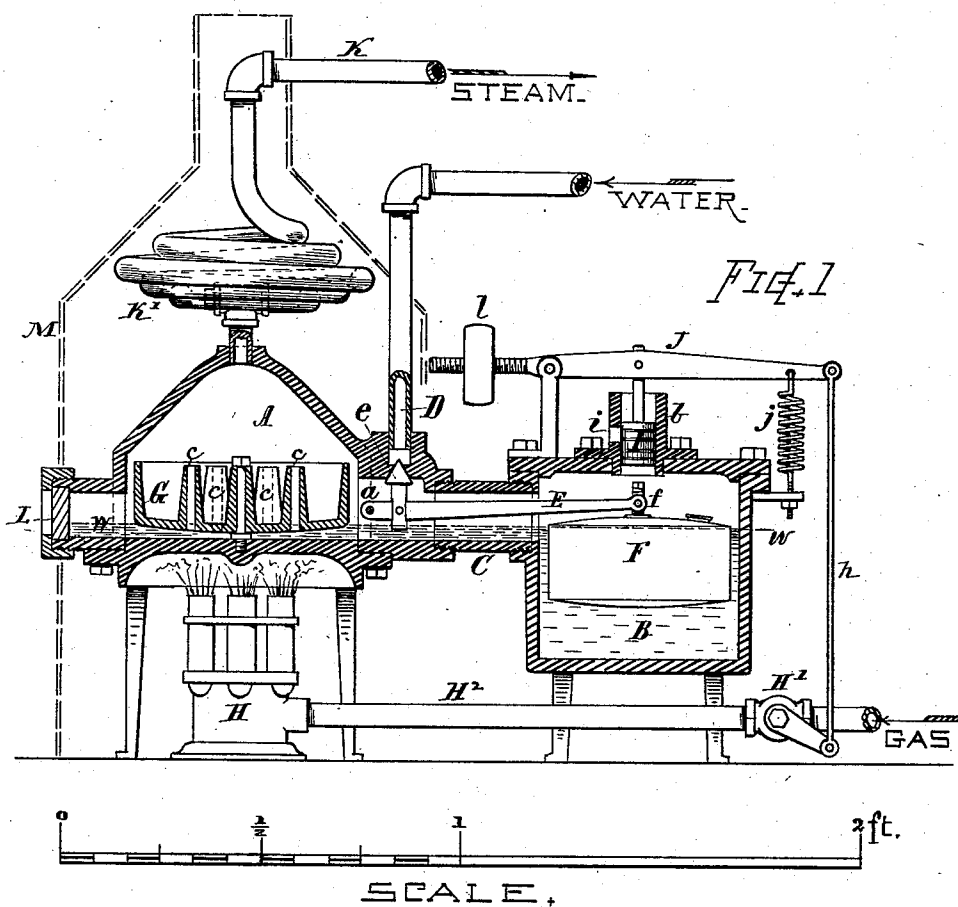
(No Model.)

W. A. PENTECOST.

APPARATUS FOR GENERATING STEAM.

No. 298,024.

Patented May 6, 1884.



WITNESSES

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APPARATUS FOR GENERATING STEAM.

SPECIFICATION forming part of Letters Patent No. 298,024, dated May 6, 1884.

Application filed January 21, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. PENTECOST, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Generating Steam; and I hereby declare the following to be a description of my said invention sufficiently full, clear, and exact to enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

The objects of my present invention are to provide a simple, compact, and efficient apparatus for generating steam over a gas, spirits, or hydrocarbon-oil flame for household purposes, such as for heating rooms or for operating light power-motors and for other purposes; to render the apparatus capable of acting on a small quantity of water distributed over comparatively large heating-surface, thereby effecting the concentration of heat upon a small body of water; to afford means for regulating the operation of the apparatus both as to feed and heating capacity; and to render the feed devices automatic for maintaining the water in constant supply and at uniform level, with but a slight depth of water above the heating-plate. I attain these objects by mechanism the nature, construction, and operation of which are illustrated in the drawings and explained in the following description, the particular subject-matter claimed being hereinafter definitely specified.

In the drawings, Figure 1 is a vertical longitudinal section of an apparatus illustrating the features of my invention, and Fig. 2 is a horizontal sectional view of the same at a position above the water-level.

My improved apparatus for generating steam consists of two connected receptacles or parts, one of which is adapted to contain a small quantity of water only to be acted upon by the heat, while the other is adapted for containing a sufficient quantity of water for supporting a float for regulating the valve of the feeding-pipe, as hereinafter explained.

In referring to parts, A designates the boiler proper or heating-chamber, and B the regulating-chamber, which chambers are connected with each other by a short pipe or conduit, C,

along the water-level, so that the water and steam pressures will be maintained substantially equal in both portions of the apparatus, the greater space of the chamber A being above the water-level *w*, and the greater portion of the chamber being below the water-level, as indicated. The parts A and B may be made of cast metal, in the form shown, or of other suitable material, with proper flanges for bolting the parts together, and with bosses for the connecting-pipe C and for the feed and delivery pipes, as required. The diameter of the part A, as herein constructed, is about eight inches and that of the part B about seven inches. These dimensions can be made more or less, according to the service for which the generator is intended.

D denotes the pipe for supplying water to feed the generator. A valve, *e*, is arranged at the mouth of said pipe where it enters the generator. Said valve *e* is made automatically active by its connection with a lever, E, which is properly fulcrumed at *a*, and arranged through the conduit C, as shown, with its opposite end connected to a float, F, which is located within the tank or chamber B, where it occupies the greater portion of the interior area, having sufficient space only to rise and fall freely as the water increases or diminishes within the apparatus. As the water rises and falls the float F works the lever E, and thereby automatically closes and opens the valve *e*, as required, to maintain the water within the generator at a uniform level, as indicated in Fig. 1 by the line *w*.

G indicates a pan or cup-shaped body fixed within the generator-chamber A, with its outer surface at a short distance from the inner surface of the generator-shell, and which serves to confine the water to a thin space next the heating-surface at the bottom of the chamber A, so that there will only be about one-fourth inch (more or less) in depth or thickness of water which is acted upon by the heat at one time, and any rise of the water-level only carries the water up in the annular space at the sides of the pan G, without materially increasing the volume of water exposed to the heat. The pan G is furnished with several tubes or passages, *c*, for permitting the steam to escape from beneath it as fast as it is generated.

H indicates the heater or fire-piece located

beneath the boiler A, which may be arranged for burning gas, spirits, hydrocarbon oils, or such other substances as are commonly used for lighting or heating purposes. I prefer a compound Bunsen burner with ordinary illuminating-gas as the most convenient form of heating device for this purpose. In localities not supplied with gas-service, the fire-piece H could be adapted for burning oil, and some of the carbon oil products could be used; or gas might be supplied from any one of the various kinds of small gas-machines such as are now in the market.

I indicates a small piston arranged in a cylinder, *b*, located on the top of the regulating-chamber B, and communicating with the interior thereof. This piston I is connected to a lever J, fulcrumed on a suitable standard, as indicated, and having its principal arm connected by a rod, *h*, with the cock H' in the gas-pipe H², or with means for regulating the flame of the burner H. The lever J is provided with a spring, *j*, for holding the piston against the steam-pressure, and with a weight, *l*, for balancing the mechanism. These devices can be adjusted so that the piston and lever will act at any desired degree of pressure for regulating the heating devices. An opening, *i*, is formed in the side of the cylinder *b*, so that the piston serves as a safety-valve, as well as a regulator, the steam blowing off through the opening *i* in case the pressure within the generator becomes sufficient to force the piston above said opening *i*. At the same time the lever J closes off the flame and reduces the heat beneath the generator.

K indicates a pipe for conducting the steam from the top of the chamber A to the place of use. Said pipe K is arranged as a coil, K', above chamber A, which coil serves as a super-heater for drying the steam as it passes from the boiler-chamber A.

The generator A and coil K' may be inclosed in a suitable outer casing of brick or metal, as indicated by dotted line M on Fig. 1.

L indicates a glazed aperture in the side of the boiler A, through which to observe the water-level; and *m* indicates a glazed tube through which to observe the action of the valve *e*. In some cases these glazed portions may be omitted, if preferred.

P indicates a blow-off cock for clearing the interior of the boiler A.

The connection of the lever E with float F may be made by an adjustable joint device at *f*, so that the parts can be adjusted to close the valve *e* when the water-level *w* is at the desired height above the bottom of the boiler A.

In the operation the steam is generated in the chamber A by the heat of the burner H beneath it, and passes up through the coil K' and pipe K. The water enters through pipe D from a tank placed at sufficient height above the level of the apparatus, and keeps up the supply, as required, under the control of the float F and valve *e*.

By making the apparatus in the form shown and described, I attain a very shallow sheet of water over the heating-plate, and the consequent concentration of the heat on little water, while the location of the float F is in a sufficient body of water for its sure and satisfactory operation, which water is not subject to the commotion and ebullition occurring in the generating-chamber, and the water rises and falls quietly, so that the valve *e* is operated with regularity and precision.

I am aware that the regulating of a gas or hydrocarbon flame by the pressure of steam generated by such flame has heretofore been practiced; and I do not, therefore, herein make claim, broadly, to such feature in connection with steam apparatus, or otherwise than in the combinations specified.

What I claim as of my invention, and desire to secure by Letters Patent, is—

1. The combination of the heating-chamber A, flat at its base, for containing a thin sheet of water, the auxiliary tank B, of greater depth, connected therewith by the conduit C, leading from the bottom level of said chamber to the upper part of said tank, the water-inlet having valve *e*, the valve-lever E, fulcrumed as at *a* and extending through said conduit, the float F, attached to said lever, the steam-delivery K, and burner H, said parts being constructed and relatively arranged for operation substantially as shown and hereinbefore described.

2. The combination, with the generating-chamber A, auxiliary tank B, valve-regulating float F, and valve *e*, of the circular pan or d sh-shaped piece G, secured within said chamber, substantially as and for the purpose described.

3. The combination, with the generating-chamber A, having connected therewith the tank or regulating-chamber B, of the disk-shaped piece G, provided with tubes *c*, substantially as set forth.

4. The cylinder *b*, having the side opening, *i*, the piston I, the lever J, and adjustable weight *l* and spring *j*, in combination with the boiler A, tank B, and burner H, the same being adapted for action as a safety-valve and for regulating the flame of the burner, substantially as set forth.

5. The combination, substantially as hereinbefore described, of the chamber or boiler A, the chamber or tank B, connected therewith, as at C, the water-supply pipe D, having valve *e*, the float F, lever E, the burner H, the coil K', and steam-delivery pipe K, for the purposes set forth.

Witness my hand this 10th day of January, A. D. 1884.

WILLIAM A. PENTECOST.

Witnesses:

CHAS. H. BURLEIGH,
S. R. BARTON.