(No Model.)

J. P. FORBES.

STEAM GENERATOR.

No. 345,375. Patented July 13, 1886.

Fig. 1.

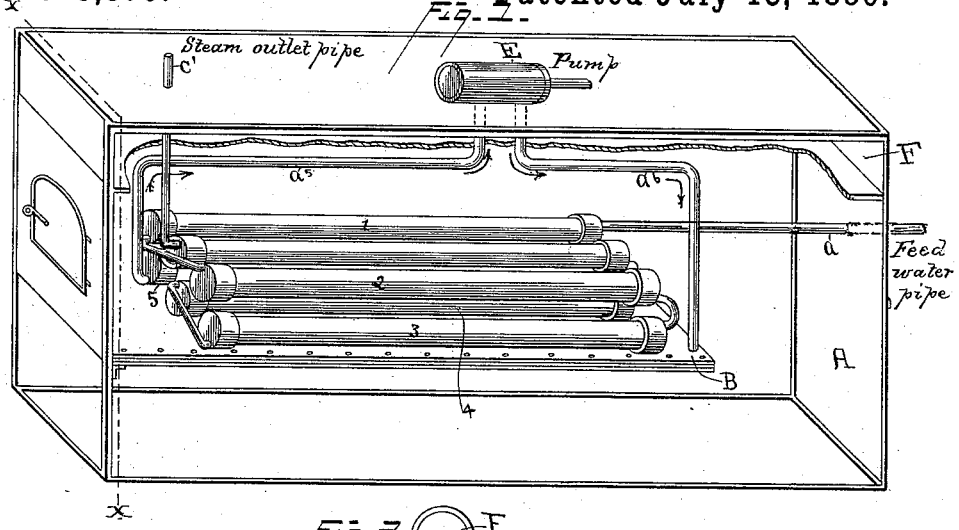


Fig. 2.

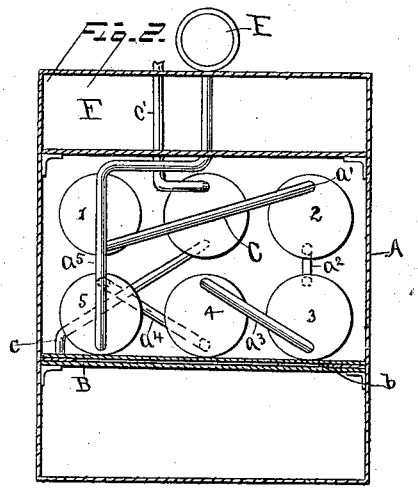
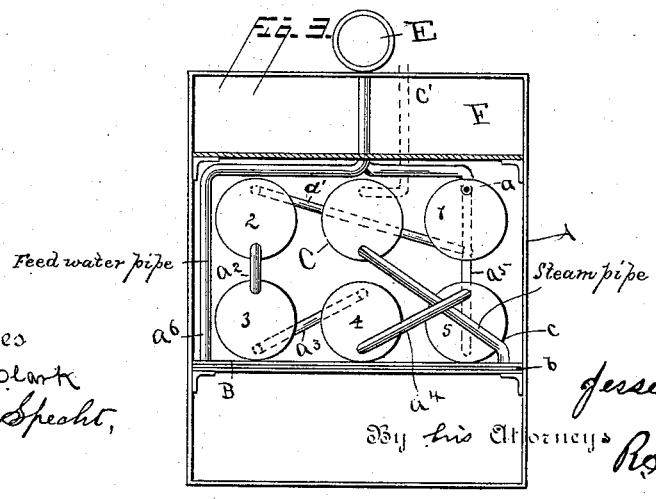


Fig. 3.



Witnesses
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UNITED STATES PATENT OFFICE.

JESSE P. FORBES, OF COSHOCTON, OHIO.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 345,375, dated July 13, 1886.

Application filed May 4, 1886. Serial No. 201,074. (No model.)

To all whom it may concern:

Be it known that I, JESSE P. FORBES, residing at Coshocton, in the county of Coshocton and State of Ohio, have invented certain new and useful Improvements in Steam-Generators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to steam engines, and pertains particularly to the means for heating the water before supplying it to the generator, and to the means for storing the steam after being generated, so that in case the supply of water should be momentarily checked the engine will not be stopped.

It consists in the novel features particularly hereinafter set forth and claimed, and shown in the annexed drawings, in which—

Figure 1 is a perspective view, parts being broken away, of a generator of my construction embodying my improvements. Fig. 2 is a sectional view on the line *x x* of Fig. 1. Fig. 3 is a rear end view having the end plate removed.

Within the case or furnace A is located the flasher B, water-heater, comprising a series of connected tubes, 1 2 3, &c., and the steam-reservoir C. The flasher consists of two plates separated by a bar or strip, *b*, located near the edge and secured by bolts, forming a steam-space between the plates the thickness of the bar *b*. The steam generated by the flasher is conveyed therefrom to the reservoir C by pipe *c*, and from thence to the engine or point of usage by a pipe, *c'*. By this means a certain amount of steam is stored and held in reserve, and may be used to run the engine a few minutes, if perchance the flasher should fail to generate any steam, owing to a momentary check or stoppage of the supply of water.

The heat is applied to the under side of the flasher, and the reservoir and water-heater are located above the same, and are heated by radiation from the flasher and by the products of combustion which pass through the compartment in which they are arranged. The tubes of the water-heater are arranged in series, the one above the other, preferably in two series, having the steam-reservoir C located intermediate the upper series. They are spaced apart and supported in such manner that the heat may circulate freely between them, the connecting-pipes *a a'* being sufficient.

The inlet-pipe *a* is connected with tube 1. Pipe *a'* unites the tubes 1 and 2, pipe a^2 the tubes 2 and 3, pipe a^3 the tubes 3 and 4, pipe a^4 the tubes 4 and 5, pipe a^5 the tube 5 with the pump E, and the pipe a^6 the pump and flasher B. The opposite ends of the tubes are alternately connected with the upper end of the one with the lower end of the other, whereby in the case of an accumulation of sediment the same may be blown out by disconnecting the end of the pipe a^5 from the pump and forcing a stream of water or jet of steam in the inlet-pipe, when the sediment will be quickly blown out or ejected.

The operation is as follows: The water enters through pipe *a* into tube 1, and from thence through all the other tubes to the pump E, from which it is delivered to the flasher, where it is converted into steam and delivered into the reservoir, from which it is conveyed to the point of usage by the pipe *c'*. The water in its passage through the tubes becomes heated before being discharged into the flasher, by reason of the small bore of the tubes and the extended surface they present to the surrounding heating medium.

A water-tight compartment, F, is formed in the crown of the furnace or case A, and may be used as a tank or reservoir to hold a supply of water and form a head for the water-heater. The water may be fed continuously into this compartment or at intervals, as desired. By this construction a certain percentage of heat is again saved, as the water in the compartment is partially heated before its introduction into the heater, thus utilizing the heat to the best possible advantage.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with the flasher, of a series of tubes located above the same, pipes alternately connecting the upper end of one with the lower end of the other on opposite

sides, and a pipe connecting the lower one or last of the series with the flasher, substantially as described, and for the purposes specified.

2. The combination, with the flasher and a series of tubes located above the same and alternately connected at their opposite ends, of a pipe connecting the lower or last tube of the series with a flasher, and a pump located in said pipe to draw the water through the tubes and force it in the flasher, substantially as set forth.

3. The combination, with the flasher and water-tubes, arranged as shown, of a reservoir or tube for the storage of steam generated thereby, substantially as and for the purpose specified.

4. The combination of the flasher, a connected series of tubes located above the same and in communication with the flasher, and a steam-reservoir or tubular storage-chamber located intermediate the series of water-heating tubes, and connected with the flasher at the lower rear corner opposite to that at which the feed-water enters the flasher, substantially as described, and for the purposes set forth.

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

JESSE P. FORBES.

Witnesses:
R. M. VOORHES,
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