

(No Model.)

T. L. STURTEVANT.
STEAM GENERATOR.

No. 473,979.

Patented May 3, 1892.

Fig. 1.

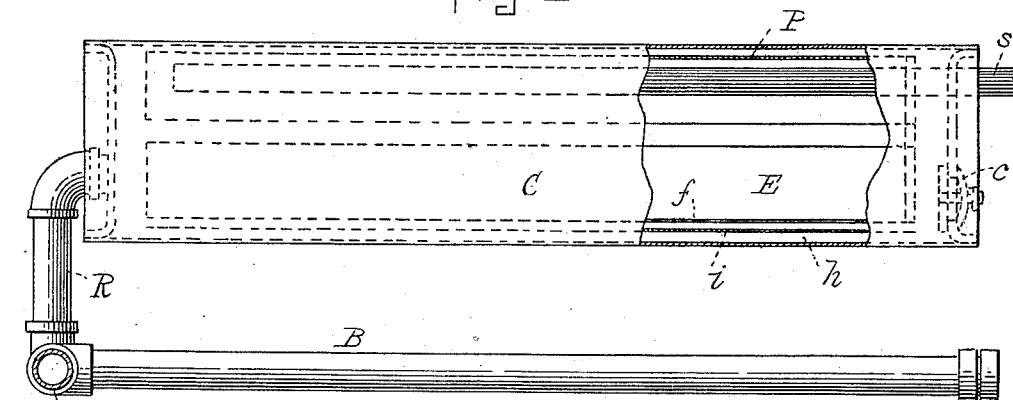


Fig. 2.

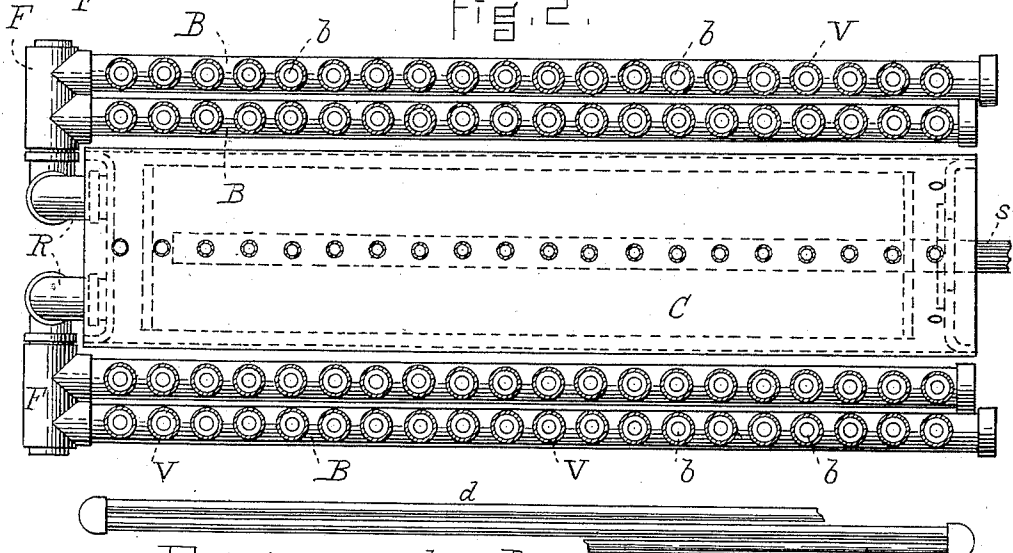
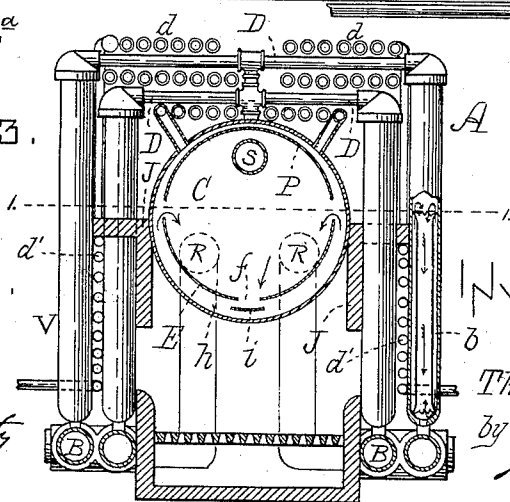


Fig. 2^a

Fig. 3.



WITNESSES.

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UNITED STATES PATENT OFFICE.

THOMAS L. STURTEVANT, OF FRAMINGHAM, MASSACHUSETTS.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 473,979, dated May 3, 1892.

Application filed June 6, 1891. Serial No. 395,803. (No model.)

To all whom it may concern:

Be it known that I, THOMAS L. STURTEVANT, a citizen of the United States, residing at Framingham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Steam-Generators; and I do hereby 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 letters and figures of reference marked thereon, which form a part of this specification.

This invention pertains to "steam-generators," so called, and may be considered as relating to and an improvement upon an apparatus of a similar class shown and described in United States Letters Patent No. 430,445, issued in my name on June 17, 1890.

My present improvements are contained particularly in the construction of the steam and water drum and its partitions and shields, likewise to the arrangement of certain pipes termed the "base-pipes," by which the water-leg mentioned in the above patent is dispensed with and greater and more perfect circulation is obtained between the drum and said base-pipes by two pipes instead of one, as in the early patent.

The drawings accompanying this specification represent, in Figure 1, a sectional elevation of the steam and water drum with return and base pipes. Fig. 2 is a plan. Fig. 2^a is a partial plan view of the feed-water pipes. Fig. 3 is a transverse section vertically of a generator embodying my invention.

The primary object of this steam-generator is to secure large heating-surface with free circulation, and yet obtain dry steam in large volume. To this end, in connection with various generating-pipes, I have altered the construction of the steam and water drum in order to prevent foaming and obtain better circulation of the water, attended with free delivery of the steam generated.

The various parts composing this generator A are as follows: Centrally of the generator is placed a steam and water drum C, which extends the length of said generator. The front end is provided with a hand-hole *c* to

provide for removal of sediment. Further, a pipe *s* acts to deliver the steam to the engine or other machine to be supplied. At the opposite ends two or more pipes R, termed "return-pipes," act to unite the drum with one or more horizontal "base-pipes" B, so called. Thus the water coming from the drum through the return-pipes, which enter at a point below the normal water-level, is delivered to the base-pipes through a pipe F, common to each series. (See Fig. 1.) In the present instance the base-pipes are placed in pairs on both sides of the fire-box.

Arranged in series and longitudinally along each base-pipe are set vertical pipes V, which act as steam-generating pipes. Each of the latter is provided (see Figs. 2 and 3) with an interior circulating-tube *b*, supported therewithin and open at both ends to allow of free circulation of water within the pipe V and yet permit of escape of steam as it is generated. Said pipes are connected with the drum at or near the top by pipes D.

Feed-water is supplied to the generator through coils of pipe *d* above the drum, with which they connect, as shown.

To prevent foaming or violent ebullition and to increase the circulation of the water within the drum, an interior partition E, with a longitudinal opening *f* at the lowest point, is placed in the drum at the bottom to induce a circulation. As will be seen by reference to Figs. 1 and 3, this circulating-plate is non-contiguous to, but preferably concentric with, the shell of the drum to create a space through which the water is compelled to pass when heated. To permit of circulation and at the same time to obviate violent ebullition or foaming, a lower shield *i* is positioned in the space *h*, opposite the aperture in the partition E and midway between the latter and the exterior shell of the drum. Said lower shield prevents steam rising through the water inclosed by the partitions and causing ebullition. This especial construction is only one of several ways by which the same result can be obtained, since it is evident that in lieu of a single apertured partition two plates may be used, with their lower adjacent edges non-contiguous. In case it is desired to dispense with the lower shield *i*, said plates may be

caused to overlap upon their lower edges, which must be non-contiguous to allow flow of water therebetween.

In addition to the coils of feed-water pipes *d* above mentioned, I have arranged two groups *d'* *d'* to create vertical partitions between the steam-generating pipes V. The pipes forming these partitions extend longitudinally and below a divisional wall J, which extends from each side of the drum-shell outwardly to the outer row of steam-generating pipes, the purpose of this wall being to prevent the hot air and gases from passing upwardly and directly out. By reference to the drawings it will be seen that the heated gases and by-products of combustion are compelled to escape laterally and course upward between the said feed-pipes *d'* *d'* and the outer row of vertical pipes, thus directing the heat upon these steam-making pipes nearer the case that, would otherwise be less strongly heated. The upper part of the drum is, moreover, supplied with a shield or deflector plate P, against which the feed-water entering the drum strikes and is compelled to pass down to join the hot water circulating in the drum without commingling with the steam, which now in a dry state fills the upper portion of said drum.

The circulation is as follows: Feed-water through the series of heating-coils *d'* *d'* enters the drum C, impinging against the shield P, and flowing down supplies the drum, as likewise the vertical pipes and base-pipes, the normal water-level being shown at 1 1. (See Fig. 3.) Upon application of the heating agency circulation ensues in the drum, as before explained, the steam collecting in the upper part of the drum. In a similar manner steam is created in the steam-generating pipes V, and such steam escapes upwardly, passing through the conducting-pipes D, enters the drum behind the shield, which controls the course of any water contained in the steam, and joins the main body of steam in the drum. The water so converted into steam in the steam-generating pipes is supplied by water through the return-pipes R, which lead from the drum to the base-pipes.

What I claim is—

1. A steam-generator composed of the steam and water drum, base-pipes longitudinally therebeneath, the return-pipes, which connect the drum with each base-pipe or series of base-pipes, a group of vertical pipes having interior circulating-tubes and mounted upon the base-pipes, and steam-conducting pipes, which unite the vertical pipes with the drum, substantially as specified.

2. In a steam-generator, the combination, with a series of base-pipes, a group of steam-generating pipes, each having interior circulating-tubes and positioned on said base-pipes, and the steam-conducting pipes from their upper ends, of a steam and water drum, its shield P, and circulating-partition E, ap-

ertured as shown, and the return-pipes, substantially as described.

3. In a steam-generator, the combination, with a series of base-pipes, a group of steam-generating pipes mounted on said base-pipes, and the steam-conducting pipes discharging against the shield P, of a steam and water drum, its shield P, the partition E, apertured as shown, and the return-pipes, which connect said drum with the base-pipes, substantially as specified.

4. In combination with a steam and water drum having a circulating apertured partition, as stated, the feed-pipes *d*, and steam-conducting pipe D, a series of base-pipes connected with the water-space of the drum by the return-pipes and with the steam-space of said drum by the steam-generating pipes V, substantially as set forth.

5. The combination, with a steam and water drum having a circulating apertured partition, as stated, the feed-pipes *d*, steam-conducting pipes D, and a series of base-pipes, of the return-pipes, which unite the water-space of the drum with the base-pipes, and the steam-generating pipes V, having the interior circulating-tubes, which unite the steam-space of said drum likewise with said base-pipes, substantially as explained.

6. The combination, with the longitudinal base-pipes, the vertical steam-generating pipes positioned thereupon, and their interior tubes, of the steam and water drum provided with the interior shield P, the steam-conducting pipes, which discharge against said shield and connect the steam-generating pipes with the drum, and the return-pipes, which unite the water-space of said drum with the base-pipes, substantially as specified.

7. In a steam-generator, the combination, with a drum having a steam-discharge and water-supply, of an apertured circulating-partition longitudinally along the bottom, but non-contiguous thereto, and a shield positioned in the upper portion, substantially as described.

8. In a steam-generator, the combination, with the drum, the shield in the upper part, and the circulating apertured partition longitudinally in the lower portion, of a lower shield interposed between the shell of the drum and the circulating-plate and oppositely of the aperture in said partition, substantially as set forth.

9. In a steam-generator, the combination, with a drum having a steam-discharge and a water-supply, the apertured circulating-partition at the bottom, but non-contiguous, and an imperforate shield similarly arranged in the top part, of a divisional wall transversely of the shell of the drum and the coil-partitions below said wall and vertically between the steam-generating pipes, substantially as described.

10. In a steam-generator, the combination, with the drum, its shield at the top, and the

circulating apertured partition longitudinally in the lower portion, of the lower shield interposed between the shell of the drum and the circulating-plate opposite said aperture and a divisional wall exteriorly of the drum extending from each side of the latter to the steam-generating pipes, substantially as set forth.

11. The combination, with the longitudinal base-pipes, the vertical steam-generating pipes positioned thereupon, and their interior tubes, of the steam and water drum provided with the interior shield P, the feed-pipes *d*,

which discharge against the shield, the steam-conducting pipes, which also discharge against said shield and connect the steam-generating pipes with the drum, and the return-pipes, which unite the water-space of said drum with the base-pipes, substantially as specified.

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

THOS. L. STURTEVANT.

Witnesses:

H. E. LODGE,

FRANCIS C. STANWOOD.