

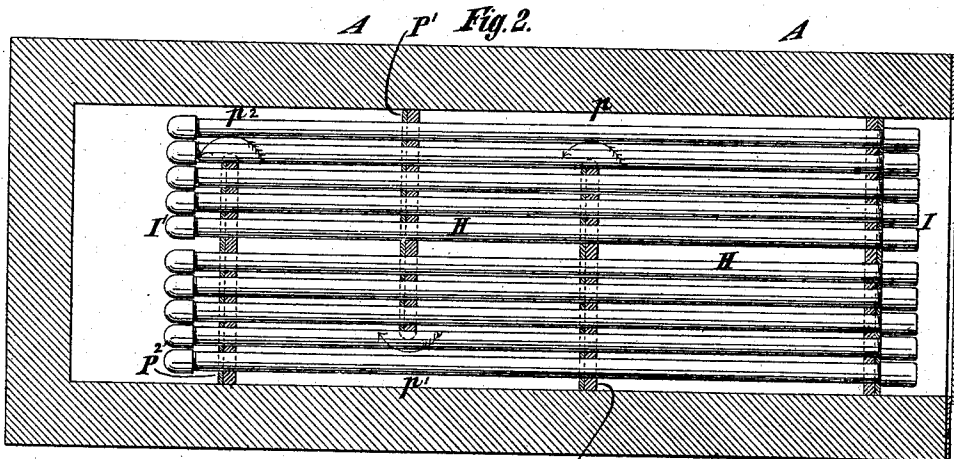
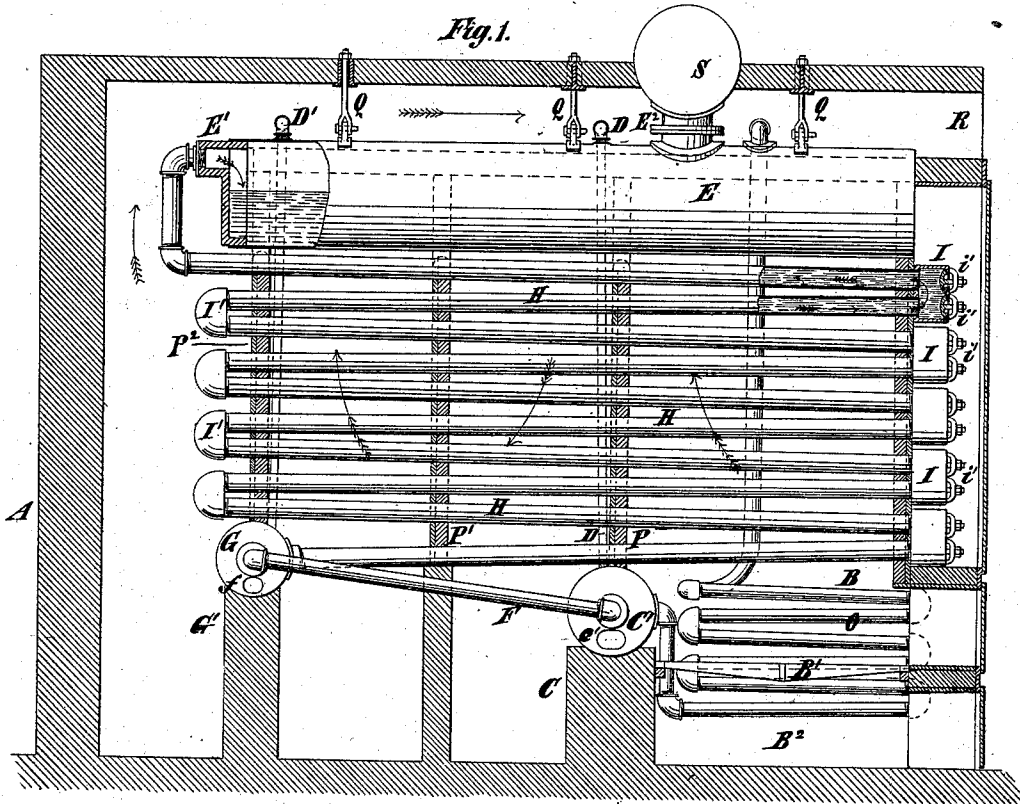
(No Model.)

2 Sheets—Sheet 1.

J. C. STEAD.
STEAM GENERATOR.

No. 267,762.

Patented Nov. 21, 1882.



Witnesses—
J. H. Keane
James W. Bowen

Inventor:
James C. Stead
 By his atty,
Edwin H. Brown.

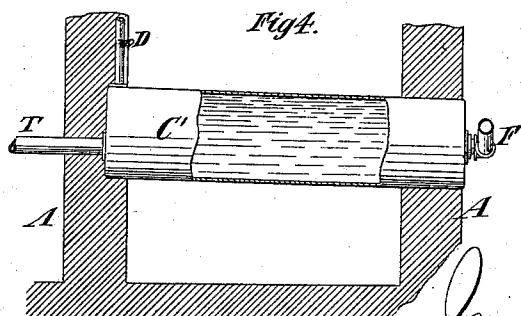
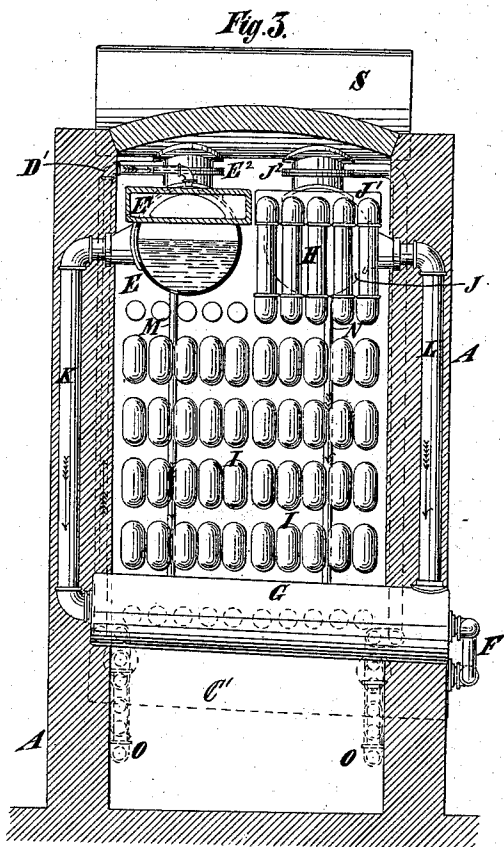
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2 Sheets—Sheet 2.

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STEAM GENERATOR.

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Patented Nov. 21, 1882.



Witnesses.
W. E. Kane
James R. Bowen.

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Edwin Brown.

UNITED STATES PATENT OFFICE.

JAMES C. STEAD, OF BROOKLYN, NEW YORK.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 267,762, dated November 21, 1882.

Application filed March 17, 1882. (No model.)

To all whom it may concern:

Be it known that I, JAMES C. STEAD, of Brooklyn, in Kings county, in the State of New York, have invented a certain new and useful Improved Steam-Generator, of which the following is a specification.

My improvement consists in certain combinations of parts, including a separator, whereby the steam generated will be readily separated from the water, a header, and a mud-drum, whereby mud and other sediment will be collected.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a steam-generator embodying my improvement. Fig. 2 is a horizontal section of the same. Fig. 3 is a vertical transverse section thereof, and Fig. 4 is a transverse section of the lower part of the generator, taken in a plane immediately behind the mud-drum.

Similar letters of reference designate corresponding parts in all the figures.

A designates the walls of the steam-generator, which may be constructed of masonry in a well-known manner.

B designates the furnace, B' the grate thereof, and B² the ash-pit.

C designates the bridge-wall, which, as here shown, comprises a mud-drum, C', made of boiler-iron and of any approved construction, and set inclined from end to end, as best shown in Fig. 4. The object of setting it on an incline is that mud and sediment shall gravitate to the lower end and the heated water, or water and steam, shall have a tendency to circulate toward the other end. Any steam which is generated in the mud-drum is conveyed by a pipe, D, leading from its upper portion, near the higher end, to a drum or chamber, E, which I term a "separator," located in the upper part of the generator. The office of this separator is to separate the steam which is generated in the generator from the water therein, and the pipe D leads to its upper portion above the water-line; hence water conveyed into it by said pipe drops down and the steam enters the space above the water-line. The separator E is partly filled with water when the generator is supplied, and the supply of water therein is kept up at all times.

A pipe, F, leads from the lower end of the mud-drum C', from a point considerably above

its bottom, to a device, G, which I term a "header," consisting of a cylinder or drum made of boiler-iron and of any approved construction. This header is supported on a suitable foundation of masonry, G'. It is somewhat higher than the mud-drum, and it is correspondingly inclined. The pipe F leads to its lower end, but is connected to it at a point considerably above the bottom. Mud and sediment will also be deposited, to a greater or less extent, in the lower end of the header. The mud-drum and header are respectively provided at the lower ends and near the bottom with man-holes *e' f'* to afford facility for the removal of mud and sediment.

A pipe, D', leads from the upper portion, near the higher end of the header, to the separator E above the water-line. The water conducted by it to the separator falls down and the steam enters the space above the water-line.

A number of pipes, H, which I term "circulating-pipes," lead from the circumference of the header, at a point considerably above the bottom or lowermost portion, toward and over the furnace. These pipes H, as shown, are arranged side by side. They incline upward at an incline of, say, one-half inch to the foot, (more or less.) At the ends they are secured to return-bends I, whereby they are connected with other similar pipes, H, extending at a reverse but corresponding incline to a point over or slightly beyond the header G. Here they are connected by return-bends I' with other similar pipes, H, extending similarly to the first series. These are connected by return-bends I to another series of pipes, H, like the second series. Any desired number of series of these pipes may be similarly connected together by return-bends II', and the last or uppermost series extend rearwardly, and are connected directly, some to a chamber, E', formed in the adjacent head of the separator E, and others to a chamber, J', formed in a similar and adjacent separator, J. The circulating-pipes H may be screwed or expanded into or otherwise connected with the return-bends II'. Inasmuch as the pipes H communicate directly with the separators, a direct and rapid current or circulation is kept up through the entire length of the pipes, and this current is not broken up or disturbed until the water is discharged into the separator. The return-bends

may all be like the return-bends I or like the return-bends I'. The return-bends I are provided with hand-holes *i'* opposite the pipes H, which they connect, so as to afford convenient access to the pipes without disturbing the latter. The covers of these hand-holes can be ground to fit the holes tightly, or they can have rubber, asbestos, or other suitable packing. The heads of the separators E J, which are provided with the chambers E' J', may be made of cast metal, and the chambers just mentioned are located above the water-line of the separators. The incline of the circulating-pipes causes their contents, when subjected to the heat from the furnace, to ascend. When they enter the separators E J the water falls down and the steam enters the space above the water-line.

K designates a pipe extending from opposite the water-line of the separator E to about the middle of the higher end of the header G.

L designates a pipe extending from opposite the water-line of the separator J to the top of the header G, near its lower end. It is well known that vegetable, mineral, and other foreign substances with which water fed into a steam-generator is impregnated will commonly rise to the surface of the water and seriously impede the globules of steam rising to the surface. As soon as the lighter buoyant particles become freed from the heavier the latter drop to the bottom and form a scale. The object of the pipes K L is to carry all these substances rising to the surface of the water in the separators off into the header G, and ultimately the majority of them pass into the mud-drum C'.

Pipes M N respectively lead from the bottom of the separators E J to the header G. Sediment falling to the bottom of the separators is by these pipes conveyed to the header G, and thence the majority of it passes to the mud-drum C'.

O designates pipes located adjacent to the side walls of the furnace. They extend at reverse angles, and are connected by return-bends. At the lower ends they are connected to the ends of the mud-drum C', at a suitable distance above the bottom, and at the upper end they connect with the separators E J above the water-line. Steam enters the space above the water-line, and water drops to the bottom of the separators from these pipes. These pipes O afford protection to the sides of the furnace, besides adding to the generation of steam.

P P' P² designate division-walls extending alternately from opposite sides nearly across the generator, and made of masonry, metal, or masonry and metal combined. They severally have openings *p p' p²*, which are out of line with those of the others; hence they cause the products of combustion to be deflected from side to side or reverberated in their passage through the steam-generator. These walls may have any desired number of openings, and as the products of combustion are deflected from side to side of the generator the draft is not interfered with. The products of combustion ul-

timately pass through a passage, R, to a chimney.

The separators E J are connected by pipes E² J² with a steam-drum, S. While these separators may be partly supported on these walls in some cases, I have here shown them as supported by suspenders Q, connected to them and extending from an arched top of the steam-generator. One may be used alone, or a greater number than two may be employed, according to the size of the steam-generator to be made.

The circulating-pipes H may be staggered and connected in a zigzag arrangement, if desirable, and instead of being arranged in one long group several shorter groups of them may be used. Indeed, they may be arranged in short groups and extended transversely, instead of longitudinally, in the steam-generator.

Any suitable doors may be provided for the furnace and its ash-pit, as also for the chamber T, in which the return-bends of the circulating-pipes are arranged.

The feed-water is supplied to the lower part of the generator before its passage to the drums or separators E J. In this example of my invention the feed-water is supplied to the mud-drum C' by means of a pipe, T. (Shown in Fig. 4.)

While I have shown the separators made in the form of cylinders only, I may make them of other forms, or, indeed, of a tubular or flue construction.

Water entering the circulating-pipes from the header will, owing to the inclination of the pipes, be caused to travel forward and back until it reaches the separators as it rises in temperature. The continuous circulation thus produced in the pipes precludes dirt or sediment from lodging there.

I do not here claim broadly as my invention a generator comprising a header, circulating-pipes extending from the header, and a steam-drum with which said circulating-pipes are connected, into which the feed-water is supplied, and from which the feed-water passes downward to the header. In such a generator the feed-water, which is cold, or, at best, of a much lower temperature than the dry steam, being introduced into the steam-drum, will condense the steam to a very considerable extent, and although the feed-water will be thereby heated it will entail a waste of steam and a corresponding increase in the consumption of fuel over a generator in which the feed-water is introduced into its lower part, where the water is more nearly of the same temperature.

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

1. In a steam-generator, the combination, with a drum or chamber which is partly filled with water when the generator is supplied, of a header, circulating-pipes leading therefrom and communicating directly with the drum or chamber above the water-line, a pipe leading from the bottom of the drum or chamber to said header, and a pipe for feeding water into the lower part of the generator before its passage to

said drum or chamber, substantially as specified.

2. In a steam-generator, the combination, with a drum or chamber which is partly filled with water when the generator is supplied, of a header, circulating-pipes leading therefrom and communicating directly with said drum or chamber above the water-line, a pipe leading from the bottom of the drum or chamber to said header, a pipe leading directly from said header to the drum or chamber above the water-line, and a pipe for feeding water into the lower part of the generator before its passage to said drum or chamber, substantially as specified.

3. In a steam-generator, the combination, with a drum or chamber which is partly filled with water when the generator is supplied, of an inclined header and an inclined mud-drum, connected by a pipe communicating with their lower ends, circulating-pipes leading from said header and communicating directly with said drum or chamber above the water-line, a pipe

leading from the bottom of said drum or chamber to said header, and a pipe for supplying feed-water to the lower part of the generator before its passage to the drum or chamber, substantially as specified.

4. In a steam-generator, the combination, with a drum or chamber which is partly filled with water when the generator is supplied, of an inclined header and an inclined mud-drum, a pipe connecting said header and mud-drum at their lower ends, pipes connecting said header and mud-drum, near their upper ends, with the drum or chamber above the water-line, circulating-pipes leading from said header and entering said drum or chamber above the water-line, and a pipe for supplying feed-water to the lower part of the generator before its passage to said drum or chamber, substantially as specified.

JAMES C. STEAD.

Witnesses:

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JAMES R. BOWEN.