(No Model.) 2 Sheets—Sheet 1.

J. C. STEAD.

STEAM BOILER AND GENERATOR.

No. 302,440. Patented July 22, 1884.

Fig. 1.

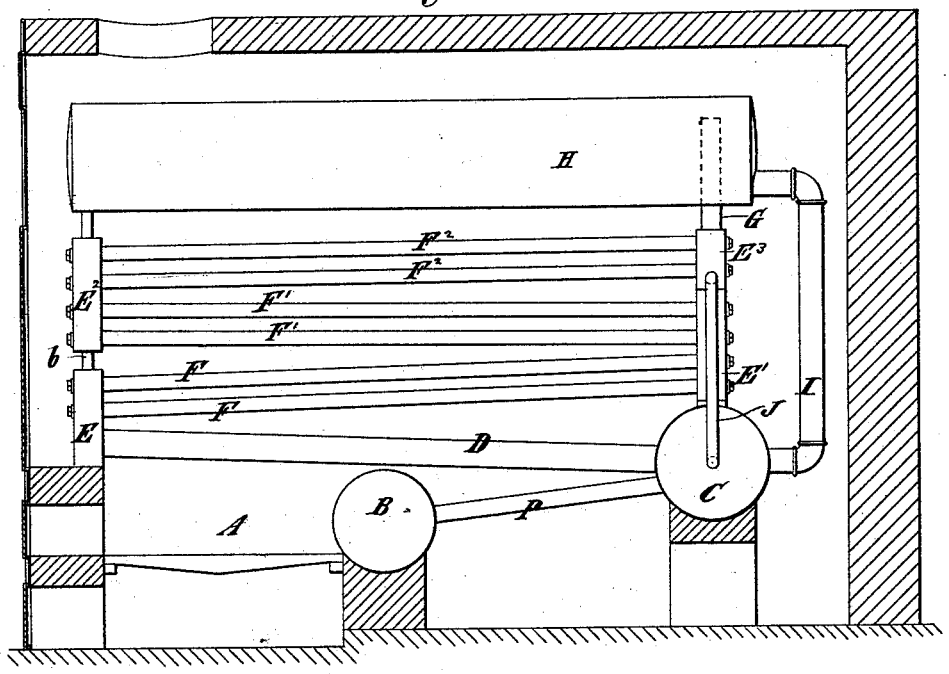


Fig. 2.

Fig. 3.

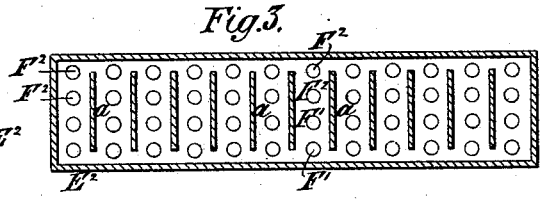


Fig. 6.

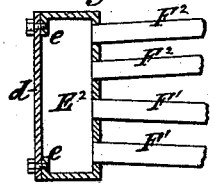


Fig. 5.

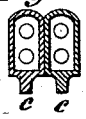


Fig. 4.

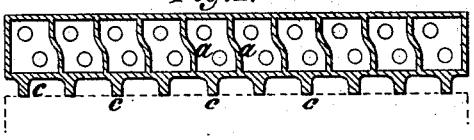
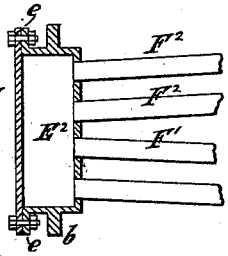


Fig. 7.



Witnesses
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(No Model.) 2 Sheets—Sheet 2.

J. C. STEAD.

STEAM BOILER AND GENERATOR.

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Fig. 8.

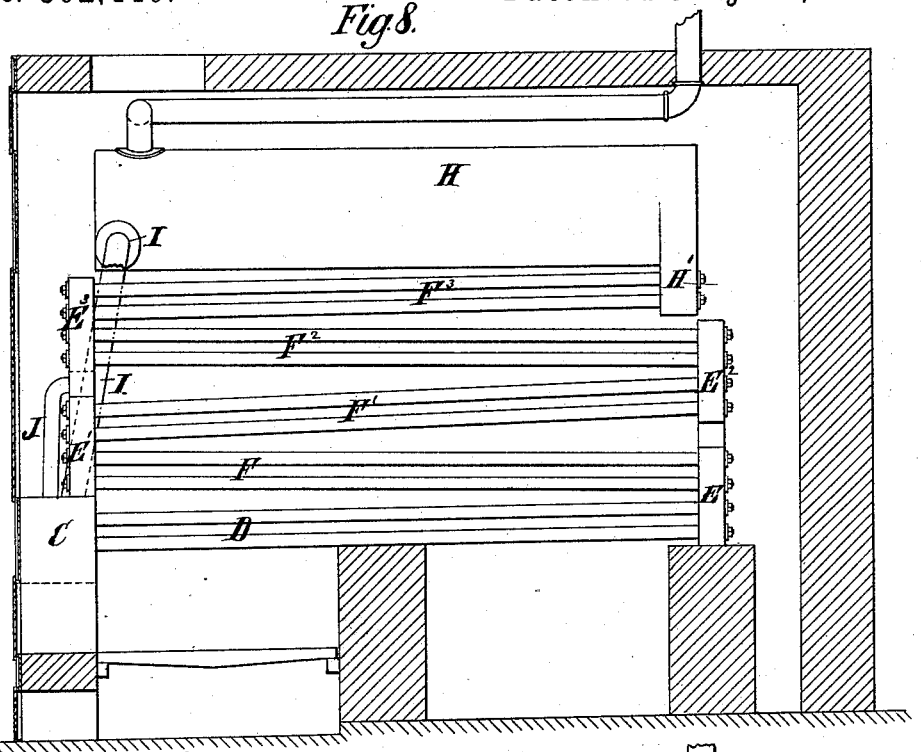


Fig. 9.

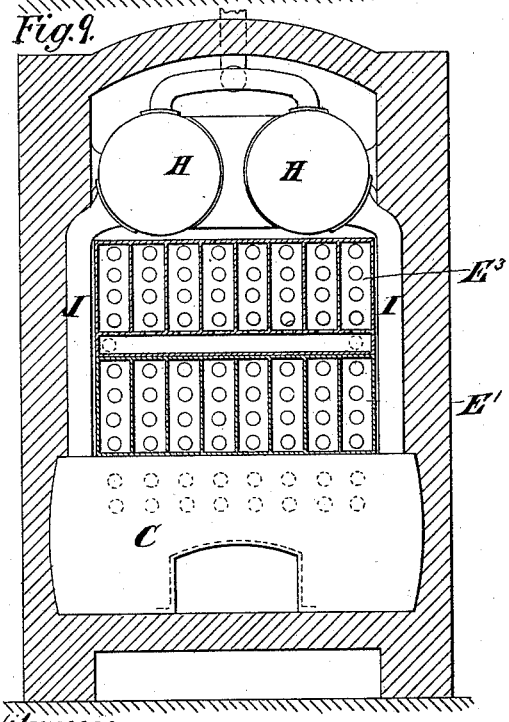
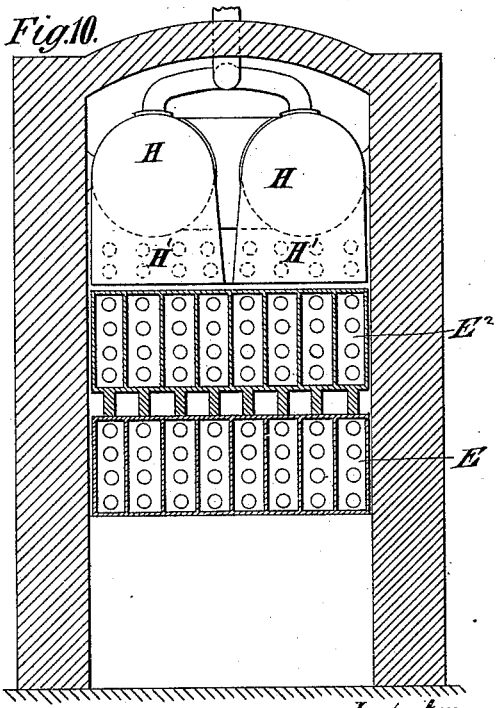


Fig. 10.



Witnesses
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UNITED STATES PATENT OFFICE.

JAMES C. STEAD, OF BROOKLYN, NEW YORK.

STEAM BOILER AND GENERATOR.

SPECIFICATION forming part of Letters Patent No. 302,440, dated July 22, 1884.

Application filed January 11, 1884. (No model.)

To all whom it may concern:

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

I will first describe a steam boiler or generator embodying my improvement, and then point out the various features of the improvement in claims.

In the accompanying drawings, Figure 1 is a longitudinal side view of a steam boiler or generator embodying my improvement. Fig. 2 is a vertical longitudinal section of a header which may form part thereof. Fig. 3 is a similar view of a header of a modified form. Fig. 4 is a like view of a header of another modified form. Fig. 5 is a like view of headers having certain features in common with the header shown in Fig. 4. Fig. 6 is a section of a header taken lengthwise of the steam boiler or generator, and Fig. 7 is a similar view of a header having certain features different from the one shown in Fig. 6. Fig. 8 is a longitudinal side view of a boiler or generator of modified form. Fig. 9 is a sectional front view thereof, and Fig. 10 is a sectional back view of the same.

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

A designates the furnace of the boiler or generator. The bridge-wall is surmounted by a drum, B, from which a pipe, P, extends to a drum, C, arranged near the rear end of the boiler or generator. From the forward portion of the drum C a large pipe, D, extends to a header, E, near the front of the boiler or generator. There may be more than the one pipe P and more than the single pipe D, if desirable. The pipe or pipes D extend at an upward incline to the header E. From the header E two tiers of pipes, F, extend at an upward incline to a header, E′. From the header E′ two tiers of pipes, F′, extend at an upward incline to a header, E^2, superposed on the header E. From the header E^2 two tiers of pipes, F^2, extend to a header, E^3, superposed on the header E′. Each header may be a long casting extending the entire width of the boiler or generator between the side walls, and may be internally open from end to end, or it may be composed of two or more longitudinal sections. It will preferably have partitions *a* between the top and bottom. If the pipes connected to the headers are staggered, the partitions *a* will be sinuous, as shown in Fig. 2; but if these pipes are tiered or placed one above the other, the said partitions may be vertically arranged, as shown in Fig. 3.

Sinuous partitions *a* may be employed in headers such as are shown in Fig. 4, which connect a fewer number of pipes than the headers which are shown in Figs. 1, 2, 3, 6, and 7. The partitions *a* in any case can extend from the top to the bottom of the headers, or they may stop short of both the top and bottom.

The header E^2 may rest directly on the top of the header E, or it may have cast on its under side a flange or rim, *b*, which will rest on the header E. The header E′ is supported by the drum C, and the header E^3 is supported by the header E′. Preferably the headers E′ E^3 will have cast on their under sides legs *c*, which will rest on the supports below them. The heat and products of combustion can pass between these legs *c*.

Legs *c* may be cast on a header such as is shown in Fig. 4, connecting but two rows of pipes, or on headers such as are shown in Fig. 5, severally connecting but two pipes, as well as on headers such as are shown in Figs. 1, 2, 3, 6, and 7.

The header E^3 (see Fig. 1) is connected by a pipe or pipes, G, with a drum or separator, H, and the pipe or pipes G may extend to the drum or separator either above or below the water-line thereof. As shown, they connect with it above its water-line. The drum or separator H is connected by a large pipe or pipes, I, with the drum C. Preferably the connection between the pipe or pipes I and the drum or separator is made below the water-line of the latter, and the said pipe or pipes will extend to the rear portion of the drum C.

A pipe or pipes, J, may advantageously be employed to establish communication between the header E^3 and the end or ends of the drum C, so that relief will be afforded at the said header when an excessive pressure occurs

there. When these pipes J are used, the several compartments of the header E^3 must be made to intercommunicate, in order that the desired result may be attained. The pipe or pipes J will preferably have a check-valve or check-valves opening downwardly.

I find that in many cases it is advantageous to extend pipes in parallel tiers, as described, between the headers E E' E^2 E^3, as then the water will pass more quickly to the drum or separator H, and the steam can escape from the water more quickly.

The headers may have at the front covers *d*, secured by screws or bolts to flanges *e* extending outwardly from the headers, as shown in Fig. 7, or to flanges *e'* extending inwardly from the headers, as shown in Fig. 6. The covers may extend the whole length of the headers or sections of the headers, or they may be made smaller, to cover any number of pipes. Indeed ordinary hand-hole covers may be used.

In Figs. 8, 9, and 10, C represents a water-arch, having the doorway for the furnace A formed in it. Two tiers of pipes, D, lead therefrom to a header, E, at the rear end of the boiler. From the header E two tiers of pipes, F, extend at an upward incline to a header, E', at the front of the boiler, and from the latter extend, at a reverse upward incline, two tiers of pipes, F', which at their rear ends are fastened to a header, E^2. From the header E^2 two tiers of pipes, F^2, extend to a header, E^3, at the front of the boiler. From the header E^3 two tiers of pipes extend to legs or downward extensions H' of separators H. From the separators H, near their front ends, pipes I extend downwardly to the water-arch C.

The header E^3 is provided with a horizontal perforated diaphragm which forms a lower passage intercommunicating with the compartments above. Pipes J lead from this lower passage to the water-arch C, and relieve the header E^3 of any excessive pressure. The pipes J will preferably be furnished with downwardly-opening check-valves. In my boilers the tubes may be either expanded or screwed into the headers to which they are connected. If the pipes F^3 are expanded into the extensions H' of the separators H, holes will be provided on the rear side of the extensions, through which an expanding implement may be operated. Such holes would be closed by plugs or hand-holes.

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

1. In a steam boiler or generator, the combination of headers and tiers of reversely-inclined pipes extending between the headers, and arranged so as to be staggered, said headers having in them sinuous partitions forming compartments, with each of which compartments two or more staggered pipes are connected, substantially as specified.

2. In a steam boiler or generator, the combination, with reversely-inclined rows of superposed pipes, of headers severally communicating with adjacent inclined rows of said pipes, said headers having in them partitions dividing them into compartments by which the inclined pipes are connected in vertical tiers, the said partitions stopping short of the top and bottom of the headers, substantially as specified.

JAMES C. STEAD.

Witnesses:
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LOUIS SCHULTZ.