(No Model.)

J. C. STEAD.

STEAM GENERATOR.

No. 311,450. Patented Jan. 27, 1885.

Fig. 1.

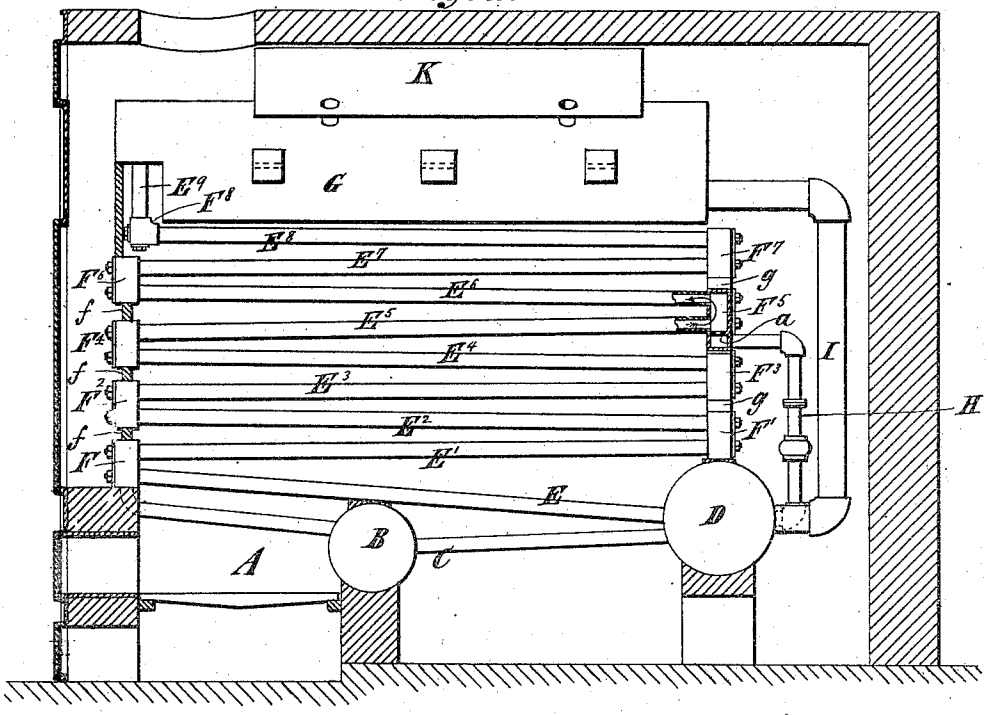


Fig. 2.

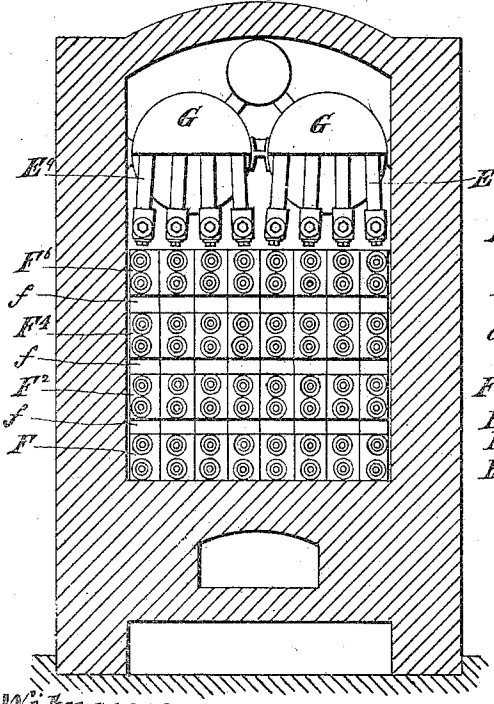
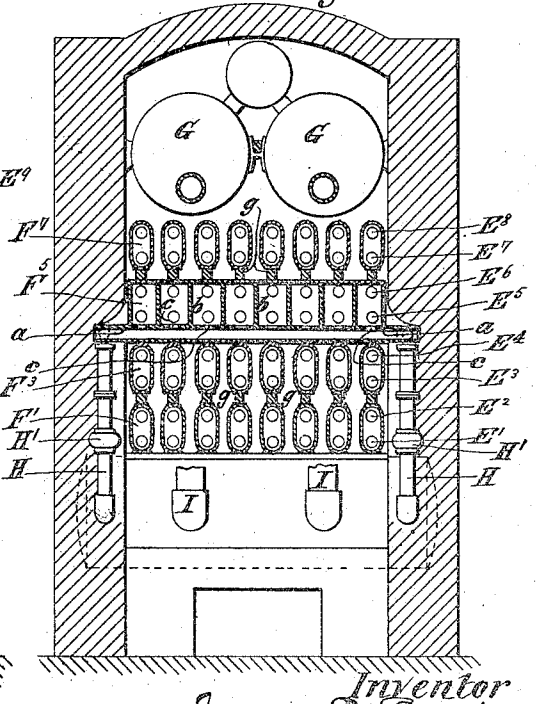


Fig. 3.



Witnesses
James R. Bowen.
H. C. Cane

Inventor
James C. Stead,
By his attorney,
Edwin H. Brown

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JAMES C. STEAD, OF BROOKLYN, NEW YORK.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 311,450, dated January 27, 1885.

Application filed January 5, 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-Generators, of which the following is a specification.

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

In the accompanying drawings, Figure 1 is a sectional side view of a steam-boiler or generator embodying my improvement. Fig. 2 is a sectional front view thereof, and Fig. 3 is a sectional back view of the same.

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

A designates a furnace of the ordinary or any other appropriate style. On the bridge-wall is a mud-drum, B. Pipes C connect this mud-drum with another drum, D, arranged, as here shown, near the back of the boiler or generator.

From the drum D—as here shown, from its front portion—extend toward the front of the boiler or generator pipes E, which at the forward ends are fastened to headers or return-bends F. The pipes E ascend or incline upwardly as they extend forward.

From the headers or return-bends F pipes E′ extend rearwardly and upwardly over the pipes E, and at the rear ends they are secured to headers or return-bends F′. Pipes E^2 extend from the headers or return-bends F′ rearwardly and upwardly over the pipes E′. At the forward ends they are secured to headers or return-bends F^2, which are arranged over the headers or return-bends F.

From the headers or return-bends F^2 pipes E^3 extend rearwardly and upwardly to headers or return-bends F^3, and from these headers or return-bends F^3 pipes E^4 extend forwardly and upwardly to headers or return-bends F^4. Pipes E^5 extend from the headers or return-bends last mentioned rearwardly and upwardly to a header, F^5, and from this header F^5 other pipes, E^6, extend forwardly and rearwardly to headers or return-bends F^6. From these last-named headers or return-bend pipes E^7 extend rearwardly and upwardly to headers or return-bends F^7. Pipes E^8 extend rearwardly and upwardly to elbows or couplings F^8, which connect them to pipes E^9, that extend upwardly into separators G. These couplings F^8 severally have openings s' s^2 s^3 s^4. The pipes E^8 fit in the holes s', and the pipes E^9 in the holes s^2. The pipes E^8 E^9 may be passed through the openings s^3 s^4 to fit them in their openings s' s^2, and may be expanded in their openings by implements operated through the holes s^3 s^4. The openings s^3 s^4 may be closed by plugs or plates. The pipes E E′, &c., may be connected to the headers or return-bends F F′, &c., not excepting the header F^5, by screw-threads, or, if the construction of the headers or return-bends will admit of it, by expanding the ends of the pipes. The headers or return-bends of each row F, F′, F^2, F^3, F^4, F^6, or F^7 are, as here shown, separate and independent, and severally serve only to connect one pipe with another pipe above it; but the header F^5 is one casting extending laterally throughout the whole range of pipes E E′, &c. This header F^5 is provided with a partition, *a*, which extends parallel with its top and bottom, and with a number of upright partitions, *b*, that extend between the partition *a* and the top of the header. The partitions *b* divide the header into a number of compartments, each of which serves to connect one of the pipes E^5 with one of the pipes E^6.

In the partition *a* between the partitions *b* are holes *c;* hence the space between the partition *a* and the bottom of the header forms a passage common to all the compartments of the header. The holes *c* should be successively larger from the ends of the header toward the middle. Thus it will be seen I produce a single header having a number of intercommunicating compartments. The ends of the passage formed between the partition *a* and the bottom of the header F^5 are connected to pipes H, which extend to the drum D—as here shown, to the back part thereof. These pipes H are furnished with check-valves H′, that are adapted to open downwardly when the pressure above them is greater than the pressure below them. Under other circumstances they will remain closed. The pipes E^9 preferably extend into the separators G above the water-line. As here shown, they extend into the bottoms of shouldered portions at the front ends of the separators. From the rear ends of the separators, below the wa-

ter-line, pipes I extend to the back portion of the drum D. As the water in the pipes E E′, &c., becomes heated it circulates upwardly through them. If, at the time of its arrival at the header F^5, the pressure is sufficiently high, part of the water will descend through the pipes H, force open the check-valves H′, and pass into the drum D, and the remainder will circulate up into the separators G, and some will return to the drum D through the pipes I. If, however, the pressure at the header F^5 shall not be sufficiently in excess of the pressure in the drum D to open the check-valves H′, then the entire circulation will be through the separators. I find that to relieve the steam from some of the water at the header F^5 is advantageous whenever the pressure at that point is excessive. The headers or return-bends of each row F, F^2, F^4, and F^6 will fit snugly together, side by side. The row F may be supported by a bridge or other device extending beneath them, and each upper row may be supported by blocks *f*, resting on the next lower row, and arranged so as to practically prevent the passage of the products of combustion between the rows. The row of headers or return-bends F′ rest upon the drum D. The row of headers or return-bends F^3 is supported by narrow blocks *g*, that will not prevent the passage of the products of combustion past the headers or return-bends. The header F^5 is supported similarly above the headers or return-bends F^3, and the headers or return-bends F^7 are similarly supported above the header F^5. The blocks *f g* may be formed with the headers, or separately therefrom. The pipes E E′, &c., may be supported between the ends by straps, if desirable. The separators may be connected together and to the side walls of the boiler or generator in any suitable manner, so as to prevent the passage of the products of combustion upward past them. I have shown a steam-drum, K, connected to the upper parts of these separators. There may be any number of partitions across or partly across the boiler or generator between the front and rear headers or return-bends, to deflect the products of combustion and aid in supporting the pipes E E′, &c.

I may feed water into the drum D by a suitable pipe, or I may feed into other parts of the boiler or generator.

In lieu of each of the rows of headers or return-bends F, F′, F^2, F^3, F^4, F^6, and F^7, I may use headers like the header F^5, excepting that the lower passage establishing communication between the compartments will have closed ends.

The header F^5—and, if others like it are used, they also—may be made in two longitudinal sections, each extending but half-way across the range of pipes E E′, &c.

Rollers may be interposed between headers and parts on which they rest, to facilitate their movements in expanding and contracting.

All of the pipes which are used may be secured at the ends by either expanding or screwing them into the parts in which they fit.

The headers F′ F^3 F^5 F^7 may all be connected, if desirable, and the headers F F^2 F^4 F^6 may all be connected, if desired.

I am aware of Letters Patent granted to W. C. Baker for improvements in steam-boilers, November 24, 1863, and numbered 40,722, and also Letters Patent granted to W. C. Baker for an improvement in steam-boilers, dated December 18, 1866, and numbered 60,459, and I do not herein claim anything therein shown and described.

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

1. In a steam boiler or generator, the combination, with a row of pipes and another row arranged above it, of a header divided by transverse partitions and a perforated longitudinal partition into compartments which severally connect a pipe in the lower row with a pipe in the upper row, and which intercommunicate through the perforations in the longitudinal partition with the passage beyond the same, substantially as specified.

2. In a steam-generator, the combination of a drum, rows of reversely-inclined circulating-pipes leading therefrom, through which water ascends, headers or return-bends connecting said circulating-pipes, a separator or separators with which each row of circulating-pipes is separately connected, pipes leading from the separator or separators back to the drum, and through which water returns, a header arranged below the separator or separators, and with which each vertical row of circulating-pipes is separately connected, said header being unconnected with the pipes through which water is returned from the separator to the drum, and a pipe or pipes leading from said header back to the drum, and adapted to afford at the header relief from excessive pressure, substantially as specified.

3. In a steam boiler or generator, the combination of a drum, rows of circulating-pipes, headers or return-bends connecting the rows of pipes, a separator or separators into which the uppermost pipes extend, pipes leading from the separator or separators back to the drum, pipes leading from a header below the separator or separators back to the drum, and check-valves in these pipes, substantially as specified.

JAMES C. STEAD.

Witnesses:
T. J. KEANE,
LOUIS SCHULTZ.

Correction in Letters Patent No. 311,450.

It is hereby certified that in Letters Patent No. 311,450, granted January 27, 1885, upon the application of James C. Stead, of Brooklyn, New York, for an improvement in "Steam-Generators," an error appears in the printed specification requiring the following correction, viz: In line 59, page 1, the reference-letters s^3 s^4 should be read between the words "openings" and "by"; and that the Letters Patent should be read with this correction therein to make it conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 10th day of February, A. D. 1885.

[SEAL.]

M. L. JOSLYN,
Acting Secretary of the Interior.

Countersigned:

BENJ. BUTTERWORTH,
Commissioner of Patents.