3 Sheets-Sheet 1.

G. B. Field,

Sectional Steam Boiler.

No. 79,110. Patented June 23, 1868.

Fig. 2.

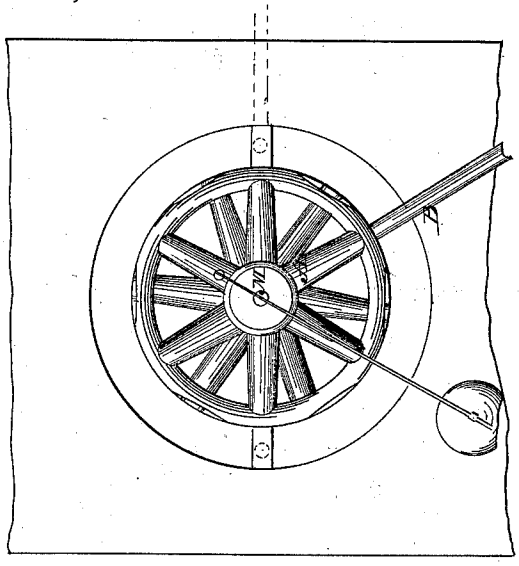


Fig. 3.

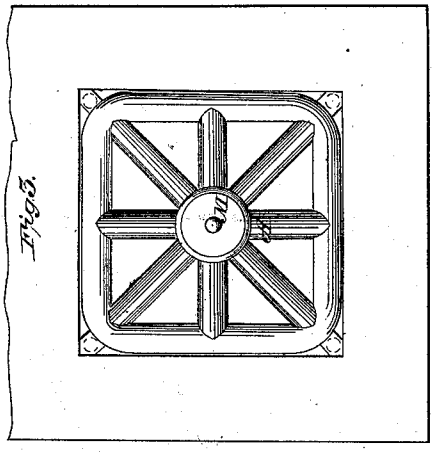
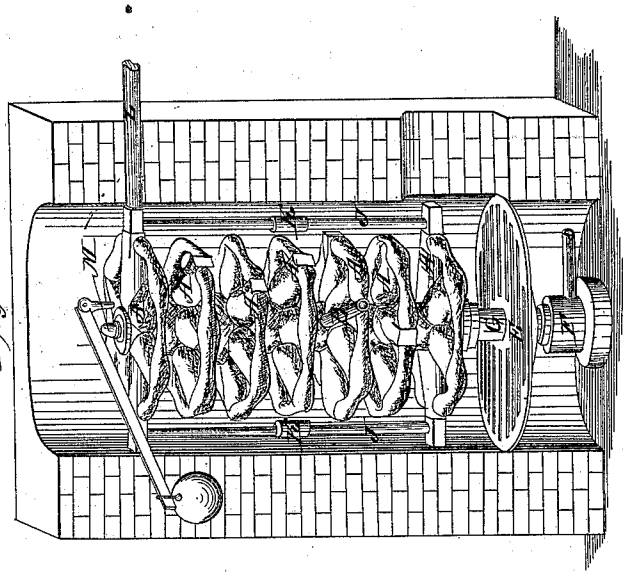


Fig. 1.



Witnesses:
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by his attys R

3 Sheets-Sheet 2.

G. B. Field,

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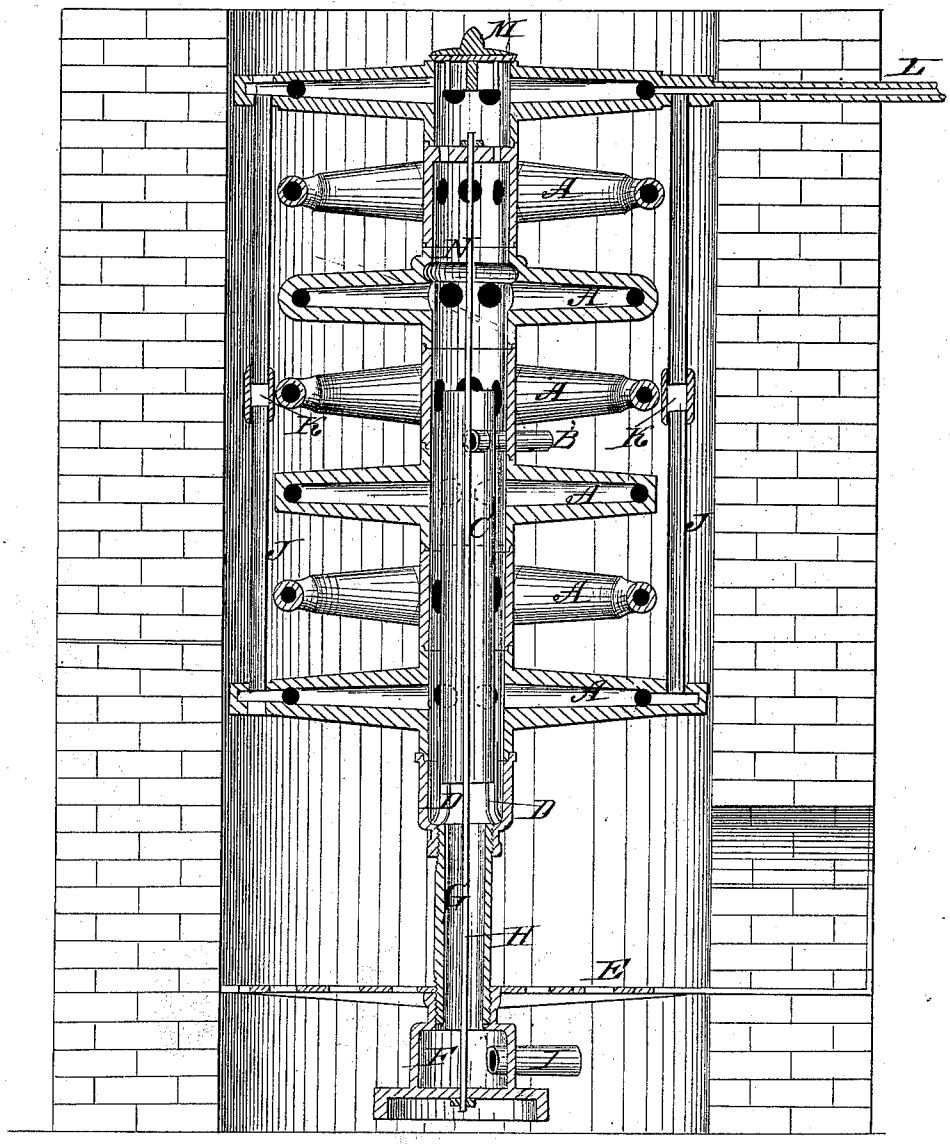
Fig. 4.



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G. B. Field,

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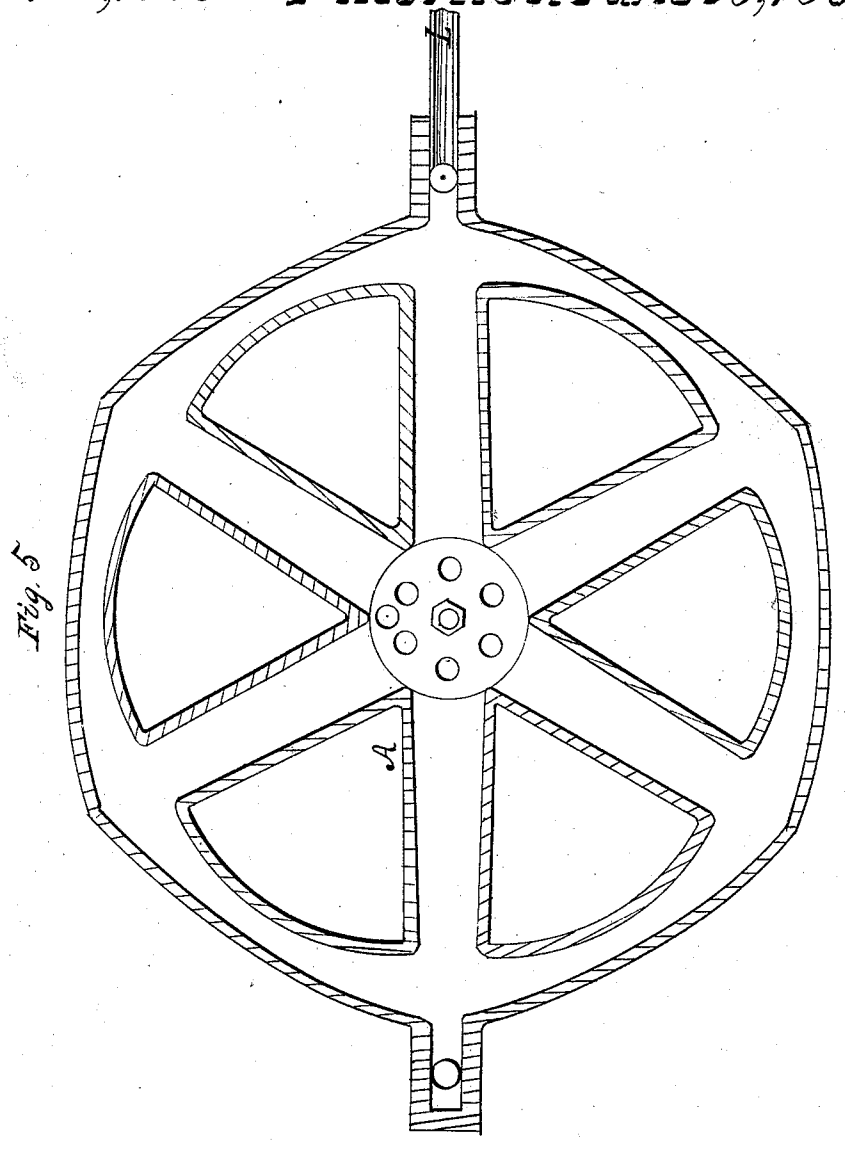

Fig. 5

United States Patent Office.

GEORGE B. FIELD, OF NEW YORK, N. Y.

Letters Patent No. 79,110, *dated June* 23, 1868.

IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, GEORGE B. FIELD, of New York, in the county of New York, and State of New York, have invented a new and useful Improvement in Steam-Generators; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my steam-generator in position, the brickwork surrounding it being broken away.

Figure 2 is a plan view of the same.

Figure 3 is another plan view of the same, showing a modified construction.

Figure 4 is vertical section through the entire generator.

Figure 5 is a horizontal section through the arms and rim of one division.

My invention relates to a steam-generator constructed of cast metal, in sections or divisions, which may be united by bolts or otherwise; and it consists—

First, in the form and arrangement of the said sections.

Second, in the manner of introducing feed-water.

Third, in the manner of preventing injurious deposits of scale, &c., within the generator.

Fourth, in the manner of securing the various sections together.

That others may understand the construction and operation of my invention, I will particularly describe it.

The sections A A, which compose, when joined together, my steam-generator, may be likened to a wheel with hollow hub, spokes, and rim. These sections are clearly shown in figs. 1, 2, and 3 of the drawings, and their internal form may be seen in figs. 4 and 5. The hollow space is continuous through the rim, and is connected with the hollow hub through each spoke. My boiler or generator is composed of any desirable number of these sections, set one upon another, and secured together by bolts or other suitable means. Each hub is turned in a lathe with a rabbet and flange, so that they will fit each other accurately, and when the generator is set up, this joint may be luted if desired. The water-space within the rim and spokes of each section may be cylindrical if preferred, but, in my opinion, it is better to construct it with a continuous enlargement from points between the spokes, through said spokes, to the central space or hub, for the reason that such construction will afford perfect drainage into the central cylinder, so that neither water nor steam will be trapped and stand in the hollows of either rim or spokes. This mode of construction is clearly shown in figs. 4 and 5, while fig. 3 exhibits a section having cylindrical arms and rim.

The feed-water pipe, B, is introduced through the side of the central cylinder or hub, and extends nearly or quite to the centre thereof, as shown in fig. 4 so that the cold feed-water, instead of being discharged against the surface of the generator, is discharged in the centre of the mass of hot water. The effect of this is to relieve the iron from the effect of unequal expansion, and to increase the circulation of the water within the boiler, and, therefore, increase the rapidity with which steam is evolved.

The cylinder C is also introduced for the purpose of aiding to accomplish both of these purposes, and by receiving within itself the column of cold water, the same is not permitted to come in contact with the shell of the generator until the bottom of the cylinder C is reached, by which time the feed-water will have become heated.

The cylinder C is supported upon legs D D, and if the cold feed-water were not received within it, it would develope a complete circulation of the water contained in the boiler, in accordance with the well-known laws which govern the motions of fluids—the hotter water ascending along the surface of the generator, and the cooler descending through the centre.

At some point a little below the lowermost section of my generator, is placed the grate E, and below the grate is a reservoir, F, which is connected with the central cylinder or hub of the generator by the tube G, and if preferred, the whole may be bound together by a bolt, H, passing through the centre of the hubs of the various sections, and secured by screw-nuts, as shown in fig. 4.

From the reservoir F a waste-pipe, I, extends outward through the brick or other casing, and is provided

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with a suitable gate or cock, so that said pipe may be opened at will and the contents of the reservoir and boiler drawn off. The sedimentary matter left when the water within the boiler is being evaporated will not lodge within the spaces of the rims or arms, because of their inclined surfaces and complete drainage, but will gradually find its way into the central hub, and from thence will sink directly to the reservoir beneath the grate, from whence it can never rise again.

In an ordinary boiler this sediment settles at the lower point, and when impure water is used, it accumulates so rapidly that the transmission of heat is in a short time almost entirely arrested, but with my reservoir, where the presence of sediment can exert no deleterious influence, the action of the boiler will be uniform whatever may be the character of the water.

It is evident that this reservoir below the grate surface will be equally applicable and useful in other kinds and styles of steam-generators.

It may be deemed desirable and advantageous to couple the various sections by wrought tubular rods, J J, the ends of which are screwed into hollow lugs projecting from the upper and lower sections, and the centres joined by couplers, K K, which are provided with right and left-hand screws, so that by turning said coupler the end sections may be drawn toward each other.

The steam-pipe L leads off from the uppermost section, as shown. It is provided with the necessary valves and connections.

At the upper end of the central hub or cylinder is the safety-valve M, whose seat occupies the entire area of the central cylinder, and, therefore, when raised, it affords the greatest possible space for steam-escape. The safety-valve may be secured by a weighted lever in the ordinary manner, as shown in fig. 1.

When the hot water ascends along the inside of the steam-generator, it meets an enlargement, N, with a curved annular channel, the over-arching top of which deflects the rising current of water inward and toward the descending column at the centre of the boiler.

From the form shown, it will appear that my steam-generator may be set in the flue of the stack, instead of being placed at one side of the same, and protected by a separate structure.

The products of combustion and burning gases arising from the grate E pass upwards among the arms of sections, constantly intercepted and impeded by them, so that a large share of the heat is extracted before it is passed above the generator. The more completely to arrest and impede the upward current of heated air and flame, the arms of the sections are arranged so as to break space with each other, as shown in figs. 1, 2, and 4. The sections should, of course, nearly or quite fill the area of the flue, so as to permit as little as possible of the products of combustion to pass upward without contact with the surface of the generator somewhere. If it is desired to employ a square flue, then the sections should correspond to that form, as shown in fig. 3.

Among the advantages of this system may be enumerated cheapness of construction, ease of manufacture and fitting, few joints to keep tight, and general compactness, with a great expanse of heating-surface, facility of removing sedimentary matters, &c., &c.

Having described my invention, what I claim as new, is—

1. A steam-generator, constructed of cast iron or other cast metal, with a hollow cylindrical hub, radiating hollow arms, and a hollow rim connecting the outer ends of said arms, substantially as set forth.

2. Constructing a cast-metal steam-generator, as above described, with a continuous enlargement of the water-space from a point between the arms, through the same, to the central hub, as described and shown.

3. The cylinder C, arranged as shown and described, and for the purpose set forth.

4. In combination, with the sections A, of a steam-generator, such as described, a reservoir, E, standing under the main cylinder of said generator and beneath the fire-grate, as described.

5. In connection with the central cylinder or hub of a steam-generator, such as described, and the enclosed cylinder C, the annular enlargement N, for the purpose and with the effect set forth.

6. In combination with a steam-generator, composed of one or more sections, as herein described, the safety-valve M, having an orifice as large as the interior diameter of the cylindrical hub or largest tube of the generator, as set forth and described.

7. The arrangement of the feed-pipe B, in connection with the central cylinder or hub of the steam-generator described, so that the feed-water shall be discharged at the centre of the descending current, as set forth and described.

8. A steam-generator, composed of sections A, in the form of hollow rings, with hollow radiating arms connecting said rings with a central cylinder or hub, said sections being placed one above another, and so arranged as to fill the space within the chimney without being embedded in the same, and with the radial arms so disposed as break joint with each other, all as set forth and described.

9. The tubular rods J J, arranged to secure the sections A to each other, and located outside of said sections, so as to increase the circulation and steam-surface, as described.

GEO. B. FIELD.

Witnesses:

R. D. O. SMITH,

EDM. F. BROWN.