

(No Model.)

6 Sheets—Sheet 1.

C. D. MOSHER.
STEAM GENERATOR.

No. 550,571.

Patented Nov. 26, 1895.

FIG. 1.

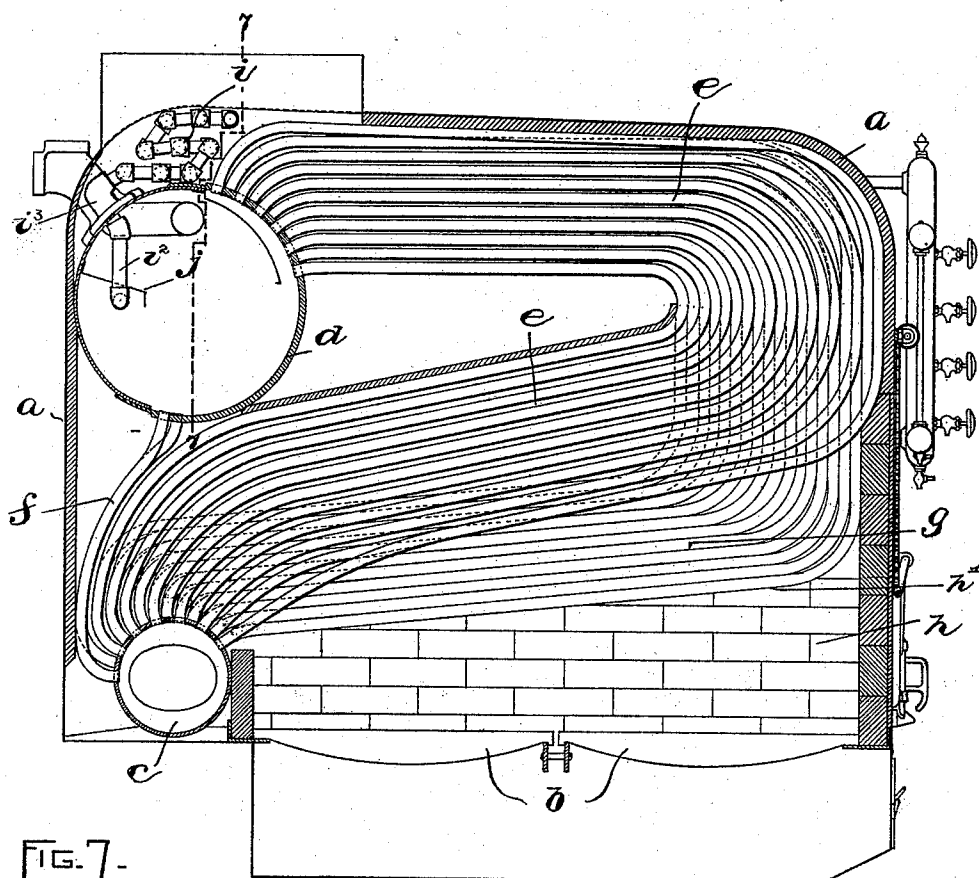
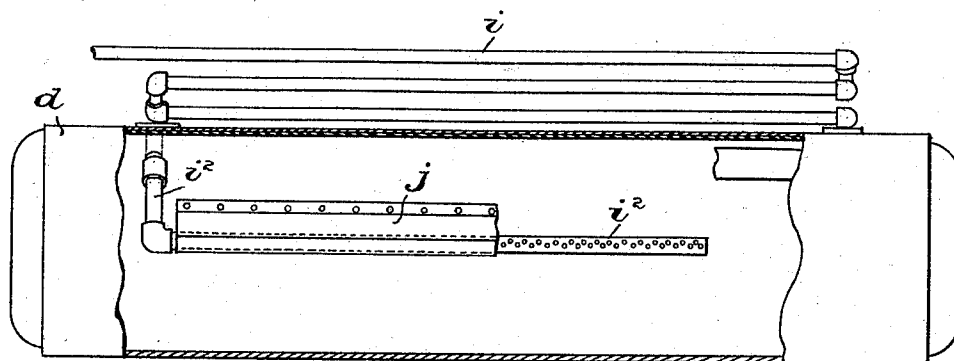
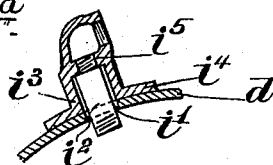


FIG. 7.



WITNESSES: FIG. 1^a

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INVENTOR:
Charles D. Mosher
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(No Model.)

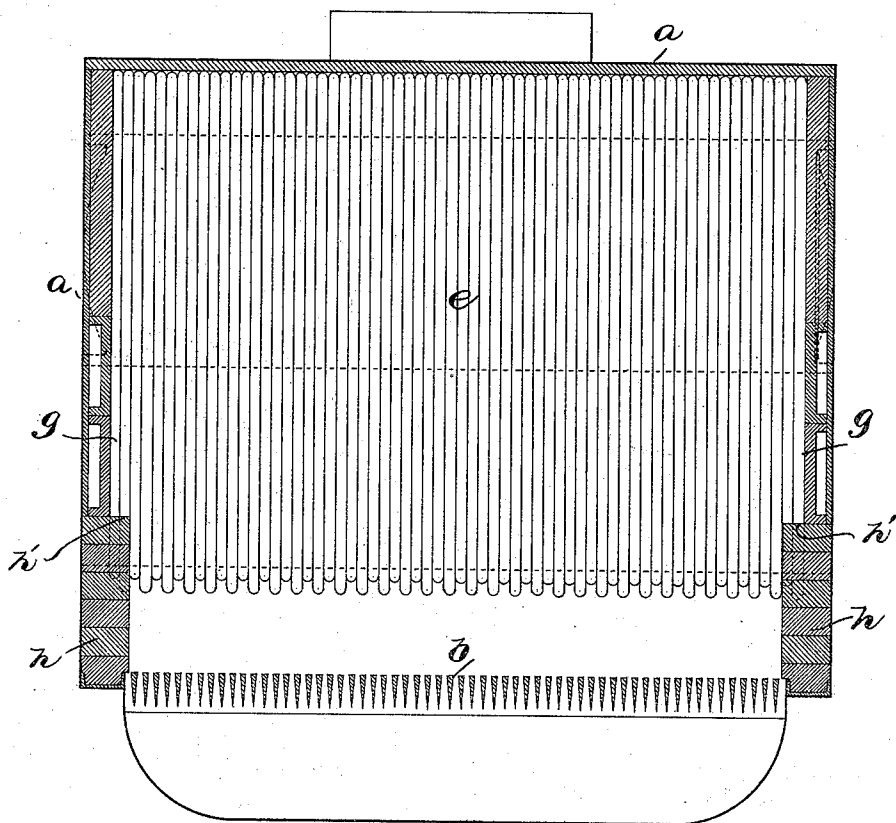
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FIG. 2.



WITNESSES:

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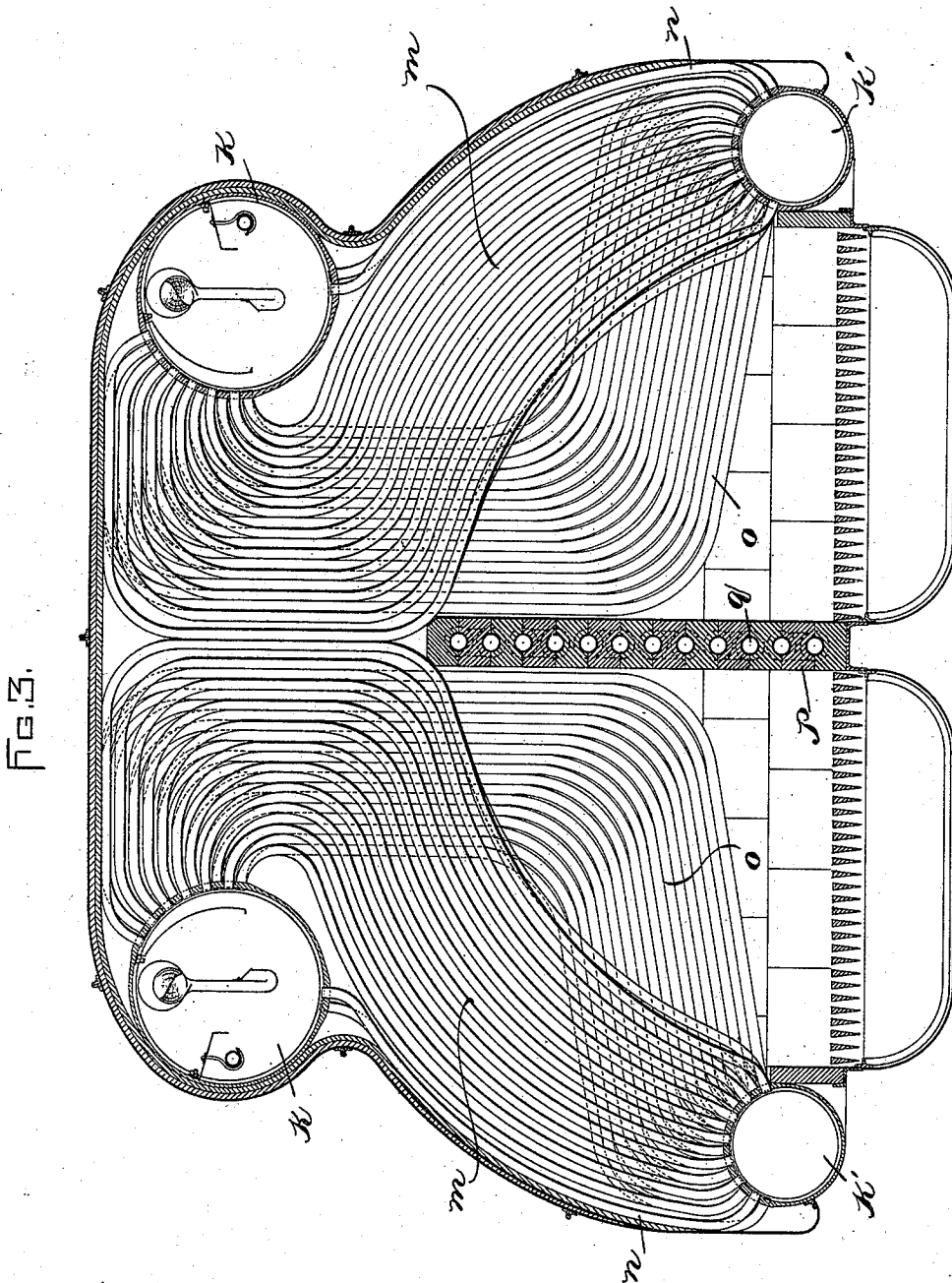
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C. D. MOSHER.
STEAM GENERATOR.

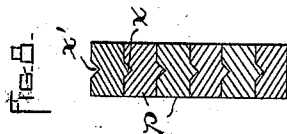
No. 550,571.

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WITNESSES:

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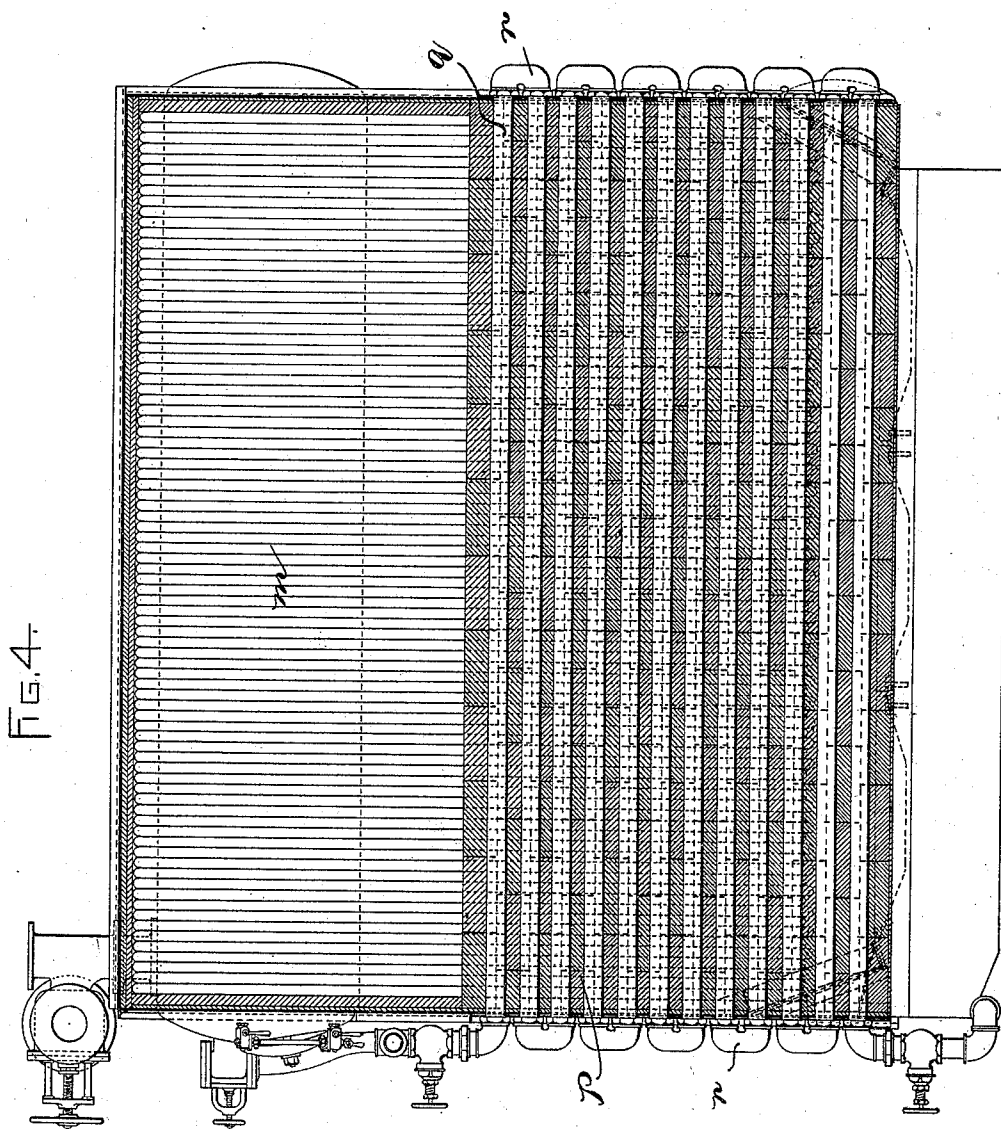
(No Model.)

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C. D. MOSHER.
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No. 550,571.

Patented Nov. 26, 1895.



WITNESSES:

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INVENTOR:

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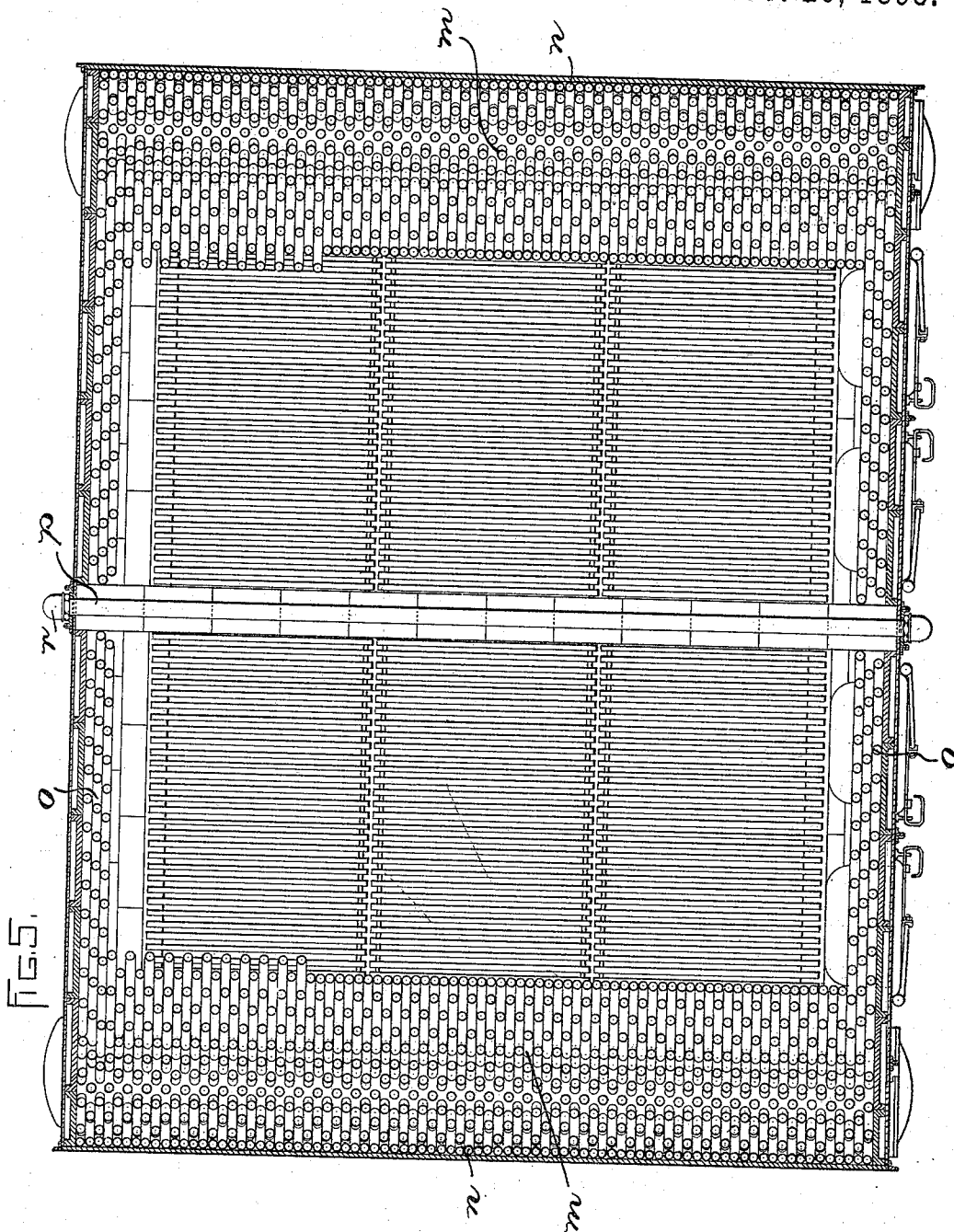
(No Model.)

6 Sheets—Sheet 5.

C. D. MOSHER.
STEAM GENERATOR.

No. 550,571.

Patented Nov. 26, 1895.



WITNESSES:

A. D. Harrison
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INVENTOR:

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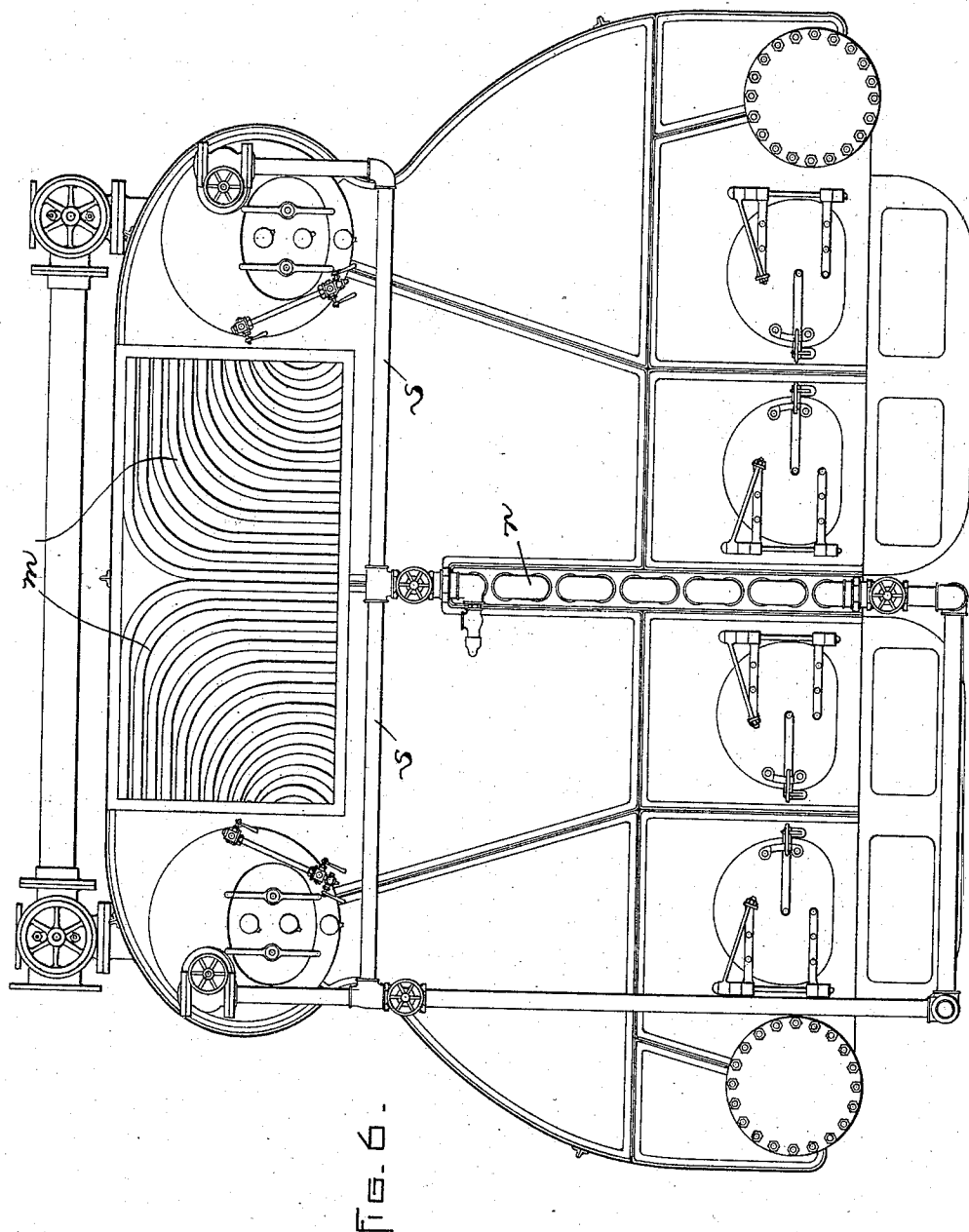
(No Model.)

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C. D. MOSHER.
STEAM GENERATOR.

No. 550,571.

Patented Nov. 26, 1895.



WITNESSES:

A. D. Hanson.

E. Davis.

INVENTOR:

Charles D. Mosher

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UNITED STATES PATENT OFFICE.

CHARLES D. MOSHER, OF NEW YORK, N. Y.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 550,571, dated November 26, 1895.

Application filed August 24, 1894. Serial No. 521,173. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. MOSHER, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

This invention relates to certain improvements in steam-generators of the class shown in my former patent of April 5, 1892, No. 472,309, in which the steam and water drums are connected by a plurality of groups or rows of curved or looped generating-tubes. It is to be noted that in this former structure the ends of the steam and water drums are connected by large return-pipes located outside of the casing which incloses the generating-tubes. By this arrangement the dimensions of the generator are increased; and it is one object of the present invention to provide means for avoiding this increase in dimensions and compacting the generator in smaller compass without lessening its capacity. The generator is specially designed for marine use and the question of space is an important one.

One feature of the invention therefore consists in arranging a row of return-pipes extending lengthwise of the drums and connecting the lower portion of the steam-drum with the water-drum, these return-pipes being placed close together to form a wall and prevent outward radiation of heat.

In addition to the above the invention contemplates a novel arrangement of the generating-tubes, consisting in diverting one or more of the groups of such tubes at one or both ends of the series and carrying them over the adjacent wall or walls of the casing, so that these diverted tubes will form a protecting-covering for said wall or walls.

Another object of the invention is to provide improved means for overcoming a vulnerable joint between the feed-water pipe and the shell of the steam-drum.

Another object of the invention is to provide an improved construction of bridge-wall in the double form of furnace and an arrangement of feed-water tubes in conjunction with said bridge-wall, whereby they lock the fire-bricks composing said wall together and are incased thereby, so that the feed-water will absorb the heat of the fire-brick.

The several combinations of elements in which the invention may be said to reside are recited in the appended claims.

The invention is illustrated in the accompanying drawings, which form part of the specification, and of which—

Figure 1 shows a longitudinal section of a boiler or steam-generator of single form. Fig. 1^a shows a sectional detail of a joint between the steam-drum and the feed-water pipe. Fig. 2 shows a front elevation of the interior parts of the generator with the inclosing casing and the grate in section. Fig. 3 shows a cross-section of a generator of double form. Fig. 4 shows a longitudinal central section of the same. Fig. 5 shows a horizontal section of this double generator. Fig. 6 shows a front elevation thereof. Fig. 7 shows a partial longitudinal section of the steam-drum with some of the parts surrounding the same shown in elevation, the view being taken substantially on the line 7 7 of Fig. 1. Fig. 8 shows a modification in the construction of a bridge-wall seen in Fig. 3.

Referring first to Figs. 1 and 2, the letter *a* designates the inclosing casing of the generator; *b*, the grate at the bottom of said casing; *c*, the water-drum located back of the said grate and extending transversely with respect thereto; *d*, the steam-drum located over, or substantially over, the water-drum and having the same direction of longitudinal extent; and *e*, groups or rows of generating-tubes connecting the upper portion of the water-drum with the upper portion of the steam-drum.

In place of the large return-pipes heretofore employed to connect the steam and water drums I employ one or more rows or groups of tubes *f*, connecting the lower portion of the steam-drum with the water-drum and closely assembled to form a wall which protects the back of the casing, the said tubes being properly separated where they enter the drums, so as to leave sufficient metal between the holes in the latter. In addition to this function of the tubes *f* they may be utilized, as above stated, to form a wall which will prevent outward radiation of the heat and will form a protection for the rear wall of the casing, so that provisions heretofore found necessary for this purpose can be dispensed with.

In further carrying out my invention one or more groups *g* at each end of the series of generating-tubes are diverted and carried over the adjacent wall of the casing and closely assembled, so as to cover and protect the same. The fire-brick *h* lining the sides of the casing is offset, as shown at *h'*, to let in the diverted tubes *g*, as shown in Fig. 2.

The letter *i* designates a coil of feed-water pipes arranged in the space above the steam-drum, where it will be exposed to the gases which have passed through the flue formed by the generating-tubes and issue therefrom above the steam-drum. The said coil *i* is connected with the steam-drum through a joint, which is calculated to lessen the evil effects of feeding cold water by avoiding a direct engagement of the feed-water pipe with the shell of the steam-drum. This joint is shown in Fig. 1^a. The hole *i'* in the shell of the steam-drum, through which the feed-water pipe *i*² enters, is made somewhat larger than said pipe, and a hollow boss or neck *i*³ is secured on the exterior of the shell around said hole by means of a flange *i*⁴. Said boss or neck is formed at a point removed from the shell with an internal annular protuberance *i*⁵, screw-threaded to receive the pipe *i*². Beyond this protuberance the neck is formed as an elbow and is internally screw-threaded in its end to receive the pipe *i*.

By this construction it will be observed that no engagement between the feed-water pipe and the shell of the steam-drum is had and expansion due to the respective temperatures of the steam and feed water is taken up in the hollow boss, there being a steam-space in the boss around the pipe and communicating with the interior of the drum.

It is evident that the boss *i*³ might conveniently form the casing of a check-valve.

The pipe *i*² extends downwardly after entering the steam-drum and then horizontally, as shown in Fig. 7, and a baffle-plate *j* extends over its horizontal portion, said baffle-plate being fastened to the shell and projecting therefrom on a downward inclination.

The feed-pipe is perforated near its end, so that the water, after passing through a considerable length of the pipe, which is wholly surrounded by steam, and therefore absorbing a quantity of heat, will be delivered in small and separated streams where it will mingle with the water already in the boiler. The baffle-plate is for the purpose of preventing the cooling effect of the feed-water from being imparted to the steam in the upper portion of the steam-drum and also for preventing the water from being thrown into the steam space of the upper portion of the drum by the rolling of the vessel in a seaway.

Figs. 3 to 6 illustrate the same improvements as hereinbefore described applied to a double boiler employing two sets of steam and water drums *k* and *k'*, separately connected by generating-tubes *m*. In this construction the rows of return-tubes *n* extend over the

sides of the inclosing casing, instead of the rear wall of the same, as in the construction shown in Figs. 1 and 2. Likewise the diverted end groups of generating-tubes *o* cover the front and rear walls of the casing rather than the sides, as in the single construction.

In the construction described in my former patent (above referred to) the water-drums were connected together at the ends by cross-pipes and tubes springing from said cross-pipes extended over the end walls of the casing, forming a protecting-lining therefor. In the present construction these cross-pipes are dispensed with and the diverted tubes *o* take the place of tubes springing from such pipes, as above explained.

A subdividing bridge-wall may be erected between the two boilers and thus form two combustion-chambers. It is composed of horizontal rows or tiers of fire-brick *p*, built up one upon another and formed in their contiguous faces with semicircular grooves. Feed-water pipes *q* occupy the grooves and thereby lock the fire-bricks against lateral displacement. By thus incasing the pipes in this bridge-wall, which is completely exposed to the products of combustion, the feed-water will absorb a large amount of heat from the fire-brick, whose life is thereby prolonged. The feed-water pipes are connected by return-bends *r* in such a manner as to permit unobstructed circulation, and the bottom pipe is connected with a source of supply, while the top pipe connects by valved branches *s* with the steam-drums.

In Fig. 8 a modified form of bridge-wall is shown, in which the bricks are formed with interlocking-ribs *x* and grooves *x'* in lieu of the feed-water pipes.

Having thus described the nature of my invention and a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim as new, and desire to secure by Letters Patent, is—

1. A steam-generator comprising in its construction one or more water drums, one or more steam drums located above the same; groups or rows of generating tubes connecting the upper part of the water-drum with the upper part of the steam-drum, and a group or row of return or circulating tubes, said row extending lengthwise of the drums and connecting the lower part of the steam-drum with the water-drum, and the tubes of the row being closely assembled to form a closed wall outside of said generating tubes.

2. A steam-generator comprising in its construction one or more water drums, one or more steam drums located above the same, and groups or rows of generating tubes bent in loops and connecting the upper part of the water-drum with the upper part of the steam-drum, the end group or groups being diverted from the other groups and carried over the adjacent wall or walls of the furnace in those

portions thereof which extend below the other groups, substantially as described.

3. In a steam-generator, a steam-drum having a hole at one part, a boss or neck fastened to the drum around the said hole, and a feed-water pipe fastened in the boss or neck and passing through the hole in the drum,—there being a steam space in the boss or neck around the feed-pipe and communicating with the interior of the drum.

4. In a steam generator, a steam-drum having a hole at a suitable part, a hollow boss or neck fastened to the drum around the said hole and having an internal annular protuberance at a point removed from the drum, and a feed-water pipe passing through the said hole in the drum and fastened in said annular protuberance.

5. In a steam generator, a steam-drum, a perforated feed-water pipe entering the same and extending longitudinally therein near one side, and a baffle-plate secured to that side of the drum above the feed-pipe and projecting therefrom on a downward inclination.

6. A steam generator of double form comprising in its construction water and steam drums, looped generating tubes connecting the same, and a bridge-wall erected between the fire-boxes below said tubes and composed of fire-bricks or pieces of other refractory material with interlocking means.

7. A steam generator of double form comprising in its construction water and steam drums, looped generating tubes connecting the same, and a bridge-wall erected between the fire-boxes below said tubes and composed of fire-bricks or pieces of other refractory material grooved in their horizontal meeting faces, and horizontal feed-water pipes lying in the grooves.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 6th day of August, A. D. 1894.

CHARLES D. MOSHER.

Witnesses:

E. BATCHELDER,
A. D. HARRISON.