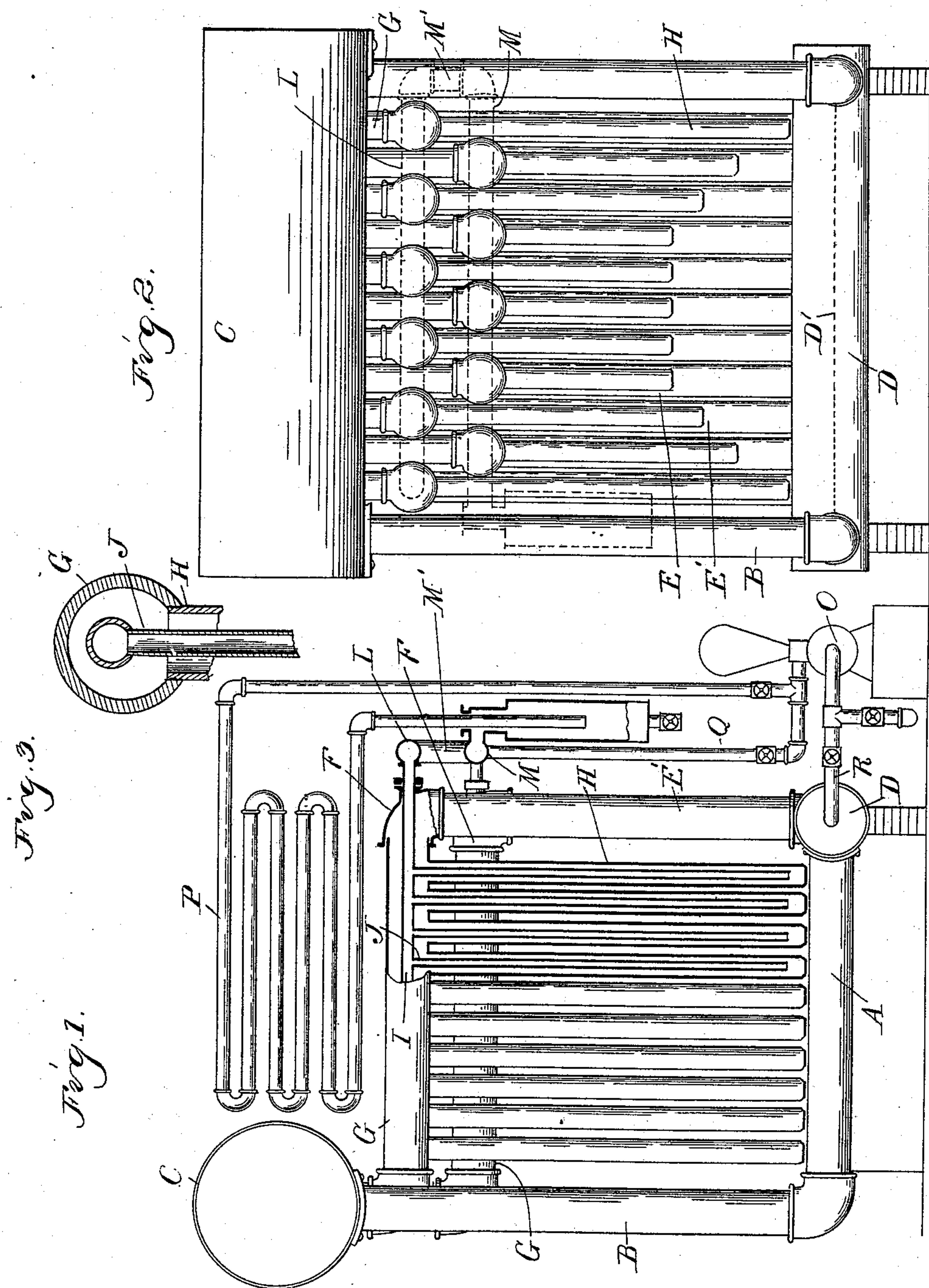


(No Model.)

B. ST. BERNARD.
STEAM GENERATOR.

No. 540,031.

Patented May 28, 1895.



Witnesses
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L. J. Whittemore

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UNITED STATES PATENT OFFICE.

BION ST. BERNARD, OF ST. CLAIR, MICHIGAN.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 540,031, dated May 28, 1895.

Application filed January 8, 1895. Serial No. 534,180. (No model.)

To all whom it may concern:

Be it known that I, BION ST. BERNARD, a citizen of the United States, residing at St. Clair, in the county of St. Clair and State of Michigan, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification, reference being had therein to the accompanying drawings.

10 The invention consists in the peculiar construction, arrangement and combination of the various parts, all as more fully hereinafter described.

15 In the drawings, Figure 1 is a side elevation of the circulating-pipes of my steam-generator, partly in section. Fig. 2 is a front elevation thereof. Fig. 3 is a section through one of the horizontal headers of a drop-tube.

20 My generator belongs to that class in which drop tubes are employed and in which auxiliary pipes are arranged concentrically within the drop tubes to effect a circulation in each tube, and consists particularly in so connecting these auxiliary pipes or auxiliary drop
25 tubes with the source of water supply, such as the boiler feed, that the water will be fed into these inner pipes at the bottom of the drop tubes, or when steam is not to be used, that the water in the generator will be circulated in the same manner.

30 The invention further consists in the combination of parts hereinafter set forth.

35 The frame of the generator comprises the horizontal side pipes A at their forward ends connected into the vertical risers B, which connect into the bottom of the steam drum C. At the rear end the pipes A connect into the horizontal header D extending across the rear of the furnace chamber.

40 D' indicates the line of grate bars in the furnace chamber.

45 On the upper face of the header D are a series of risers E E', the risers E being shorter than the risers E', these being alternately arranged. At the top of each of these risers of both lengths is the elbow F, opening forwardly and connecting with the horizontal headers G which at their forward ends connect into the bottom of the drum C. From
50 the under face of each of the horizontal head-

ers G are a series of drop tubes H closed at their lower ends.

I are manifolds arranged concentrically within the headers G free from the sides thereof, each on its lowest face being provided
55 with a series of interior auxiliary drop tubes J of smaller diameter than the drop tubes H concentrically arranged within the same and having the lower end open. These manifolds extend from the elbows F through a suitable
60 stuffing box and are connected to the feed water supply in any suitable manner, so that when the generator is in operation the water commencing through the manifolds I passes
65 downward through the pipes J and is discharged at the bottom of the drop tubes, from which it will rise through the drop tubes, pass into the steam dome or drum and after parting with its steam will descend through the
70 risers B and return to the header D through the horizontal pipes A. For convenience in distributing the water into the tubes J from a common supply I connect all of the manifolds I of the upper series into a common
75 header L and all of the manifolds of the lower series into the common header M, connecting these two headers together at their ends by the connecting pipe M', shown in Fig. 2, and then connecting the open end of the header
80 M with the boiler feed.

The boiler feed I have shown comprising a boiler feed pump O, a series of water heating coils P connected to the discharge pipe of the pump and connecting with the lower header
85 M. While this is a desirable way to connect the parts I do not wish to be limited to such a specific connection.

When the steam is not to be used it is desirable to have a circulation through the drop tubes the same as when it is in use to prevent
90 the overheating of those tubes and their burning out. This is effected by making a valved controlled connection Q from the boiler feed pump to the manifolds I and I also connect the suction side of the pump with the header
95 D by the pipe R and insert a suitable valve to control the same so that instead of feeding new water by the pump I may circulate the water from the bottom of the boiler through the drop tubes in the manner described for
100

the feed water. With a construction of this kind I get all of the advantages of the drop tube and its interior circulating tube without any of the disadvantages which heretofore
5 have existed to the use of such construction.

While I have shown a specific construction of water circulating tubes or pipes, I do not desire to be limited to such precise construction so far as my broad invention is concerned, as I believe I am the first to combine
10 a series of drop tubes connected into the water space of the generator at their upper ends with an interior concentrically arranged pipe in such drop tubes opening at the bottom, and
15 a connection with the top of the drop tubes and the source of water supply.

What I claim as my invention is—

1. In a steam generator, the combination with a series of horizontal headers of a series
20 of drop tubes connecting at their upper ends into the water space of the headers, an interior concentrically arranged series of pipes, one in each drop tube, having its discharge opening at the bottom, a connection from the
25 top of said tubes to the feed water supply, and a steam drum common to all of the headers and having a riser connected therewith substantially as described.

2. In a steam generator, the combination
30 of a series of drop tubes, connecting at their upper ends into a water space of the header, an interior concentrically arranged series of pipes, one in each drop tube having a discharge opening at the bottom, and circulating mechanism, such as a pump, having its
35 suction side connected to the lower portion of the water space, and its discharge connect-

ing into the upper end of the drop tubes, substantially as described.

3. In a steam generator, the combination 40 of a series of headers arranged over the furnace, a series of drop tubes depending from each header, a manifold within each header, a series of tubes depending from the manifolds through the drop tubes having an open- 45 ing at the bottom, a connection between the manifolds and the feed water supply and a steam drum common to all of the headers, substantially as described.

4. In a steam generator, the combination 50 of a series of drop tubes, connecting at the top into a water space of the header, an interior concentrically arranged series of pipes one in each drop tube, open at its bottom, manifolds into which these inner pipes connect, an ex- 55 terior connection between the manifolds a feed pump, a connection from the pump to the exterior connection and a valved connection from the pump to the lower water space of the boiler, substantially as described. 60

5. In a steam generator, the combination with the upper and lower headers constituting the water spaces of the generator and risers, of manifolds in the upper spaces, means comprising a pump for creating a force feed 65 to the manifolds, and a valved connection between the said means and the lower spaces, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

BION ST. BERNARD.

Witnesses:

M. B. O'DOGHERTY,
O. F. BARTHEL.