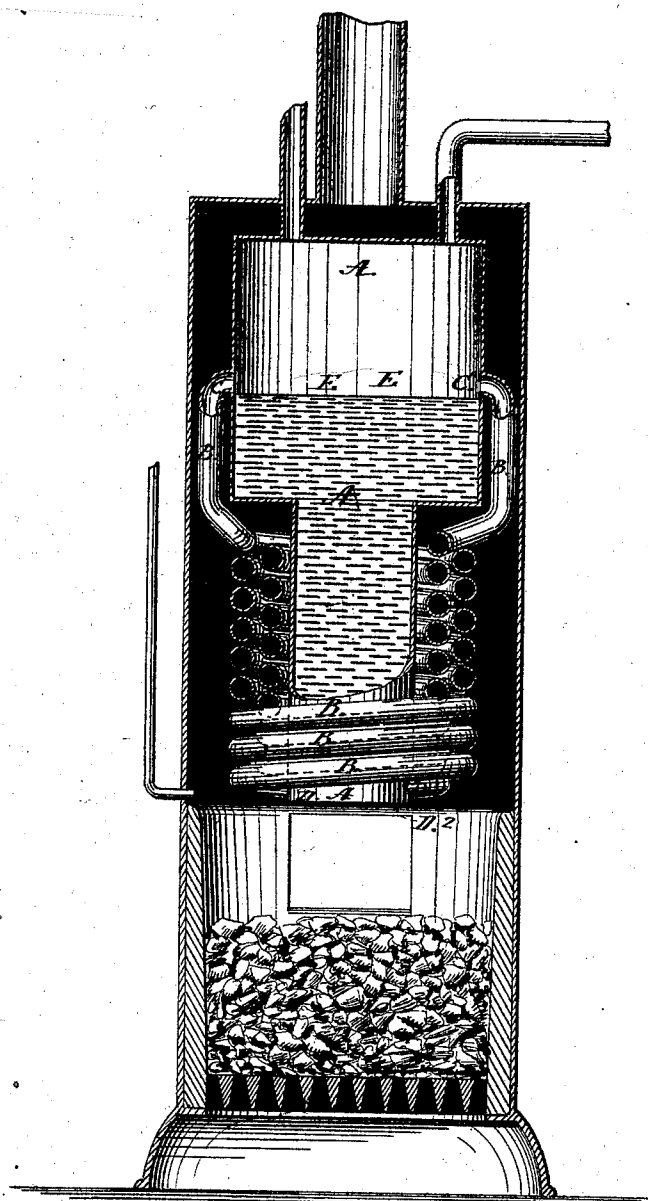


A. D. BROCK.

Improvement in Steam Generators.

No. 121,079.

Patented Nov. 21, 1871.



Witnesses.

W. A. Bartlett
F. M. Dodge

Inventor.

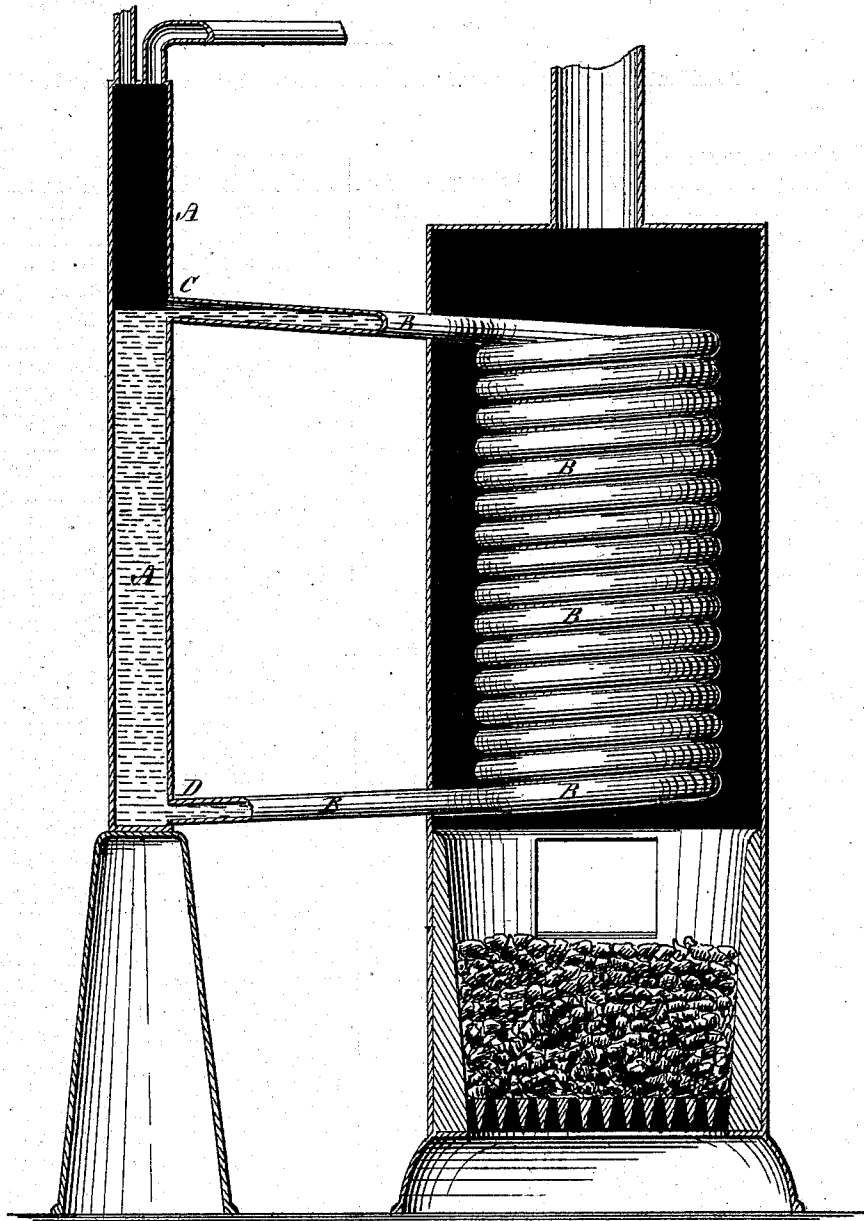
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Witnesses

Edw. W. Dunn
Lloyd J. Belt

Inventor.

Alvan E. Brock

UNITED STATES PATENT OFFICE.

ALVAN D. BROCK, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. 121,079, dated November 21, 1871.

To all whom it may concern:

Be it known that I, ALVAN D. BROCK, of the city of Washington, District of Columbia, have made a new and useful Improvement in Tubulous Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which the two figures represent front elevations of two forms of my invention, parts being broken away to show the construction.

In the drawings, A is a steam and water reservoir, which may be cylindrical or of other shape, and of any suitable metal. B B are tubes in which steam is generated. These tubes are preferably coiled in a cylindrical form, but any desired shape may be used. Any number of these coils may be employed in connection with the reservoir. The coils are connected with the reservoir by their exit-pipes C C and by their inlet-pipes D D². E E is the water-line in the reservoir.

Having shown the construction of my generator, I will now describe its mode of operation.

Water being introduced into the reservoir, it enters the coils by the inlet-pipes D D² and rises in them to the water-line E E. On the application of heat to the generator the water in the coils expands, and, as the specific gravity of water in the coils is less than that in the reservoir, this expansion must be in the direction of the exit-pipes C C, causing a rush of water through them into the reservoir at the water-line E E. The space in the coils thus made vacant is at once occupied by a fresh supply of water from the bottom of the reservoir, to be in its turn subjected to the same process. As the temperature is increased the circulation of the water in the coils is correspondingly accelerated. At 212° Fahrenheit steam is generated in the coils, which, obeying the same law, passes on, mingled with the heated water, through the exit-pipes into the reservoir. The steam thus generated and delivered into the reservoir, being of a less specific gravity than the water, rises and fills the space above the water-line. A rapid circulation in the generator, as well as a rapid circulation of steam, is by this process effected.

The vital principle of my invention is realized through the connection of the exit-pipes with the reservoir at or near the water-line, instead of

above or below that line. If the connection is made below the water surface the weight of water above said connection obstructs the circulation through the coils. If the connection be made above the water-line, or so far above that the heated water in the coils does not naturally and freely rise to the height of said connection, the generated steam only passes through the exit-pipes into the reservoir, leaving the water behind in the coils, and thus destroying all circulation of the water in the generator.

All experience touching this subject goes to show that a rapid circulation in generators is absolutely essential to a rapid generation of steam. This explains the success of my generator, in which a rapid circulation of both water and steam is effected by means of connecting the exit-pipe or pipes with the reservoir at or near the water-level in the same. By this means, also, I overcome the difficulties which the inventors of tubulous steam-generators have hitherto encountered: First, unless there is a rapid circulation of water and steam through the coils the sediment which naturally gathers in the coils remains there, and soon destroys the effectiveness of the generator. Second, unless there is a continuous flow of water from the bottom of the reservoir into the coils, (which water, being of a lower temperature, tends constantly to diminish the intensity of the heat,) the coils become overheated, and soon burn out. Third, unless there is a continuous fresh supply of water in the coils, not only is the water in the coils soon generated into steam, exposing the pipes to intense heat, but this intense heat, together with the back pressure of the steam, effectually expels and prevents all fresh supply of water from the reservoir, and destruction to the entire apparatus from exposure or burning out is the consequence.

It will be understood from the foregoing that the peculiarity and advantage of my invention relates exclusively to the particular point or height at which I connect the exit-pipe or pipes with the reservoir. That point or height is determined by the water-level in the reservoir. The water-line is rendered constant, or nearly so, by gauging the supply of water to the reservoir. The best result will always be obtained when the water-line is at the point of connection, but in practice the water-line may slightly vary; hence

I limit myself to such points of connection as are sufficiently near the water-line to secure a rapid circulation.

The exit-pipes may be connected with one common pipe before being attached to the reservoir, if found more convenient; and the form of the generator and of the reservoir may be varied in any manner.

I am aware that tubes subsidiary to ordinary steam-boilers have been attached thereto in a manner similar to that in which my steam-gene-

rator is attached to the reservoir, and I do not claim that arrangement; but—

I claim—

The steam-generator B, composed of a series or coil of tubes, connected with the steam and water reservoir A, the outlets C C of said generator entering said reservoir near its water-level, substantially as and for the purpose set forth.

Witnesses:

A. D. BROCK.

EDWARD N. BEAL,

W. A. BARTLETT.

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