(No Model.) 2 Sheets—Sheet 1.

# J. C. STEAD.

## STEAM GENERATOR.

No. 267,761. Patented Nov. 21, 1882.

Fig. 1.

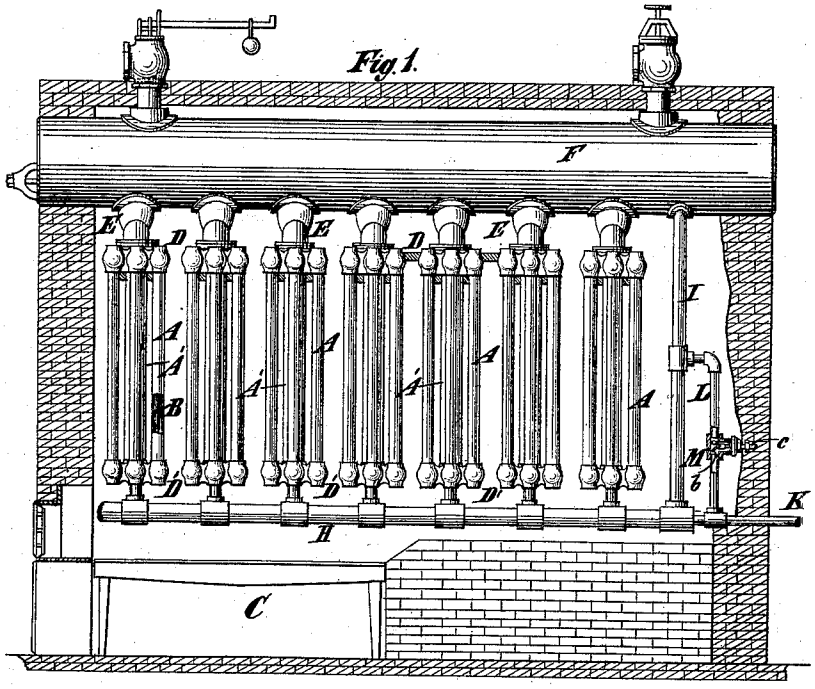



Fig. 2.

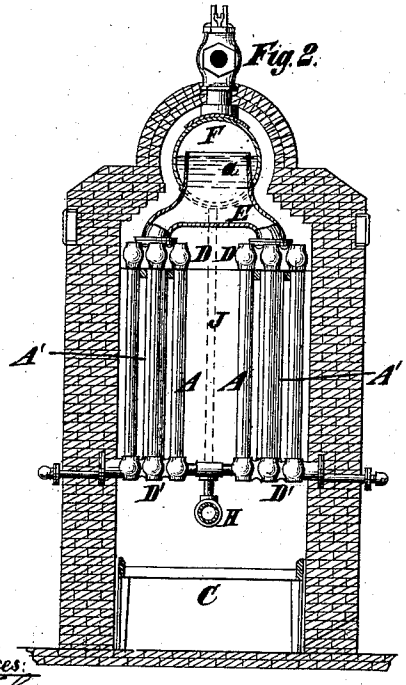
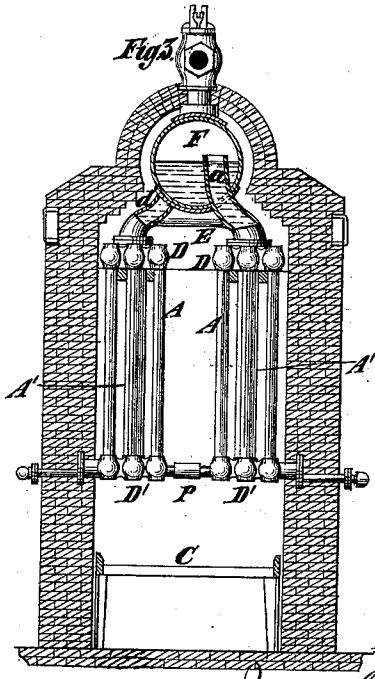



Fig. 3.




Witnesses:
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James R. Bowen.

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

(No Model.)

2 Sheets—Sheet 2.

# J. C. STEAD.

## STEAM GENERATOR.

No. 267,761. Patented Nov. 21, 1882.

Fig. 4.

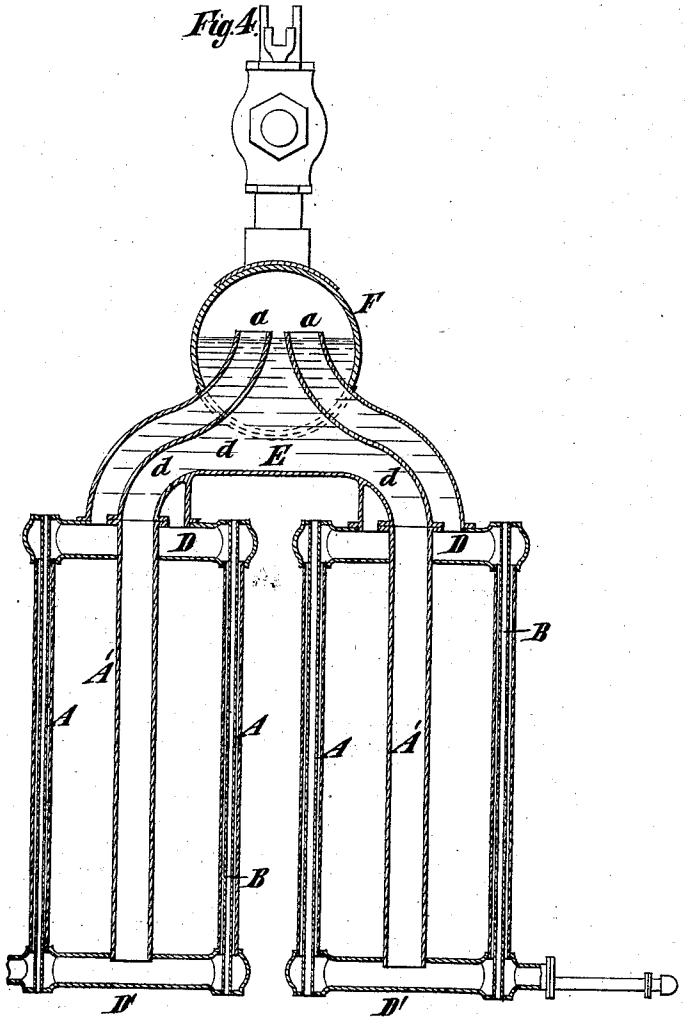
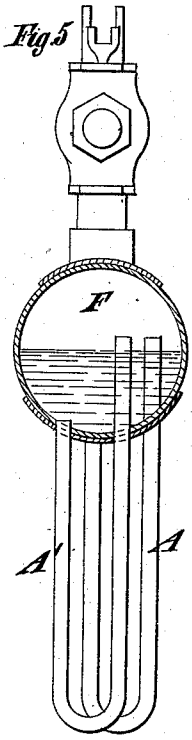



Fig. 5.

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# UNITED STATES PATENT OFFICE.

JAMES C. STEAD, OF BROOKLYN, NEW YORK.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 267,761, dated November 21, 1882.

Application filed April 27, 1882. (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.

My present improvement relates to a steam-generator comprising groups of upright or approximately upright pipes connected with an upper drum.

The object of the improvement is to add certain advantages to such a steam-generator without detracting from any of its merits.

The improvement consists in the combination, in a steam-generator, with a group of pipes and a drum, which is partly filled with water when the generator is supplied, arranged above the said group of pipes, of a throat-piece connecting the said group of pipes with said drum, and having a conduit extending into the drum above the water-line, a pipe or pipes establishing communication between the said drum below the water-line and the lower part of the group of pipes, and a pipe for feeding water into the lower part of said group of pipes before its passage to said drum.

The improvement also consists in the combination, in a steam-generator, with a group of pipes, headers connecting these pipes at the upper and lower ends, and a drum, which is partly filled with water when the generator is supplied, arranged above the said group of pipes, of a throat-piece connecting the upper header of said group of pipes with said drum, and having a conduit extending into the drum above the water-line, a pipe or pipes establishing communication between said drum below the water-line and the lower header of the said group of pipes, and a pipe for feeding water into the bottom or lower header before its passage to said drum.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a steam-generator embodying my improvement. Fig. 2 is a transverse section thereof; and Figs. 3, 4, and 5 are transverse sections of steam-generators embodying the improvement in modified forms.

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

Referring first to Figs. 1 and 2, A designates a number of groups of pipes, severally having arranged within them flues or smaller pipes B, through which pass the products of combustion arising from a furnace, C.

A′ designates pipes passing within the several groups aforesaid, and of larger diameter than the pipes A of the several groups. These pipes A′ may or may not have flues B extending through them. At both ends the pipes A A′ of each group are connected to headers D D′, which establish communication between them.

E designates throat-pieces, made of cast-iron or other suitable material, connecting the upper headers, D, with a drum, F, and suspending them from such drum. This drum F is supported in masonry G, which may be of any suitable form and construction, comprising the furnace C.

As here shown, the groups of pipes above described are arranged in pairs whose upper headers, D, are connected to the same throat-pieces E, but each of the said throat-pieces comprises a conduit, *a*, which extends into the drum F, above the water-line therein. The lower headers, D′, of the several groups of pipes are connected to a pipe, H, here shown as arranged below them, and connected at or near one end to a pipe, I, which leads to the adjacent end of the drum F, below the water-line. The water as it becomes heated in the several groups of pipes passes upward into the drum F, above the water-line, and any steam which is generated in these pipes also passes into the said drum above the water-line, and hence does not have to pass through the water contained in the drum. The drum thus has the function of a separator.

In lieu of employing the pipes H and I, I may employ the pipes J, (shown in dotted outline,) extending from the lower portion of the drum F, below the water-line, to pipes which connect the same with the lower headers, D′, of the several pairs of groups of pipes. A circulation is thus secured in a similar manner.

K designates a pipe whereby water is fed into the pipe H, and L designates a pipe connecting the lower portion of the pipe I with this pipe K.

M designates a valve applied to the pipe L, and consisting essentially of a disk, *b*, hinged

to its stem *c*, and adapted to swing backward under a pressure of water descending from the pipe I, so as to permit the water to pass from the pipe I into the feed-water pipe K, and, by mingling with the feed-water, to heat it. This valve will prevent the feed-water from passing up the pipe L into the pipe I.

In Fig. 3 the right-hand group of each pair is in communication with a conduit, *a*, in the throat-pieces E, extending into the drum F, above the water-line, but the left-hand group is in communication with a conduit, *d*, which leads only to the bottom of the drum F. The water, becoming heated in the right-hand group of pipes, ascends into the drum above the water-line, and any steam which is generated escapes without having to pass through the water in the drum. The water in the drum F descends through the left-hand group of pipes. Thus a vigorous circulation is maintained. In this example of my improvement I dispense with the pipes H I J J′, heretofore described. The lower headers of the two groups of pipes forming each pair are connected by a pipe, P.

In the generator shown in Fig. 4 there are groups of pipes A connected at the top and bottom by headers D D′, and having flues B passing through them. The upper headers, D, are in communication with a conduit, *a*, in the throat-pieces E, leading to the drum F above the water-line. The pipes A′ are not in communication with the upper headers, D, but they are in communication with the lower headers, D′. At the upper ends they communicate with conduits *d*, which lead to the lower portion of the drum F. The water in the pipes A, becoming heated, rises through the conduit *a* into the drum F above the water-line, and the cooler water in the drum descends through the pipes A′. Each of the pipes A may, if desirable, communicate with a separate smaller conduit leading into the drum F above the water-line.

Turning now to Fig. 5, F is a drum similar to those before described; and A A′ designate bent pipes, which at one end extend into the drum above the water-line, but at the other end extend to the lower portion of the drum. Water descends through the limb A′ of these pipes, and ascends through the limb A thereof into the separator above the water-line.

In all the figures A designates the groups of pipes. In Figs. 1 and 2 the pipes which establish communication between the lower part of the groups of pipes and the drum F below the water-line are the pipes I and H or J, and the appurtenances thereof. In Fig. 3 they consist of one group of pipes of each pair of groups. In Fig. 4 they are the pipes A′, and in Fig. 5 they are the limbs A′ of the pipes A A′.

If the conduit or conduits *a* of any throat-piece happened to be opposite a safety or other valve in the drum F, I would deflect them so that the water and steam issuing from them would not be projected against the same.

I do not here claim broadly as my invention a generator comprising a header, circulating-pipes extending from the header, and a steam-drum with which said circulating-pipes are connected, into which the feed-water is supplied, and from which the feed-water passes downward to the header. In such a generator the feed-water, which is cold, or at best of a much less temperature than the dry steam, being introduced into the steam-drum, will condense the steam to a very considerable extent, and, although the feed-water will be thereby heated, it will entail a waste of steam and a corresponding increase in the consumption of fuel over a generator in which the feed-water is introduced into its lower part where the water is more nearly of the same temperature.

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

1. In a steam-generator, the combination, with a group of pipes and a drum arranged above the said group of pipes, and which is partly filled with water when the generator is supplied, of a throat-piece connecting said group of pipes with said drum and having a conduit extending into the drum above the water-line, a pipe or pipes establishing communication between the said drum below the water-line and the lower part of the group of pipes, and a pipe for feeding water into the lower part of said group of pipes before its passage to said drum, substantially as specified.

2. In a steam-generator, the combination, with a group of pipes, headers connecting these pipes at the top and bottom, and a drum which is partly filled with water when the generator is supplied, arranged above said group of pipes, of a throat-piece connecting the upper header of said group of pipes with said drum and having a conduit extending into the drum above the water-line, a pipe or pipes establishing communication between said drum below the water-line and the lower header of the group of pipes, and a pipe for feeding water into said lower header before its passage to said drum, substantially as specified.

JAMES C. STEAD.

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EDWIN H. BROWN.