G. W. WALKER & M. PRATT.

Sectional Steam-Generator.

No. 168,198. Patented Sept. 28, 1875.

Fig. 1.

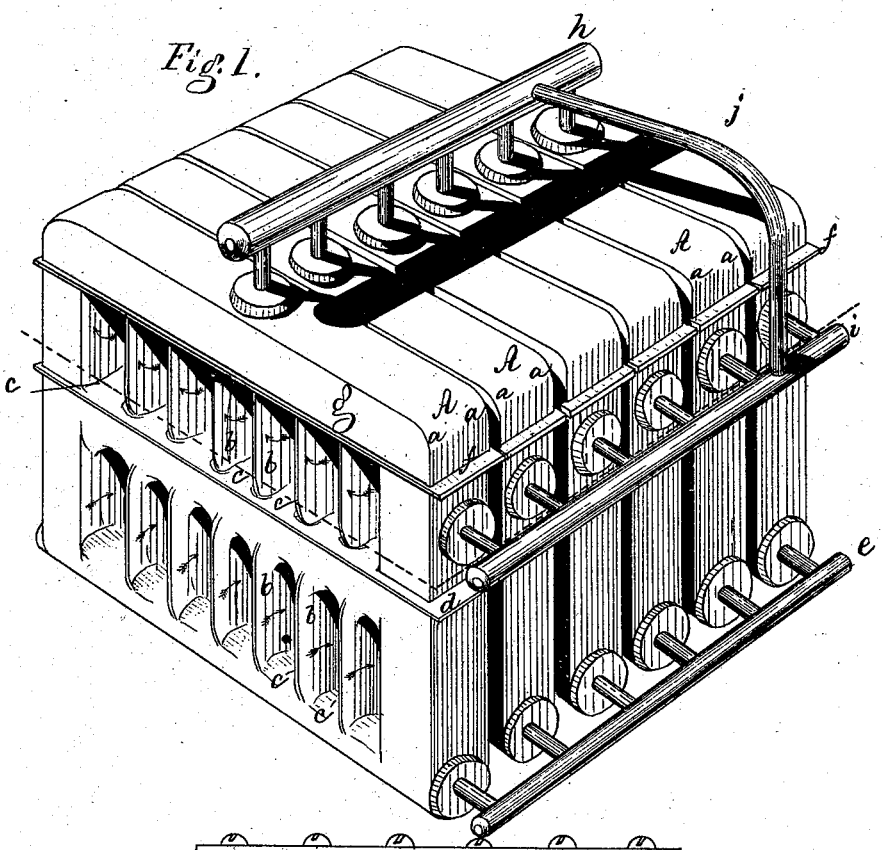
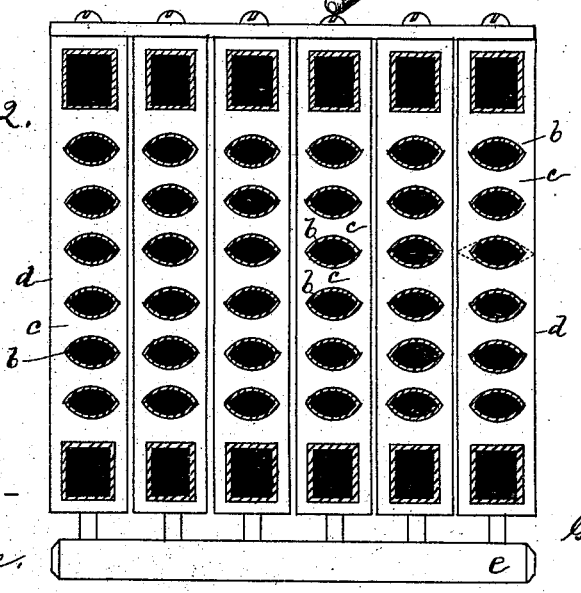


Fig. 2.



Witnesses—

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UNITED STATES PATENT OFFICE.

GEORGE W. WALKER, OF MALDEN, AND MILES PRATT, OF WATERTOWN, MASSACHUSETTS.

IMPROVEMENT IN SECTIONAL STEAM-GENERATORS.

Specification forming part of Letters Patent No. **168,198**, dated September 28, 1875; application filed August 14, 1875.

To all whom it may concern:

Be it known that we, GEORGE W. WALKER, of Malden, and MILES PRATT, of Watertown, both in the county of Middlesex and State of Massachusetts, have invented an Improvement in Steam-Generators, of which the following is a specification:

This invention relates to steam-generators specially designed for heating purposes, but applicable to other purposes.

The invention has for its object the production of a generator in which the water from which steam is produced shall circulate freely from section to section throughout the entire extent of the generator, thereby equalizing the temperature of the water in the several sections.

In generators for heating purposes, as now made, the sections containing water are connected at bottom to keep the water in each section on a level, and the sections are also connected at top above the water-line and opposite the steam-spaces, and with such a connection the steam rising from the water in the sections nearest the fire-chamber is condensed by coming in contact with the colder water and plates of the sections most remote from the fire-chamber, and the result is that the sections in excess of six or eight sections are not properly heated, and tend to lessen the production of steam.

Our invention consists in a generator of two or more connected sections, provided with inlet-pipes or water-receiving ways or passages at their lower parts, and with connecting-pipes or water-circulating ways above the inlet-passages, and connected with the sections below the steam-chamber and water-level, whereby the hottest water in the sections nearest the fire-chamber is allowed to circulate freely into the more remote sections.

Figure 1 represents our improved generator in perspective, and Fig. 2 is a horizontal section thereof.

We have not considered it necessary to show the fire-chamber for containing the coal or other fuel to heat the generator, for any well-known arrangement of fire-chamber will or may be used, and the generator will be incased in any well-known way. It is assumed that a fire-chamber of suitable construction is placed at the left of Fig. 1, and the products of combustion proceeding therefrom pass into the flue-spaces between the tubes of the first and adjacent sections, and, passing through the last section, return from the upper flue-spaces in the first section, as indicated by the arrows, and then to a suitable smoke-pipe.

The sections A are composed, preferably, of metallic hollow plates *a a*, fitted face to face. Each section is cast as shown, to form tubes *b* and flue-spaces *c* above and below a flanged portion, *d*, of the sections, which, by being fitted together, or nearly so, form between the tubes an extended flue-space sufficient to guide the products of combustion through the lower flue-spaces of all the sections, and then permit such products to return backward through the upper flue-spaces.

By making the tubes *b* wedge-shaped instead of circular or square, we are enabled to increase the surface of the tubes exposed to the action of the products of combustion, to give the greatest amount of heated surface to act on the water, and the entire surface of the tubes may be easily reached by a flue-brush to clean the tubes from soot or ashes, and at the same time the area of the flue-space is increased to an extent greater than if the tubes were circular and of a diameter equal to the largest diameter of the wedge-shaped tubes *b*.

The water to be converted into steam is led from a suitable supplying source into the inlet-pipe *e*, connected with the lower part of each section A, and the water is kept on a level about with the flange *f*, the upper portion of each section, as at *g*, above the water-level, being used as a steam-space, and the steam generated in these several sections rises in the steam space or chamber *g*, and thence passes into the steam-pipe *h*, from which it is led to the point where it is to be used.

The connecting or water-circulating pipe *i* connects with each section A below the water-level, and preferably between the two flanges *d f*, or at about the center of the height of the sections. The water in the sections circulates freely from section to section through this connecting-pipe *i*, the hottest water rising

and flowing from the section next the fire-chamber backward to the most remote section, and the cooler water passes through the pipe *e* forward into other sections nearer the fire-chamber, and in this way the circulation of the water is kept constant, equalizing its temperature, enabling the production of more steam. The pipe *j* permits the escape of air from the circulating-pipe *i* into the steam-pipe *h* when filling the generator with water, and it also serves to conduct water of condensation from the lower part of the steam-pipe back into the water-pipe or the sections. Instead of this pipe, we might use valves, which would be opened and closed as desired.

The generator may be used as a steam-boiler to generate steam for power.

Any number of sections may be used, they being suitably connected together.

Instead of the connecting-pipes *e i*, (shown in the drawings,) the sides of the sections at bottom, and at or near the center of the sections, but below the water-level in the sections, may be provided with flanged openings, which may be brought together to form the water-passages, the sections being suitably joined or fastened together.

We do not desire to limit this invention to a generator having two flue-spaces, one being a return flue-space, for the products of combustion might pass but once between the tubes and not return.

The narrow ends of the wedge-shaped tubes, instead of being separated, as shown in the drawings, may be brought together, or substantially so.

We claim—

1. The combination, with two or more sections of a steam-generator with tubes, of an inlet-pipe or water-receiving way and a water-circulating or connecting pipe or way, connected with the sections between the inlet-openings and the water-level, and below the steam-space, whereby the water in the sections circulates freely through the sections, substantially as described.

2. A steam-generator of two or more sections, in combination with an inlet-pipe or water-receiving way, a circulating pipe or way connected with the sections below the steam-space and water-level, and with a steam-pipe connecting the steam-spaces of the sections, all substantially as described.

In testimony whereof we have signed our names to this specification in presence of two subscribing witnesses.

GEO. W. WALKER.
MILES PRATT.

Witnesses:
G. W. GREGORY,
S. B. KIDDER.