

(No Model.)

2 Sheets—Sheet 1.

T. C. JOY.

GENERATOR FOR STEAM HEATING APPARATUS.

No. 258,075.

Patented May 16, 1882.

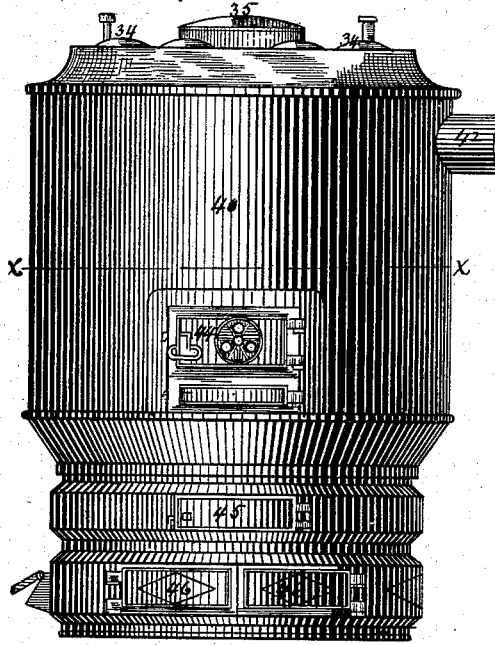


Fig. 1.

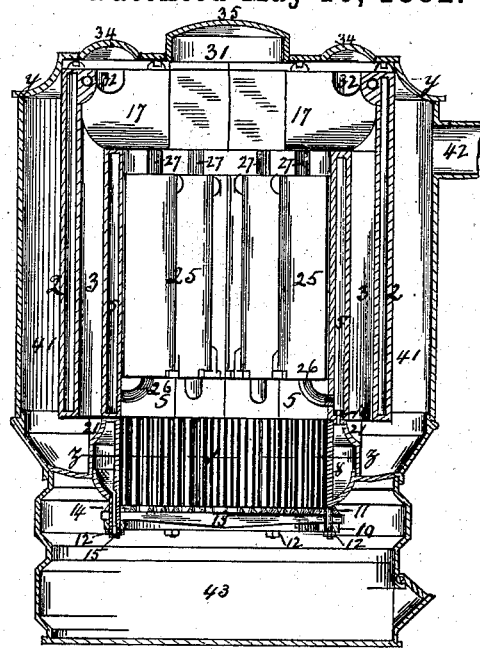


Fig. 2.

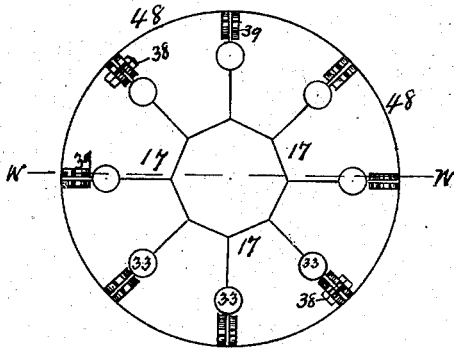


Fig. 3.

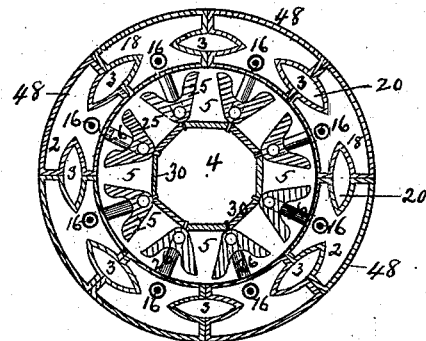


Fig. 4.

Witnesses  
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 L. C. Fidler

Inventor  
 Thaddeus C. Joy  
 by his attys  
 Bakewell & Kern

(No Model.)

2 Sheets—Sheet 2.

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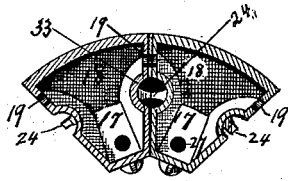


Fig. 5.

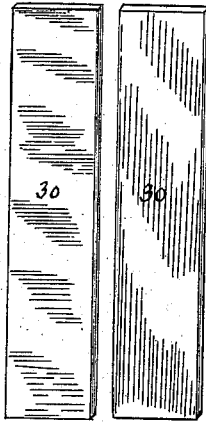


Fig. 7.



Fig. 9.

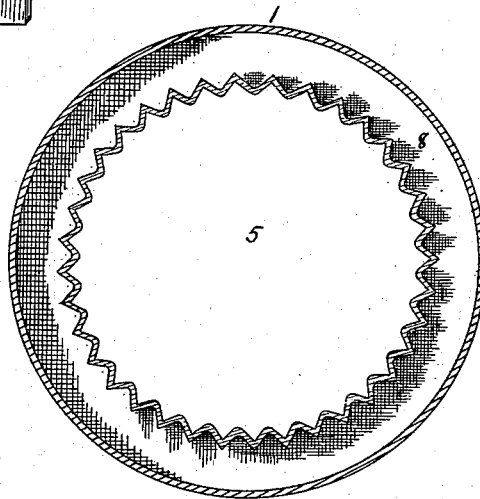


Fig. 8.

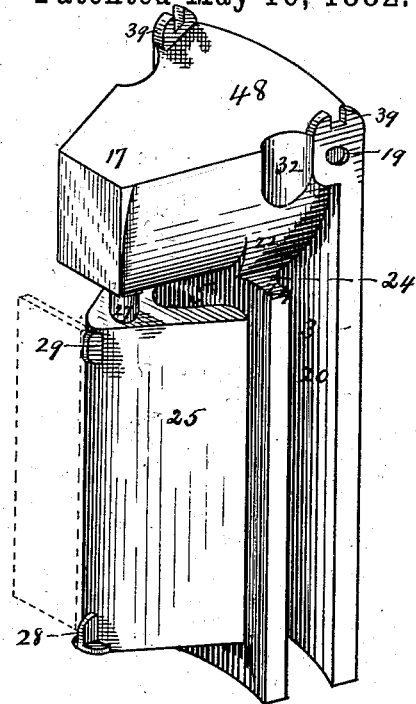


Fig. 6.

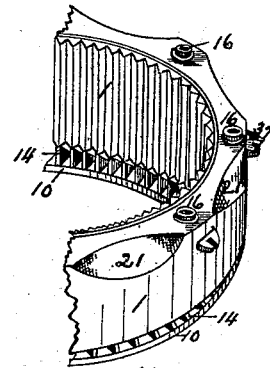


Fig. 10.

Witnesses  
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# UNITED STATES PATENT OFFICE.

THADDEUS C. JOY, OF TITUSVILLE, PENNSYLVANIA.

## GENERATOR FOR STEAM HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 258,075, dated May 16, 1882.

Application filed February 2, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, THADDEUS C. JOY, of Titusville, in the county of Crawford and State of Pennsylvania, have invented a new and useful Improvement in Generators for Steam Heating Apparatus; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to that class of steam-generators which is used for generating steam for heating purposes; and it consists in improvements in the construction of the same.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying drawings, in which—

Figure 1 is an elevation of my improved generator. Fig. 2 is a vertical section on the line *w w*, Fig. 3. Fig. 3 is a plan view. Fig. 4 is a cross-section on the line *x x*, Fig. 1. Fig. 5 is a cross-section on the line *y y*, Fig. 2, of two of the adjoining sections. Fig. 6 is a perspective view of one of the sections. Fig. 7 is a view of two of the plates of which the magazine is formed. Fig. 8 is a cross-section of the base-section. Fig. 9 is a perspective view of a piece of the grate-ring and projections, and Fig. 10 is a perspective view of a part of the base-section.

Like numbers of reference indicate like parts.

The generator is composed of the following parts—viz., an annular base-section, 1, which forms the fire-box, a sectional hollow casing, 2, having vertical flame tubes or flues 3 extending through it, a central coal-reservoir, 4, a fire-space, 5, around said reservoir, vertical water-chambers 25, suspended or projecting from the hollow casing 2 into the fire-space 5, and a steam-drum, 17, placed above and communicating with the generating-chambers.

The annular base-section 1 has hollow sides, and forms a water-chamber, 8, around the fire-chamber 5. The inner wall of the fire-pot 1 is preferably fluted or corrugated, the said wall being of equal thickness. The purpose of this construction is to obtain increased fire-surface and the more thorough and free combustion of the fuel. The corrugations admitting the air along the wall up past the edge of the fuel increase combustion and produce great heat at that point, and thereby completely prevent the coal from chilling and coking against the

wall, as is often the case with smooth walls. The admission of the air by means of the corrugations along the walls of the fire-pot also induces a draft, which causes the flame, &c., to impinge more directly on the steam-generating chamber. The grate may be suspended below the fire-pot 1 upon a flat ring, 10, which is secured to the fire-pot 1 by bolts 11 and nuts 12, and may thereby be adjusted to any desired distance below the pot. Upon the upper surface of the ring 10 are vertical lugs or projections 14, which extend up into the base-section 1 to such a distance that the grate-ring 10 and grate may be dropped or adjusted below the base 1 to any desired distance, for increasing combustion or removing clinkers, without permitting the coals to drop out at the sides and so waste the fuel; or the lugs 14 may be arranged on the bottom of the base 1 and extend down past the edge of the ring 10. This will accomplish the same result. When separate grate-bars 13 are used they may be inserted between the lugs 14 on the upper side of the grate-ring 10, upon which they may be placed from either side.

Instead of solid bolts 11, I may use one or more short externally-threaded pipes, 15, opening into the water-chamber 8, and these pipes, in addition to sustaining the ring 10, also serve for use as supply, blow-off, or return pipes to the generator. The water-chamber 8 communicates with the sectional generating-chambers of the casing 2 by short pipes or nipples 16, one of which extends to each section. The function of this method of supporting the grate upon a ring dropped below the fire-pot is mainly that it affords an opening all around for removing clinkers and gives a better draft. Where access to the fire-pot from above is cramped or limited, as in the case of this class of steam-generators, it is especially desirable to provide means for removing the clinkers from below without materially disturbing the fire. The advantage of using the supply, return, and blow-off pipes to support the grate-ring is the saving of useless bolts and unnecessary boring of holes in the fire-pot. I prefer to cast the fire-pot onto the bolts 11 and pipes 15.

The casing 2, which constitutes the main steam-generator, is composed of eight, or more or less, hollow segments, 48. Each segment has a radial inward projection, 17, at its upper

end. These projections 17 are hollow and communicate with the chambers 18 of the segments 48, forming one chamber therewith. They communicate with each other by means of the openings 19 in the meeting edges of the sections, the joints being made perfectly steam-tight by having the meeting faces planed and packed with asbestos or other suitable packing. The advantage of this way of establishing the communication between the sections of the steam-drum is that it dispenses with the use of short pipes or nipples and enables me to have a more compact and simple structure. The hollow radial projections 17 thus communicating constitute the steam-drum of the generator. In the sides of the segments 48 are V-shaped recesses 20, extending from the lower end up to the radial projections, so that when two segments are brought together their V-shaped recesses, meeting, form a smoke or flame flue, 3, which extends down through the annular space 2. At the lower end of the flues 3 the base-section 1 is cut away or recessed on the outside, as at 21, to give an outlet from the flues 3 to the chamber 41, whereby the products of combustion are enabled to pass out into the chamber 41, whence they proceed to the smoke-flue 42. The under sides of the radial projections 17 are beveled or flaring toward the top, so that their whole inner surfaces shall be exposed to the heat, and so that the lateral space 22 between the projections 17 shall conduct the products of combustion from the heating-chamber 5 over the upper edge of the inner wall, 24, into the return-flues 3.

Inside of the sectional casing 2 are eight, or more or less, secondary hollow steam-generating chambers, 25, preferably of V form in cross-section, the apex being inward and the ends outward. These chambers communicate with the segmental water-chambers 18 by pipes 26 at the lower end, and at the upper end with the radial projections 17 by pipes or nipples 27. As the projections 17 constitute the steam-drum, the opening of the chamber 25 into them by pipes 27 enables the steam from the chambers 25 to ascend directly into the drum and be in a drier and better condition than if passed through the chamber 18, which would tend to saturate it with water, making a watery vapor. The flame obtains access to all sides of the chambers 25, so that they have great generating power. They may be of other shapes, but I prefer the shape shown.

An advantage of the corrugated or fluted fire-box 1 is that the combustion is most perfect at the flutes, and the heat is consequently greatest there. Thus the flame and heat rising directly from the flutes strike upon or around the steam-generating chambers 25, so that they are exposed to the most intense heat and have a very high generating power.

On the lower end of the apex of each section 25 is an inverted T-lug, 28, and at the upper end is a plain vertical lug, 29, in line with the vertical trunk of lower T-lug. When the seg-

ments 48 are put together the coal-reservoir 4 is formed by inserting metallic flue-plates 30 through the top central opening, 31, and resting them on the adjacent horizontal parts of the inverted T's of the adjoining segments. One of the straight lugs 29 projects between the upper ends of each pair of flue-plates. The advantage of the use of these removable flue-plates is, that they are cheap in construction, easily inserted and removed, and that they permit the removal of burnt plates and their replacement with new ones without renewing the whole reservoir. The lugs on the upper and lower ends of the chambers 25 are cheap and efficient means of supporting and securing the plates.

In the sides of each projection 17, I make a semicircular groove, 32, so that when two segments 48 are united there is formed by the two semicircular grooves a hole or opening, 33, directly over the upper end of the inner wall, 24, of the segments, so that a brush or other instrument may be inserted, and the walls of the flues 3 and of the heating-chamber 5 may be cleaned from the one opening. The holes 33 and the reservoir are closed by suitable caps, 34 and 35. The segments are secured to the fire-pot 1 by bolts through lugs 37, and to each other by bolts 38 and lugs 39.

The furnace may be inclosed in brick-work, or it may have a surrounding casing, 40, of sheet-iron, forming a surrounding chamber, 41, a suitable smoke flue, 42, and an ash-pit, 43. Doors 44, 45, and 46 are provided to give access to the fire-chamber above the fire-pot 1 to the grate-bars and to the ash-pit.

In order to get into the fire-chamber 5 above the fire-pot, it is necessary to make one or more of the chambers, 18, shorter than the others. The outer surface of the base-section 1 is cut out, as at 21, at the lower ends of the downflues 3 to establish communication between them and the casing-chamber 41. The steam-circulating pipe or pipes lead out of the steam-drum as usual.

The course of the flame is as follows: It rises from the fire-pot 1, through the chamber 5, around the reservoir and the V-chambers, and up to and against the radial projections 17, thence over the upper edge of the inner walls, 24, of the segments 48 to and down through the flues 3, out into the casing-chamber 41, and thence to the smoke-flue 42.

Though I have shown a fire-pot and grate-support of novel construction because the same is best adapted for use with the generator which is the subject-matter of this invention, yet I do not herein claim said fire-pot or grate-support, the same being the subject-matter of a separate case.

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

1. An annular steam-generator composed of segments having downward flame-flues extending through them, in combination with an annular grate-section, which supports the seg-

mental generator, and is beveled or cut away at the ends of the downward flame-flues to give exit to the flame, substantially as and for the purposes described.

5 2. A segmental steam-generator composed of hollow segments, each having a radial inward projection extending over the fire-chamber, the interior of both segment and projection constituting one chamber, the lower part  
10 of which acts as a steam-generator and the upper part as a steam-drum, substantially as and for the purposes described.

3. A segment of a steam-generator, having a tapering radial projection at its upper end, the lower side of which is tapered or cone-shaped, so that when in place it shall be exposed to the action of the heat arising from below, substantially as and for the purposes described.

20 4. A segmental steam-generator composed of hollow segments having inward radial projections which communicate with each other by ground and packed joints, substantially as and for the purposes described.

25 5. A segmental steam-generator having return-flues extending down between the segments, combined with segments having radial projections extending inward at the upper ends, which projections have cone-shaped or tapered under surfaces, so as to form between  
30 them the passages to the return-flues and to increase their heating-surface, substantially as described.

35 6. A segmental steam-generator having a vertical fire-chamber and return-flues, provided with holes or openings directly over the

wall between the fire-chamber and return-flues, so as to permit the introduction through one opening of a brush or other device for cleaning the walls of both, substantially as and for  
40 the purposes described.

7. A segmental steam-generator having steam-generating chambers projecting from the annular water-chamber formed by the segments into the central fire-chamber, in combination with overhanging radial projections extending inward from the upper ends of the segments and nipples, making a direct vertical connection between the secondary generating-chambers and the radial projections, substantially  
45 as and for the purposes described.

8. A steam-generator having a central fuel-reservoir composed of sectional plates secured in or by supporting and retaining lugs on the steam-generating chambers which surround or  
50 are placed in the fire-chamber, substantially as and for the purposes described.

9. In a segmental steam-generator having secondary generating-chambers extending in from the main or segmental chambers, inverted  
60 T-lugs at the lower end and vertical lugs at the upper ends of said secondary chambers, for supporting, and in combination with, flue-plates placed thereon and forming a fuel-reservoir in the center of said generator, substantially as  
65 and for the purpose described.

In testimony whereof I have hereunto set my hand this 23d day of January, A. D. 1882.

THADDEUS C. JOY.

Witnesses:

JOHN W. APPLE,  
SAMUEL GRUMBINE.