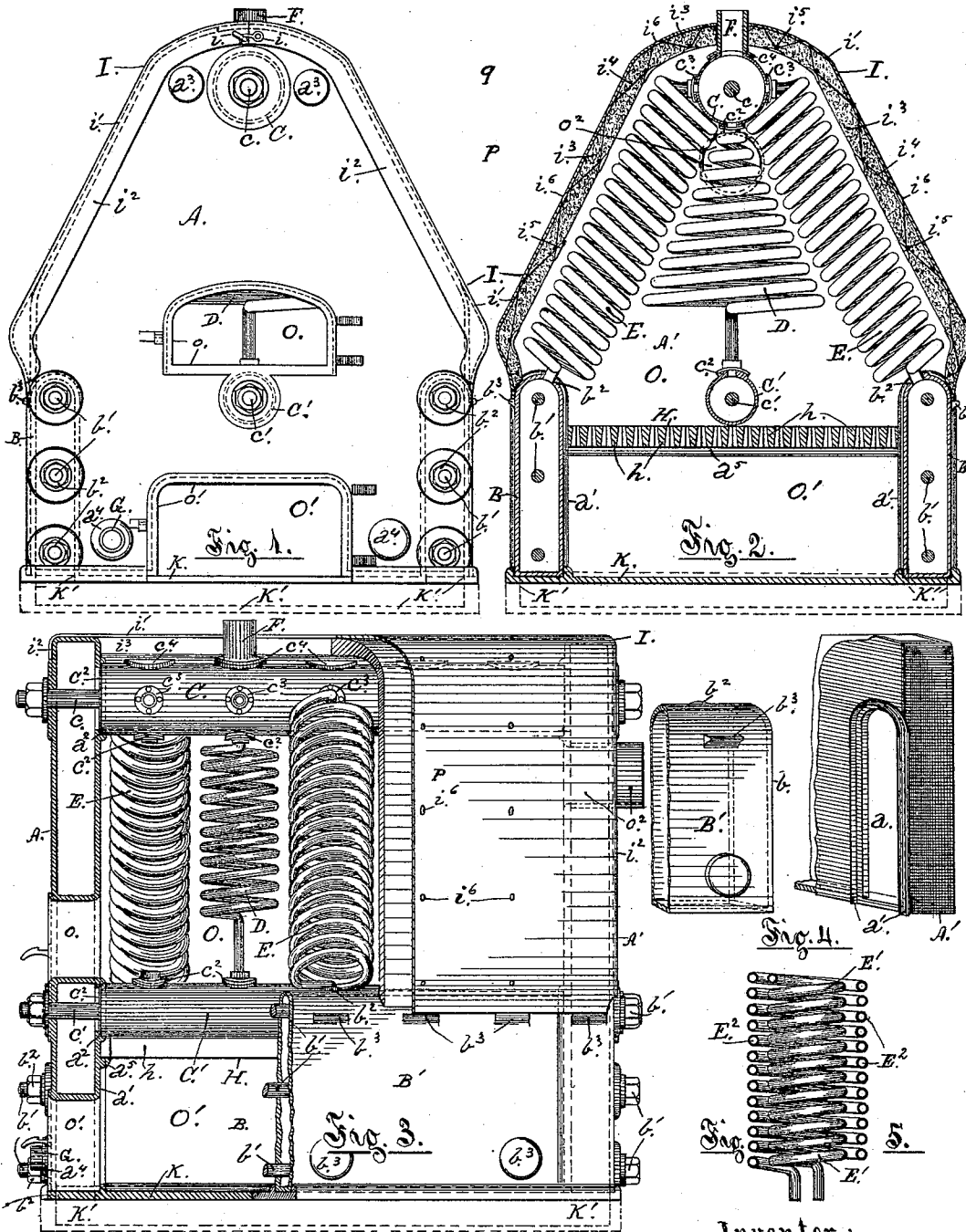


(No Model.)

S. D. STAUFFER.
STEAM GENERATOR.

No. 461,454.

Patented Oct. 20, 1891.



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SAMUEL D. STAUFFER, OF LANCASTER, PENNSYLVANIA.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 461,454, dated October 20, 1891.

Application filed February 24, 1891. Serial No. 382,382. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL D. STAUFFER, of Lancaster, in the county of Lancaster and State of Pennsylvania, have invented certain
5 new and useful Improvements in Steam-Generators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to
10 make and use the same.

My invention relates to improvements in a sectional steam generator or boiler consisting of a hollow bottom section, hollow side and end wall sections, horizontal tubes or pipes
15 placed in the same vertical plane connecting the end-wall sections, spiral coils of tubing joining the tops of the side-wall sections and the upper horizontal tube, spiral or conical coils of tubing connecting the horizontal
20 tubes in the vertical plane, and a removable hood or covering lined with some non-heat-conducting material to confine the action of the heat in the fire-box most directly to the arrangement of the coils and tubes, as will be
25 hereinafter more clearly set forth.

The objects of the invention are manifold: first, the construction of a boiler in sections, so that the separate parts can be packed compactly for shipment and readily set up at
30 destination; second, that the several individual parts may be readily exposed for cleaning or repairs; third, having a great area of heating-surface in a small place, and, fourth, dispensing with the usual crown-sheet.

35 The purposes of the invention are attained by the devices illustrated in the several views of the accompanying drawings, in which similar letters of reference designate like parts throughout, and in which—

40 Figure 1 is a front end elevation of a sectional steam-generator embodying the elements of my invention, the fire-box and ash-pit doors removed; Fig. 2, a vertical cross-section, through the outlet-tube, showing the connecting-coils in full lines in place; Fig.
45 3, a view from the right of Fig. 1, partially in section, to show the inside arrangement of the parts; Fig. 4, a perspective view of portions of a side and end wall detached, showing the
50 opening in the end wall where the two are joined; and Fig. 5, a detail view showing one

coil within another when increased heating-surface is desired.

The end walls A and A' and the side walls B and B' are hollow throughout, and may be
55 made of any suitable material, each cast in one piece or otherwise given the required shape. Extending to the lower edge at each end and through the inner face of the end walls is a vertical opening a, having around
60 it a ridge or bead a', forming a recess adapted to receive an end b of the hollow side walls B and B', while bolts b', extending through the end walls and longitudinally within the
65 side walls, serve, by means of nuts b², screwed home, to bind the parts together. These bolts may be omitted and any other approved means for attaching the parts may be used instead.

Centrally located and in the same vertical
70 plane are two pipes or tubes C and C', their ends fitted into recesses a², formed about orifices through the inner faces of the end walls A and A'. The pipe C, situated in the ridge, becomes the steam-drum, and the pipe C',
75 extending through the fire-bed, becomes water or fire pipe of the boiler, while bolts c and c', by means of their respective nuts, screwed home, serve to bind the parts together. Packing-rings C² are used to complete these joints,
80 and the joints of the side and end walls may also be packed.

A number of flattened conical coils D of tubing connect the ridge pipe or drum C and the fire-pipe C'. These coils are placed verti-
85 cally and at desired intervals throughout the length of the boiler, and c² designates the places where the extremities of the coils are joined to the respective pipes.

A number of coils E of tubing connect the
90 tops of the side walls B and B' with the ridge pipe or drum C. These coils are shown inclined in the drawings, and are placed at desired intervals throughout the length of the boiler, and b² designates the places where
95 their lower ends are attached to the top of the respective side wall B or B', while c³ indicates the places where their upper ends join the ridge pipe or drum C.

When an increased area of heating-surface
100 is desired, coils may be doubled, as is clearly shown in Fig. 5, where one coil E' is placed

within another coil E², and the conical coils D may likewise be doubled. Any number of coils may be thus bunched.

While the coiled connections just described are preferred, they may be dispensed with and horizontal tubes used in place, said tubes joining the front and the rear end walls A and A' and bound together, as in the case of the pipes C and C' just described; but a bolt need not be passed through every tube. This construction being so evident, its illustration was deemed superfluous.

F shows a portion of an outlet-tube, which is attached to one of the bosses c⁴ on the upper side of the steam-drum C, forming an outlet for the eduction of steam or heated water to the place where either is to be used. This outlet-tube may be attached to bosses on the outer face of either end wall, as at a³, near the top of the wall A in Fig. 1, while G shows a portion of an inlet-tube through a boss a⁴ near the bottom of the same wall, forming an inlet for the induction of return matter or water into the body of the boiler. This inlet-tube may also be applied to any of the bosses b³ shown near the bottom of either of the side walls.

H shows a fire-grate consisting of the usual grate-bars h, placed longitudinally from front to rear of the generator and immediately below the fire-pipe C', where the extremities of said bars rest on a bracket or projecting ridge a⁵, integral with the inner face of each end wall A or A'. The grate divides the interior of the boiler horizontally into two compartments, O being the fire-box or combustion-chamber, and O' the ash-pit or air-chamber, while o indicates the doorway or fuel-inlet to the former, and o' the doorway or ash-outlet to the latter, both of which may be closed by doors in the usual manner, and o² indicates the smoke-outlet from the combustion-chamber through the rear wall A' of the boiler.

Any other fire-grate of approved construction may be used in this connection, and all grates may be dispensed with or used in a modified form when either natural or manufactured gas is used as fuel, or any vapor-burning device may be substituted.

A lined hood or bonnet I, made in two sections meeting on top along the ridge where the sections are held together at intervals by a hook and staple i, covers all of the boiler above the side walls B and B' and between the upper portions of the end walls A and A'. Each section of the hood is formed of metal sheeting i', lying on the upper edges of the end walls and extending from the ridge of the boiler down over the sides to a point a little below the top of the respective side walls, where the lower edge of the section rests on lugs or projections b³, placed at intervals against the outer face of said side wall, and the sheeting has a flange i² along each side edge projecting downward over the outer face of the end wall, along which the flange extends, and the lining i³, which consists of any

non-heat-conducting material, like mineral wool or asbestos felt, and is securely attached to the under side of said sheeting by means of wires i⁴, laced through the eyes of asbestos buttons i⁵ and through punctures i⁶ in the sheeting.

K designates a metallic base on which the generator stands; but this base may be deepened and made hollow and openings made from below through their bottoms into the side and end walls of the boiler, said openings to register with similar openings through the upper face of the hollow base where said walls stand, as is clearly indicated by dotted lines K' in the drawings, Figs. 1, 2, and 3. When desired, the metal base may be dispensed with and the generator stand on a cement or on any other approved floor; but in this case, as well as when a solid metal base is used, there will be no openings in or through the bottoms of the several wall-sections.

It will here be observed that by the construction and junction of the several parts, as described, the device forms a complete water-circuit throughout and that all pressure arising from the generation of steam or the heating of water is confined to within these parts; that this pressure, being thus confined, the usual crown-sheet is dispensed with, and that the lined hood or bonnet serves to confine the action of the heat in the fire-box directly to the parts; that fixing the water-level at about the point p the parts above said point become a superheater and that steam may be made dry; that fixing the water-level at about the point q will give the effect of an ordinary steam-boiler, and that by filling the entire device, together with the outlet and return pipes, with water it will become a hot-water circulator or heater; but in all cases, owing to the small quantity of water confined therein and the large area of heating-surface acting thereon, the device is a quick generator of steam or a rapid circulator of heated water, and always with the greatest economy or saving in fuel.

It will also be observed that my generator is equally as well adapted to high-pressure or engine purposes as it is for heating, for it may be provided with the usual gages and levels or other means for safety, as well as with the usual appliances for regulating the draft.

Having now described the invention and fully set forth its application, what I do consider new, and desire to secure by Letters Patent, is—

1. The herein-described sectional boiler having no crown-sheet, consisting of hollow bottom, hollow side, and end wall sections, the sections joined, as shown, and having continuous internal communication, a horizontal pipe in the ridge and a horizontal pipe in the fire-bed connecting the interior of the hollow end-wall sections, coils of tubing connecting the interior of the horizontal pipes, coils of

tubing connecting the interior of the hollow side-wall sections with the interior of the upper horizontal pipe, and a non-heat-conducting hood, said hood resting on the upper edges of the end and side wall sections, a combustion-chamber having means for firing and the outlet of smoke, means provided for the education of steam or heated water and the induction of return matter or water, and an ash-pit having means provided for the removal of ashes and for regulating the draft, all substantially as described, and for the purpose set forth.

2. The combination, in a steam-generator having no crown-sheet, with a water-wall consisting of hollow end-wall sections, hollow side-wall sections at the base, a drum at the ridge, and a water-pipe in the fire-bed, connecting the interior of the end-wall sections, and means provided for holding the sections together, of a non-heat-conducting hood resting on the upper edges of the end and side wall sections, covering the space between said sections, whereby a combustion-chamber is formed, substantially as described, and for the purpose set forth.

3. The combination, in a steam-generator, with a water-wall consisting of hollow end-wall sections, hollow side-wall sections at the base, a drum near the top, and a water-pipe in the fire-bed, connecting the interior of the end-wall sections, and means to hold the sections together, of a tubular outlet from the drum, a tubular inlet near the bottom, and tubular return connections joining said outlet and inlet, whereby a circuit hollow throughout is formed, substantially as described, and for the purpose set forth.

4. The combination, in a steam-generator, with a water-wall consisting of hollow end sections, hollow intermediate side sections below, an intermediate drum above, and an intermediate water-pipe in the fire-bed, connecting the interior of the end sections, and means to hold the sections together, of a series of coils of tubing connecting the interior of the drum with the interior of the water-pipe, substantially as described, and for the purpose set forth.

5. The combination, in a steam-generator,

of the hollow end sections, hollow intermediate side sections connecting the interior of the lower portions of the end sections, an intermediate drum connecting the interior of the end sections near the top, an intermediate water-pipe in the fire-bed, connecting the interior of the end sections, means to hold the sections together, and vertical tubular connections between the interior of the drum above and the interior of the water-pipe below, substantially as described, and for the purpose set forth.

6. The combination, in a steam-generator, of hollow end-wall sections, intermediate hollow side-wall sections connecting the interior of the lower portions of the end-wall sections near their outer ends, an intermediate drum above and an intermediate water-pipe below, said pipe and drum having vertical tubular conical coil connections between them, and said drum and pipe connecting the interior of said end-wall sections, and tubular connections with the interior of the hollow side-wall sections below and the interior of the drum above, substantially as described, and for the purpose set forth.

7. The combination, in a sectional steam-generator, of the hollow front and rear end sections, hollow intermediate side sections connecting the interior of the lower portions of said end sections, an intermediate steam-drum connecting the interior of said end sections near their tops, an intermediate water-pipe connecting the interior of said end sections below, a series of conical coils of tubing connecting vertically the interior of said steam-drum with the interior of said water-pipe, and a series of spiral coils of tubing connecting the interior of the drum above with the interior of the intermediate side sections below, substantially as described, and for the purpose set forth.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

SAMUEL D. STAUFFER.

Witnesses:

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