(No Model.) 2 Sheets—Sheet 1.

N. A. BOYNTON.

SECTIONAL STEAM BOILER.

No. 491,979. Patented Feb. 21, 1893.

Fig. 1.

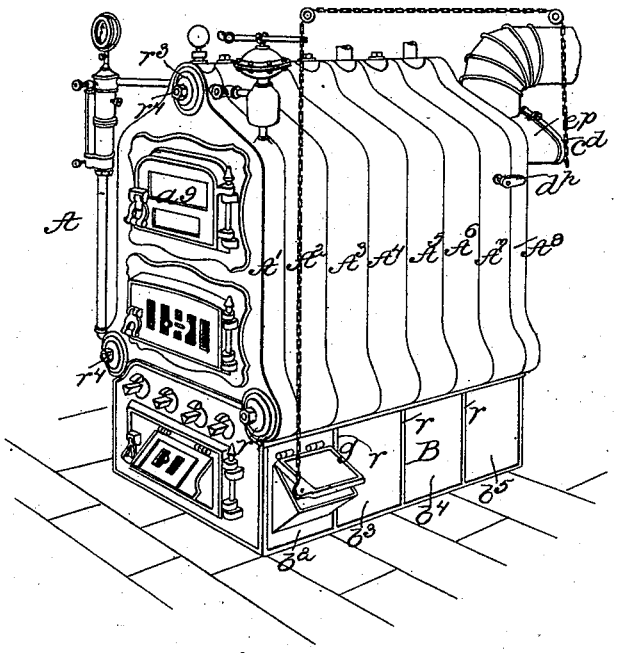


Fig. 2.

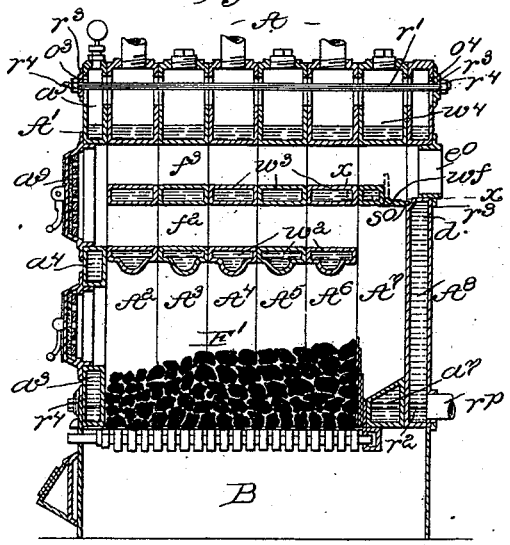
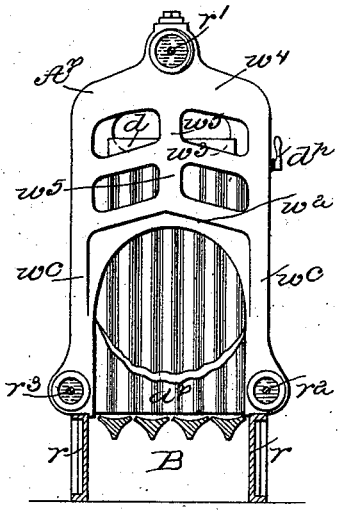


Fig. 3.



Witnesses:
Arthur Ashley
Walter S. Dodge.

Inventor
Nathaniel A. Boynton
by J. Ashley Atty

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

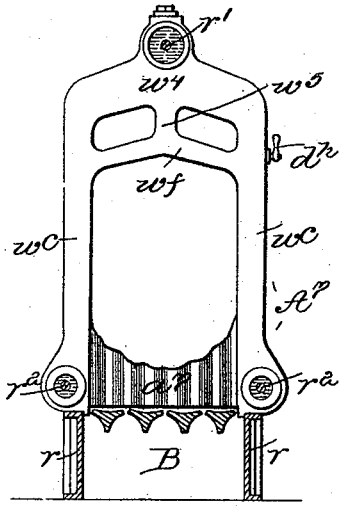


Fig. 5.

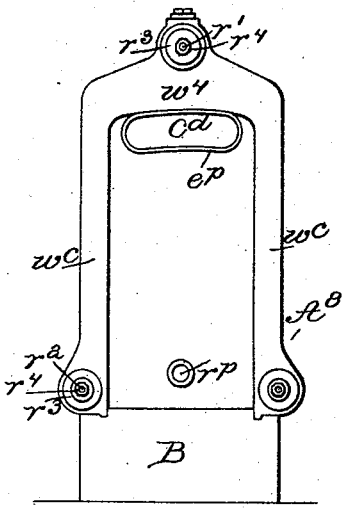
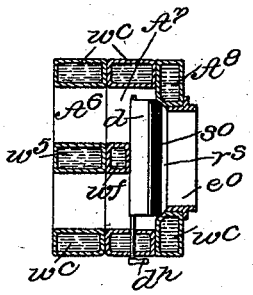


Fig. 6.



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UNITED STATES PATENT OFFICE.

NATHANIEL A. BOYNTON, OF NEW YORK, N. Y., ASSIGNOR TO THE BOYNTON FURNACE COMPANY, OF SAME PLACE.

SECTIONAL STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 491,979, dated February 21, 1893.

Application filed June 2, 1892. Serial No. 435,239. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL A. BOYNTON, a citizen of the United States, and a resident of the city of New York, in the county of New York, in the State of New York, have invented a new and useful Sectional Steam-Boiler, of which the following is a correct description.

The invention relates generally to that class of boilers which are composed of transverse vertical sections, as in United States Patents No. 396,802; No. 407,850, and No. 408,455, issued to me, respectively on the 29th day of January, 1889; on the 30th day of July, 1889; and on the 6th day of August, 1889; and it relates particularly to certain improvements whereby the apparatus is adapted equally for use in establishing and maintaining a circulation of hot-water, or as a source of steam-supply under low-pressure, for a system of steam-radiators,—located wherever necessary in the several stories, and throughout the various apartments of the structure in which the apparatus is placed.

The invention consists in various novel parts and in various novel combinations of parts in a sectional steam-boiler; whereby the steam drum is in direct continuation of the water-space; whereby each of the several intermediate transverse sections is in communication with the contiguous section, only at its base, and at its upper extremity; whereby the use of "manifolds," or other exterior communications between the sections is rendered unnecessary; whereby a portion of the front closing or covering section is adapted to constitute a rising-flue; whereby a transverse section behind and contiguous to the fuel-chamber, is adapted to constitute a rising-flue, through which the volatile products of combustion pass from the combustion chamber to a horizontal smoke-flue which overlies such combustion chamber; whereby a rear closing or covering section is adapted to receive "the condense" of the circulating-system of pipes and radiators, at a point coincident with an interior water-space or chamber,—and thus avoid the production of unequal circulation and unequal heating within such interior water-space; and whereby various other important advantages are secured.

In the drawings;—Figure 1 represents a perspective elevation of the apparatus. Fig. 2 represents a vertical, longitudinal central section of the same. Fig. 3 represents a front elevation, the door-section or front closing section having been removed. Fig. 4 represents an elevation of the rising-flue section detached. Fig. 5 represents a rear elevation. Fig. 6 is a detail, sectional plan, in the line x—x, in Fig. 2.

As will be best seen in Figs. 1 and 2, the front or closing section A′, of the boiler A, has at each side a vertical water chamber or column a^2, the two columns being in communication at their foot through a transverse horizontal water-way a^3, which is surmounted by any suitable automatic draft regulator dr the vertical extent of which adapts it to fill the space between the plane of the grate bars and the lower extremity of the frame of the fuel-supply opening. A similar horizontal water-way a^4, connects the two columns at about their midheight, and occupies the space between the fuel-supply opening and the flue-clearing opening. Above the clearing opening of this section and extending therefrom to the top of the section, is a water and steam chamber a^5. It will be observed that this front section is of relatively small extent from front to rear, and that its clearing-opening, between the closing door of the clearing opening and the next succeeding section, provides a vertical flue for the passage of the products of combustion from the lower smoke flue f^2, to the upper smoke flue f^3.

In rear of the front door-section or closing section A′, are arranged a series of intermediate water and steam sections A^2, A^3, A^4, A^5, A^6, of uniform construction, and in numbers to adapt them to form the side walls of the fuel-chamber, which chamber may be of any desired longitudinal extent. Each of these sections has side water-columns wc, a transverse water-way w^2, above the fuel chamber F, a second transverse water-way w^3, above the lower smoke-flue f^2; a water and steam chamber w^4, above the upper smoke flue f^3; front and rear openings o, o^2, in the lower extremity of each water-column; front and rear openings o^3, o^4, in the upper extremity or water and steam chamber of the section, and a

central, vertical passage w^5, which extends from the transverse water-way w^2, to the water and steam chamber w^4.

Behind the series of sections A^2, A^3, &c., and contiguous to and forming the rear wall of the fuel chamber F, is the rising flue-section A^7, which like the described intermediate sections has right and left exterior chambers or water columns *wc*, but which at its foot, intermediately of the columns *wc*, has a transverse water-way or chamber a^7, which in a vertical plane is from its center curved upwardly and outwardly right and left, and which from its rear surface is sloped downwardly toward the grate.

Above the plane of the lower smoke-flue f^2, is a transverse water-way *wf*, which is coincident with the ways w^3, but, as seen in the detail, Fig. 6, is provided with a rectangular smoke-opening *so*, in which is pivoted any suitable damper *d*, which has an operating-handle *dh* (Figs. 1 and 3) and which when closed bears upon recessed seat *rs*, formed in the rear or closing-section of the boiler. Above the upper smoke-flue the section is identical in construction with the intermediate sections, already described.

The rear closing-section A^8, is in its main lower portion continuous and imperforate, but in its outer plate it receives, at its central lower extremity the return-pipe *rp*, of the boiler; and in its upper portion below the water and steam-dome section, and coincidently with the upper smoke-flue f^3, it has an opening *eo*, to receive an exit-pipe *ep*, which at its inclined outer extremity has an ordinary, inclined check-draft door *cd*, which is suitably connected with the automatic-regulator *dr* already referred to.

It will be understood that upon opening the check-draft damper *cd*, and the damper *d*, in the rising-flue section, the horizontal flue f^3, will be accessible for clearance, from the rear as well as from the front, the accumulations being discharged directly downward, into the rear portion of the fuel-chamber.

The base or ash-pit section B, is of the rectangular form represented; its side and rear walls having top, bottom and end flanges b^2, b^3, b^4, and b^5,—the two former being strengthened by curved double ribs *r* which at suitable intervals are provided between the horizontal flanges; its front being provided with an ash-opening and a door *ad*, and its side, near the front, with a draft-opening and an automatically-acting draft-door *dd*.

As will be very clearly seen in the first three figures of the drawings, the several sections are secured together by means of rods r', r^2, &c. which extend through the longitudinal water-spaces, and through the longitudinal steam-dome. At each end the rods are extended through a closing-plate r^3, which is fitted upon the coincident opening, and which in its outer portion is provided with a recess, to receive a suitable packing, the whole, when in place being secured by means of nuts r^4.

Persons conversant with the art to which the invention relates will understand that the products of combustion will ordinarily pass from the rear of the combustion-chamber F′, upwardly through the rising flue *rf*, in the section A^7, thence through the flue f^2 to the rising-flue contiguous to the clearing-door a^9, and thence through the flue f^3, to the smoke-exit-opening.

Water, introduced from any convenient source, at the base of any of the intermediate sections, will at that point find communication with the contiguous sections, through their lateral openings, already described; and steam, as generated, will find its way to the steam-dome, and thence through the several conducting-pipes to the radiators in the various apartments,—whence, as condensed, it will be returned, by the pipe *rp*, to the lower portion of the rear section, and behind the protected portion of the rising-flue section, so that no irregularity in heating and circulating will be produced thereby.

Having thus described my invention, what is claimed is—

1. A steam-boiler which in its main portion embraces a series of vertically-placed transversely-extending sections, each of which is composed essentially of a lower bifurcated portion which is closed at front and at rear except at its foot, which is open at front and at rear for open and direct communication with each contiguous section; and of an upper or flue portion which is integral with the lower bifurcated portion and which is mainly closed at front and at rear, but at its upper extremity which constitutes the steam-space of the section, is open at front and at rear, to form communication with the adjacent sections, and to form jointly with such sections a steam-dome which extends longitudinally of the boiler, from end to end thereof.

2. A steam-boiler which in its main portion, coincident with the fire-pot, embraces a series of vertically-placed, transversely-extending sections, each of which is composed of a lower bifurcated portion which bestrides the fuel-chamber, and an upper portion which is provided with a series of horizontal smoke-openings, the sections being closed at front and at rear, except at their lower extremities which are open at front and at rear for the direct movement of water from section to section, and at their upper extremity, above the upper smoke-openings, which is open at front and at rear to form with the remaining sections a continuous longitudinal steam-dome, which is common to and receives steam from all the sections of the boiler; substantially as set forth.

3. A sectional steam-boiler which behind the plane of the fuel-chamber is provided with a transversely-extending section, which in its lower portion has a transverse water-cham-

ber, which in its midheight portion is unobstructed, to constitute a rising-flue for the products of combustion; which directly above the midheight portion is provided with a transverse-water-chamber, or passage which constitutes a part of the lower portion of an upper horizontal smoke-passage; and which in its upper portion, above such upper smoke-passage has a space which is adapted to contain water and steam, and is open at front and at rear, to form in connection with the contiguous sections a continuous longitudinal steam-chamber or dome.

4. A sectional steam-boiler which embraces a series of vertically-placed transversely-extending sections each of which is composed of a single casting which in its lower portion is bifurcated to bestride the fuel-chamber, and each of which in its midheight and upper portions has a longitudinally-extending smoke-opening,—one or more; and a vertically-placed transversely-extending section directly behind the feed chamber which in its lower portion has a transversely-extending portion, which in its midheight portion is unobstructed, to permit upward movement of the volatile products of combustion,—and which in its upper portion has a smoke-opening, one or more, through which the products of combustion pass to an exit-opening in the rear or closing section of the boiler;—the several sections being each closed at all points, except in their upper and lower extremities, which are open at front and at rear, to form in the lower portion of the boiler, a longitudinal water-passage, and to form in the upper portion of the boiler a longitudinally-extending steam-chamber; substantially as described.

5. A sectional steam-boiler which embraces a transverse rising-flue section, directly behind the fuel-chamber sections, such rising-flue section having at each side of its flue-space, a vertical water-column or chamber, and having also a horizontal water-passage at the lower extremity of the section, between the two columns; and a rear closing or covering section which at its lower extremity, at a point coincident with the horizontal passage of the rising-flue section, receives the return-pipe of the boiler.

6. A steam-boiler which embraces a front or covering section which is provided with an unobstructed smoke-passage or rising-flue; a series of bifurcated sections, of uniform construction, each of which bestrides the fuel-chamber; a rising-flue section arranged directly behind the series of bestriding sections, and provided at its foot with a transversely-extending water-chamber or passage; and a rear closing or covering-section which is provided with a smoke-exit opening, and which receives the return-pipe of the steam-circuit.

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Witnesses:

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CHAS. M. BENEDICT.