

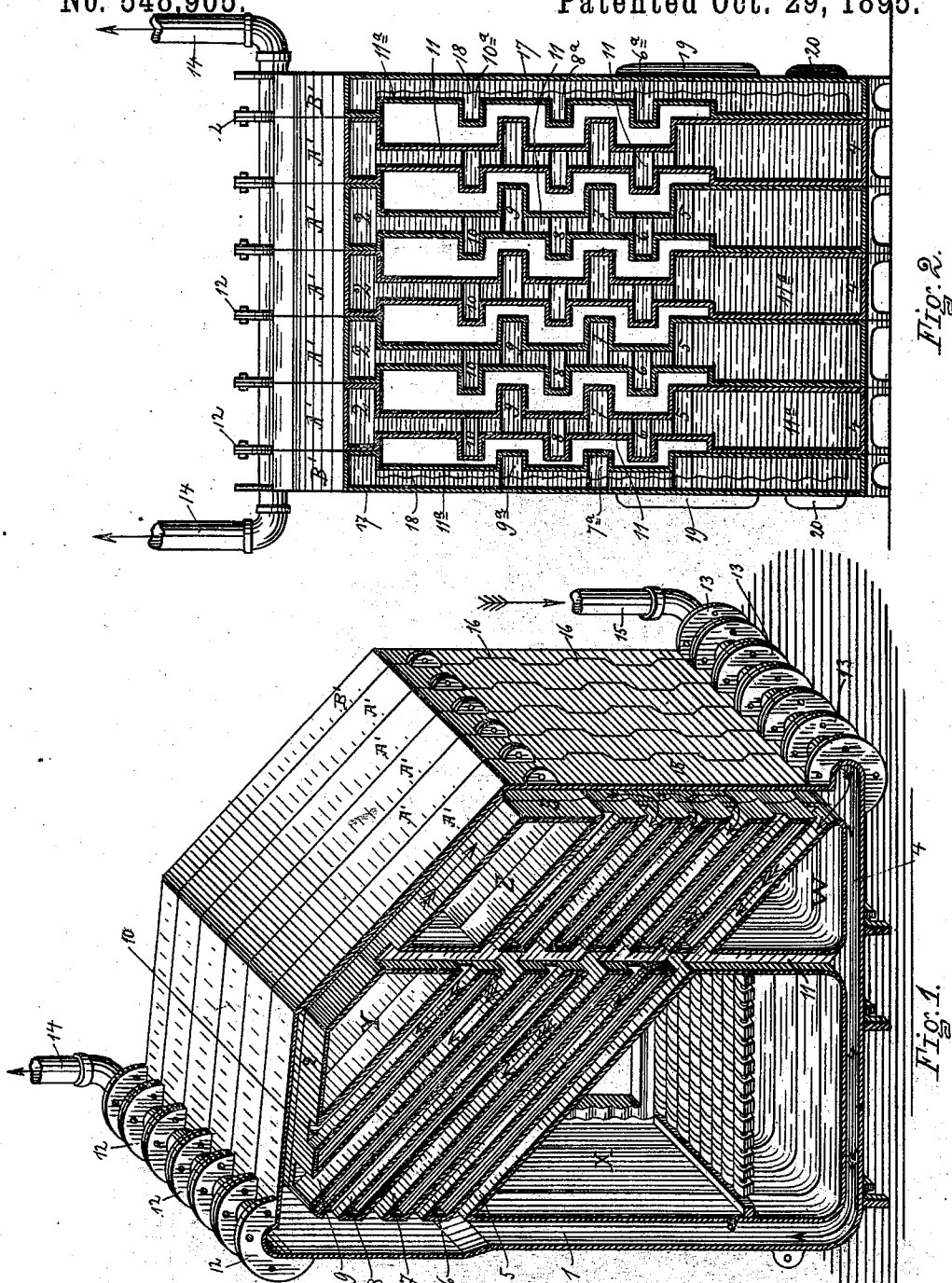
(No Model.)

2 Sheets—Sheet 1.

A. C. A. BAUER & H. L. WRIGHT.
HEATER.

No. 548,905.

Patented Oct. 29, 1895.



WITNESSES
Rich. A. George.
E. W. Jones

INVENTORS
ALBERT C. A. BAUER
HENRY L. WRIGHT
By *Risley, Robinson & Love*
ATTORNEYS

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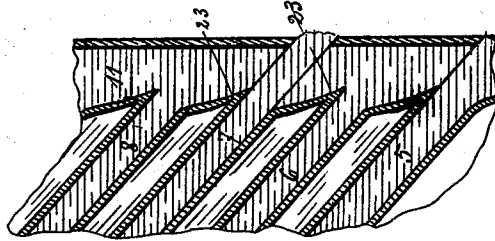


Fig. 5.

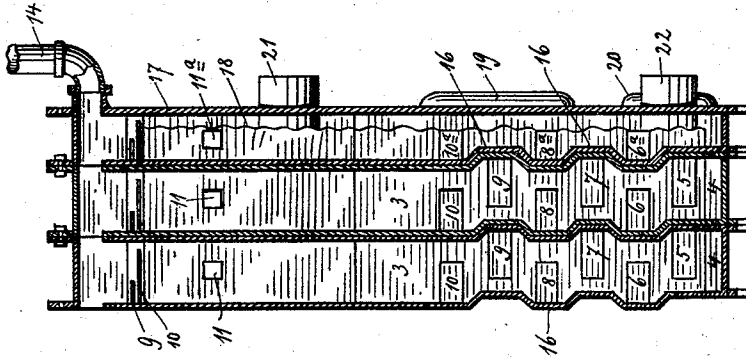


Fig. 4.

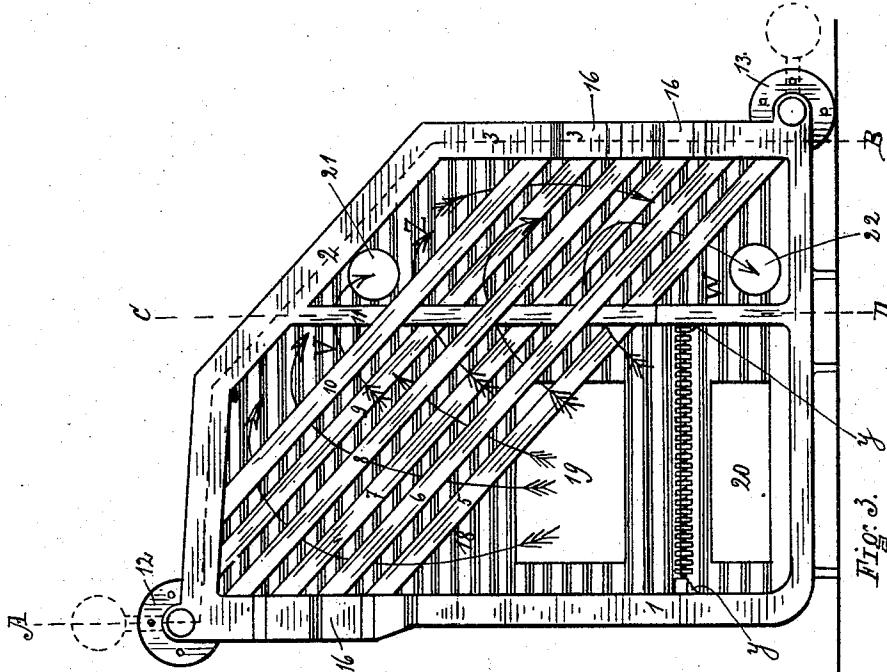


Fig. 3.

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UNITED STATES PATENT OFFICE.

ALBERT C. A. BAUER AND HENRY L. WRIGHT, OF UTICA, NEW YORK.

HEATER.

SPECIFICATION forming part of Letters Patent No. 548,905, dated October 29, 1895.

Application filed March 18, 1895. Serial No. 542,188. (No model.)

To all whom it may concern:

Be it known that we, ALBERT C. A. BAUER and HENRY L. WRIGHT, of Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Heaters; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and numerals of reference marked thereon, which form part of this specification.

Our invention relates to improvements in hot-water or steam heaters.

In the drawings which accompany and form a part of this specification, and in which similar letters and numerals of reference refer to corresponding parts in the several figures, Figure 1 shows a cross-section of the heater and a partial perspective view. Fig. 2 shows a vertical section taken on line C D of Fig. 3, showing the parts to the left. Fig. 3 shows a section of the heater in side elevation and an end section in connection therewith. Fig. 4 shows a section of three sections of the heater, taken on line A B of Fig. 3 and to the left of this line. Fig. 5 shows details of construction.

Referring to the letters and numerals of reference in a more particular description of the device, A' A', &c., indicate the regular or main sections of the heater, and B' indicates the end sections. These sections are of substantially square form, except as to one of the sides, which is sloped, preferably, in a broken line, as shown. Each of the main sections A' has a continuous circuit of water spacer or tube, consisting of the parts 1, 2, 3, and 4, extending diagonally across each section on the inclined water-tubes 5, 6, 7, 8, 9, and 10. There are six of these tubes shown, although the number might be increased or decreased at pleasure, but an even number is preferably employed. These diagonal tubes are disposed alternately at one side and then the other of each section, or are "staggered." These tubes are not the full width of the section, and by reason of their staggered position a free passage is provided for the products of combustion between the tubes. Each section A' is also provided with a vertical tube 11, which at its lower end is the full width of each section, as shown at 11^a, and when the sections

are placed together forms a complete wall across the beam of the heater. The tubes 11 are narrow in their upper portions and have less width than the thickness of the sections, affording a number of passages over the wall formed by the lower ends of the tubes 11. The tube 11 also communicates with each of the diagonal tubes 5 to 10, inclusive, and at its upper end enters the water-space 2. The upper portions of the tubes 11 are narrower than the sections of which they form a part, affording a passage for the products of combustion from the front portion to the rear portion of the heater.

The sections are provided at their upper and lower corners, substantially in line with the diagonal tubes, with flanges 12 12 and 13 13, by which the sections are held together and which make provision for packed joints between the sections. There are openings also within the circle of flanges by which communication is established between the sections, and constituting, essentially, drums at the head and foot of the heater.

The flanged connection between the sections might be dispensed with and a separate drum and connecting-nipples used instead, as shown in dotted lines in Fig. 3. The flow-pipes 14 are attached to the head of the heater and return pipe 15 to the drum at the foot.

The whole body of the tubular frame of the sections of heater on opposite sides are offset or zigzag to form interlocking tapered truncated projections 16 16, which, when the sections are bound together, cause them to register, and at the same time make provision for expansion and retraction without straining the section.

The side sections B' B' of the heater are preferably the same except for being "rights and lefts." These sections are provided with an outer plain wall 17 and inner corrugated wall 18, between which is a water-space. On the corrugated face or wall 18 are provided part tubes 6^a, 7^a, 8^a, and 10^a, corresponding in position to the tubes 7 to 10, inclusive, of the sections A'. There is also provided on the wall a part upright tube 11^a, corresponding to 11.

Preferably in both of the end sections B' B' are provided feeding-doors 19, ash-pit door 20, and smoke-exits 21 and 22 for the direct and indirect draft, respectively. In the event that a large number of sections are employed in a heater, the doors at each end of the fire-

box and ash-pit will be found useful, and even a double set of smoke-exits might be employed to advantage. In case of a heater of only a few sections, the extra doors and openings would not be undesirable for clean-outs; but it is obvious that in lieu of one of the sections B' a section might be employed not having the openings. The heater is divided by the diagonal tube and the upright tube into fire-box portion or chamber X, first combustion-chamber Y, second combustion-chamber Z, and smoke-chamber W.

In the chamber X are located the grate-bars *x*, supported from lugs *y y*, cast on the sections of the heater. The portion of the chamber below the grate-bars becomes the ash-pit.

At the lower end of the diagonal tube and at the intersection with tube 11 may be provided a projecting lip or edge 23, Fig. 5, which assists in dividing the currents circulating in the heater-sections. This lip is preferably formed by curving the walls of the section at this point, as shown in Fig. 5.

In operation the greater portion of the products of combustion arising from the fire on the grate find their way through to the several staggered passage-ways between the upper portion of the diagonal tubes into the first combustion-chamber Y. In this passage they are directed against the many faces of the tubes, giving up their heat and being thoroughly commingled with a fresh supply of air received above the fire, by which they are prepared for the combustion in chamber Y. Under certain conditions the secondary combustion might not take place until the products of combustion had reached the combustion-chamber Z, after being more thoroughly commingled in passing through the several passages between the upper ends of the tubes 11. When the indirect draft is in operation, the products pass downwardly from the chamber Z through the broken or staggered passages between the lower ends of the diagonal or inclined tubes into the smoke-chamber W, thence out at the opening 22.

In the event that the direct draft is in use the products pass directly out from the chamber Z through the opening 21.

When the indirect draft is in use, a certain minor part of the product of combustion finds its way over the bridge-wall formed by the lower wide portions 11^a of the tubes 11 into the smoke-chamber without rising to the height of the chambers Y and Z.

It may also be noted that the inclination of the diagonal tubes tends to shed the product of combustion off toward the left side of the heater, as shown in Figs. 1 and 3, and reduces the quantity which tends to take the short course over the bridge-wall into the smoke-chamber.

The circulation of water in the heater is partially shown by the arrows in Fig. 1. The main volume of the circulation is through the diagonal inclined tubes directly from the point

where the return or feed is received to the point where the outlet or service pipes are connected. These tubes also pass the circulating waters, first, through the cooler products of combustion, and, lastly, through the hottest point directly over the fire, and then deliver the water directly to the service-pipes. The inclination of the diagonal pipes also allows any sediment to be washed out, either in cleaning or during the active operation of the heater.

It is evident that numerous changes in and from the construction described other than those herein pointed out may be made without departing from the equivalents of our construction.

What we claim as new, and desire to secure by Letters Patent, is—

1. A heater composed of tubular sections each section substantially rectangular in form and having diagonal and vertical tubes dividing the heater into fire box portion combustion chambers and smoke chamber substantially as set forth.

2. A heater composed of sections each having tapered, truncated, inter-locking projections, forming a wall on the periphery of the sections in combination with bolts passing transversely to the plane of the sections binding them together, substantially as set forth.

3. A section for a heater consisting of a continuous circuit of tubular frame, diagonal cross-tubes across the frame, an outlet adjacent to the upper ends of the diagonal cross-tubes and an inlet adjacent to the lower end of the same tubes, substantially as set forth.

4. A section of heater consisting of a tubular frame of parts 1, 2, 3, and 4, diagonal cross tubes and an intermediate vertical tube 11, connecting with the cross tubes, substantially as set forth.

5. A section of a heater having a substantially rectangular, tubular frame, and diagonal staggered water tubes extending across the heater frame and through between where the products of combustion pass substantially as set forth.

6. In a heater composed of sections, a section consisting of a tubular frame entirely surrounding the fire-box combustion chamber and smoke chamber, diagonal cross tubes and vertical tubes dividing the heater into fire box combustion chamber and smoke chamber, substantially as set forth.

7. The combination in a heater for the diagonal and intersecting water tubes and a narrow lip or edge 23 projecting into the vertical water tubes from the side of the upwardly extending portion of the diagonal tube to divide the circulation substantially as set forth.

In witness whereof we have affixed our signatures in presence of two witnesses.

ALBERT C. A. BAUER.
HENRY L. WRIGHT.

Witnesses:

F. H. HAZARD,
LOUIS T. DIBBLE.