(No Model.) 2 Sheets—Sheet 1.

# J. A. BREEN.

## HEATER.

No. 590,962. Patented Oct. 5, 1897.

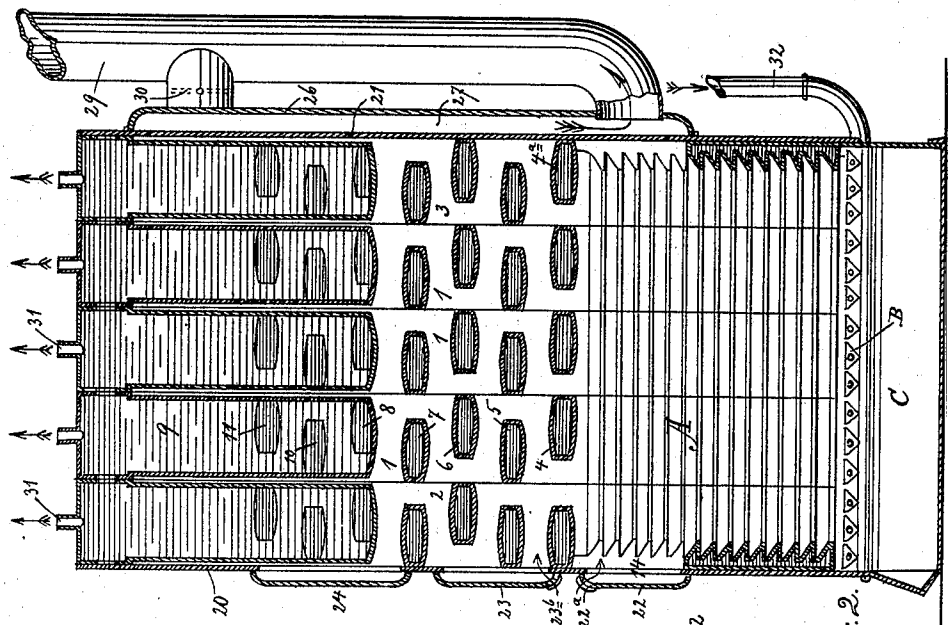


Fig. 2.

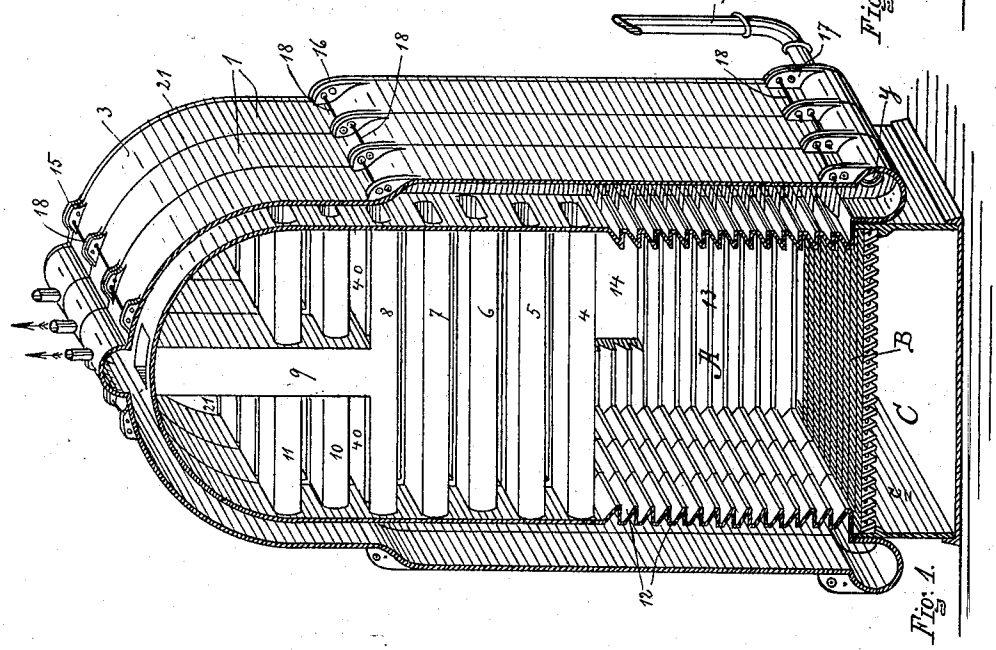


Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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## HEATER.

No. 590,962. Patented Oct. 5, 1897.

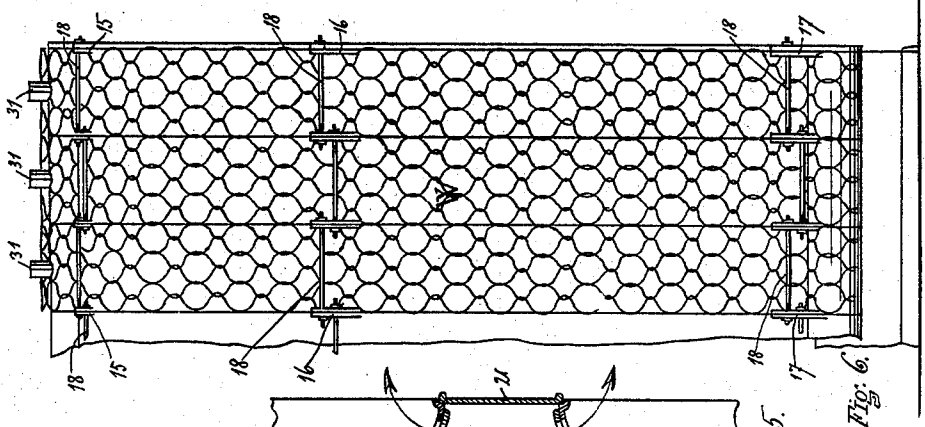

Fig. 6.

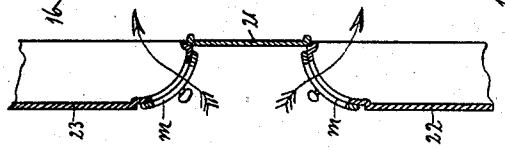

Fig. 5.

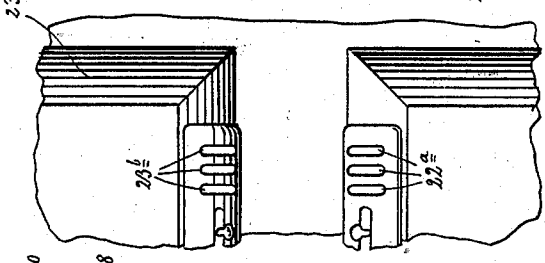

Fig. 4.

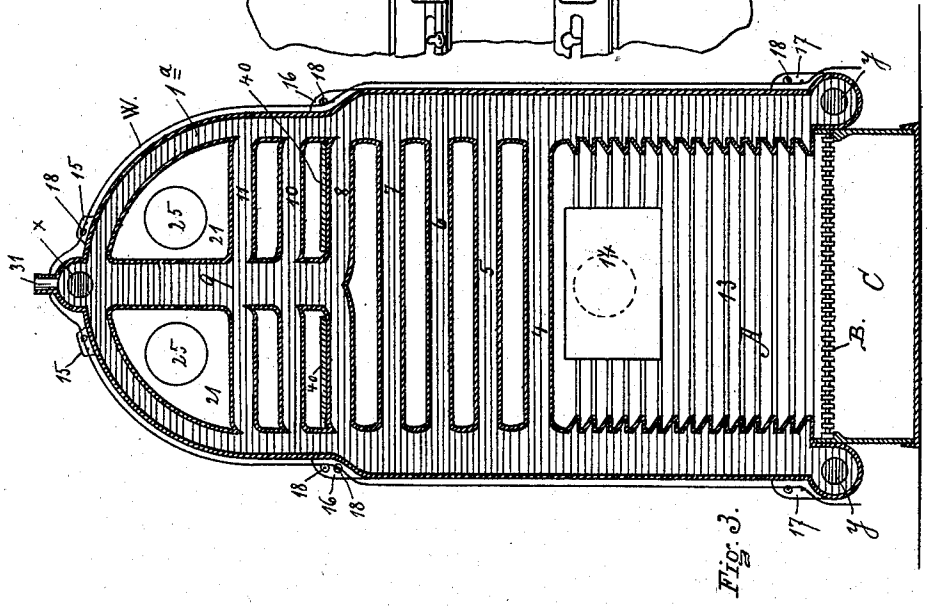

Fig. 3.

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# UNITED STATES PATENT OFFICE.

JOHN A. BREEN, OF UTICA, NEW YORK.

## HEATER.

SPECIFICATION forming part of Letters Patent No. 590,962, dated October 5, 1897.

Application filed December 29, 1896. Serial No. 617,327. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN A. BREEN, of Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Heaters; and I 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 figures of reference marked thereon, which form part of this specification.

In the drawings, Figure 1 shows a perspective view of the rear portion of a heater constructed according to my plan, the forward sections of the heater being removed. Fig. 2 shows a vertical central longitudinal section of the heater. Fig. 3 shows a vertical section of one of the sections of the heater, the rear section appearing behind the one shown. Fig. 4 shows details of draft-openings in doors employed in the construction, showing a front view of the same. Fig. 5 shows a sectional view of the same construction. Fig. 6 shows details of the connections between the several sections of the heater and the manner in which the covering is secured.

Referring to the reference letters and figures in a more particular description of the device, 1 1 1, &c., indicate the regular or intermediate sections of which the heater is composed, and 2 3 the front and rear sections. The intermediate sections are all similar in construction, as well as the front and rear sections, and the front and rear sections are somewhat similar to the regular sections, as will be noted by reference to the drawings. The regular and intermediate sections all have an inverted-U-shaped hollow-form body, having cross-tubes 4, 5, 6, 7, and 8 and a central upright tube 9, extending from the cross-tube 8 to the upper end of the section. Between the central tube 9 and the body portion of the section are provided also the short cross-tubes 10 and 11.

The tubes 4, 5, 6, 7, 8, 10, and 11 are alternately disposed on opposite sides of the section, as shown clearly in Fig. 2, whereby the heated gases and products of combustion are deflected and caused to travel in an irregular course, so as to encounter the largest amount of exposed surface to be heated. The upper portion $1^a$ of the hollow section-frame is reduced as compared with the lower portion $1^b$, so that there is a greater volume of water held by the section in its lower portion than in its upper portion. The lower portion of the section straddles the fire-box A, and the lower ends of each side of the section-frames are provided with hollow tooth-like projections 12 12, &c., which have an inclined upper surface and a substantially horizontal lower surface, as shown, and when these several sections are placed together these tooth-like projections form ribs extending the full length of the sides of the fire-box. At the bottom of the fire-box is provided a grate B, and under the grate is the ash-pit C, formed by ash-pit walls *c*.

The end sections 2 and 3 are similar to the regular sections, except at the lower portion below the lowest cross-tube $4^a$ the space is filled up with the wall 13, which is provided with the two tooth-like ribs on its inner face and with a door-opening 14. The sections are coupled together by slip-nipples or other suitable connections at their upper ends at *x* and at their lower ends at *y y* to make provision for circulation of the water contained in the sections between the several sections. The sections are also provided with a series of corresponding lugs 15 at the top of the section 16, adjacent to the middle of the section 17, near the bottom of the section, and the sections are secured together, as well as the front and rear plates, hereinafter described, by bolts 18.

It will be noted that each section is provided with a pair of lugs at each of the points indicated, one upon either side of the section, and the bolts 18 are of a length somewhat greater than the width of one section, so as to pass through the lug of one section and span the width of an intermediate section through the lug of the next section. By this arrangement the use of the long bolt is obviated and the objectionable expansion which results from the use of long bolts in heater constructions is eliminated. The lugs or projections 15, 16, and 17 are provided with two sets of openings, as will be noted upon ex-

amination of the drawings, so that these bolts can be readily placed and removed independently of each other.

The end sections 2 and 3 being similar and each being provided with a door-opening, the heater can be readily changed about, so as to be fired from either end, as may be desired. In the construction as shown the front end of the heater is closed by a front plate 20 and the rear end of the heater is closed by a back plate 21. The plate 20 is provided with an opening into the fire-box through the opening 14 in the end section, closed by a door 22. It is also provided with clean-out openings closed by doors 23 and 24. The rear plate 21 is provided with openings 25 25 to afford smoke-passages, and these openings are covered from the outside by a jacket 26, which extends downwardly on the outside of the plate 21 and furnishes a reverse flue 27. At the upper end the jacket 26 is provided with an opening connected by a short pipe 28 with the smoke-flue 29, and in this short section of pipe is provided a damper 30. The smoke-tube 29 is extended down below the cross-pipe 28 and connects with the lower end of the reverse flue, as shown in the drawings.

It will be noted that the plate 21 closes the opening 14 in the back end of the furnace and in the section 3 as the construction is arranged in Fig. 2. It is evident that by slightly modifying the form and length of the jacket 26 and the lower end of the smoke-flue an opening and a door might be provided through this plate, so that the heater could be fired from both ends in case a heater with a large number of sections was employed. Each section of the heater is provided at its upper end at the highest point with an opening 31, to which the conducting-pipes can be attached or which may be connected with a drum to which the connecting-pipes are attached. The return-pipes 32 are attached to the foot of the rear section, as shown in Figs. 1 and 2, but in case of the use of a large number of sections in the same heater return-pipes might be attached to all four of the lower corners of the heater.

For the purpose of supplying fresh air to combine with the products of combustion above the fire there is provided in the lower side of the door 23, as shown at $23^b$, and in the upper side of the door 22, as shown at $22^a$, a series of openings with suitable slides or other means for controlling these openings. The slide is indicated by *m* on each of the doors.

When these heaters are set up, they are to be covered with some non-conducting material or substance in order to prevent radiation, and for this purpose I employ a plaster in which asbestos forms a large part of the material. For securing this covering on the heater I provide a wire-netting *w*, which is passed over the heater and is fitted over the lugs or projections 15, 16, and 17, as shown in Figs. 3 and 6, by having the lugs passed through the meshes of the netting before the bolts 18 are put in place. When these bolts 18 are put in place, the netting is thereby firmly secured on the heater, and when the plastering is applied it surrounds the netting, so that the netting is embedded therein, and thereby the covering is formed and secured on the heater. More or less lugs may be employed between the netting *w* and the heater, so as to hold the netting out of contact with the surface of the heater and allow considerable portions of the plaster to take a position between the netting and the surface of the heater.

The use and operation of heaters of this description being well understood, specific description of operation may be omitted. It, however, might be noted that in the fire-box the fuel is held out of contact with the body of the sections of the heater which absorbs the heat, and being so held out of contact by the tooth-like ribs or projections the fuel which lies adjacent to the walls of the heater is not cooled to such an extent that it will fail to properly consume with the fuel held in the center portion of the fire-box. The inclined upper surface of the tooth-like projections on the interior of the fire-box causes the accumulation of ashes or dust to slide off, so that the capacity of these surfaces for absorbing heat is not impaired, and exerts no detrimental influence upon the combustion. The arrangement of the cross-tubes of the sections on alternate sides of the section is such as to deflect the products of combustion as they rise from the fire in such manner as to bring them in contact with as much heat-absorbing surface as possible, whereby the best results are attained. In order to prevent the products of combustion passing directly to the smoke-exit openings 25 25, is employed a pair of plates 40 40, which are of less length than that of the heater as a whole, which are placed through the openings close by the door 24 on top of the cross-tubes 8 and at either side of the feet of the upright tubes 9. These plates are placed in the rear end of the heater, so as to cause the products of combustion to pass to the front and not directly toward the smoke-exit openings 25. These plates 40 need not be close-fitting. If they direct the major part of the products of combustion, they perform their offices sufficiently.

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

1. The combination with a sectional heater of hollow tooth-like rib projections 12, the upper surface of which is inclined and the lower surface substantially horizontal, extending across the several sections and lining the fire-box, substantially as set forth.

2. The combination in a heater of hollow sections, the bodies of which are of inverted-U shape having horizontal transverse tubular connections between the arms of the body portion of less transverse thickness on a horizontal line than that of the body of the sec-

tion and alternately disposed at opposite sides of the section, as shown and described.

3. The combination with a sectional heater having external lugs or projections, of a netting cover adapted to secure composition material, the netting being held by being engaged with lugs or projections and retained thereon by bolts which pass through the lugs or projections and secure the sections of the heater together, substantially as set forth.

4. A hollow heater-section of an inverted-U-shape form having a series of horizontal transverse connecting-tubes 4, 5, 6 and 7 between the arms immediately over the fire-box and other transverse horizontal tubes 8, 10 and 11 with a central vertical tube 9 of larger capacity than the other tubes, substantially as set forth.

In witness whereof I have affixed my signature in presence of two witnesses.

JOHN A. BREEN.

Witnesses:
J. C. BREEN,
RICH. A. GEORGE.