

1,054,420.

14 SHEETS—SHEET 1.



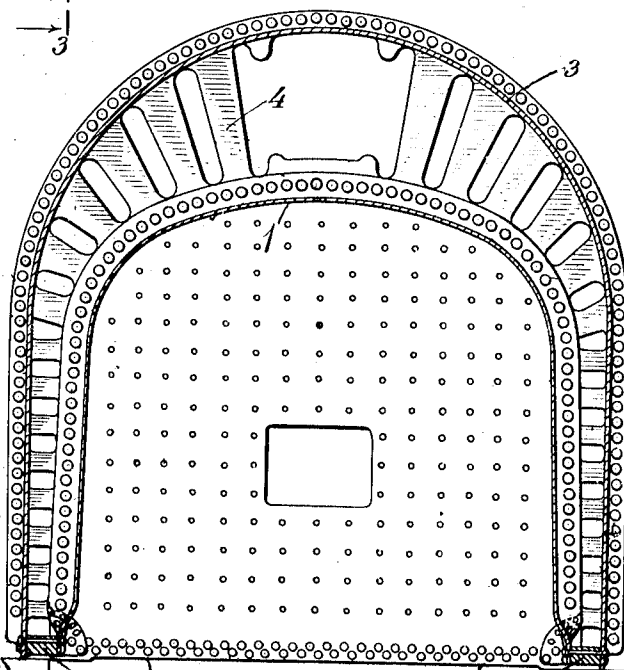
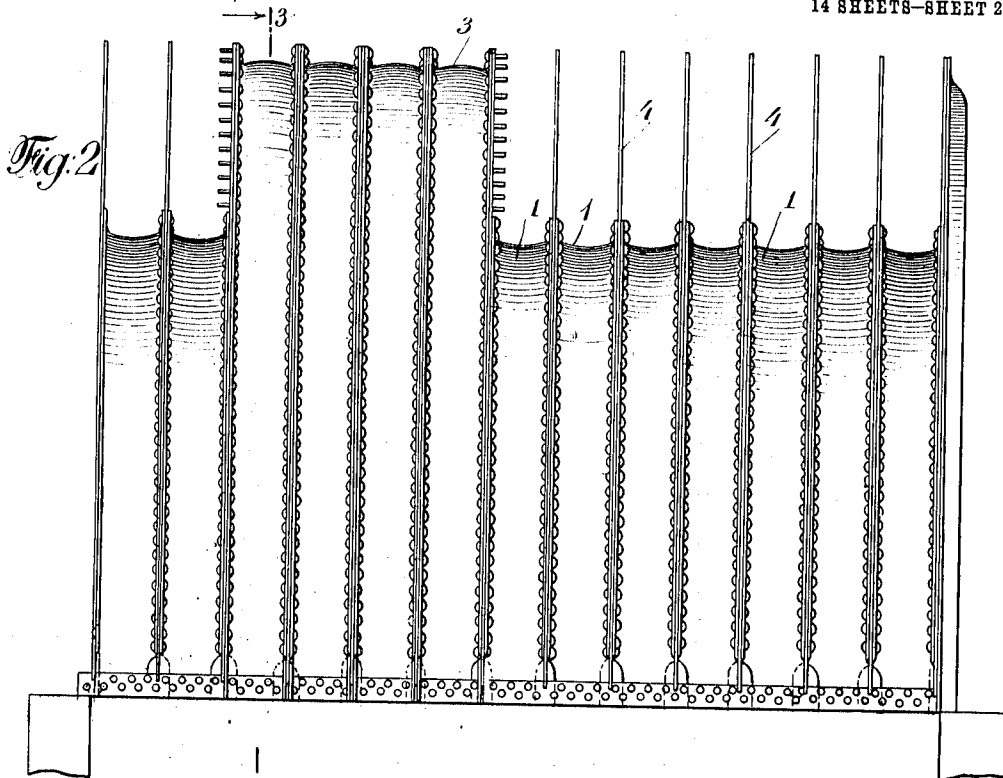
Inventor
Henry W. Jacobs
By his Attorneys
Pindle & Shoup

H. W. JACOBS.
METHOD OF FORMING FIRE BOXES.
APPLICATION FILED OCT. 20, 1909.

1,054,420.

Patented Feb. 25, 1913.

14 SHEETS—SHEET 2.



Witnesses:
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14 SHEETS—SHEET 3.

Fig. 4.

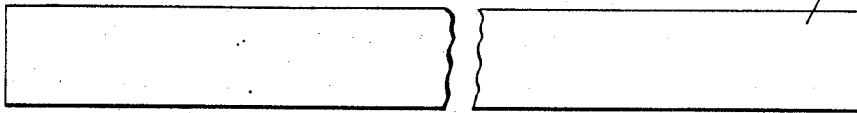


Fig. 4^a.

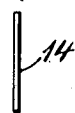


Fig. 5.

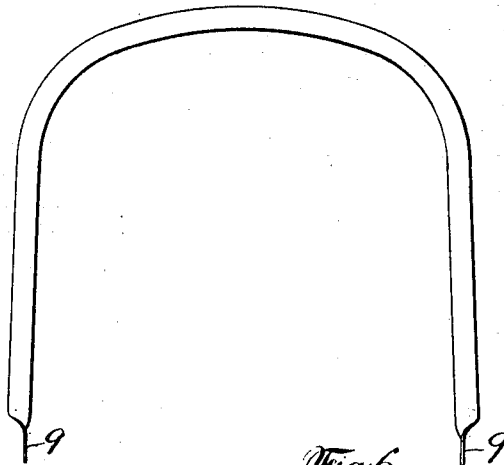


Fig. 5^a.

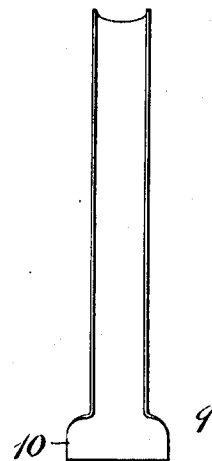
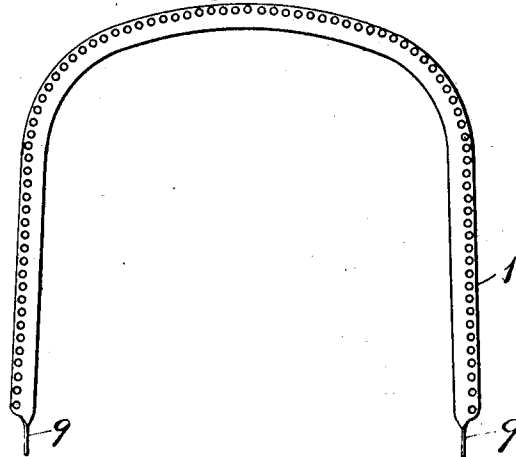


Fig. 6.



Witnesses
Elizabeth C. Krollinger.
J. S. Lloyd

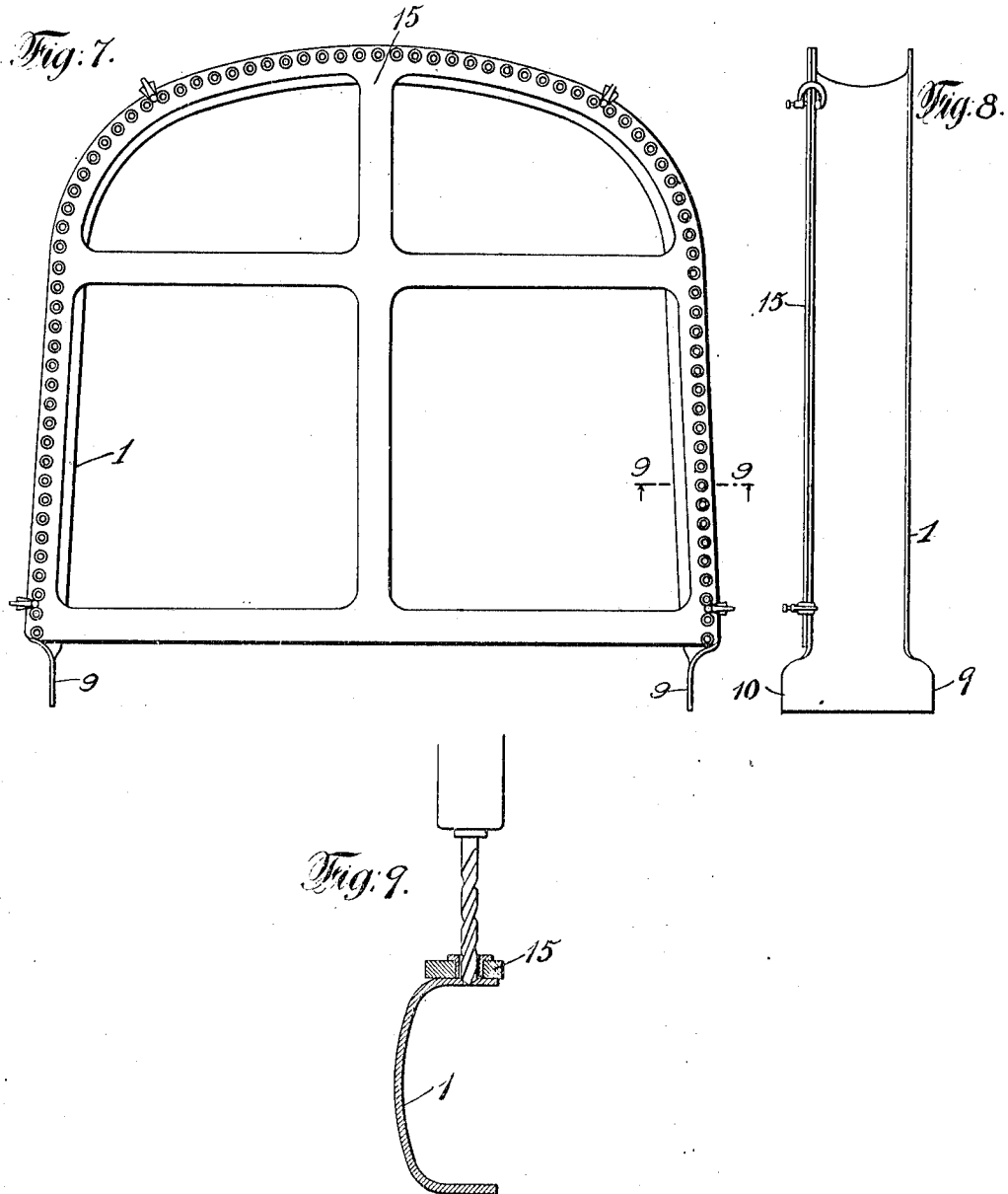
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Henry W. Jacobs,
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14 SHEETS—SHEET 4.



Witnesses:
Elizabeth B. Drollinger
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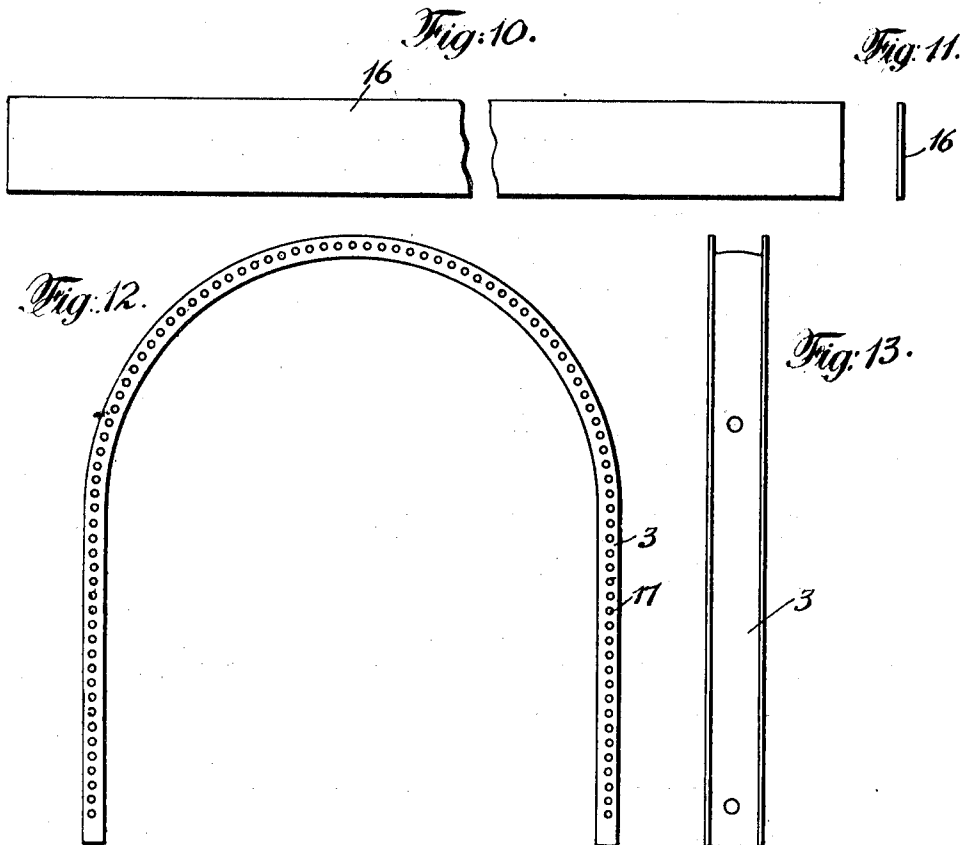
Inventor
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14 SHEETS—SHEET 5.



Witnesses:
Elizabeth B. Drollinger
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14 SHEETS—SHEET 6.

Fig. 14.

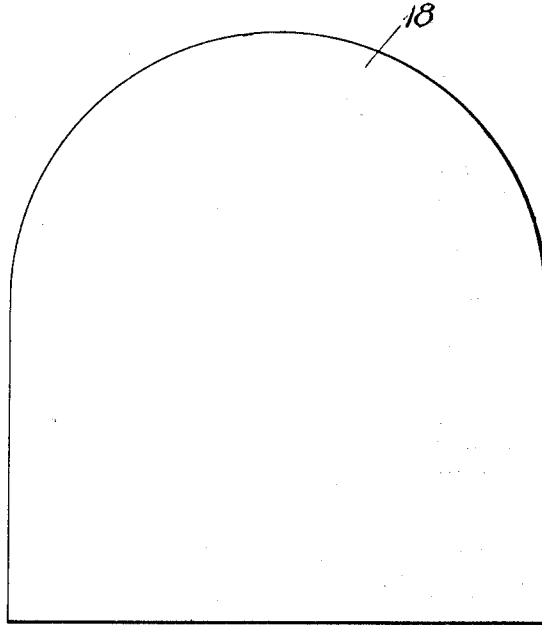
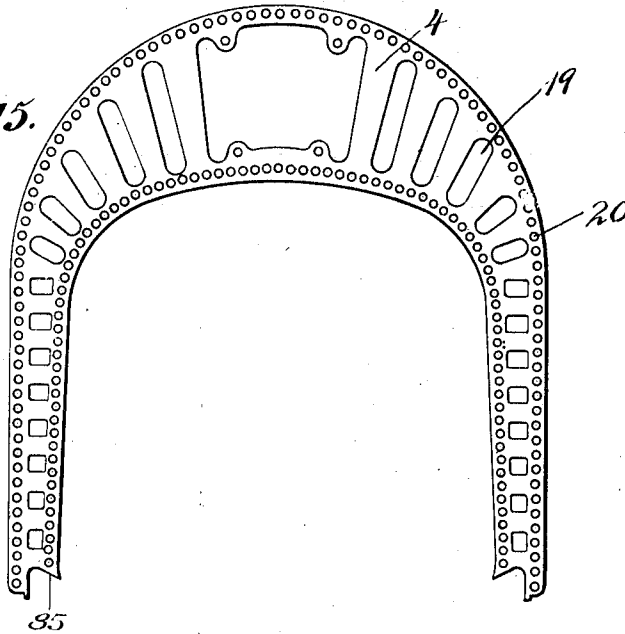


Fig. 15.



Witnesses:
Elizabeth B. Quollinger
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14 SHEETS—SHEET 7.

Fig. 16.

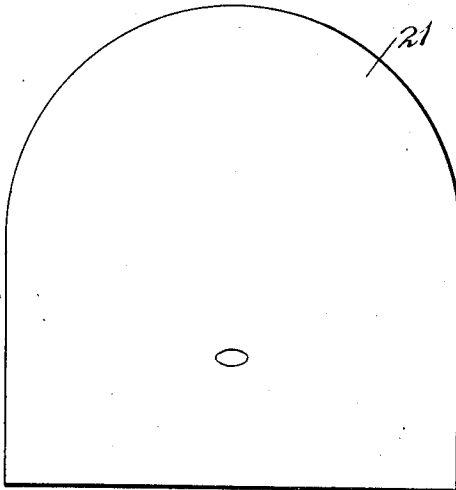


Fig. 17.

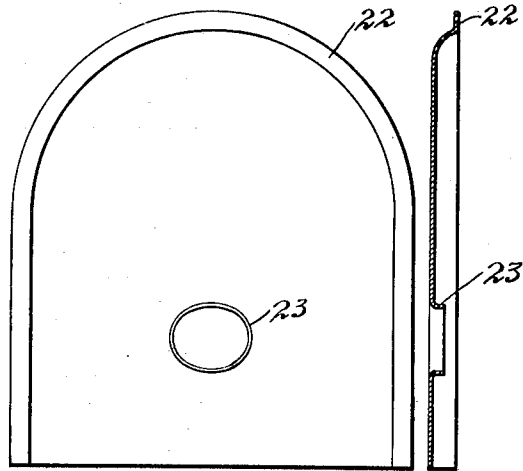


Fig. 17^a

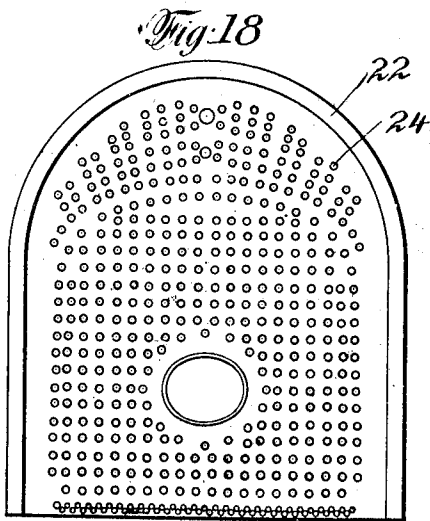
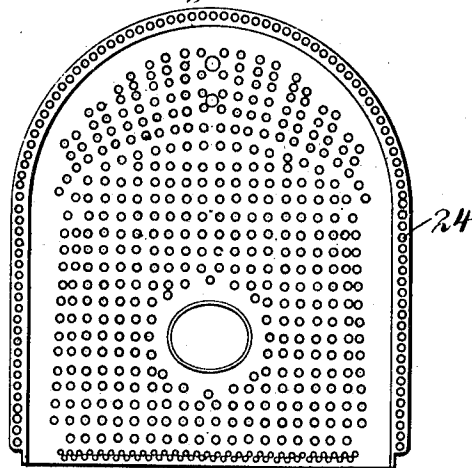


Fig. 19.



Witnesses:
Elizabeth B. Drollinger
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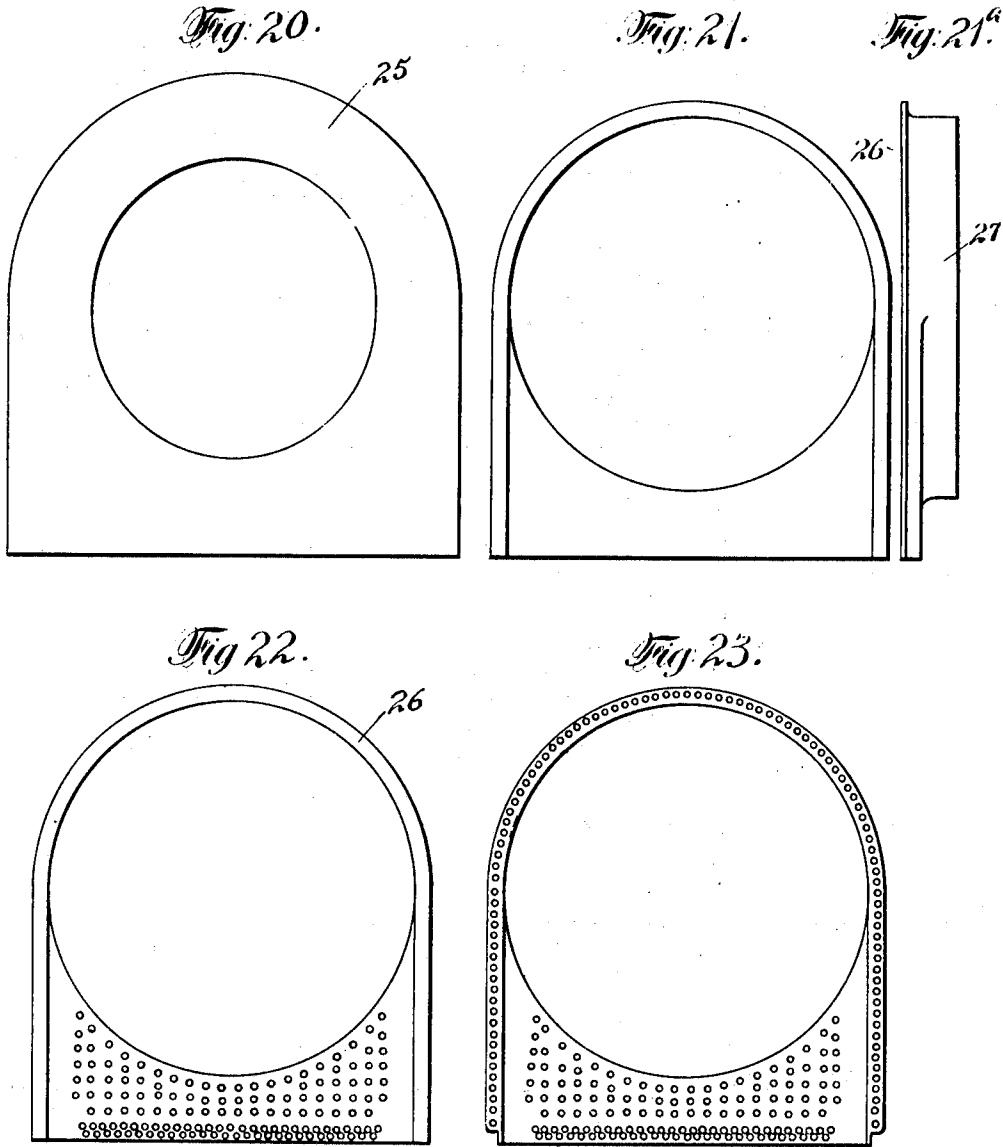
Inventor
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14 SHEETS—SHEET 8.



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H. W. JACOBS.
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14 SHEETS—SHEET 9.

Fig. 24.

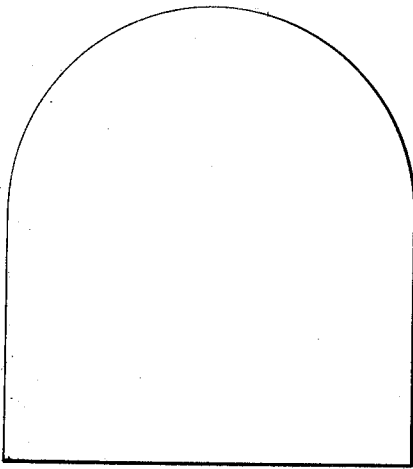


Fig. 25.

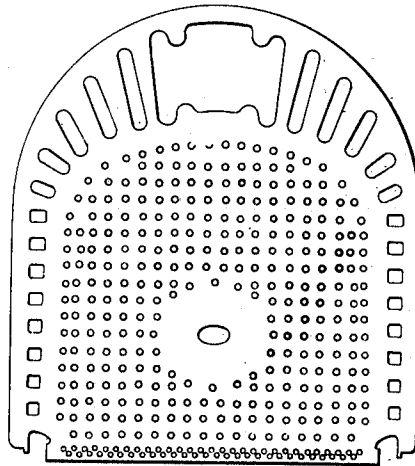


Fig. 26.

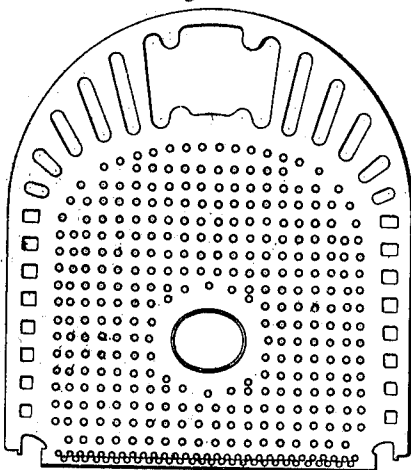
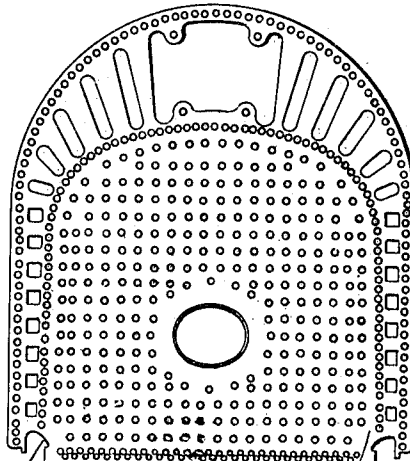


Fig. 27.



Fig. 27.



12

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14 SHEETS—SHEET 10.

Fig. 28.

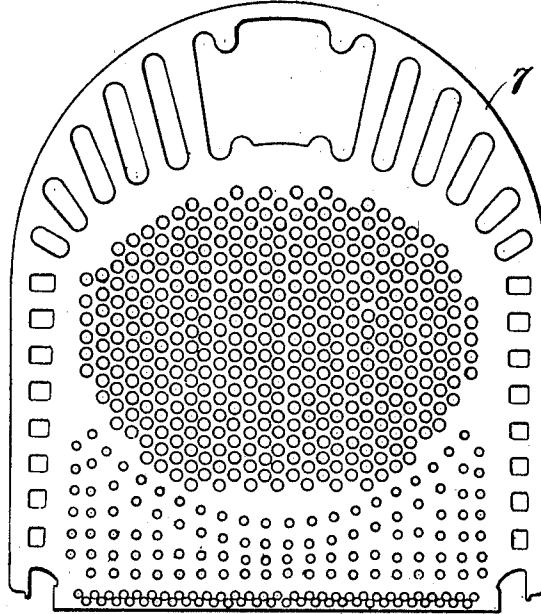
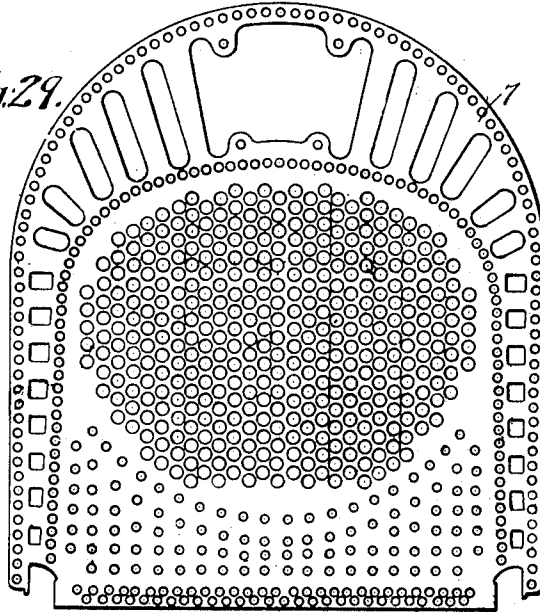


Fig. 29.



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Patented Feb. 25, 1913.

14 SHEETS—SHEET 11.

Fig. 30.

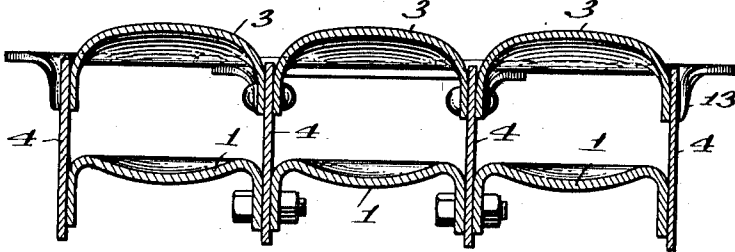


Fig. 32^a.

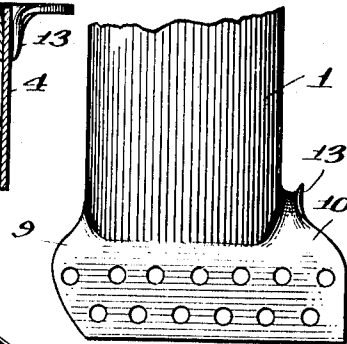


Fig. 31^a.

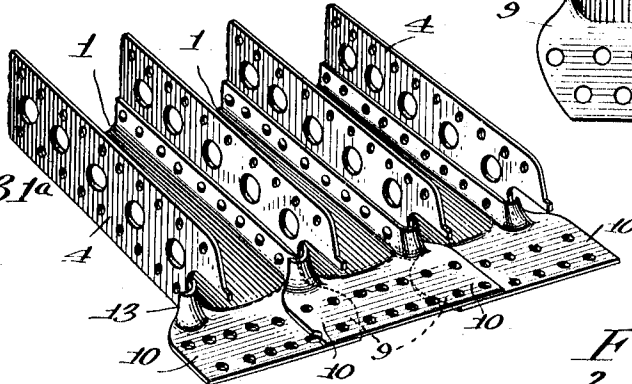


Fig. 32.

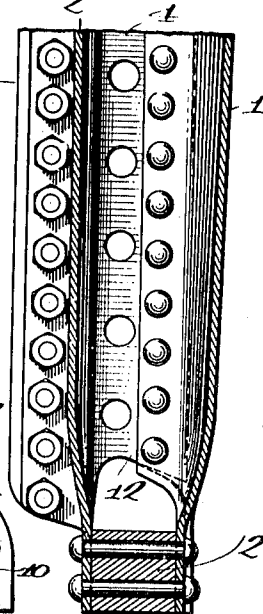
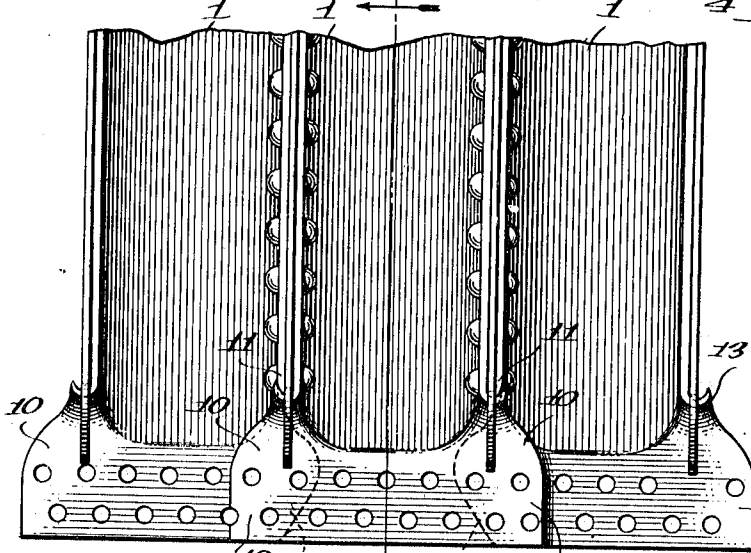


Fig. 31.



Witnesses:

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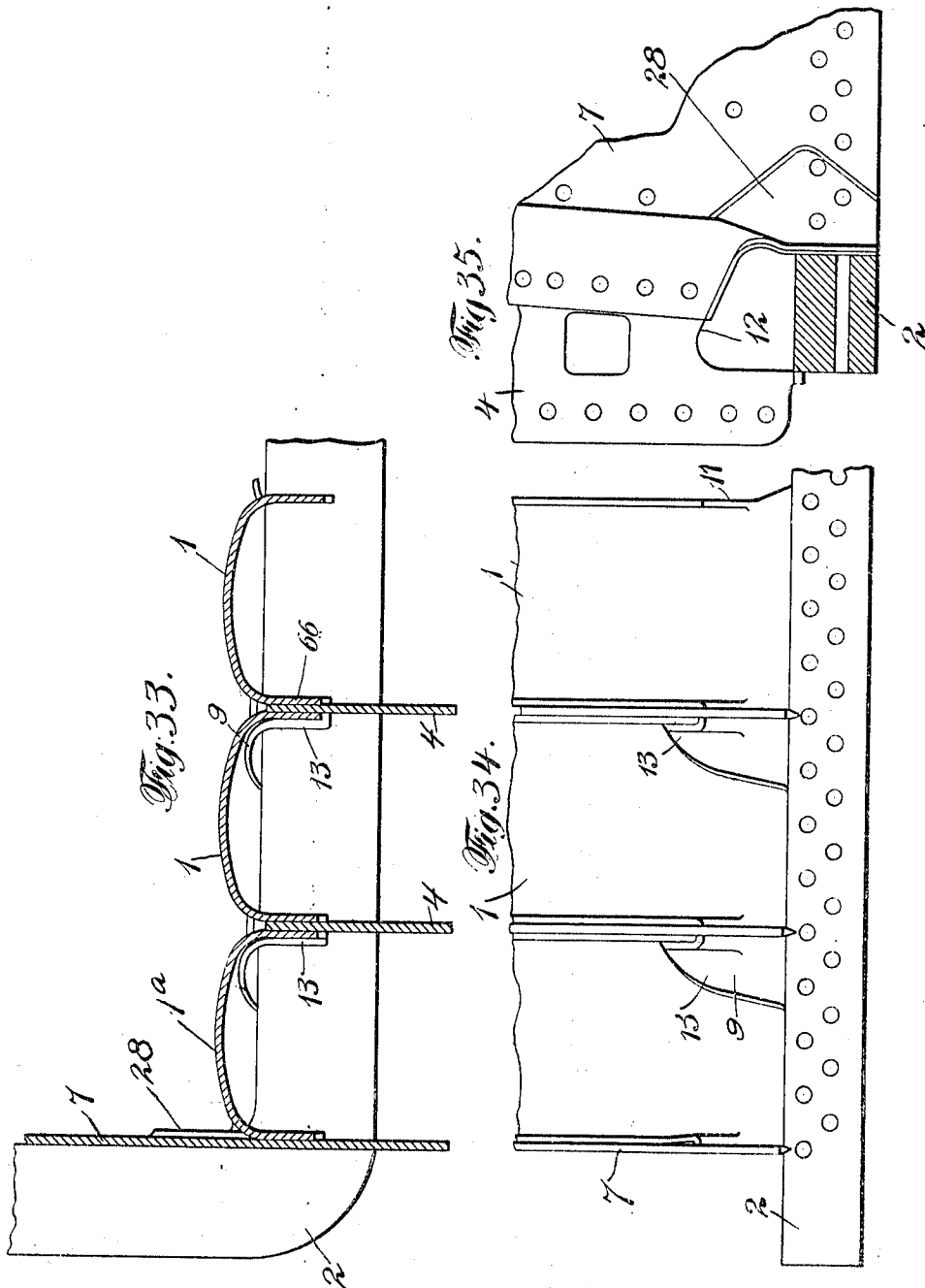
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H. W. JACOBS.
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14 SHEETS—SHEET 12.



Witnesses:
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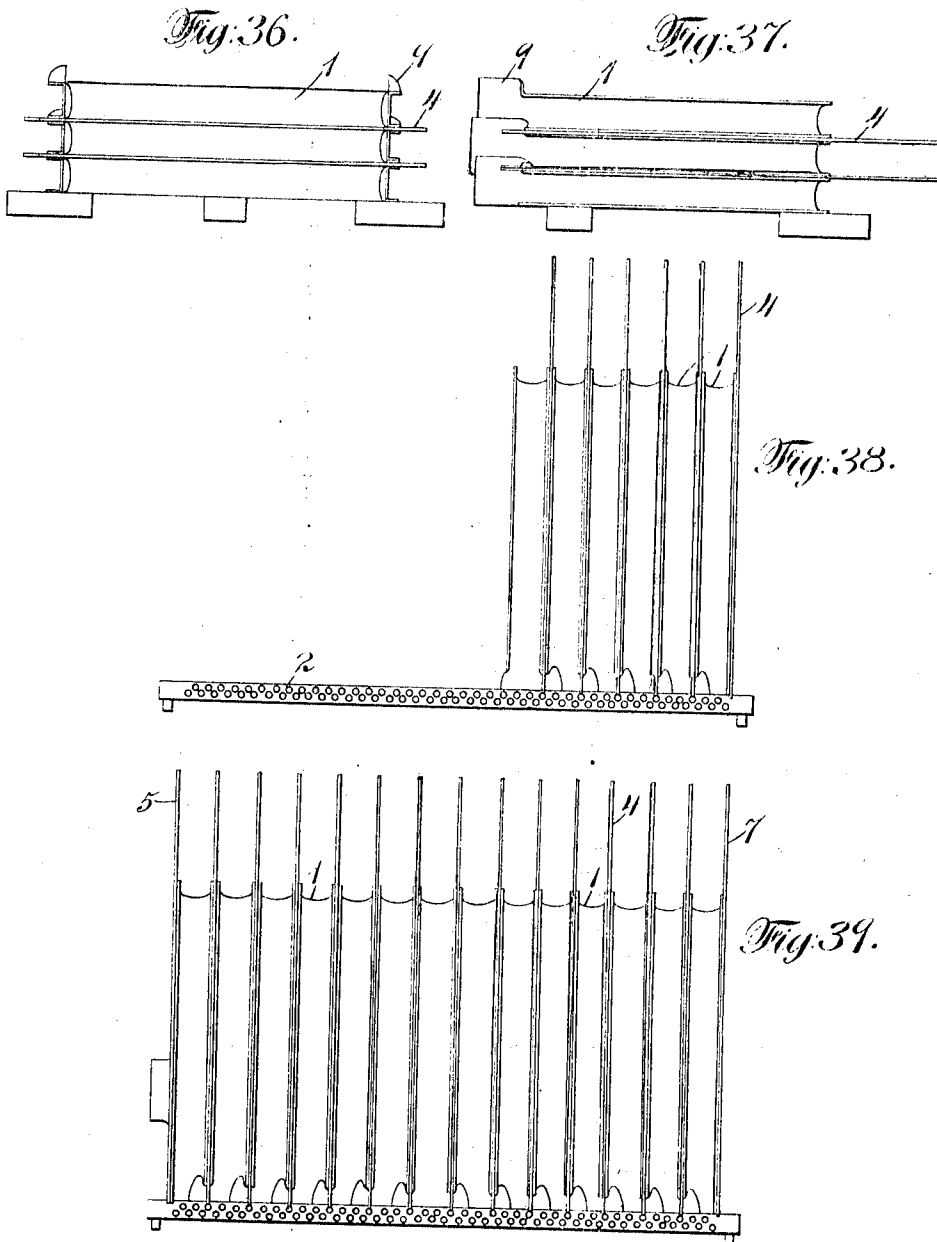
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14 SHEETS—SHEET 13.



Witnesses:
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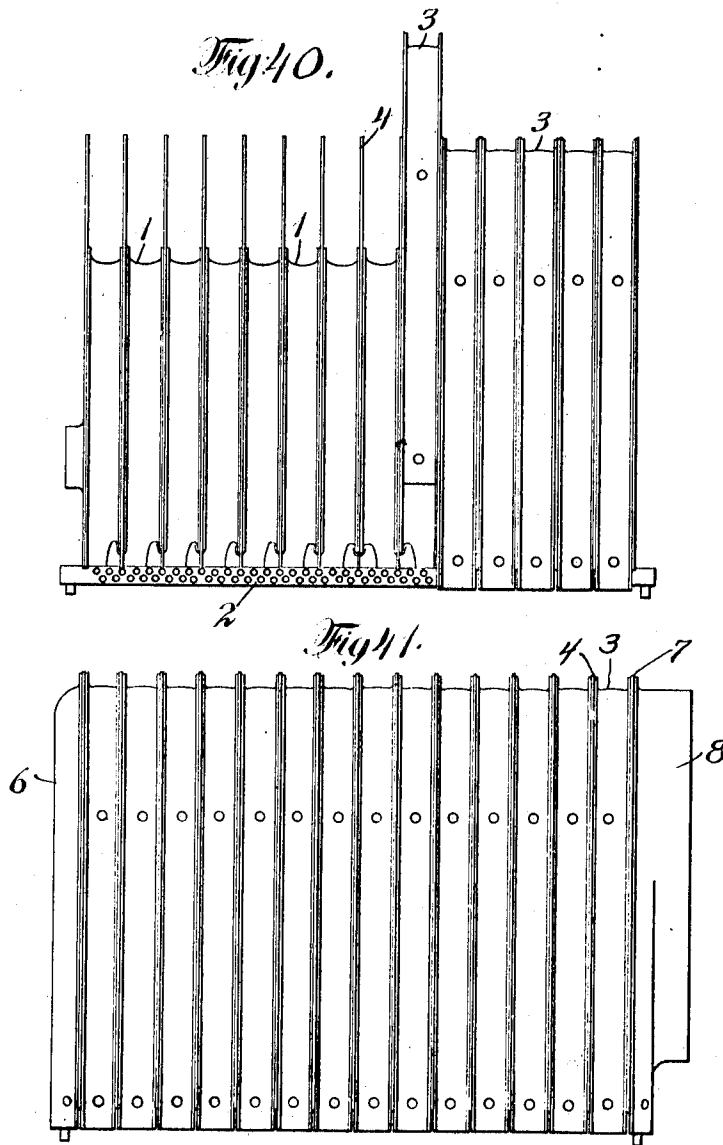
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METHOD OF FORMING FIRE BOXES.
APPLICATION FILED OCT. 20, 1909.

1,054,420.

Patented Feb. 25, 1913.

14 SHEETS-SHEET 14.



Witnesses:
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UNITED STATES PATENT OFFICE.

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SYLVANIA, A CORPORATION OF PENNSYLVANIA.

METHOD OF FORMING FIRE-BOXES.

1,054,420.

Specification of Letters Patent.

Patented Feb. 25, 1913.

Application filed October 20, 1909. Serial No. 523,569.

To all whom it may concern:

Be it known that I, HENRY W. JACOBS, of Topeka, in the county of Shawnee, and in the State of Kansas, have invented a certain
5 new and useful Improvement in Methods of Forming Fire-Boxes, and do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to a method of pro-
10 ducing fire-boxes, and especially fire-boxes made with a plurality of sections, and its object is to provide a method by which such fire-boxes can be constructed with ease, rapidity, and at a minimum of cost, and also
15 by which they can be constructed with such accuracy and uniformity in the like parts of different fire-boxes, that such parts shall be interchangeable, and may be assembled without special fitting together. And to such
20 ends my invention consists in the method of forming fire-boxes hereinafter specified.

In the accompanying drawings Figure 1 is a vertical section of a fire-box made by my process; Fig. 2 is a side elevation of the
25 same partially assembled; Fig. 3 is a transverse sectional view of the same taken on a line 3—3 of Fig. 2; Figs. 4 and 4^a are, respectively, a plan view and an edge view of the blank from which one of my fire-box
30 sections is made; Figs. 5 and 5^a are, respectively, front and end elevations of a fire-box section formed but not drilled; Fig. 6 is a side elevation of a fire-box section drilled; Figs. 7 and 8 are, respectively, a side and
35 end elevation of a fire-box section having a templet for drilling attached thereto; Fig. 9 is a section on the line 9—9 of Fig. 7; Figs. 10 and 11 are, respectively, a plan and edge view of a blank for forming an outside
40 shell section; Figs. 12 and 13 are similar views of a completed shell section; Figs. 14 and 15 are, respectively, a side elevation of a stay-sheet blank and a completed stay-sheet; Figs. 16 to 19 are views showing the
45 various stages of making a back-head; Figs. 20 to 23 are views showing the steps of making a throat plate from the blank to the completed throat plate; Figs. 24 to 27^a are views showing the steps of making a
50 door-sheet from the blank to the completed door-sheet; Figs. 28 and 29 are views showing a partially and wholly completed flue-sheet; Fig. 30 is a plan sectional view, through a water-leg of the boiler showing

the relations of the fire-sheet section, the
51 wrapper-sheet and the stay-sheet; Fig. 31 is an elevation showing a portion of the outer side of the fire, or inner, sheet of the boiler, including the sections and stay-sheets, and showing the particular arrangement for
60 making water-tight joints between such parts and the mud-ring; Fig. 31^a is a perspective view of the parts shown in Fig. 31; Fig. 32 is a section of Fig. 31 taken on the line 32, the section also showing the wrap-
65 per-sheet parts and the mud-ring; Fig. 32^a is a view of the lower portion of one of the sections of the fire-sheet, as seen from the fire side thereof; Figs. 33, 34 and 35 are views, respectively, like Figs. 30, 31 and 32,
70 but intended to show the joint between the forward crown sheet section 1^a and the flue-sheet 7; Figs. 36 and 37 are side elevations from different sides, showing the steps of assembling the fire-sheet sections and stay-
75 sheets; Fig. 38 shows the said parts turned into vertical position and placed upon the mud-ring preparatory to securement to the mud-ring; Fig. 39 shows the assembling with the said parts of the inner door-plate
80 and flue-sheet; Fig. 40 is an elevation showing the procedure of placing the outside shell sections in place; and Fig. 41 is an elevation representing the securement of the outer door-plate and the throat-sheet to the
85 aforesaid parts.

I have chosen as an illustration of my invention that embodiment which is the best embodiment known to me. Such embodiment, however, is to be regarded as typical
90 only of other possible embodiments, and my invention is not to be limited to the specific embodiment shown.

I have chosen to illustrate my method by applying it to a fire-box which is shown in
95 Figs. 1 to 3, inclusive, and which is of the type of the patent to F. W. Shupert and Henry W. Jacobs #917,172, April 6, 1909. This fire-box consists essentially of crown-sheet sections 1 which are arched across
100 from side to side of the mud-ring 2, and which are U-shaped in cross-section so that they present outwardly projecting flanges; of wrapper-sheet sections 3, which also extend from side to side of the mud-ring, and
105 are formed of sheet metal with outwardly projecting flanges, stay-sheets 4 being interposed between each two crown-sheet sections

and extending outwardly between the corresponding wrapper-sheet sections, each stay-sheet and the adjacent crown-sheet flanges being riveted together, and each stay-sheet and corresponding wrapper section flanges being riveted together. A door-plate 5 is riveted to the rear crown-sheet section flange and to the rear wrapper-sheet section flange, and a back-head 6 is riveted to the outer edge of the door-sheet and to the door flange. A flue-sheet 7 is riveted to the forward crown-sheet flange and to the flange of the forward wrapper-sheet section, the flue-sheet also being secured to the inside of the mud-ring. A throat-sheet 8 has a flange that is riveted to the flue-sheet and the throat-sheet is also riveted to the outside of the mud-ring. As the inner face of the mud-ring is flat, and as the crown-sheet sections are not only U-shaped in cross-section, but have their outwardly projecting flanges projecting toward the mud-ring and must make a tight joint, not only with each other but with the stay-sheets and with the mud-ring, a connection difficult to make tight is presented. I accomplish this by forming ears 9 and 10, respectively, (see Figs. 31 and 32) on the lower ends of the crown-sheet sections which are flat and adapted to lie along the mud-ring. I also cause one flange 11 of each crown-sheet section to lie along the stay-sheet and cut it off approximately level with the lower projecting edge 12 of the stay-sheet (see Fig. 32), the latter being cut away to afford water circulation along the top of the mud-ring. I then form the ear of the adjacent crown-sheet section so that it passes under the lower edges both of the stay-sheet and of the crown-sheet flange referred to, and form it up on the opposite side of the stay-sheet, so as to form a lip 13 which infolds the said flange and stay-sheet, and which can be welded or riveted or calked so as to make a tight joint.

The parts are to be prepared in the following manner: A crown-sheet section is formed (Figs. 4 to 9) by bending a blank 14 transversely and longitudinally by dies. A templet 15 is then clamped to the said section and a series of holes is drilled in the flanges, as shown in Figs. 7 to 9. In a similar manner, from the blank 16 one of the outer U-shaped sections 3 is formed, and its series of rivet holes 17 is likewise drilled by the use of a templet (as shown in Figs. 10 to 13).

From a blank 18 (Fig. 14) a stay-sheet 4 (Fig. 15) is formed, the slots 19 being preferably formed by punching by dies, and the holes 20 being formed by drilling by means of a templet.

The back-head is formed (as shown in Figs. 16 to 19) by clamping the body of the blank 21 against a male die and then dish-

ing the blank and forming a flange 22 by pressure of a female die around its outer edge. In the same manner the door-flange 23 is formed. The rivet holes 24 in the body of the plate, and the rivet holes 30 in the flange are then drilled, preferably by the use of a templet.

In forming the throat-sheet (Figs. 20 to 23) a blank 25 is treated in the same manner as the blank of the door-sheet, to form the flange 26, and the plate is then held by means of such flange and the body while the throat 27 is being formed. The plate is then preferably drilled by the use of templets.

The door-sheet 5 is formed (Figs. 24 to 27) by punching and drilling the holes therein and flanging the door opening in the same manner as the back-head in Figs. 16 to 19. The flue-plate is formed (Figs. 28 and 29) by punching the water circulation slots by dies and forming the flue and rivet holes, the latter, at least, being preferably drilled, using a jig or templet.

The drilling of boiler parts by the use of templets greatly facilitates the making of a fire-box. The making of a fire-box of so many parts as the present fire-box, would be very difficult and expensive, if it were not for shaping the parts accurately by the use of dies and placing the holes accurately by the use of templets, since otherwise the errors in shaping and putting together each to the adjacent parts would be multiplied as the number of parts connected together is increased.

The parts of the fire-box are now ready for assembling, except the reverse lapping of the ear 28 of the forward crown-sheet section 1^a, to form the joint between such section and the flue-sheet (as shown in Figs. 33 to 35). It will be seen that the ear 28 is turned back, away from its crown-sheet section 1^a, so that it lies against the inner face of the flue-sheet 7, thus a tight joint can be made.

In assembling the parts to form a complete fire-box (as shown in Figs. 36 to 41) the crown-sheet sections are stacked one upon another in a horizontal position, with a stay-sheet interposed (as shown in Figs. 36 and 37) and riveted together. All the crown-sheet sections and stay-sheets are preferably riveted at this time. This avoids any handling of the box between the riveting operations and any changing of men to perform alternate operations, and it enables the riveting or calking of these parts to be done with the greatest possible ease.

The ears at the bottom of the crown-sheet sections are riveted together and, if desired, welded together, and the assembled structure is preferably riveted to the mud-ring at this time, the door-sheet and flue-sheet being secured in place. The outside shell sections

3 are then slipped into place between the stay-sheets by a vertical movement (as shown in Fig. 40) and are riveted to each other and to the stay-sheets. By this method the riveting of these parts together can proceed without interruption from beginning to end, thus saving the time of changing men and tools which would occur if other operations were interposed. The back-head 6 and the throat-sheet 8 are then secured in place and the rivets securing the parts to the mud-ring put in when the fire-box is ready for calking. The mud-ring may, if desired, be the last part put in place.

Not only can sectional fire-boxes be made by this method with great ease and rapidity, and at a minimum cost, but the component parts of the fire-box may be constructed with great accuracy and uniformity. By forming all of the component parts by formers and dies, and drilling the rivet holes by the aid of jigs, all of the units of the fire-box produced will be alike in their essential features and a uniformity and exactness will result, which is independent of the skill of the workmen.

Claims—

1. The method of forming fire-boxes comprising forming U-shaped inner and outer channel sections having outwardly extended flanges, forming stay sheets adapted to lie between and connect corresponding pairs of flanges of said inner and outer sections, and assembling such fire-boxes by first securing said inner sections and stay sheets together alternately, and afterward placing said outer sections between said stay sheets and securing their flanges and said stay sheets together.

2. The method of forming fire-boxes comprising alternately placing U-shaped inner channel sections, having outwardly projecting flanges, and correspondingly shaped stay sheets in coaxial relation, and securing said flanges and stay sheets together, and afterward placing U-shaped outer channel sections between said stay sheets, and securing their flanges and stay sheets together.

3. The method of forming fire-boxes comprising alternately placing U-shaped inner channel sections, having outwardly projecting flanges, and correspondingly shaped stay sheets in coaxial relation and securing said stay sheets together and afterward

placing U-shaped outer channel sections between said stay sheets and securing their flanges and said stay sheets together, securing a flue-sheet and a door sheet to the first and last of said series of inner and outer sections respectively, and finally securing a throat plate and a back head to said flue-sheet and door sheet respectively.

4. The method of forming fire-boxes comprising alternately placing U-shaped inner channel sections, having outwardly projecting flanges, and correspondingly shaped stay sheets in coaxial relation, bringing said parts into proper relation to a mud-ring, laying the lower ends of said flanges along the inner face of said mud-ring, and placing U-shaped outer channel sections between said stay sheets, said outer sections being put in place after said inner sections and stay sheets are assembled.

5. The method of forming fire-boxes comprising alternately placing U-shaped inner channel sections, having outwardly projecting flanges, and correspondingly shaped stay sheets in coaxial relation, bringing said parts into proper relation to a mud-ring, laying the lower ends of said flanges along the inner face of said mud-ring, causing said flanges to infold the lower edges of said stay sheets, and placing U-shaped outer channel sections between said stay sheets, said outer sections being put in place after said inner sections and stay sheets are assembled.

6. The method of forming fire-boxes comprising alternately placing U-shaped inner channel sections, having outwardly projecting flanges, and correspondingly shaped stay sheets in coaxial relation, bringing said parts into proper relation to a mud-ring, laying the lower ends of said flanges along the inner face of said mud-ring and overlapping each other, causing said flanges to infold the lower edges of said stay sheets, and placing the U-shaped outer channel sections between said stay sheets, said outer sections being put in place after said inner sections and stay sheets are assembled.

In testimony that I claim the foregoing I have hereunto set my hand.

HENRY W. JACOBS.

Witnesses:

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