

H. W. JACOBS & F. W. SHUPERT.

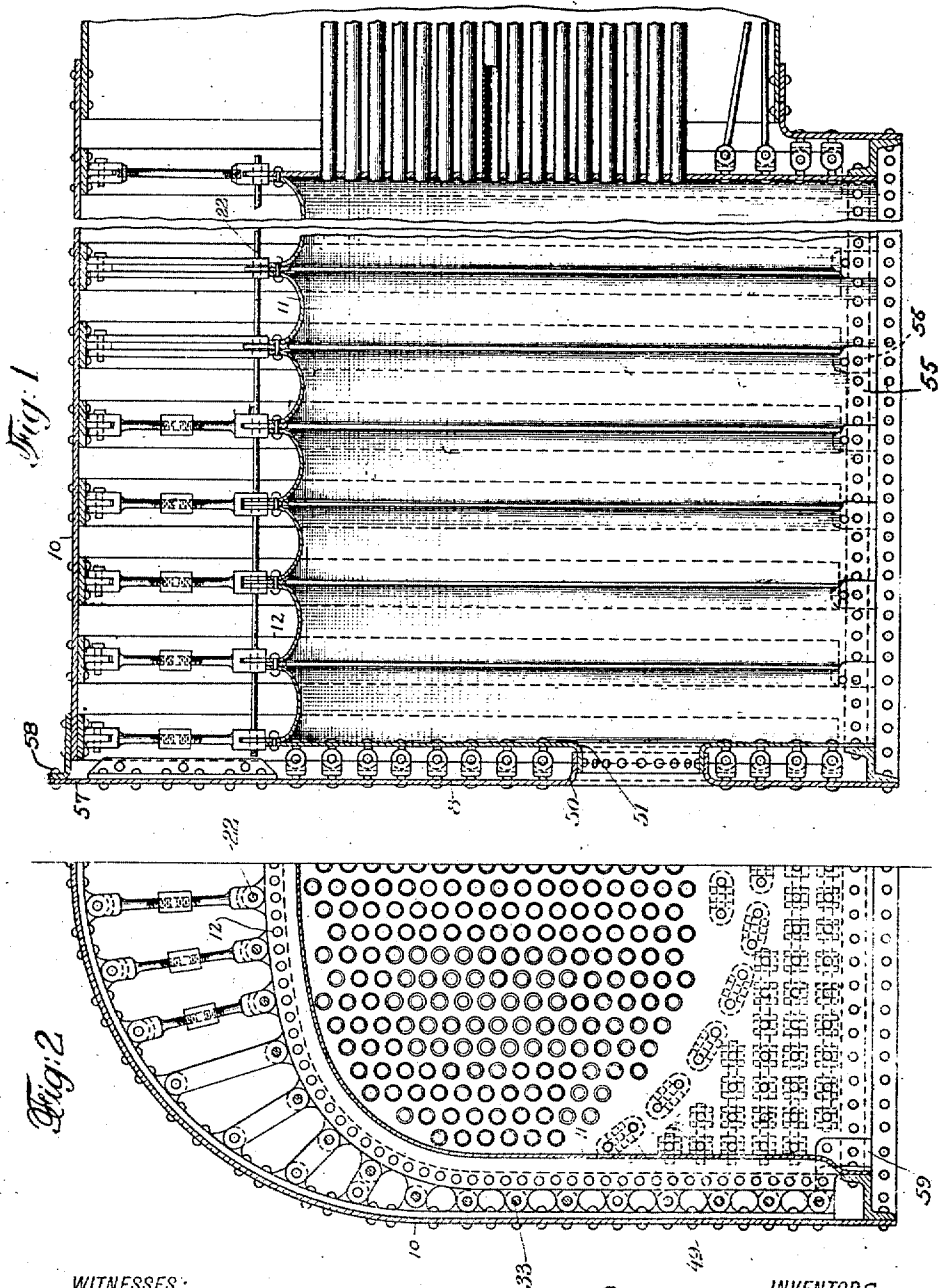
FIRE BOX.

APPLICATION FILED JUNE 30, 1909.

982,723.

Patented Jan. 24, 1911.

3 SHEETS—SHEET 1.



WITNESSES:
M. Meikle.
G. B. Prindle

INVENTORS.
Henry W. Jacobs and
Frank W. Shupert,
BY
Prindle and Wright,
ATTORNEYS.

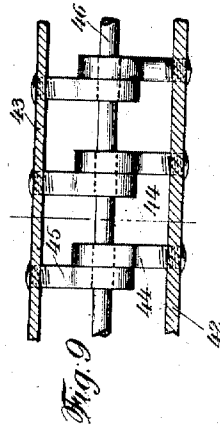
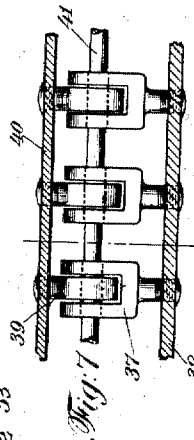
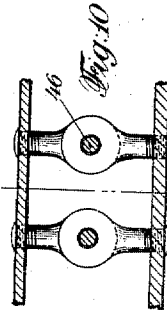
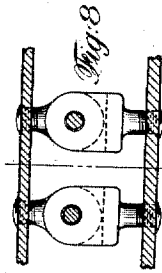
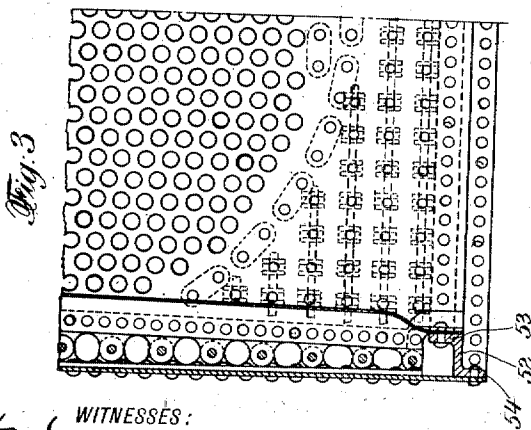
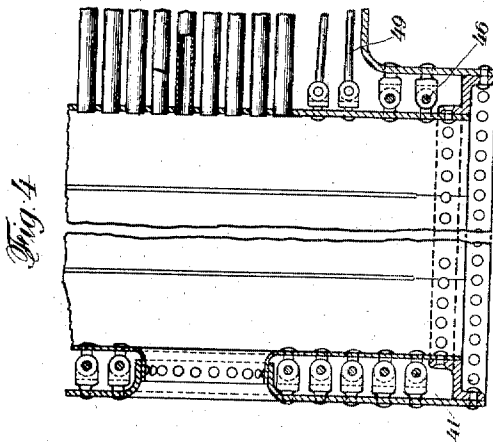
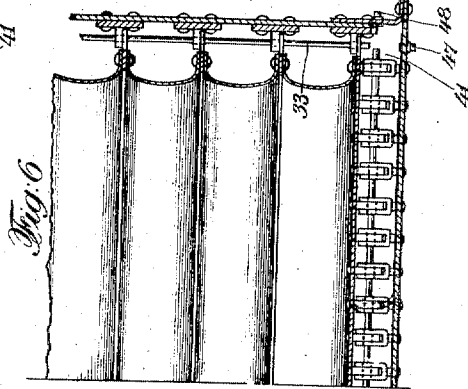
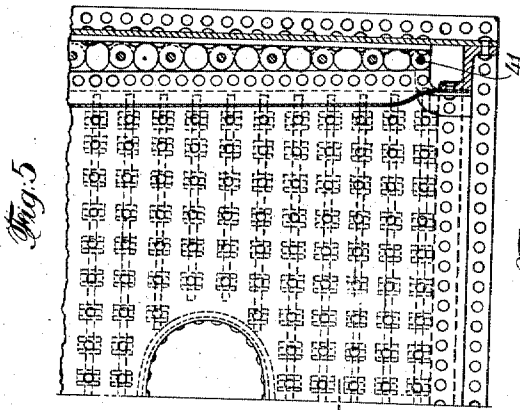
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3 SHEETS—SHEET 2.



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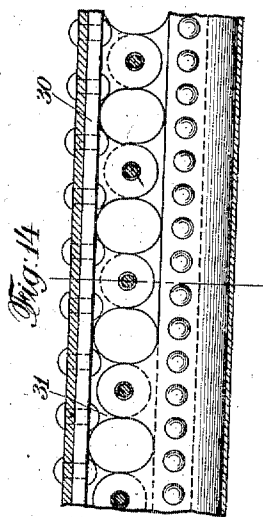
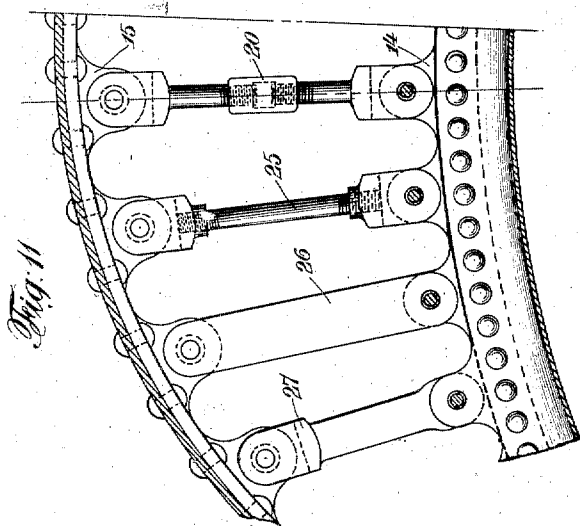
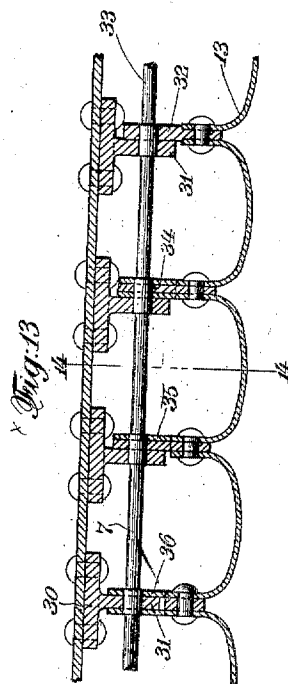
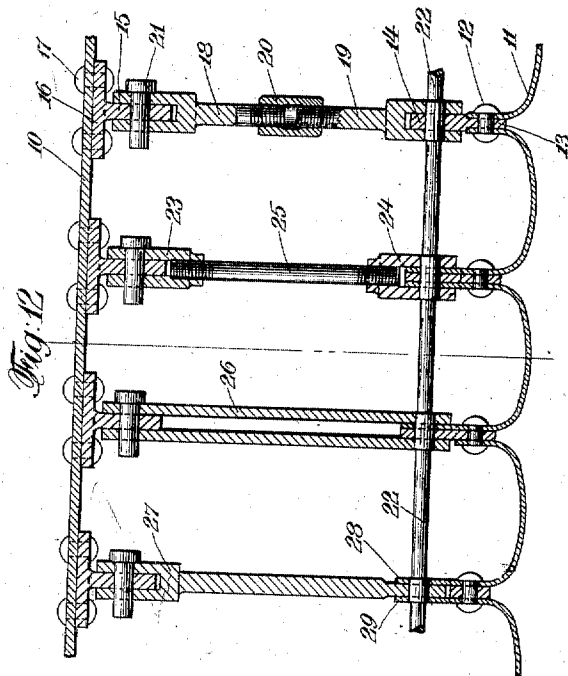
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3 SHEETS—SHEET 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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FIRE-BOX.

982,723.

Specification of Letters Patent.

Patented Jan. 24, 1911.

Application filed June 30, 1909. Serial No. 505,116.

To all whom it may concern:

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

The object of our invention has been to provide a fire-box which can be readily removed from the boiler shell for repairing; and to such ends our invention consists in the readily removable fire-box hereinafter specified.

In the accompanying drawings Figure 1 is a longitudinal sectional view of a boiler having our fire-box applied thereto; Fig. 2 is a vertical sectional view, taken at right angles to the view shown in Fig. 1, showing one-half of the fire-box; Fig. 3 is a partial sectional view showing the rear side of the flue sheet; Fig. 4 is a vertical longitudinal sectional view showing the front and rear staying; Fig. 5 is a partial sectional view showing the rear fire-box sheet and the door; Fig. 6 is a partial plan view showing the parts of Fig. 5; Figs. 7 and 8 are respectively a plan view and side elevation of one form of detachable staying; Figs. 9 and 10 are similar views of another form of detachable staying; Fig. 11 is a partial vertical sectional view showing stays of various forms for the top of the crown sheet; Fig. 12 is a view showing in section each of the form of stays shown in Fig. 11; Fig. 13 is a horizontal sectional view through the water legs; and Fig. 14 is a view on the line 14—14 of Fig. 13.

As fire-boxes are ordinarily constructed, and particularly locomotive fire-boxes, the fire-box shell is connected to the boiler shell by many hundreds of stay bolts and other old form of staying; and in order to remove the fire-box shell for the purpose of repairing, it is necessary to remove or cut all of such stay bolts or staying. Each time the stay bolts are taken out of the wrapper sheet of the boiler, it is necessary to make the holes larger in order to cut a new thread, and this necessitates making the stay bolts larger, and after a few such removals and replacements, the stay bolts become so large that it is necessary to discard the wrapper sheet and replace it with a new one.

It is the object of our invention to avoid the necessity for disconnecting the staying

from the wrapper sheet, and to so construct our fire-box that more or less, and preferably substantially all, of the staying can be disconnected, and the fire-box removed without destroying any of the staying.

We are aware that our invention is capable of embodiment in many different forms, and we have chosen for illustration that form which we regard as the best form known to us; but such form is only to be regarded as typical of many possible embodiments of the invention, and our invention is not to be limited to the details thereof.

In carrying our invention into practice, in the illustrated embodiment, we provide an outer boiler shell or wrapper sheet 10, and a fire-box consisting of U-shaped sections 11, having their flanges fastened together by rivets 12, which connect them and calking pieces 13, which calking pieces are also preferably provided with eyes 14, by which the staying can be connected thereto. The fire-box is preferably constructed according to our Patent Serial No. 917,172, granted April 6, 1909, but in the broad aspects of the invention, the fire-box may be constructed in any desired manner, such, for instance, as the ordinary standard locomotive fire-box. Eyes 15 are fastened to the shell or wrapper sheet, as by being formed on a base 16 that is secured to the shell by rivets 17. We provide some form of connection between the eyes on the fire-box and those on the shell, whereby a staying is formed that can be disconnected either from one of said eyes, or that is formed in two parts, which can be disconnected from each other. As shown in the right hand staying of Fig. 12, a link is formed of upper and lower bars 18 and 19, connected by a turnbuckle 20, the upper bar being connected to the eye 15 by a bolt 21, and the lower bar being connected to the eye 14 by a rod 22. The next stay to that just described consists of a yoke 23, connected by a bolt to the corresponding eye 15, and a yoke 24, connected by the rod 22 with the corresponding eye 14, the two yokes being connected by an oppositely threaded rod 25. The next stay consists of two simple links 26, connected to the eyes 14 and 15, respectively, by the rod 22 and a bolt. The left hand stay, illustrated in Figs. 11 and 12, consists of a link 27 which has a yoke at its upper end, and connected with the eye 15 by a bolt, and which is received between the two

flanges 28 and 29, respectively, of the adjacent boiler sections, and is connected to them by the passage of the rod 22 through holes formed in the said three parts.

5 In the water legs, the detachable staying is preferably formed by securing a bar 30 to the wrapper sheet, said bar having eyes 31 formed thereon at intervals, and by securing plates, having eyes formed thereon, between
10 the flanges of adjacent fire-box sections, and threading rods through the overlapping eyes. As shown in Fig. 14, the right hand form of connection with the fire-box is a simple plate 32, riveted between the flanges
15 of adjacent fire-box sections, and having eyes formed thereon to receive a rod 33. The next form of connection differs only in that the flanges of the fire-box sections are themselves formed into eyes 34. In the next
20 form of connection, but one of the flanges of the fire-box section is formed into an eye 35. In the left hand form of connection, as shown in Fig. 13, eyes 36 are formed in the flanges of the fire-box sections, and the eye 31
25 on the T-iron 30 is received between the eyes 36.

As shown in Figs. 7 and 8, the form of staying between the back head and the fire door sheet preferably consists of yokes 37
30 secured in the back head 38, which are connected to the eyes 39 in the fire door sheet 40, the connection being by means of rods 41 threaded through holes formed in said yokes and eyes.

35 As shown in Figs. 9 and 10, the form of connection between the flue sheet 42 and the throat sheet 43 preferably consists of simple eyes 44 and 45, which are respectively secured to the said sheets, and which are connected
40 by rods 46.

In order that each of the various rods which connect the portions of the staying may be removed without removing any sheet
45 of the fire-box or boiler shell, we preferably provide holes which are closed with plugs, through which holes rods may be passed. For instance, as shown in Fig. 6, the plug
50 47 closes a hole through which the rod 33 may be drawn, and a plug 48 closes a hole through which the rod 41 may be drawn. Similarly, a hole is provided through which the rods 46 may be drawn. The rods 22 can be drawn forward into the boiler, because, before the removal of the fire-box, it is
55 necessary to remove the boiler flues.

The usual stays 49 may be provided for the connection of the flue sheet between the flues and the throat sheet, and such stays, as shown in Fig. 2, are connected with the
60 flue sheet by feet secured by two rivets. Said stays may be made in two parts having eyes at their meeting ends, and a pin can be threaded through said eyes to detachably
65 secure them together.

The back head and the door sheet are, as

usual, provided with flanges 50 and 51, respectively, which telescope into each other, and are riveted together to form the door opening.

While any desired form of mud-ring can be used, we prefer to form a mud-ring in Z-
70 shape, as shown particularly in Figs. 3 and 4, wherein the mud-ring consists of a horizontal body 52, having an upwardly extending flange 53, which is secured to the fire-
75 box, and a downwardly extending flange 54, which is secured to the wrapper sheet. In this manner, it is only necessary to remove the rivets securing the flange 54 to the wrapper sheet in order to loosen the fire-box
80 at this point.

The manner of securing the U-shaped fire-box sections to the flat mud-ring is shown in Fig. 1. It consists in flattening the central portion 55 of the fire-box section,
85 and forming a flange or ear 56 thereon, said flange or ear being shown in dotted lines in the said figure. The adjacent fire-box section is secured over the said flange or ear, and thus makes a tight joint. The parts
90 forming this connection may be either welded together or riveted together, and calked. Of course, whether welded or riveted together, the parts are riveted to the mud-ring.

When the fire-box is in use, the top of the
95 crown sheet is fastened on the top of the wrapper sheet by means of the stays and rods 22. The sides of the fire-box are fastened to the sides of the wrapper sheet by means of the stays and rods 33. The flue
100 sheet is fastened to the throat sheet by means of the stays and rods 46. The door sheet is fastened to the back sheet by means of the stays and rods 41, and the lower edges of the fire-box and wrapper sheet are fastened to-
105 gether by means of the mud-ring. When it is desired to disconnect the fire-box, the flues are first removed. The rivets connecting the lower flange of the mud-ring with the wrapper sheet are removed, and the rivets connect-
110 ing the flanges 50 and 51 on the back sheet and the door sheet, respectively, are removed. The rods 22 are drawn forward into the boiler, thus disconnecting the top of the crown sheet from the top of the wrapper
115 sheet. The plugs 47 are removed, and the rods 33 drawn through the holes thus left, and in this manner the sides or water legs of the fire-box are disconnected from the sides of the wrapper sheet. The plugs 48
120 are removed, and the rods 41 drawn through the holes thus formed, and in this manner the door sheet is disconnected from the back sheet. The fire-box is now entirely disconnected
125 from the wrapper sheet, and by swinging all of the link connections between the top of the fire-box and the top of the wrapper sheet to one side, so that they will not interfere with the forward movement of
130 the eyes formed on the fire-box, the fire-box

can be moved bodily forward to disconnect the flange 51 from the flange 50. This forward movement is not opposed by the connections between the throat sheet and the flue sheet, because the eyes 44 and 45 can slide past each other in longitudinal direction. It is, of course, necessary that one of the three forms of water legs-connections shown in Fig. 13, which three forms were first described, should be used, and that the eyes on the fire-box should be forward of the eyes on the wrapper sheet, as otherwise the forward bodily movement of the fire-box, to disconnect the door flanges, could not occur. If for any reason this forward movement of the fire-box to disconnect the said flanges is not desirable, the back sheet can be removed by removing the rivets fastening it to the shell, in which case the fire-box can be removed from the shell by simply dropping the fire-box down, like a telescope traveling bag, instead of the forward movement referred to. If the forward movement referred to is to occur, it is also necessary to completely remove the mud-ring, or at least that portion of it between the throat sheet and the flue sheet.

In order that the back sheet may be readily removable, we preferably provide a flange 57, which is riveted to the wrapper sheet, and the back sheet is fastened to the said flange by rivets 58. By this manner of fastening, the rivets to be removed are exposed at both ends, and can be readily taken out. As shown in Fig. 2, the lower end of the fire-box section adjacent to the flue plate is provided with a flange 59, by which a tight joint is made between said parts, said flange being secured to said flue plate.

The rods 22 and 33 are made smaller between the points where they support the fire-box sections, so as to render said rods readily removable in case of accumulation of any scale thereon.

Our fire-box is adapted for use in stationary as well as locomotive boilers.

We believe we are the first to ever provide a readily removable fire-box, and desire that our claims shall receive a corresponding interpretation.

We claim:

1. A boiler, comprising a shell, a fire-box, staying for the sides and crown, and means for readily disconnecting the same, and a mud-ring having an upwardly extending flange and a downwardly extending flange, said mud-ring connecting said shell and fire-box, one of the said flanges being attached to one of said parts, and the other of said flanges to the other of said parts.

2. In a boiler, the combination of a shell and a fire-box composed of sections, members having eyes carried by said shell and fire-box sections, and a rod passing through said eyes and extending from one group of

eyes to another and securing said parts together.

3. In a boiler, the combination of a shell and a fire-box, members having alining eyes carried by each of said parts, a rod passing through said eyes, said shell being provided with an opening through which said rod can be withdrawn, and means for closing said opening.

4. In a boiler, the combination of a shell, a fire-box, the top and sides of said parts being provided with alining eyes extending transversely, rods extending through said eyes and securing said parts together, the back and door sheets being provided with alining eyes extending longitudinally, and transverse rods extending through said eyes and securing said parts together, the flue and throat sheets being provided with alining eyes, and rods extending through said eyes and securing said parts together, means being provided permitting the withdrawal of said rods from their respective eyes, whereby said fire-box is rendered removable from said shell.

5. In a boiler, the combination of a shell, a fire-box, the top and sides of said parts being provided with alining eyes extending transversely, rods extending through said eyes and securing said parts together, the back and door sheets being provided with alining eyes extending longitudinally, and transverse rods extending through said eyes and securing said parts together, the flue and throat sheets being provided with alining eyes, and rods extending through said eyes and securing said parts together, said shell being provided with openings through which said rods may be withdrawn whereby said fire-box is rendered removable from said shell.

6. In a boiler, the combination of a shell, a fire-box, a mud-ring, readily removable means for detachably connecting the shell and fire-box, the door plate of the fire-box and the back plate of the shell being provided with telescoping flanges for forming a door opening, said connecting means being so formed that when said flanges are disconnected and said mud-ring is removed, said fire-box can be moved forward to withdraw one of said flanges from within the other, and can then be dropped down.

7. In a boiler, the combination of a U-shaped fire-box section having outwardly projecting flanges, a transverse sheet to which said section is fastened, and an inwardly bent ear formed on said fire-box section and secured to said sheet.

8. In a boiler, the combination of a U-shaped fire-box section having outwardly projecting flanges, a mud-ring, said section being flattened and secured to the inner face of said mud-ring, said section having an inwardly bent ear that is adapted to be secured

cured to a face of said mud-ring at an angle to the face to which said flattened portion is secured.

9. In a boiler, the combination of a U-shaped fire-box section, a transverse plate to which said section is secured, and an angular mud-ring, said plate being secured to one vertical face of said mud-ring, said section having a flattened lower portion that is secured to another section of said mud-ring, said section having an inwardly bent ear that is secured to said plate and to said mud-ring, whereby a tight joint is formed in the corner.

10. In a boiler, the combination of a shell, a fire-box and a mud-ring, staying for the sides and crown, and means for readily disconnecting the same, said fire-box being composed of U-shaped sections having outwardly projecting flanges, said sections be-

ing flattened and overlapped at their lower ends and secured to said mud-ring, said sections being welded where they overlap.

11. A boiler, comprising a shell, a fire-box, staying for the sides and crown, and means for readily disconnecting the same, a mud-ring, and means for attaching said shell and fire-box to said mud-ring, whereby said fire-box may be removed from said shell by disconnecting said staying and severing said attachment between said shell and fire-box and said mud-ring.

In testimony that we claim the foregoing we have hereunto set our hands.

HENRY W. JACOBS.
FRANK W. SHUPERT.

Witnesses:

A. NEWCOMB,
M. MEIKLE.