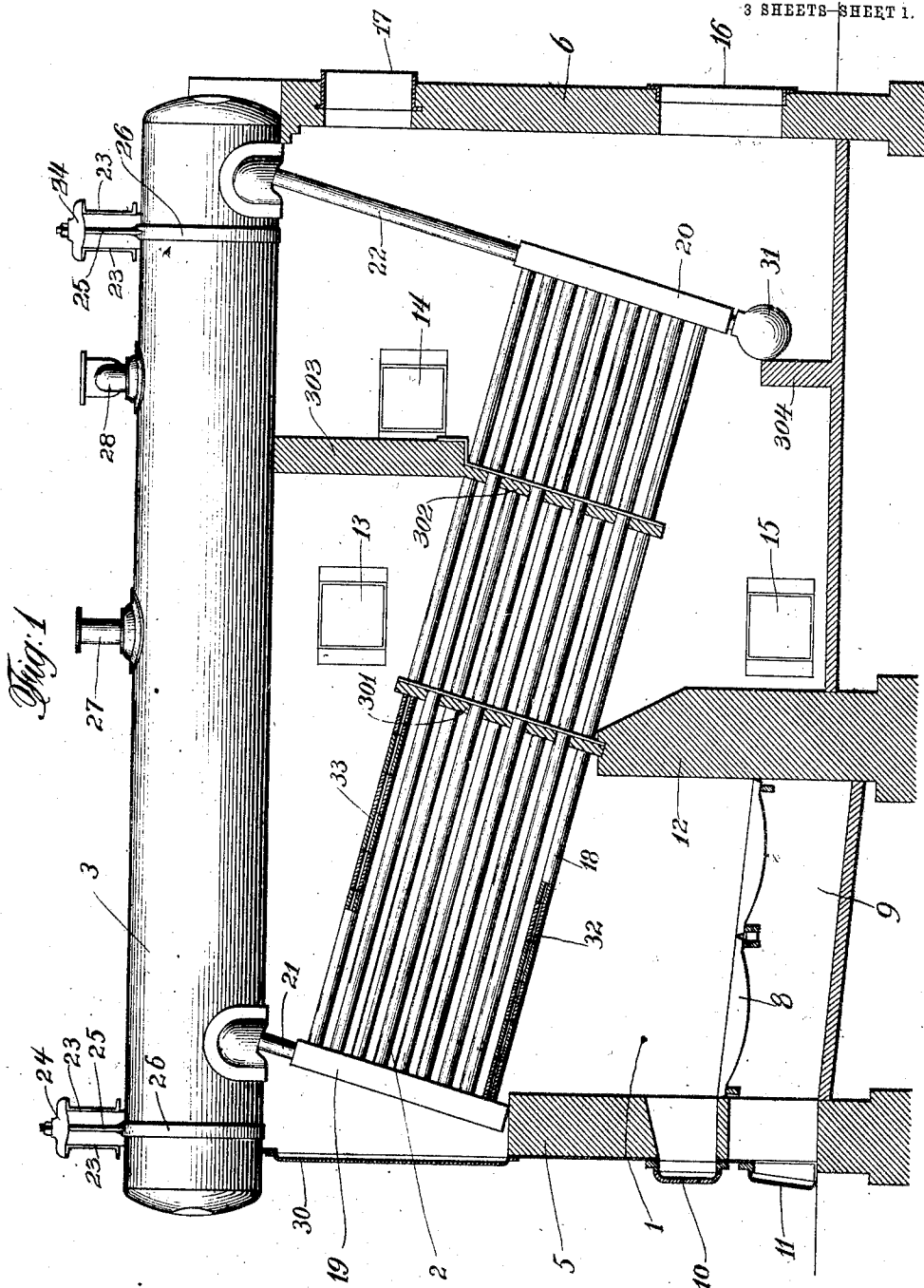


1,034,079.

A. A. CARY.
STEAM GENERATOR.
APPLICATION FILED MAR. 6, 1907.

Patented July 30, 1912.

3 SHEETS-SHEET 1.



WITNESSES:
John O. Kempler
Wilbert A. Hutton

Albert A. Cary, INVENTOR

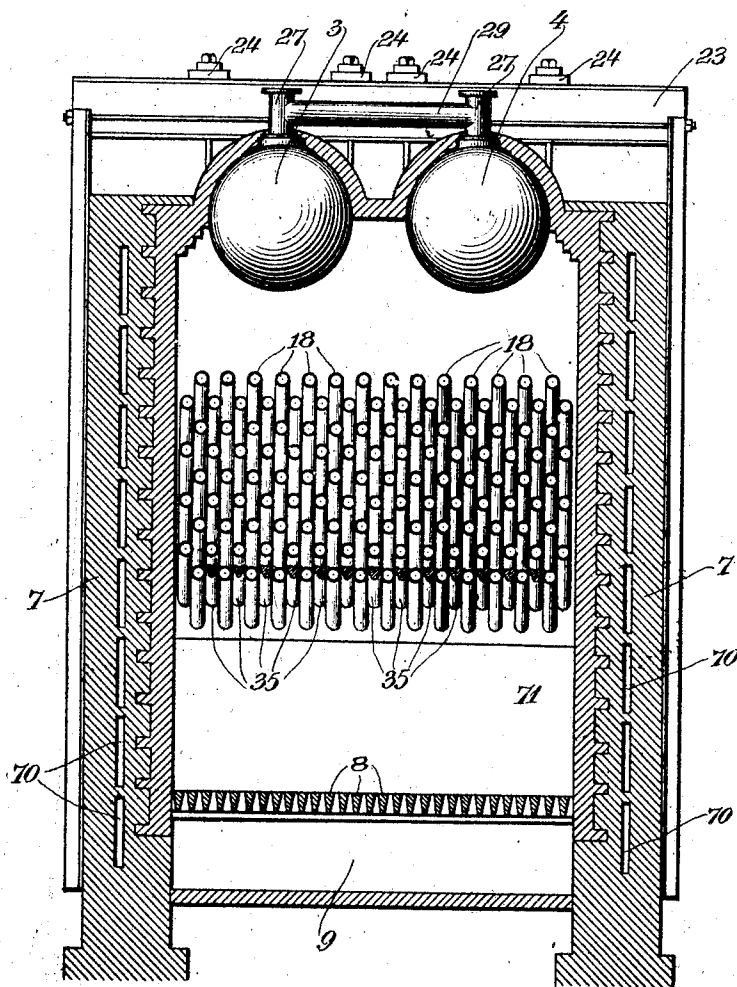
BY *W. S.* ATTORNEYS *Kennedy & Henson*

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3 SHEETS—SHEET 2.

Fig. 2



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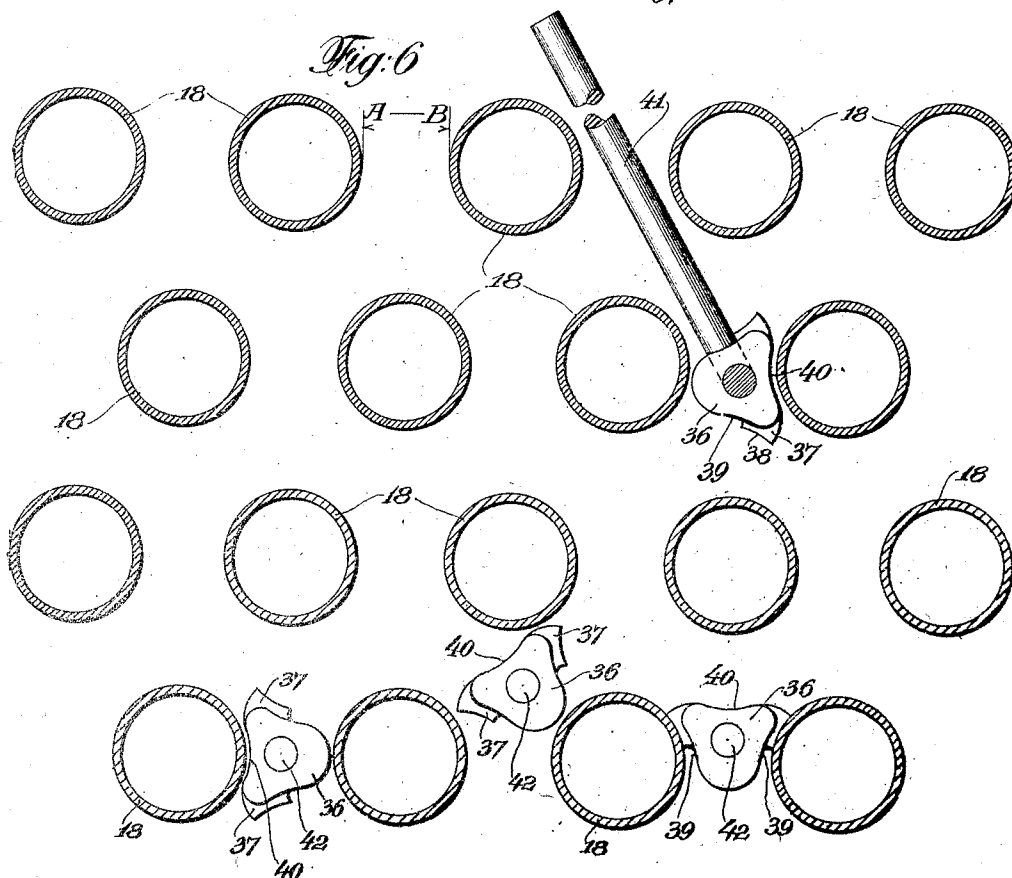
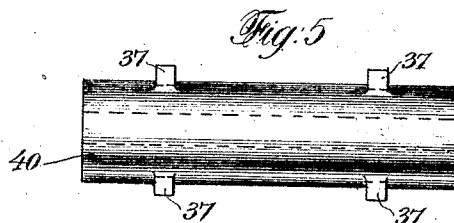
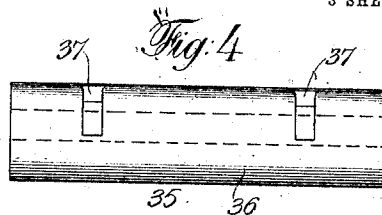
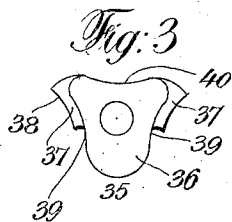
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A. A. CARY.
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Patented July 30, 1912.

3 SHEETS—SHEET 3



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UNITED STATES PATENT OFFICE.

ALBERT A. CARY, OF NEW YORK, N. Y.

STEAM-GENERATOR.

1,034,079.

Specification of Letters Patent.

Patented July 30, 1912.

Application filed March 6, 1907. Serial No. 360,946.

To all whom it may concern:

Be it known that I, ALBERT A. CARY, a citizen of the United States, and a resident of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

My invention relates to steam generators and more especially to that class of generators having boilers of the water tube type.

One object of my invention is to provide an improved form of throttling brick for such boilers which will more effectively break up all "dead" spaces in the boiler and cause a more efficient consumption of heat than in prior boilers.

A further object of my invention is to so arrange these brick that the products of combustion are caused to travel in a more efficient manner through the boiler.

A further object of my invention is to provide a throttling brick of such shape and dimensions that it may be readily moved transversely with respect to the tubes of the boiler and easily put in place.

A further object is to provide brick which will fit in place between the tubes of a single row so as not to fill up the space between two or more rows of tubes and act as an obnoxious obstruction when it is desired to clean the tubes of the boiler.

Further objects, features and advantages will more clearly appear from the detail description given below taken in connection with the accompanying drawings which form a part of this specification.

In the drawings: Figure 1 is a vertical longitudinal view of a steam generator embodying one form of my invention. Fig. 2 is a vertical transverse section through Fig. 1. Fig. 3 is a transverse section of one form of my improved refractory brick. Fig. 4 is a side elevation of the refractory brick shown in Fig. 3. Fig. 5 is a plan view of the brick shown in Fig. 3. Fig. 6 is a section of the boiler showing the manner of inserting the fire brick.

The steam generator shown in Figs. 1 and 2 comprises a combustion chamber 1, and a boiler 2, with steam and water drums 3, 4. Front walls 5, rear walls 6, and side walls 7, form a chamber to inclose the parts. The combustion chamber 1 is provided with the usual grates 8, and ashpit 9, together with doors 10 and 11, for the fuel and ashes, re-

spectively. A brick wall 12 forms the rear of the fire chambers and is designated as the bridge wall. Doors 13, 14 15 and 16 are provided for obtaining access to the parts inclosed between the walls 5, 6 and 7. A flue opening 17 permits the products of combustion to escape.

The boiler, as illustrated upon the drawings, consists of a plurality of water tubes 18, the front end of the boiler being supported over the combustion chamber and the tubes inclining from front to rear. The tubes end in the usual headers 19, 20, which in turn communicate by means of pipes 21 and 22 with a pair of steam and water drums 3 and 4. The steam and water drums 3, 4, are supported from cross beams 23 by means of hangers 25 and straps 26, connected to bridge pieces 24. Steam is drawn from the boiler by means of pipe 28; while the safety valve is attached to the nipples 27; a connecting pipe 29 may be used to connect the nipples 27. Access to the front of the boiler is provided, as usual, through the tube door 30. A mud drum 31 is connected to the header 20. Baffling members or partitions or flame plates 301 and 302, a hanging bridge wall 303 and a mud drum wall 304 may be provided for dividing the boiler into a plurality of sections or divisions so as to compel the products of combustion to pass through the divisions of the boiler, from the furnace to the flue outlet.

In the embodiment of my invention illustrated in the drawings, by assembling my refractory bricks, I provide a baffling means 32 extending along one of the lower rows of tubes partway over the combustion chamber and so construct and arrange this baffling means with relation to the water tubes 18 or which the baffling means rests that a smaller part of the products of combustion travel transversely between the baffling means and the tubes and the greater part passes around the end of the baffling means on their way to the boiler's heating surface. By this means dead spaces among the boiler tubes above the baffling means are prevented, and instead of forming more or less quiescent pockets of gas including air above the baffling means, this space is constantly supplied with fresh hot gases from the combustion chamber. I also, by assembling my refractory bricks in the case illustrated, provide the boiler with a baffling means 33, further removed from the combustion cham-

ber, and arranged between the combustion chamber and flue outlet, which baffling means extends from the flame plate 301 along one of the upper rows of tubes toward the front of the boiler and which is so constructed and arranged with relation to the boiler tubes that a smaller proportion of the products of combustion may pass between this baffling means and the tubes and the greater proportion of the hot gases pass around the end of the baffling means on their way to the rear of the boiler. By these means the tubes lying beneath this upper baffling means have a constant circulation of hot gases passing over their heat absorbing surface. By this arrangement of upper and lower baffling means the path of a very large percentage of products of combustion passing from the combustion chamber to the stack through the boiler, is lengthened, and the velocity of flow of these products of combustion is materially increased, thus causing a much greater circulation so that more heat is absorbed by the conducting surfaces.

The baffling means 32, for the combustion chamber, and the baffling means 33, for the upper bank of tubes, are, in the best embodiment of the invention, composed of refractory brick 35. (See Figs. 3 to 6 inclusive.) The body 36 of the brick is adapted to extend lengthwise of the tube and is provided with surface projections 37 which project from the body. The body is thus maintained out of contact with the tubes on which the surface projections are adapted to rest. As shown, the projections project from opposite sides of the body of the brick and may be curved as at 38, in order to fit upon the boiler tubes. These projections I make integral with the body of the brick, and they are supported upon the two contiguous tubes at a position located above the plane determined by the axes of the tubes on which the brick rests, to prevent crushing when expansion occurs.

The brick when in place rests between the tubes that support it, that is, it lies substantially below the top surfaces of the tubes on which it rests so that it lies within the space bounded by the row of tubes on which it rests or, in other words, does not extend materially above the upper level of the tubes on which it rests. This is important since if the brick extended materially above the tubes on which it rests it would prevent satisfactory cleaning of the boiler. Thus when a steam nozzle or pipe is inserted transversely of the tubes to blow off dirt and soot, it would strike the tops of the bricks and, in many cases, cause breakage thereof. Moreover the steam coming from the nozzle with considerable force would strike the top of the brick and be liable to dislodge it. By placing the bricks

as specified, I avoid these difficulties. One dimension or the depth of the body of the brick is less than the distance A B between the surfaces of the tubes on which it rests.

In the embodiment of the invention illustrated, the brick is provided with concave arc-shaped side walls 39 conforming to the walls of the adjacent tubes. These walls thus form one side of a passageway for the hot gases, the other side of the passage being the walls of the tubes.

In the best embodiment of my invention, I so make the brick that its height is less than the distance A B between the tubes, and I prefer to make the top of the brick with a concave face 40. I also provide the brick with means to which a tool 41 may be connected, so that the brick may be inserted transversely of the tubes and located at any place among the boiler tubes and removed by passing it through the vertical or inclined spaces found between the tubes. As shown, the brick is perforated at 42 in order to engage with the peg carried near the end of the tool. The brick will readily turn on the peg when necessary in order to fit the brick into place on the supporting boiler tubes. Although I have illustrated the brick as forming part of the baffling means arranged between the combustion chamber and the flue outlet of the boiler, it will be understood that one or more bricks may be located at different parts of the boiler in order to avoid dead spaces and in order to deflect the greater portion of the hot gases into contact with any part of the heating surfaces.

From the above it will be apparent that I have provided an exceptionally efficient, simple and economical arrangement whereby the efficiency of the boiler is very much increased. By providing baffling means 32 and 33 as shown the path of the flow of part of gases is lengthened and the velocity of the flow of gases is increased, thereby causing a greater absorption of heat by the water tubes. By providing and arranging the refractory brick so that part of the products of combustion may pass between the brick and tubes, all dead spaces are efficiently removed and the gases are kept moving over all portions of the tubes so that the heating is much more effective and evenly distributed. By forming the baffling means of brick so constructed that they are spaced from the sides of the tubes on which they rest, the moving gases are forced against the sides of these tubes in a most effective manner, so that the tubes are thoroughly scrubbed with these gases and a greater absorption of heat is obtained. These brick also cause a flow of products of combustion upward between the tubes at these points to more effectively bathe the tubes above and below the baffling means.

By so constructing the brick that it may lie within the space bounded by a single row of tubes from side to side there is left no obstruction between the various rows of tubes and the soot and dirt which collects on the tubes may be easily removed. By so constructing the brick that it may pass in among the tubes transversely thereof, the brick may be inserted from the sides of the boiler and deposited upon any row of tubes very simply and easily, thus obviating the necessity of removing the brick endwise along the boiler tubes. By arranging the brick with the concave surfaces 39, gases are forced in a direction toward the adjacent boiler tubes to more forcefully impinge upon the same, and the concave surfaces 39 and 40 more readily allow the brick to be handled among the tubes.

Various other features and advantages will be clearly apparent from the above description to those skilled in the art.

It will also be clearly apparent that various of my improvements may be advantageously applied to various kinds of boilers, including those in which the tubes are both vertical and horizontal as well as inclined.

Although I have described my improvements in great detail nevertheless I do not desire to be limited to the various details shown and described except as specifically claimed.

However, having fully and clearly described my invention, what I claim and desire to secure by Letters Patent is:

1. The combination of a suitable chamber, a plurality of rows of boiler tubes arranged in said chamber, a baffling member extending transversely of the tubes and dividing said chamber into sections, baffling means extending from one end of said chamber part way along said tubes, and a second baffling means extending from said baffling member part way along said tubes, said baffling means being arranged so that part of the products of combustion will pass between each baffling means and its adjacent tubes and part will pass around the ends of both of said baffling means.

2. The combination of a plurality of rows of boiler tubes arranged in a suitable chamber, a baffling member extending transversely of the tubes and dividing said chamber into sections, baffling means extending from one end of said chamber part way along one of the rows of tubes, and a second baffling means extending from said member part way along another of said rows of tubes, both of said baffling means embracing refractory brick supported by and between the adjacent tubes of its respective row and the body portion of the brick being spaced from the tubes on which they are supported and both of said baffling means being arranged so that part of the products of com-

bustion will pass between said bricks and the tubes on which they are supported and part will pass around the ends of said baffling means.

3. The combination of a plurality of rows of boiler tubes arranged in a suitable chamber, a baffling member extending transversely of the tubes and dividing said chamber into sections, a combustion chamber below one end of said tubes, baffling means extending part way along one of the rows of the tubes from one end of the same and over and adjacent said combustion chamber, and baffling means extending from said baffling member part way along one of the upper rows of tubes, each of said baffling means embracing refractory bricks supported by adjacent tubes, the body portion of the bricks being spaced from the tubes on which they are supported, whereby part of the products of combustion pass upwardly between the bricks and the tubes on which they are supported and part pass around the ends of said baffling means.

4. The combination of a fire chamber, a plurality of rows of water tubes suitably arranged with respect thereto, a baffling means arranged along one of said rows of tubes, said means consisting of refractory bricks extending part way along said row of tubes and lying substantially within the space bounded by said row of tubes, said bricks having a dimension less than the distance between the tubes on which they rest so that the bricks may be readily moved about transversely among the tubes and the body portion of said bricks being spaced from the tubes of said row by projections integral with said bricks so that part of the products of combustion will pass between the bricks and the tubes of said row to more effectively bathe the tubes.

5. The combination of a plurality of rows of boiler tubes arranged in a suitable chamber, a baffling member extending transversely of the tubes and dividing said chamber into sections, a combustion chamber below one end of said tubes, baffling means extending part way along one of the rows of the tubes from one end of the same and over and adjacent said combustion chamber, and baffling means extending from said baffling member part way along one of the upper rows of tubes, each of said baffling means embracing refractory bricks supported by and lying substantially within the space bounded by its respective row of tubes having their body portions spaced therefrom by projections whereby part of the products of combustion pass upwardly between the bricks and the tubes on which they are supported and part pass around the ends of said baffling means.

6. The combination of a plurality of rows of boiler tubes arranged in a suitable cham-

ber, a baffling member extending transversely of the tubes and dividing said chamber into sections, a combustion chamber below one end of said tubes, baffling means 5 extending part way along one of the rows of the tubes from one end of the same and over and adjacent said combustion chamber, and baffling means extending from said baffling member part way along one of the 10 upper rows of tubes, each of said baffling means embracing refractory bricks supported by and lying substantially within the space bounded by its respective row of tubes, the body portions of the bricks being 15 spaced therefrom by projections integral with the brick, whereby part of the products of combustion pass upwardly between the bricks and the tubes on which they are supported and part pass around the ends 20 of said baffling means, said bricks having a dimension less than the distance between the tubes so that they may be readily moved about transversely among the tubes.

7. The combination of a combustion 25 chamber, a plurality of rows of water tubes suitably arranged with respect thereto, a baffling means arranged along one of said rows of tubes, said means consisting of refractory bricks extending part way along 30 said row of tubes and lying substantially within the space bounded by said row of tubes and the body portions of the bricks being spaced from the tubes of said row by projections integral with said bricks so that 35 part of the products of combustion will pass between the bricks and the tubes of said row to more effectively bathe the tubes, and part will pass around the end of said baffling means, said bricks having a dimension 40 less than the distance between the tubes on which they rest so that they may be readily moved about transversely among the tubes.

8. The combination of a plurality of rows 45 of boiler tubes arranged in a suitable chamber, a baffling member extending transversely of the tubes and dividing said cham-

ber into sections, baffling means extending from one end of said chamber part way 50 along one of the rows of tubes, and a second baffling means extending from said member part way along another of said rows of tubes, both of said baffling means embracing refractory brick supported by 55 and between the adjacent tubes of its respective row and having their body portions spaced from the tubes on which they are supported and both of said baffling means being arranged so that part of the products 60 of combustion will pass between said bricks and the tubes on which they are supported and part will pass around the ends of said baffling means, said bricks having a depth less than the distance between the tubes so 65 that they may be readily moved about transversely among the tubes.

9. The combination of a plurality of rows of boiler tubes arranged in a suitable chamber, a baffling member extending transversely 70 of the tubes and dividing said chamber into sections, baffling means extending from one end of said chamber part way along one of the rows of tubes, and a second baffling means extending from said member 75 part way along another of said rows of tubes, both of said baffling means embracing refractory brick supported by and lying substantially within the space bounded by its respective row of tubes, the body portion 80 of the brick being spaced therefrom by projections integral with the brick and both of said baffling means being arranged so that part of the products of combustion will pass between said bricks and the tubes on 85 which they are supported and part will pass around the ends of said baffling means.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ALBERT A. CARY.

Witnesses:

EDWIN SEGER,
JOHN O. GEMPLER.