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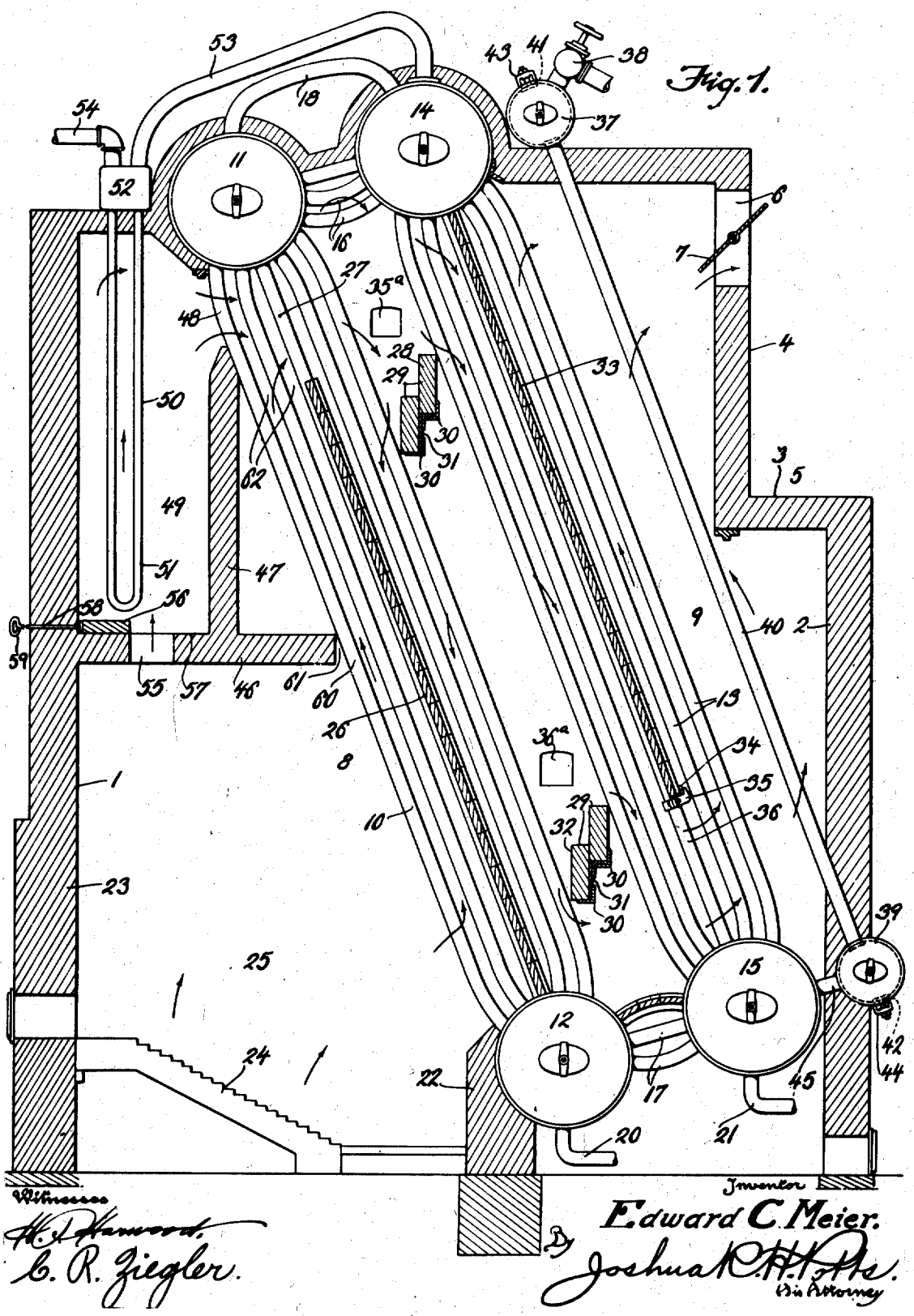
BOILER.

APPLICATION FILED APR. 3, 1917.

1,245,005.

Patented Oct. 30, 1917.

5 SHEETS—SHEET 1.



Witnesses

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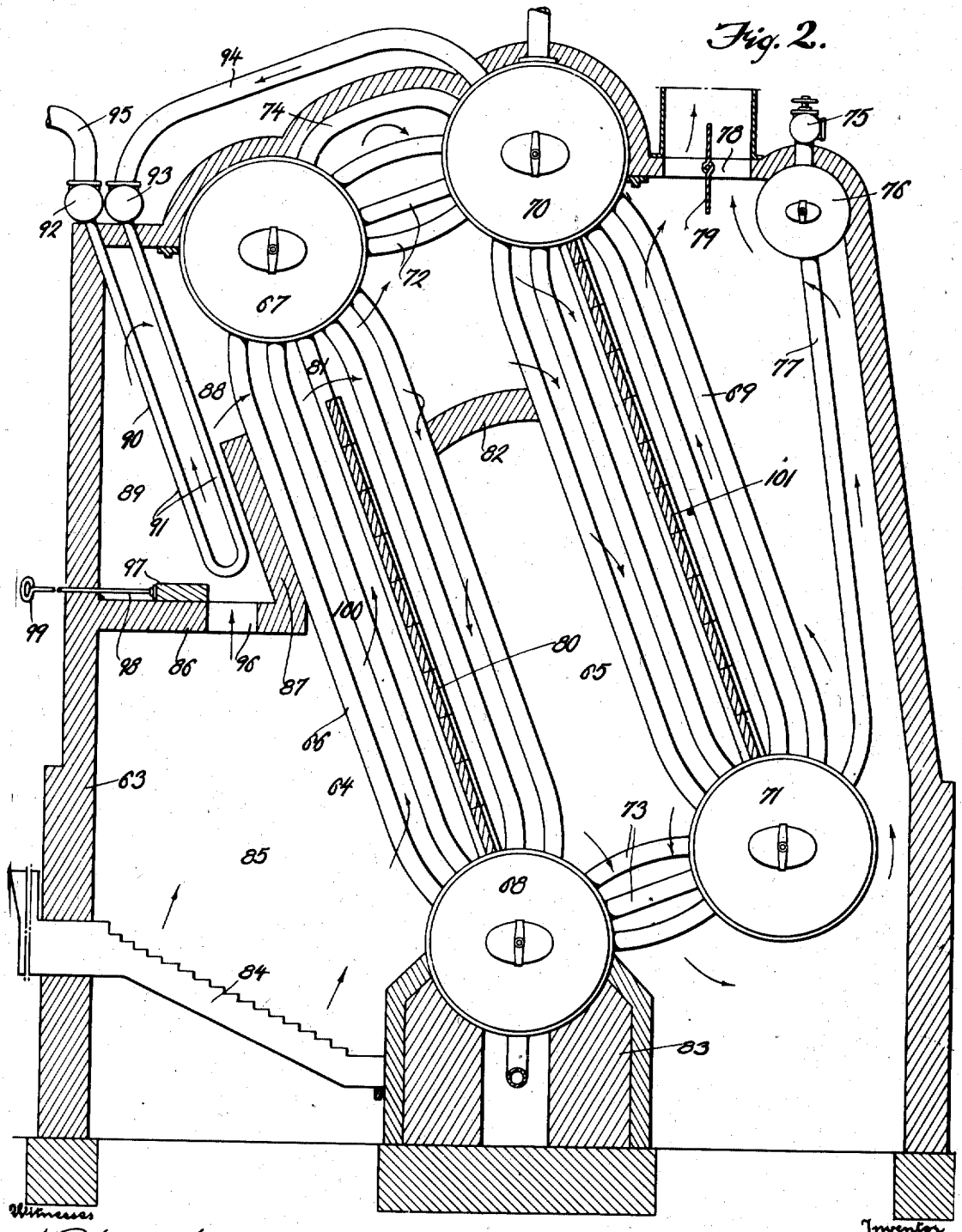
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5 SHEETS—SHEET 2.

Fig. 2.



Witnesses

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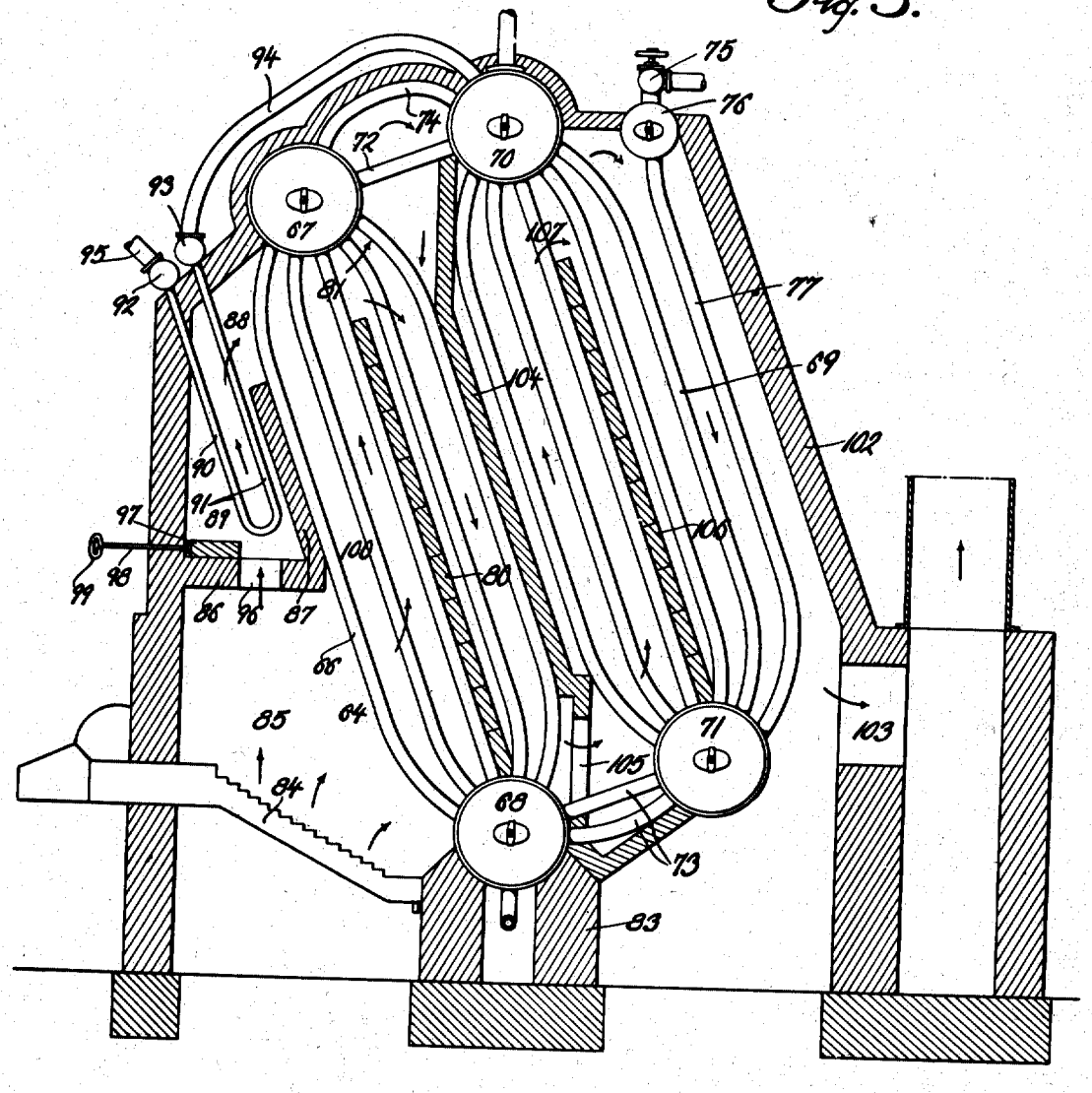
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5 SHEETS—SHEET 3.

Fig. 3.



Witnesses

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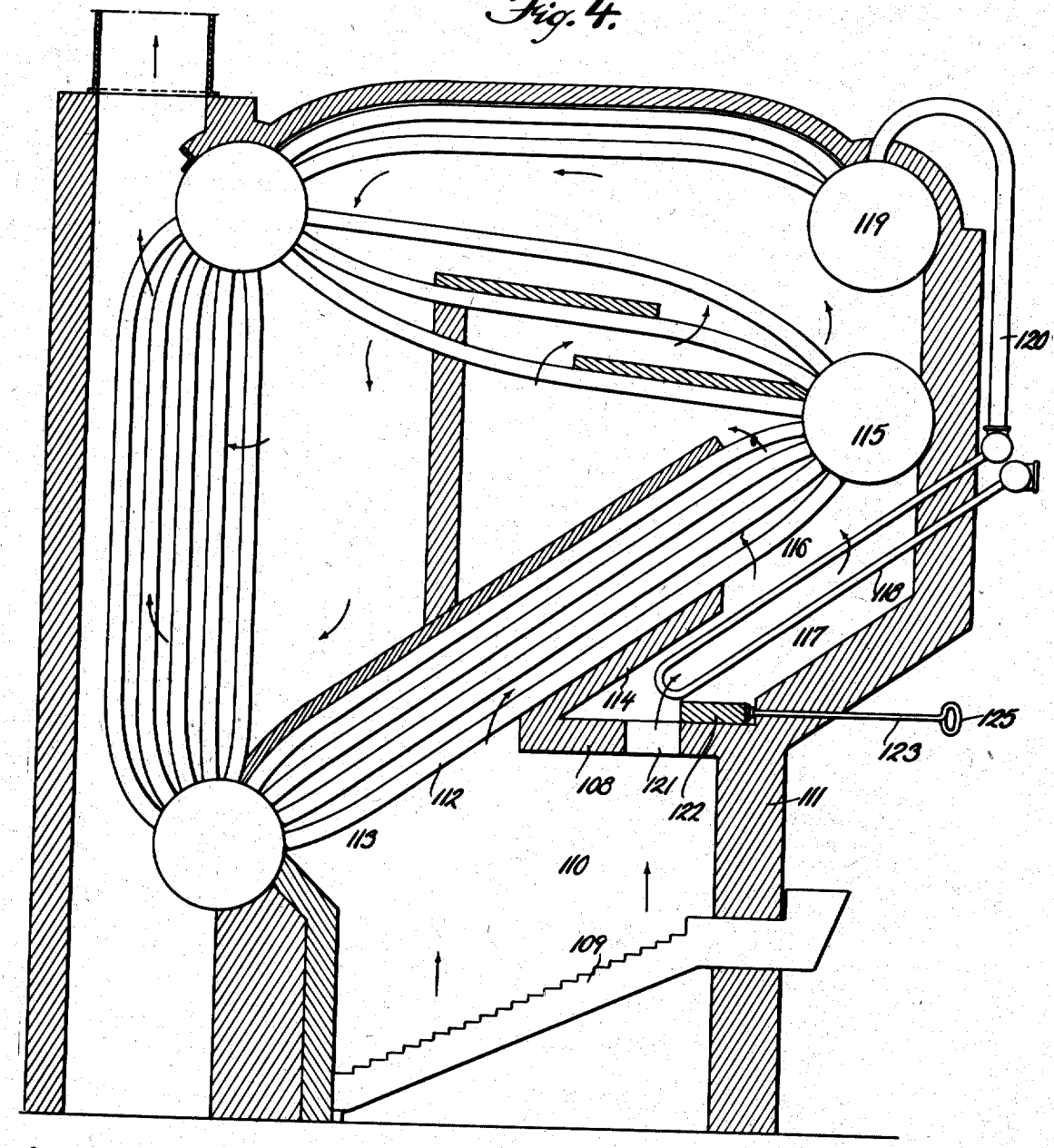
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5 SHEETS—SHEET 4.

Fig. 4.



Witnesses

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5 SHEETS—SHEET 5.

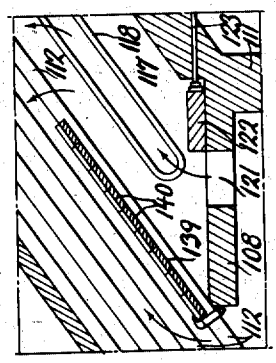


Fig. 6.

Fig. 5.

Witnesses

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UNITED STATES PATENT OFFICE.

EDWARD C. MEIER, OF PHOENIXVILLE, PENNSYLVANIA.

BOILER.

1,245,005. Specification of Letters Patent. Patented Oct. 30, 1917.

Application filed April 3, 1917. Serial No. 159,399.

To all whom it may concern:

Be it known that I, EDWARD C. MEIER, a citizen of the United States, residing at Phoenixville, in the county of Chester and State of Pennsylvania, have invented certain new and useful Improvements in Boilers, of which the following is a specification.

My invention consists of improvements in boilers, and more particularly consists of an improved construction and arrangement of superheater within a boiler.

One object of my invention is to form a superheater chamber and to so locate said chamber within a boiler that an extremely high degree of superheated steam can be obtained.

Another object is to provide means for regulating the amount of the products of combustion passing into the chamber and thereby regulate the degree of the superheated steam.

Another object is to so design the means which form my improved superheating chamber that it will be of simple construction and can be easily and quickly installed in boilers of various types.

A further object is to so design my improved superheater construction that its use within a boiler serves to add to the efficiency of the boiler.

These objects, and other advantageous ends which will be described hereinafter, I attain in the following manner, reference being had to the accompanying drawings in which

Figure 1 is a sectional elevation of my improved boiler illustrating my improved superheater construction.

Figs. 2 and 3 are sectional elevations showing modifications of my improved boiler and superheater construction.

Figs. 4 and 5 are sectional elevations of two well known types of boilers having my improved superheater construction illustrated in connection therewith.

Fig. 6 is a fragmentary sectional elevation showing a modification of the construction shown in Fig. 4 including a baffle formed of tile and resting upon the lower tubes 112 of the boiler unit 113.

Referring to Fig. 1, 1 represents the boiler casing having vertical front, rear, and side walls, the rear wall 2 having an off-set or stepped portion 3 which connects with the upper vertical portion 4 of said rear wall, the off-set portion being substantially horizontal and forming an indentation 5 in the rear wall.

An outlet passage for the products of combustion, is illustrated at 6, and a damper 7 is provided to regulate the amount of opening through said outlet passage, it being noted that a flue (not illustrated) can connect with said outlet passage and fit within the space provided by the indentation 5.

Two boiler units 8 and 9 are arranged within the casing 1, the boiler unit 8 comprising a plurality of water tubes 10 connecting at their top and bottom with drums 11 and 12. The boiler unit 9 includes a plurality of tubes 13 which connect at their top and bottom with drums 14 and 15.

The drums 11 and 14 are connected by tubes 16, and the drums 12 and 13 are connected by tubes 17, it being noted that the tops of the drums 11 and 14 are also connected by a tube 18 which acts as an equalizing tube between the steam spaces of the drums 11 and 14.

The drum 14 has a main steam pipe 53 leading therefrom, and the drums 12 and 15 have blow-off pipes 20 and 21 connecting therewith. The drums 11, 12, 14, and 15, are arranged horizontally and supported within the side walls, the drum 12 being further supported by a pedestal 22 on the bottom of the casing.

The drums 11 and 12 are in different vertical planes so that the tubes 10 extend at an incline toward the front wall 23 of the casing. This is also true of the drums 14 and 15 so that the tubes 13 also extend at an incline and substantially parallel with the tubes 10 of the boiler unit 8.

A grate 24 is provided adjacent the front wall 23 and at the bottom of the casing, thus producing a fire box 25 which is located forward of the boiler unit 8. A baffle 26 is provided between the tubes 10 and extends upwardly from the drum 12 throughout a portion of the length of said latter tubes, stopping short of the drum 11 so as to provide a passage 27 between it and the drum 11.

A baffle 28, extending between the oppositely disposed side walls of the casing 1, is

located between the tubes of the boiler units 8 and 9. This baffle is arranged as illustrated substantially on a level with the top of the baffle 26 and consists of fire bricks 29 which rest on angle bars 30. These angle bars are connected with a plate 31 and form a rigid supporting structure for the bricks 29. Furthermore, the bricks being located above and forward of the angle bars and plate, receive the direct heat of the products of combustion after passing through the passage 27 as will be hereinafter more fully described, and thus protect said angles and plate against the direct heat of the products of combustion which pass downwardly to the rear of the baffle 26.

A second baffle 32 is located between the boiler units 8 and 9 and is of the same construction as above described in connection with the baffle 28, only that it is arranged at a lower level.

Another baffle 33 is arranged between the tubes 13 of the boiler unit 9 and extends downwardly from the drum 14. This baffle is supported at its lower end by an angle bar 34, this angle bar resting upon clamps 35, the latter being adjustably secured to the tubes 13 of the boiler unit 9.

The lower end of the baffle 33 stops short of the drum 15, and thus provides a passage 36 between it and said drum. The top of the baffle 32 is arranged as illustrated substantially on the level with the bottom of the baffle 33.

I preferably form cleaning doors 35^a and 36^a in the side walls of the casing and arrange these doors above the baffles 28 and 32, so that any dirt collecting on the latter can be removed therefrom by a rake inserted through said doors.

A comparatively small drum 37 is located on the top of the boiler casing 1 and has a feed water inlet valve 38 connecting therewith. The drum 37 is connected to another small drum 39 by straight pipes 40, said pipes extending through the casing 1 and into the interior thereof to the rear of the tubes 13 of the boiler unit 9.

The drums 37 and 39 have openings 41 and 42 respectively, which are in direct alinement with the straight pipes 40. These openings 41 and 42 are closed by plugs 43 and 44 during the operation of the boiler. Short pipes 45 connect the drum 39 with the drum 15.

It will be noted that the drum 39 is partially embedded within the rear wall 2 of the casing and the opening 42 and plug 44 are located outside of said rear wall. This arrangement of the drums 37 and 39, and the pipes 40, permits the ready cleaning through the openings 41 and 42 from the outside of the boiler casing.

Within the chamber 1, I form an arch wall 46. This arch wall is preferably made of fire brick and is directly over the grate 24 and fire box 25. The arched wall 46 extends from the front wall of the casing 1 to a position directly adjacent the forward tubes 10 of the boiler unit 8.

A baffle wall 47 leads upwardly from the arch wall 46, and at its upper end intersects the forward tubes 10 of the boiler unit 8 at a position sufficiently below the drum 11 so as to provide an outlet passage 48 for the superheater chamber 49 which is formed by the baffle wall, arch wall, and front and top portions of the casing 1.

Within the chamber 49, I insert a superheater 50 which, as illustrated, includes depending tubes 51 which intersect a header 52 located on the top of the boiler, said header being connected by a steam pipe 53 which leads from the drum 14, it being noted that the steam passes outwardly from the drum 14 through the steam pipe 53, then through the head 52 and tubes 51 of the header, and eventually out through a pipe 54 which connects with the outlet end of the superheater.

The arch wall 46 has a passage 55 which communicates with the superheater chamber 49 and the fire box 25, it being noted that the passage 25 is directly above the grate 24 so that the products of combustion can pass directly upwardly from the grate through the passage 55 into the chamber 49. By this construction, the superheater 50 can be heated to an extremely high temperature.

In order to regulate the amount of opening of the passage 55 into the combustion chamber 49, I provide a damper 56 which rests and is designed to slide upon the upper surface 57 of the arch wall 46 between the baffle wall 47 and the front wall of the casing 1. The damper 56 can be slid over the passage 45 by means of a rod 58, said rod extending through the front wall of the casing 1 and at its outer end being provided with a handle 59 so that a forward movement of the handle will tend to slide the damper 56 from the position shown in Fig. 1 to a position which is directly over said passage. If it is desired to only partially close said passage, the rod 58 may be pulled until the damper is moved to such position as to give said desired amount of opening.

It will be noted that the outlet passage 48 from the superheater chamber 49 is in alinement with the passage 27 formed between the upper end of the baffle 26 and the bottom of the drum 11. Furthermore, it will be noted that by extending the arch wall 46 into close proximity with the forward tubes 10 of the boiler unit 8, the portion of the products of combustion which do not pass through the passage 55, will be forced to pass through a passage 60 formed between the inner end 61 of the arch wall 46 and the forward face of the baffle 26, thus causing

said latter portion of the products of combustion to closely hug the forward tubes of said boiler unit 8.

The baffle wall 47 also forms a passage 62 between it and the top of the baffle 26, this passage leading directly into the passage 27.

With this construction, the desired amount of products of combustion will enter the combustion chamber 49 to heat the superheater, the remaining portion of the products of combustion passing upwardly between the forward tubes of the boiler unit 8 and the end 61 of the arch wall 46. This latter mentioned portion of the products of combustion which pass between the end 61 of the baffle wall 46 and the forward face of the baffle 26, will also pass outwardly through the passage 62 into the passage 27 and that portion of the products of combustion which pass upwardly through the superheater chamber 49, will pass outwardly through the passage 48 and combine with said other portion of the products of combustion as they pass through the passage 27.

The products of combustion passing through the passage 27 heat the drums 11 and 14, upper portions of the tubes 10, and the upper portions of the tubes 13 which are forward of the baffle 33. These products then pass downwardly between the baffles 26 and 33 and in so doing are split up or divided by the baffles 28 and 32, causing them to pass between the rear tubes of the boiler unit 8 and the forward tubes of the boiler unit 9. A portion of said products of combustion then pass between the baffles 26 and 32 and serve to heat the drum 12, then move rearwardly and combine with that portion of the products passing between the baffle 32 and the baffle 33. Then all of said products of combustion combine and pass through the passage 36 and upwardly to the rear of the baffle 33 and finally pass out through the outlet passage 6 to the flue.

In the form of my invention shown in Fig. 2, I have provided a casing 63 in which are mounted two water tube boiler units 64 and 65. The boiler unit 64 includes tubes 66 which connect at their top and bottom with drums 67 and 68 respectively. In like manner, the boiler unit 65 has tubes 69 which connect at their top and bottom with drums 70 and 71 respectively. The drums 67 and 70 are connected by tubes 72 and the drums 68 and 71 are connected by tubes 73.

An equalizing tube 74 connects the drums 67 and 70 adjacent their top. A feed water inlet valve 75 connects with a drum 76 within the casing, and this drum is connected to the drum 71 by a pipe 77. An outlet passage 78 is formed within the casing to permit the products of combustion to pass to the flue (not illustrated), and a damper 79 is mounted within said passage 78 so that its opening may be varied according to the draft desired.

A baffle 80 is positioned between the tubes of the boiler unit 64 and extends upwardly from the drum 68 to a position below the drum 67, thereby providing a passage 81 between the top of the baffle and the drum 67. An arched baffle 82 extends from the rear tubes of the boiler unit 64 to the forward tubes of the boiler unit 65 and in a position in substantial alinement with the top of the baffle 80.

A pedestal 83 is mounted below the drum 68, and a grate 84 extends between this pedestal and the front wall of the casing 63, thus producing a fire box 85 directly above the grate 84. An arch wall 86 is formed within the casing directly above the grate 84 and fire box 85, this arch wall 86 extending from the front wall of the casing 63 rearwardly to the forward tubes 66 of the boiler unit 64.

A baffle wall 87 connects with the inner end of the arch wall 86 and extends upwardly adjacent the forward tube 66 of the boiler unit 64. This baffle wall 87 is of such height as to provide an outlet passage 88 between its top and the bottom of the drum 67. Furthermore, the baffle wall 87, arch wall 86, and front and top portions of the casing 63, provide a superheater chamber 89 into which extends a superheater 90 including tubes 91 which connect with headers 92 and 93, the header 93 being in communication with the drum 70 through the medium of a steam pipe 94, while the header 92 has an outlet pipe 95 for conveying the superheated steam for the purpose desired.

The arch wall 86 has a passage 96 which is directly above the grate 84 and fire box 85 and communicates with the superheater chamber 89 in a manner similar to that described in connection with the passage 55 as shown in Fig. 1.

A damper 97 is designed to slide upon the upper surface of the arch wall 86, said damper 97 being movable by a rod 98 connected thereto and extending through the casing 63. The outer end of the rod 98 is provided with a handle 99 for convenience in moving the damper 97 backwardly and forwardly over the passage 96. It will thus be noted that the amount of opening of the passage 96 into the superheater chamber 99 can be varied by moving the rod 98 longitudinally, thus the amount of the products of combustion which pass into the combustion chamber 89 can be varied by the movement of said damper.

It will be noted that by the arrangement of the baffle wall 87, directly adjacent the forward tubes of the boiler unit 64, a passage 100 will be formed so that the portion of the products of combustion which do not

pass through the passage 96 will be forced to pass through the passage 100 and thereby closely hug and efficiently heat the tubes of said boiler unit 64 which are located forward of the baffle 80.

That portion of the products of combustion which pass into the superheater chamber 89 will pass upwardly and outwardly through the passage 88, where it will combine with the portion of said products which pass upwardly through the passage 100. Then the entire products of combustion will pass through the passage 81.

Another baffle 101 is located between the tubes of the boiler unit 65 and extends from the drum 71 upwardly to the drum 70. Therefore, the products of combustion after passing through the passage 81, will be divided, part passing down between the rear tubes of the boiler unit 64 and the tubes which are forward of the baffle 101. Then all of said products again combine and pass between the tubes 73, around the drum 71, and upwardly to the rear of the baffle 101 and eventually out through the passage 78, thus heating the tubes of the boiler unit which are to the rear of the baffle 101 and the feed water.

In Fig. 3, I have shown a boiler of the same general construction as that described in connection with Fig. 2 with the exception that the casing 102 has its outlet opening 103 adjacent the bottom of the rear wall instead of at the top as illustrated in Fig. 2, the design of said casing being slightly changed at the rear end.

The other difference of construction between Figs. 2 and 3, is that in Fig. 3 instead of the arched baffle shown in Fig. 2, I have shown a baffle wall 104. This baffle wall extends between the two boiler units and at its top intersects the drum 70, since it will be noted that I have given similar parts corresponding reference numerals in Figs. 2 and 3.

The lower end of the baffle wall 104 intersects the pedestal 83 and the drum 71, and has a passage 105 adjacent its bottom which permits the products of combustion passing downwardly between the baffle 80 and the baffle wall 104 to pass upwardly between the baffle 104 and the baffle 106, it being noted that the baffle 106 is shorter than the baffle 101 above described in connection with Fig. 2. A passage 107 is thus provided between the top of the baffle 106 and the drum 70, so that the products of combustion after passing upwardly between the baffle wall 104 and the baffle 106, will pass through the passage 107 and downwardly between the rear face of the baffle 106 and the rear wall of the casing 102 and eventually will pass out of the outlet 103 to the flue.

In all other respects the constructions shown in Figs. 2 and 3 are substantially identical including the means which provide the superheater chamber.

In Fig. 4, I have shown my superheater construction built in a boiler which is known as the "Badenhausen" boiler. In this construction, I have shown an arch wall 108 which is built directly over the grate 109 and fire box 110. This arch wall extends from the front wall 111 of the boiler casing rearwardly into intersection with the tubes 112 of the boiler unit 113.

A baffle wall 114 extends upwardly adjacent the forward tubes 112 and stops short of the drum 115 to provide a passage 116 between the upper end of the baffle wall 114 and said drum 115, it being noted that the baffle wall 114, arch wall 108, and front wall of the casing 111 provide the superheating chamber 117 into which extends the superheater 118, said superheater communicating with the steam drum 119 through the medium of a steam pipe 120.

The arch wall 108 has a passage 121 which is directly above the grate 109 and communicates with the fire box 110 and superheater chamber 117. A damper 122 is located within the superheater chamber 117 and is designed to slide upon the upper surface of the arch wall 108 to regulate the amount of opening of the passage 121 into the superheater chamber. This damper 122 is connected with a rod 123, said rod extending through the front wall of the boiler casing and is provided with a handle 125 to facilitate the longitudinal movement thereof.

With this construction, the baffle wall 114 and arch wall 108 cause a portion of the products of combustion to pass directly between the tubes 112, and another portion of the products of combustion pass directly through the passage 121 into the combustion chamber to heat the superheater 118. Therefore, using my invention in connection with a boiler of this type, I am able to secure superheated steam at an extremely high temperature.

In Fig. 5, I have shown my improved superheating construction in connection with what is known as a "Sterling" boiler. In this form of boiler, I produce the superheating chamber in substantially the same manner as described in connection with my improved boiler shown in Fig. 1. That is, I provide an arch wall 126 which extends rearwardly of the front wall 127 of the boiler casing to a position adjacent the forward tubes 128 of the boiler unit 129. From this arch wall can be erected a baffle wall 130 which leads upwardly into close proximity to said tubes 128. I thus provide a superheater chamber 131 into which projects a superheater 132.

The arch wall 126 has a passage 133 which is directly above the grate 134 and fire box 135. A damper 136 is designed to slide upon

the upper surface of the arch wall 126 and this damper can be actuated by means of a rod 137 which extends through the upward wall of the boiler casing, so that said damper may be moved over the passage 133 to vary the amount of opening of said passage into the superheater chamber 131.

In the construction illustrated, it will be noted that a portion of the products of combustion will pass upwardly from the grate 134 and fire box 135 through the passage 133 into the superheater chamber 131, so that the steam within the superheater will be heated to an extremely high temperature. The other portion of the products of combustion will be forced to pass between the inner end 138 of the arch wall 126 and the tubes 128 of the boiler unit 129 to effectively heat the latter.

In the form of my invention shown in Fig. 6, instead of providing the baffle wall 114 as shown in Fig. 4, I provide a baffle 139 which is made of fire brick tiles 140 and rests upon the lower tubes 112.

It will be noted that in each of the forms illustrated, the extremely hot products of combustion will pass directly from the grate and fire box through the passage in the arch wall into the superheater chamber prior to the engagement of said products with any other body. The intensity of this heat within the superheater chamber can be regulated by the movement of the damper so that it is possible with my invention to control the temperature of the superheated steam which is of material advantage in view of the numerous requirements and demands for superheated steam.

While I have described my invention as taking a particular form, it will be understood that the various parts of my invention may be changed without departing from the spirit thereof, and hence I do not limit myself to the precise construction set forth, but consider that I am at liberty to make such changes and alterations as fairly come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a boiler casing, of a boiler unit having angularly disposed water tubes, means providing a fire box, an arched wall directly above said fire box, a baffle wall leading directly to said tubes at its upper end and joining the arch wall at its lower end to provide a chamber, a superheater extending into said chamber, said arch wall having a passage directly above the fire box and communicating with the latter and the superheater chamber, substantially as described.

2. The combination with a boiler casing, of a boiler unit having angularly disposed water tubes, means providing a fire box, an arch wall directly above said fire box, a baffle wall leading directly to said tubes at its upper end and joining the arch wall at its lower end to provide a chamber, a superheater extending into said chamber, said arch wall having a passage directly above the fire box and communicating with the latter and the superheater chamber, and a damper operative to regulate the size of said passage, substantially as described.

3. The combination with a boiler casing, of means providing a fire box, a water tube boiler unit adjacent the fire box, an arch wall directly above the fire box and having a portion extending into close proximity with the tubes of the boiler unit, a baffle wall projecting upwardly from the arch wall and having a portion located adjacent the tubes of said boiler unit, said arch wall and baffle wall providing a chamber within said casing, a superheater extending into said chamber, a baffle located adjacent to certain of the tubes of said boiler unit which are remote from said arch wall to provide a passage between the arch wall and said latter baffle, said arch wall having a passage communicating with the fire box and the superheater chamber, and a damper operative to regulate the amount of opening of said passage into the superheater chamber, substantially as described.

4. The combination with a boiler casing, of means providing a fire box, a water tube boiler unit adjacent the fire box, an arch wall directly above the fire box and having a portion extending into close proximity with the tubes of the boiler unit, a baffle wall projecting upwardly from the arch wall and having a portion located adjacent the tubes of said boiler unit, said arch wall and baffle wall providing a chamber within said casing, a superheater extending into said chamber, a baffle located adjacent to certain of the tubes of said boiler unit which are remote from said arch wall to provide a passage between the arch wall and said latter baffle, said arch wall having a passage communicating with the fire box and the superheater chamber, said baffle wall providing an outlet passage for the products of combustion passing through the superheater chamber, substantially as described.

5. The combination with a boiler casing, of means providing a fire box, a water tube boiler unit adjacent the fire box, an arch wall directly above the fire box and having a portion extending into close proximity with the tubes of the boiler unit, a baffle wall projecting upwardly from the arch wall and having a portion located adjacent the tubes of said boiler unit, said arch wall and baffle wall providing a chamber within said casing, a superheater extending into said chamber, a baffle located adjacent to certain of

the tubes of said boiler unit which are remote from said arch wall to provide a passage between the arch wall and said latter baffle, said arch wall having a passage communicating with the fire box and the superheater chamber, said baffle wall providing an outlet passage for the products of combustion passing through the superheater chamber, said outlet passage communicating with the first-mentioned passage, substantially as described.

6. The combination with a boiler casing, of means providing a fire box, a water tube boiler unit adjacent the fire box, an arch wall directly above the fire box and having a portion extending into close proximity with the tubes of the boiler unit, a baffle wall projecting upwardly from the arch wall and having a portion located adjacent the tubes of said boiler unit, said arch wall and baffle wall providing a chamber within said casing, a superheater extending into said chamber, a baffle located adjacent to certain of the tubes of said boiler unit which are remote from said arch wall to provide a passage between the arch wall and said latter baffle, said arch wall having a passage communicating with the fire box and the superheater chamber, said baffle wall providing an outlet passage for the products of combustion passing through the superheater chamber, said outlet passage communicating with the first-mentioned passage, and a damper operative to regulate the amount of opening of said second-mentioned passage into the superheater chamber, substantially as described.

7. The combination with a boiler casing, of means providing a fire box, a water tube boiler unit adjacent the fire box, an arch wall directly above the fire box and having a portion extending into close proximity with the tubes of the boiler unit, a baffle wall projecting upwardly from the arch wall and having a portion located adjacent the tubes of said boiler unit, said arch wall and baffle wall providing a chamber within said casing, a superheater extending into said chamber, a baffle located adjacent to certain of the tubes of said boiler unit which are remote from said arch wall to provide a passage between the arch wall and said latter baffle, said arch wall having a passage communicating with the fire box and the superheater chamber, said baffle wall providing an outlet passage for the products of combustion passing through the superheater chamber, said outlet passage communicating with the first-mentioned passage, and a damper operative to regulate the amount of opening of said second-mentioned passage into the superheater chamber, said baffle providing a passage between the tubes of the boiler unit, said passage communicating with the outlet passage of the superheater chamber and with said first-mentioned passage, substantially as described.

8. The combination with a boiler casing, of means providing a fire box, a water tube boiler unit adjacent the fire box, and including upper and lower drums connected by tubes, a baffle located between the tubes and extending upwardly from the lower drum, said baffle stopping short of the upper drum to provide a passage, an arch wall directly above the fire box and having a portion extending into close proximity with the outer tubes of the boiler unit, a baffle wall projecting upwardly from the arch wall and having a portion located adjacent said outer tubes, said arch wall and baffle wall providing a chamber within said casing, a superheater extending into said chamber, said arch wall having a passage communicating with the fire box and the superheater chamber, substantially as described.

9. The combination with a boiler casing, of means providing a fire box, a water tube boiler unit adjacent the fire box, and including upper and lower drums connected by tubes, a baffle located between the tubes and extending upwardly from the lower drum, said baffle stopping short of the upper drum to provide a passage, an arch wall directly above the fire box and having a portion extending into close proximity with the outer tubes of the boiler unit, a baffle wall projecting upwardly from the arch wall and having a portion located adjacent said outer tubes, said arch wall and baffle wall providing a chamber within said casing, a superheater extending into said chamber, said arch wall having a passage communicating with the fire box and the superheater chamber, and a damper operative to regulate the amount of opening of said latter passage into the superheater chamber, substantially as described.

10. The combination with a boiler casing, of means providing a fire box, a water tube boiler unit adjacent the fire box, and including upper and lower drums connected by tubes, a baffle located between the tubes and extending upwardly from the lower drum, said baffle stopping short of the upper drum to provide a passage, an arch wall directly above the fire box and having a portion extending into close proximity with the outer tubes of the boiler unit, a baffle wall projecting upwardly from the arch wall and having a portion located adjacent said outer tubes, said arch wall and baffle wall providing a chamber within said casing, a superheater extending into said chamber, said arch wall having a passage communicating with the fire box and the superheater chamber, said baffle wall terminating at its top below the upper drum of the boiler unit to provide an outlet passage for the superheater chamber whereby the outlet passage communicates

with said first-mentioned passage to permit the products of combustion passing upwardly through the superheater chamber to combine with the portion of said products which pass between the arch wall and the baffle prior to passing through said first-mentioned passage, substantially as described.

11. The combination with a boiler casing, of means providing a fire box, a water tube boiler unit adjacent the fire box, and including upper and lower drums connected by tubes, a baffle located between the tubes and extending upwardly from the lower drum, said baffle stopping short of the upper drum to provide a passage, an arch wall directly above the fire box and having a portion extending into close proximity with the outer tubes of the boiler unit, a baffle wall projecting upwardly from the arch wall and having a portion located adjacent said outer tubes, said arch wall and baffle wall providing a chamber within said casing, a superheater extending into said chamber, said arch wall having a passage communicating with the fire box and the superheater chamber, said baffle wall terminating at its top below the upper drum of the boiler unit to provide an outlet passage for the superheater chamber whereby the outlet passage communicates with said first-mentioned passage to permit the products of combustion passing upwardly through the superheater chamber to combine with the portion of said products which pass between the arch wall and the baffle prior to passing through said first-mentioned passage, and a damper operative to regulate the amount of opening of the passage which leads from the fire box to the superheater chamber, substantially as described.

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

EDWARD C. MEIER.

Witnesses:

N. JOHN NELSON,

EUGENE V. HEILMAN.