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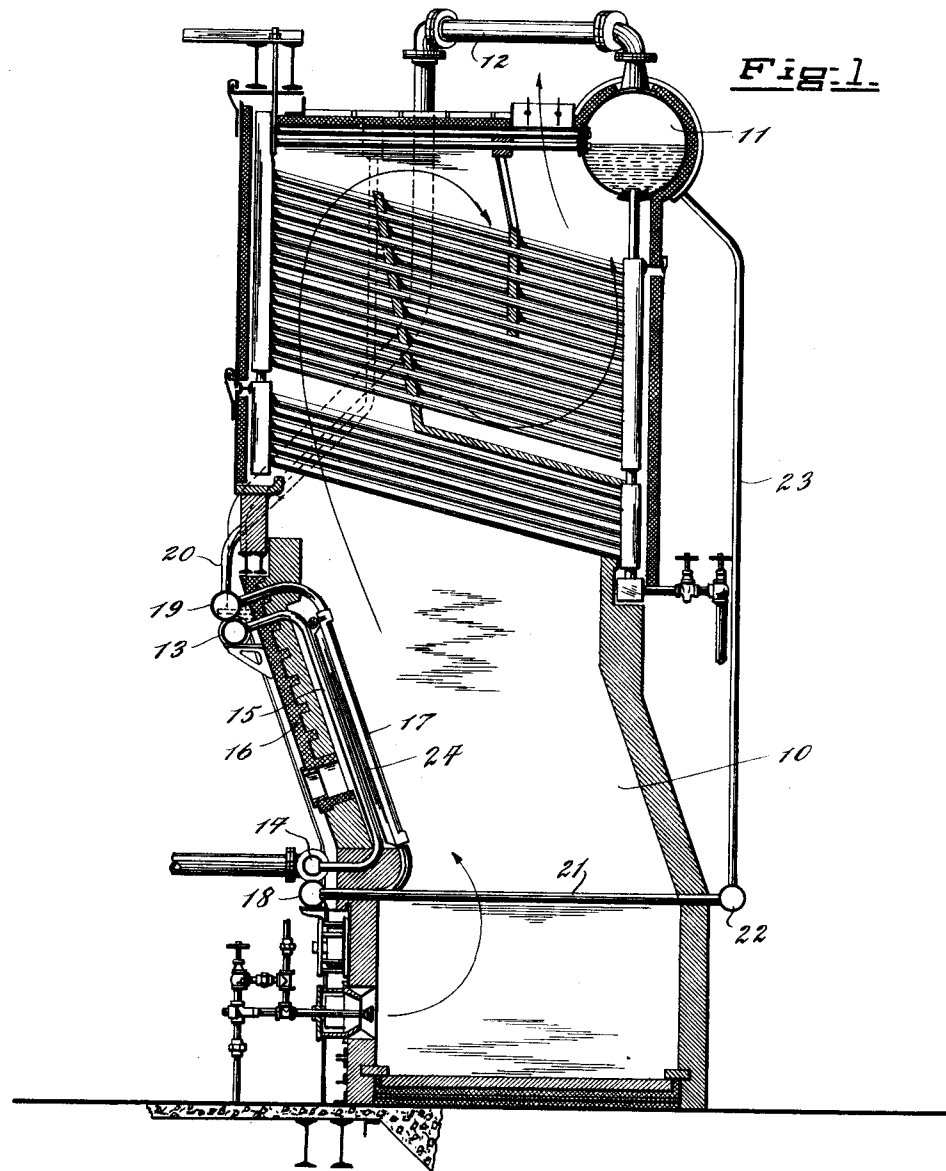
H. J. KERR

1,747,011

SUPERHEATER

Filed Feb. 2, 1925

4 Sheets-Sheet 1



INVENTOR

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Feb. 11, 1930.

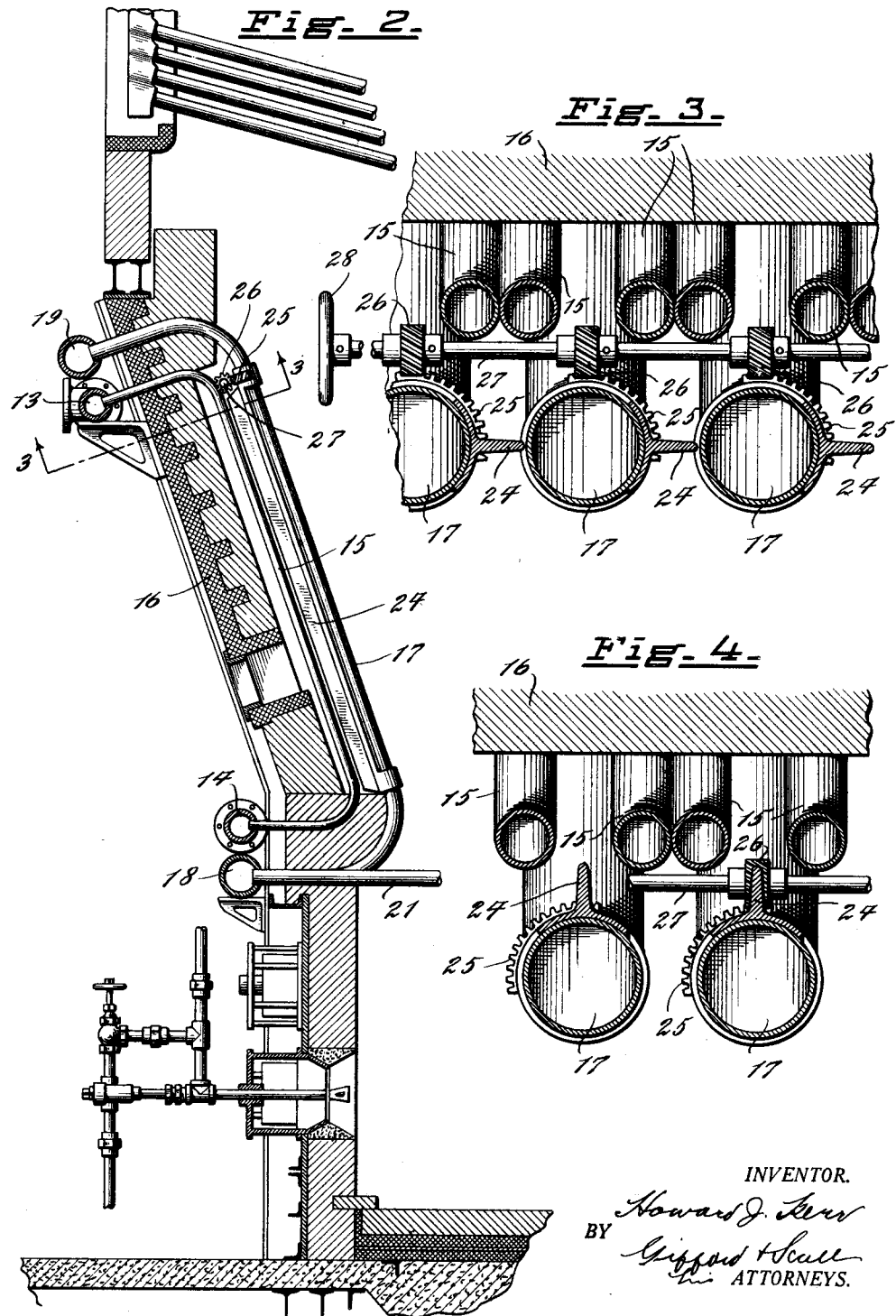
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SUPERHEATER

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4 Sheets-Sheet 2



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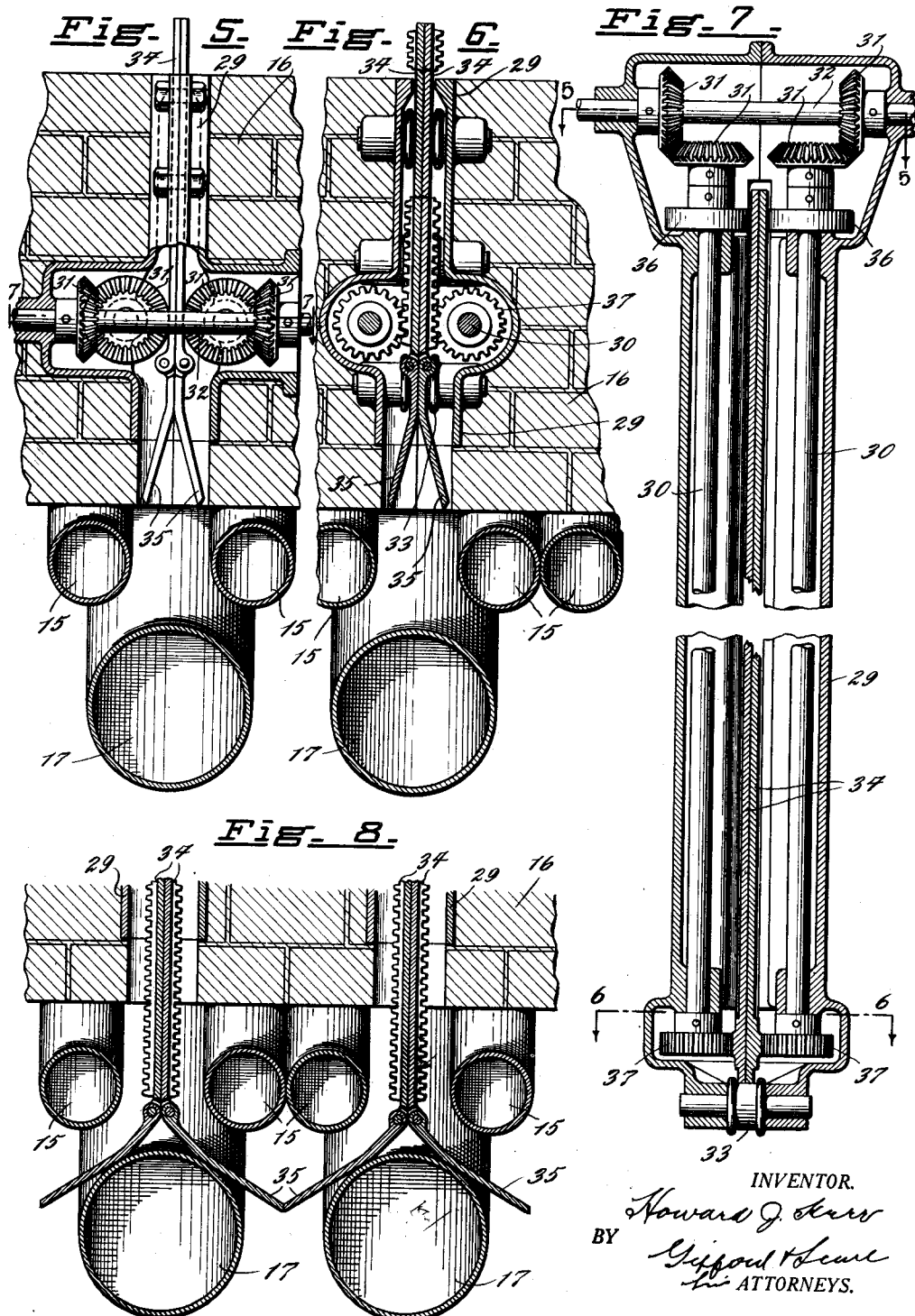
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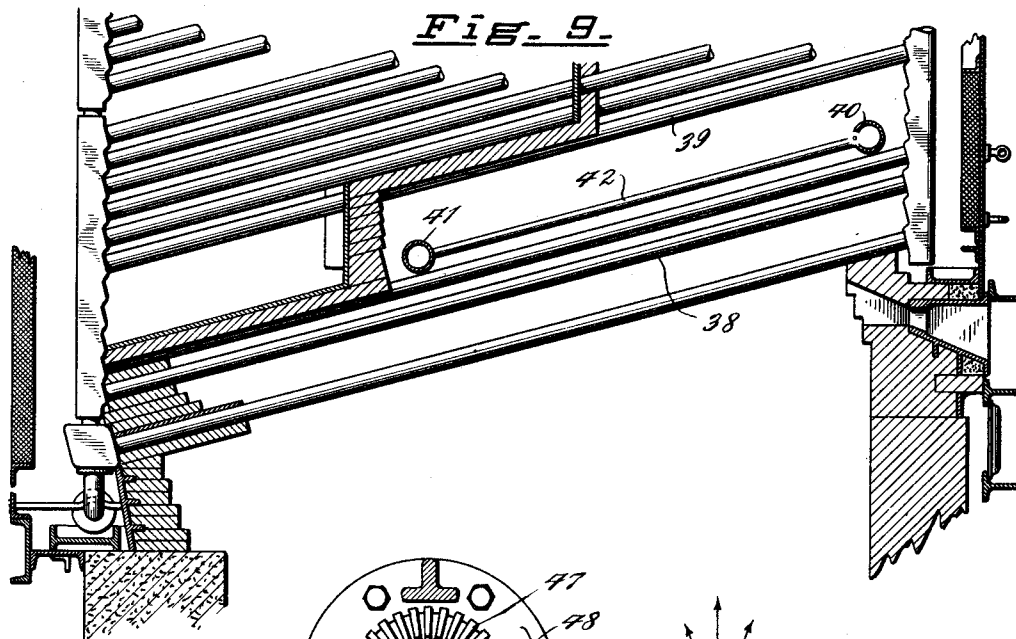


Fig. 11.

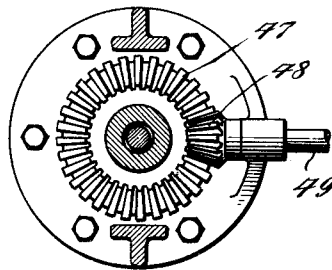
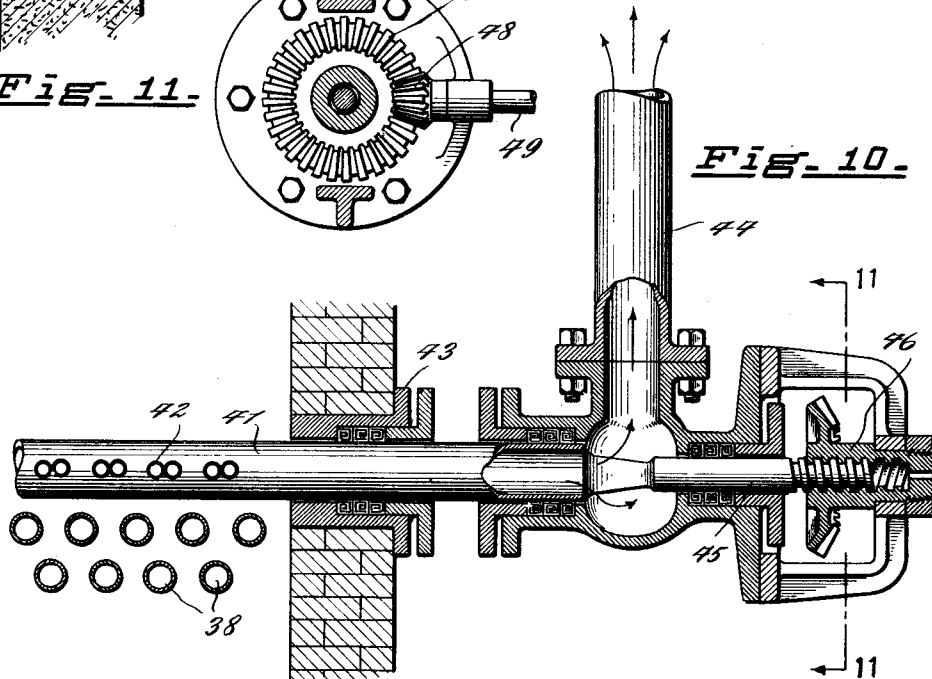


Fig. 10.



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UNITED STATES PATENT OFFICE

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SUPERHEATER

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My present invention relates to superheaters, particularly those arranged to be contacted with radiant heat, and will be best understood from the following description and the annexed drawings, in which Fig. 1 is a sectional side elevation of a boiler showing one form of my invention; Fig. 2 is an enlarged view of a portion of Fig. 1; Fig. 3 is a section on the line 3—3 of Fig. 2; Fig. 4 is a view similar to Fig. 3, but showing the parts in a different position; Fig. 5 is a horizontal section through the boiler wall and showing a modification of the arrangement shown in Fig. 1, such section being taken on the line 5—5 of Fig. 7; Fig. 6 is a view similar to Fig. 5, but taken on the line 6—6 of Fig. 7 and Fig. 7 is a section taken on the line 7—7 of Fig. 5, with the wall parts removed; Fig. 8 is a view similar to Fig. 6, but showing the parts in a different position; Fig. 9 shows the lower portion of another form of water tube boiler, with a modification of my invention applied thereto; Fig. 10 is an enlarged side elevation of a part of Fig. 9, and Fig. 11 is a section of Fig. 10 on the line 11—11.

Like reference characters indicate like parts in the different views.

Referring now to the arrangement shown in Figs. 1 to 4, inclusive, 10 is a furnace chamber fired, in the illustrative form, with oil and having above it a water tube boiler of known type having a steam and water drum 11, the steam from which is led through the pipe 12 to an inlet header 13 of a superheater having an outlet header 14, the headers 13 and 14 being connected by tubes 15 extending along the inner face of the front furnace wall 16. In front of the superheater tubes 15 is a set of water tubes 17 connected to the inlet header 18 and the outlet header 19, the latter being connected through the pipe 20 with the steam and water drum and the header 18 being connected by a row of tubes 21 extending across the furnace chamber to a header 22 which is connected by pipes 23 to the drum 11. The tubes 21 serve to increase the circulation through the tubes 17 and may also be used as slag screens when powdered fuel is burned in the chamber 10.

It will be obvious that the water from the

drum 11 passes down through the pipes 23, the header 22, the tubes 21, the header 18, the tubes 17, the header 19 and the connections 20 back to the drum 11, so that there is a circulation through the tubes 17.

As will be noted best in Fig. 3, the water tubes 17 are spaced apart and the superheater tubes 15 are arranged in the rear of such spaces. Consequently the tubes 15 are contacted not only by the hot gases in the chamber 10, but also by the radiant heat from the burning fuel and the incandescent rear wall of the furnace chamber.

In the operation of the boiler, it is desirable at certain times, particularly when starting up the boiler, to protect the superheater tubes from the direct radiant heat to prevent injury to the tubes, or to limit the degree of superheat, and I have provided means by which this may be accomplished.

In the arrangement illustrated in Figs. 3 and 4, a protecting member 24 is mounted on sleeves at its top and bottom on each of the tubes 17 so as to be rotatable about the axes of the tubes 17 on which it is mounted. As a convenient means for turning the protecting member 24 from the position shown in Fig. 4 to the position shown in Fig. 3, in which latter position it will cut off the flow of radiant heat to the superheater tubes 15, I have shown the upper end of each of the protecting members 24 as provided with gear teeth 25 meshing with gears 26 on a shaft 27 extending out through the boiler setting and controlled by a hand wheel 28. When the shaft 27 is rotated, it is obvious that each of the protecting members 24 will be rotated around its respective water tube 17.

In the arrangement shown in Figs. 5 to 8, there is a modification of the arrangement just described, the protecting members being arranged so that normally they are out of contact with the hot gases and are, therefore, less liable to be injured. In this arrangement, a box-like casing 29 extends through the furnace wall 16 and carries a pair of vertical shafts 30 rotatable through gears 31 from a shaft 32 extending out through the boiler setting and provided with suitable operating means by which it may be turned. Between

the shafts 30 and supported on rollers, as 33, is a pair of sliding plates 34 supported so that they may be slid toward and away from the water tubes 17, each pair of plates preferably being arranged in alignment with the axis of a tube 17.

On the inner end of each of the plates 34 is pivoted a protecting member 35 bent outwardly as shown best in Figs. 5 and 6, with the opening through the furnace wall small enough to force the members 35 to the position shown in Fig. 5 when the plates 34 are in the position shown in that figure.

On rotating the shaft 32, the plates 34 are carried in toward the furnace chamber by friction rolls 36 on shafts 30 and by gears 37 also on such shafts gearing with suitable racks cut on the sides of the plates 34. It will be noted that the protecting members 35 are held at an angle to each other, so that as the curved surface of the tubes 17 is contacted, these members will be turned on the pivots to the final position shown in Fig. 8, in which they stand across the spaces between the water tubes 17 to cut off the radiant heat from the superheater tubes 15. When it is desired to permit the radiant heat to contact with the tubes 15, the shaft 32 is rotated in the opposite direction which will draw the plates 34 away from the furnace chamber and will bring the pivoted protecting plates 35 back to the position shown in Fig. 5, where they will be out of contact with the hot gases and with the radiant heat from the furnace.

In the arrangement shown in Figs. 9, 10 and 11, the lower water tubes 38 are spaced from the upper water tubes 39 to form a superheater chamber in which is located a superheater having inlet and outlet headers, 40, 41 connected by tubes 42. The headers 40, 41 extend through the side wall of the boiler setting in the manner illustrated as to one of them in Fig. 10, it being understood that the other header is similarly arranged. The header 41 is slidably mounted in a wall box 43 provided with a stuffing box. The outlet pipe 44 for the superheated steam is also provided with a stuffing box through which the end of the header 41 extends, the end of the header being connected through a pair of spaced members with a rod 45 having a screw-thread formed on the end thereof on which there is a geared nut 46, the gear 47 of which is connected through a gear 48 on a shaft 49 with the corresponding gear on the end of the header 40.

When the shaft 49 is rotated, therefore, it will be obvious that the headers 40 and 41 will be drawn simultaneously through the side wall of the chamber to shift the position of the tubes 42 in relation to the water tubes 38. In the position shown in Fig. 10, the staggered tubes 38 will cut off substantially all of the radiant heat from the superheater tubes 42 and this would be the position, for

instance, in which the tubes 42 would be located when the boiler is starting up and before any substantial amount of steam is flowing through the tubes 42. Then, when the boiler is steaming fully, the shaft 49 will be turned to shift the headers 40, 41 to bring the tubes 42 into the diagonal path between the rows of tubes 38, and consequently into position to be contacted by the radiant heat of the furnace. The tubes 42 may, of course, be located in any intermediate position to vary the amount of radiant heat with which they are contacted.

It will be understood that the arrangements which I have shown are merely illustrative and that the embodiment of my invention may be widely varied.

I claim:

1. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the furnace and spaced apart to permit radiant heat rays to pass therebetween to said superheater, and means to vary the amount of the radiant heat passing between said water tubes and reaching the superheater.

2. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the furnace and spaced apart to permit radiant heat rays to pass therebetween to said superheater, and adjustable means to cover the spaces between said water tubes, whereby the amount of the radiant heat passing to the superheater may be regulated.

3. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the furnace and spaced apart to permit radiant heat rays to pass therebetween to said superheater, adjustable means to cover the spaces between said water tubes, whereby the amount of the radiant heat passing to the superheater may be regulated, and operating means for said adjustable means operable from the exterior of the furnace.

4. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the furnace and spaced apart to permit radiant heat rays to pass therebetween to said superheater, and adjustable metal plates arranged to contact with said water tubes and cover the spaces between said water tubes, whereby the amount of the radiant heat passing to the superheater may be regulated.

5. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the

furnace and spaced apart to permit radiant heat rays to pass therebetween to said superheater, an adjusting member movable at right-angles to the axes of said water tubes and a protecting member hinged to the end of said adjusting member and adapted to contact with a water tube to be swung across the space between a pair of said water tubes and in front of said superheater when said adjusting member is moved toward the water tube.

6. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the furnace and spaced apart to permit radiant heat rays to pass therebetween to said superheater, one of the furnace walls extending at the rear of said superheater and said water tubes and having a relatively narrow opening therethrough, an adjusting member extending through said opening, a protecting member hinged to the inner end of said adjusting member and arranged to contact with a water tube as said adjusting member is moved toward the water tube to swing said protecting member across the space between a pair of said water tubes and in front of said superheater.

7. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the furnace and spaced apart to permit radiant heat rays to pass therebetween to said superheater, and means cooperating with said tubes to vary the amount of the radiant heat passing between said water tubes and reaching the superheater.

8. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the furnace and spaced apart to permit radiant heat rays to pass therebetween to said superheater, and means movably associated with said tubes to vary the amount of the radiant heat passing to the superheater.

9. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the furnace and spaced apart to permit radiant heat rays to pass therebetween to said superheater, and metal plates associated with said tubes and movable to adjustably cover the spaces between said tubes, whereby the amount of the radiant heat passing to the superheater may be regulated.

10. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the furnace and spaced apart to permit radiant heat rays to pass therebetween to

said superheater, in combination with means to vary the amount of the radiant heat passing between said water tubes to the superheater, said means comprising protecting members movably mounted with respect to said tubes and adapted to at least partially close the spaces therebetween.

11. In a steam boiler, a superheater arranged to be contacted normally by the radiant heat of the furnace, boiler water tubes between said superheater and the source of heat in the furnace and spaced apart to permit radiant heat rays to pass therebetween to said superheater, and means associated with said superheater and water tubes for regulating the amount of heat imparted to the superheater from the source of heat in the furnace.

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