Feb. 5, 1935. W. H. ATTSCHULER 1,990,058

INTERDECK SUPERHEATER AND SUPPORTS

Filed April 26, 1933 2 Sheets-Sheet 1

Fig. 1.

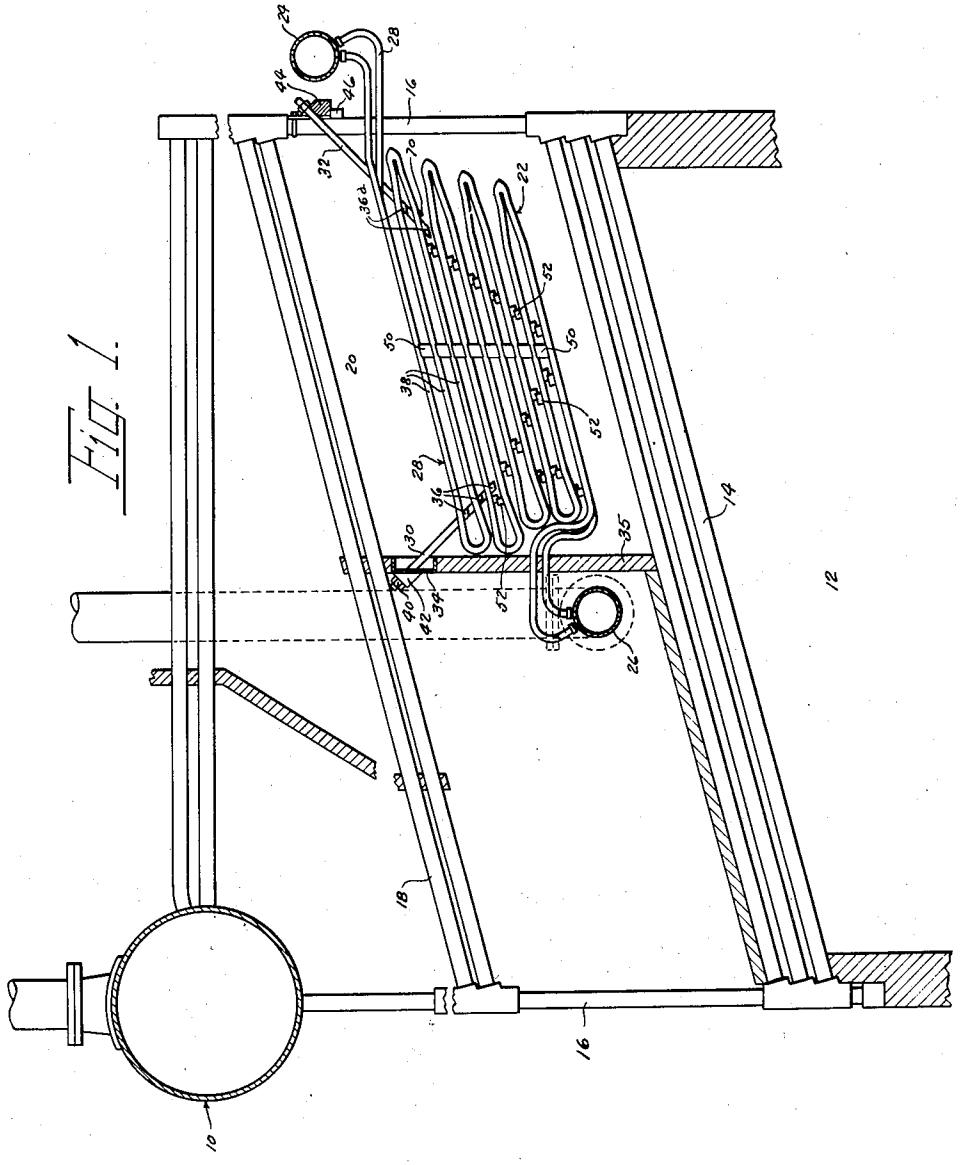
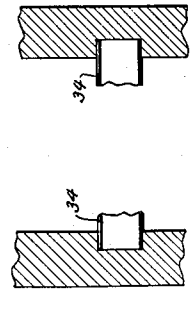


Fig. 2.



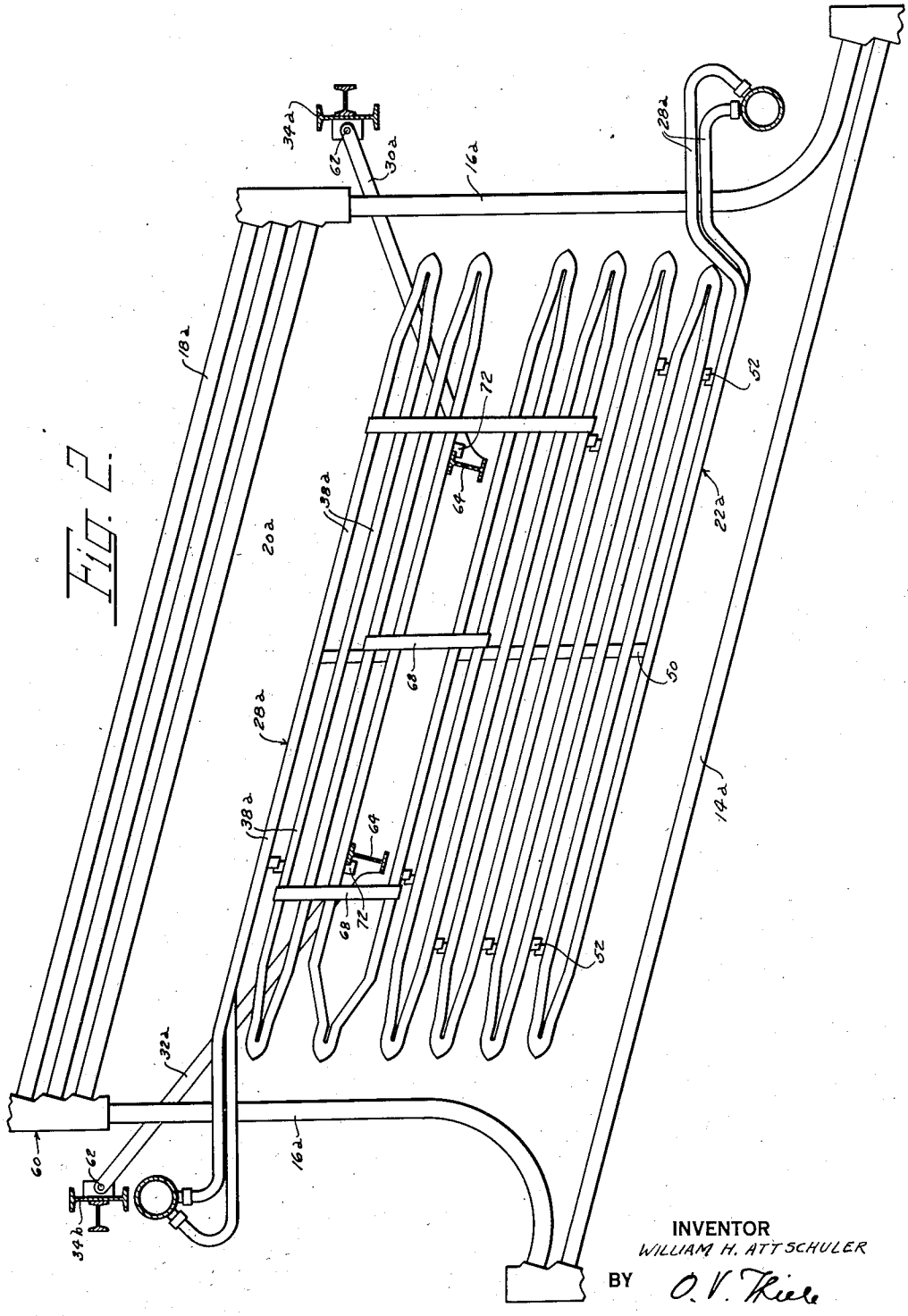
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Fig. 2.



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1,990,058

INTERDECK SUPERHEATER AND SUPPORTS

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Application April 26, 1933, Serial No. 667,975

5 Claims. (Cl. 122—478)

My invention relates to a horizontal water tube boiler and more especially to arrangements whereby superheaters may be supported between spaced banks of generating tubes in water tube boilers of the horizontally inclined type.

The novel features of my invention are pointed out in the appended claims. In order, however, that my invention, together with its objects and advantages, may be readily and fully understood, I will now describe in detail and in connection with the accompanying drawings two superheater boilers each in accordance with my invention and selected by way of example from a number of possible embodiments thereof. In the drawings,

Fig. 1 is a sectional elevation of a three pass horizontal water tube boiler having a superheater and supports therefor in accordance with my invention.

Fig. 2 is a sectional elevation of a portion of a single pass horizontal water tube boiler having a superheater and support therefor of somewhat different form from that of Fig. 1, but also within my invention.

Fig. 3 is a view of a detail of the superheater support.

It is common practice to install superheaters in water tube boilers of the horizontally inclined type in spaces between banks of water tubes of which the lower bank has a relatively small number of tubes so that the gases reach the superheater at quite a high temperature. It is also a common practice to support such superheaters from and/or on the generating tubes. Owing to the location of the superheater, however, such method of supporting the superheater throws at least some of its weight on the generating tubes in comparatively hot zones thereby tending to overload them. Arrangements have been proposed for distributing the weight of the superheater on a number of rows of generating tubes, but, while some of these are successful, some of them are either difficult or expensive to install or require special lay-outs for the water tubes. The arrangements in accordance with my invention prevent the weight of the superheater from falling on the generating tubes and, while inexpensive, are convenient to install.

In the arrangement illustrated in Fig. 1, 10 indicates in general a water tube boiler of the three pass horizontally inclined interdeck type. Boiler 10 has a combustion chamber 12 above which is a lower or slag screen bank 14 of generating tubes whose headers are connected by nipples 16, 16 to those of an upper main bank 18 of generating tubes. Nipples 16 are long enough to provide a space 20 between banks 14 and 18 to receive a superheater 22. Superheater 22 is shown as arranged in the first gas pass, such being the usual practice at present. Superheater 22 has an intake header 26, an outlet header 24 and a number of serpentine units 28, 28 connected therebetween. Such units are substantially rectangular in elevation and lie in parallel vertical planes so that the superheater 22, as a whole, has a somewhat prismatic form with eight edges, four of them horizontal and four slightly inclined. It is clear from the drawing that superheater elements 28 lie in a zone of high temperature. It is undesirable, therefore, to throw the weight of units 28 on the tubes of bank 14 or the lower tubes of bank 18. Furthermore, it is desirable that the supports for units 28 shall not themselves be exposed to the hottest gases striking the superheater. In the arrangement shown in Fig. 1, each unit 28 is supported from its two upper corners by a number of oppositely inclined rods 30 and 32 which extend diagonally upward and outward from opposite upper edges of the superheater and transfer the weight of the elements to supports distinct from the generating tubes. Each rod 30, only one being shown, extends through a beam 34 which extends horizontally close beneath the lower row of tubes of bank 18. Beam 34 extends to the side walls of the setting and is supported thereby so that no weight from any rod 30 falls on the boiler. As illustrated, beam 34 is placed in the vertical baffle 35 which separates the first gas pass from the second gas pass. I do not limit myself to this, however. As shown, the lower end of each rod 30 has lateral ribs or projections 36, 36 thereon which engage the under sides of individual elements or runs 38, 38 of each unit 28 so as to transfer the weight of the unit to a rod. Preferably each pair of rods 30 and 32 carries the weight of two units. At its upper end, each rod 30 engages the beam or support 34 and I have shown for this purpose, a nut 40 threaded on the upper end of rod 30 and engaging a flat face on a boss 42 formed on the beam 34. Similarly each rod 32 has lateral projections 36*a*, 36*a* thereon which project beneath and engage the elements 38 to transfer the weight of the units in part to the rod. As illustrated, each rod 32 extends upwardly and outwardly between nipples 16 and through a block 44 which rests on one or more brackets 46 fixed to one of the nipples 16. However, I do not limit myself to supporting either rod 30 or 32 from a boiler part as both such

rods may be supported by means entirely distinct from the boiler. The units 28 preferably are reinforced by short webs 50, 50 and/or by slip spacers 52, 52 (see Patent No. 1,946,258, issued December 26, 1933 to Charles W. Gordon), so that they need be supported only along their upper edges and the rods 30 and 32 need therefore not extend into the hottest gas zone, the lower elements of the units acting, in addition to the action to the tubes 14, to cool the gases somewhat before the gases strike the rods 30 and 32. In the arrangement shown in Fig. 2, 60 indicates a single pass boiler of the horizontally inclined water tube type having a lower bank 14A of generating tubes and an upper bank 18A of generating tubes, said banks separated to provide a sapce 20A for a superheater 22A having units 28A and elements 38A, 38A. Superheater 22A is of the same general shape and type as superheater 22 and has its units 36*a*, of rectangular form in elevation, arranged in parallel vertical planes. The supporting means for superheater 22A comprises two sets of beams 34A and 34B both of which lie entirely outside boiler 60. Connected to beams 34A and 34B by pivot pins 62, 62 are rods 30A and 32A which extend between nipples 16A, 16A of boiler 60 into the space 20A. Rods 30A and 32A incline towards each other in the same manner as the rods 30 and 32 and extend downwardly to a level below the upper elements 38A of the superheater. At their inner and lower ends rods 30A and 32A are connected to beams 64, 64 which extend transversely to the elements 38A and support the weight of the units 28A.

Units 28A are reinforced and tied together somewhat in the same manner as units 28, webs 50, slip spacers 52 and also straps 68, 68 being shown for this purpose.

As is apparent from the drawings units 28 and 28*a* lie in vertical planes parallel to the generating tubes of the boiler. Also, supporting rods 30, 32, 30A and 32A lie in substantially vertical planes parallel to the planes of the units which they support, so that the units can hang down from their supports and no separate means need be provided to take up the horizontal components of the stresses in the rods 30, 32, 30A and 32A as such components are taken up by tension in the tubular elements of the units. It will be seen further that, in accordance with my invention, the weight of the superheaters is removed entirely from the generating tubes at the same time that the supporting rods entirely avoid the spaces outlined by the groups of generating tubes. The rods are therefore capable of being removed, installed and inspected with minimum difficulty.

In both the arrangements illustrated, it is necessary that means be employed to counteract the tendency of the rods 30 and 32, as well as rods 30A and 32A, to sag at their lower and inner ends so as to permit the units 28 and 28A to drop down. In the arrangement illustrated in Fig. 1, I have shown for this purpose a stop piece 70 fixed to one of the elements 38 immediately on the outside of the lower rib 36A on rod 32 so as to prevent the tendency of the rib 36A to slide along the element 38 and thereby allow the unit 28 to drop. With respect to the rod 30 and its lower rib 36, it so happens that one of the slip spacers 52 is placed in position to prevent the rib 36 from sliding on element 38 and the slip spacer therefore serves the same purpose as the stop 70 while also acting to reinforce the unit 28.

In the arrangement shown in Fig. 2, stops 72, 72 are fixed to certain elements 38A of the units 28A in contact with the outer edges of the beams 64 so as to overcome any tendency of the beams to slide lengthwise of the elements, the rods 30A and 32A thereby being kept in tension so as to support the units.

While I have disclosed in detail two forms of apparatus embodying my invention, I do not limit myself to the details of the disclosure and desire the following claims to be accorded such equivalents as the state of the art permits.

What I claim is:

1. The combination of a boiler having two groups of generating tubes spaced one above the other, a superheater between said groups, and supporting means for said superheater including diagonal members each lying entirely outside the space outlined by the tubes in any of said groups and tied to said superheater at their one ends and to members other than said tubes at their other ends.

2. The combination of a boiler having two groups of generating tubes spaced one above the other, a superheater between said groups, and means for supporting said superheater including rods inclined upwardly and outwardly from points at two opposite upper edges of the superheater, a beam separate from the boiler for supporting the upper end of one of said rods and a support for the upper end of the other of said rods carried on the boiler at a point outside the generating tubes.

3. The combination of a boiler having two groups of generating tubes spaced one above the other, a superheater between said groups, and supporting means for said superheater including tension rods inclined upwardly and outwardly from points at two opposite upper edges of the superheater, and supports for the upper ends of said rods both separate from the boiler.

4. The combination as set forth in claim 3 and in which the upper ends of the tension rods have pivotal connections to their supports.

5. The combination of a boiler having two groups of generating tubes spaced one above the other, a superheater between said groups having units rectangular in elevation, and supporting means for said superheater including diagonal members each tied to said superheater at their one ends and extending outwardly and upwardly therefrom at the upper edges of said units.

WILLIAM H. ATTSCHULER.