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WATER CIRCULATING TUBE ATTACHMENT FOR HORIZONTAL BOILER FLUE

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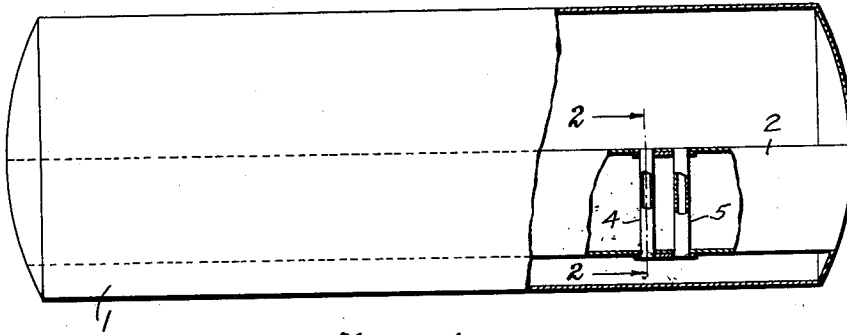


Fig. 1.

Fig. 3.

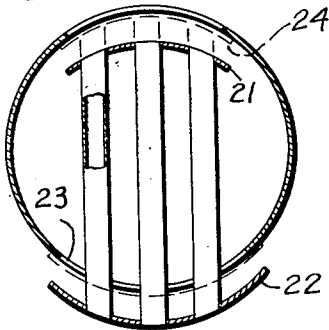


Fig. 2.

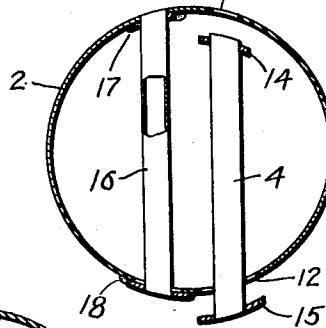


Fig. 6.

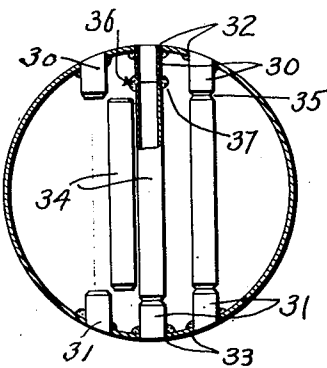
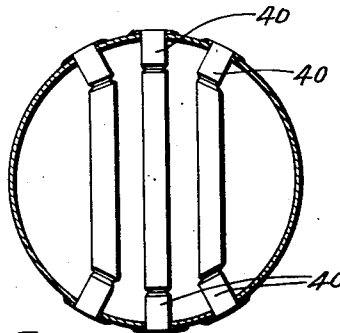


Fig. 4.

Fig. 5.



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WATER CIRCULATING TUBE ATTACHMENT
FOR HORIZONTAL BOILER FLUE

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2 Claims. (Cl. 122-145)

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This invention relates to boilers and has particular reference to devices within such boilers designed to increase circulation of water through the boilers thereby to substantially increase the efficiency thereof.

In boilers of the Scotch marine type it is customary to extend a relatively large furnace or flue horizontally through the boiler. This arrangement has the disadvantage that the water above this flue becomes quickly heated, while the water below the flue remains comparatively cold. In order to improve this condition it is common practice to extend an external conduit from the bottom of the boiler to the part of the boiler above this flue and while such water circulating conduit may improve conditions somewhat it is objected to because of the extra expense and also because it interferes with other mechanism outside of the boiler.

It is in view of the foregoing the object of the present invention to place within the flue extending through the boiler a plurality of vertically disposed water circulating tubes. It is a further object to provide improved means for placing and securing such tubes within the flue of the boiler.

With these and other objects in view the invention resides in the combinations hereinafter described in detail and reference is invited to the accompanying drawings in which preferred forms of the invention are illustrated.

In the drawing:

Fig. 1 is a side elevational view of a boiler within which the device of the invention is installed and parts of which have been broken away for the sake of clearness;

Fig. 2 is end view on a larger scale taken substantially on line 2 of Fig. 1 in the direction of the arrow;

Fig. 3 is a similar view showing a somewhat modified form of the invention, and

Figs. 4 to 6 illustrate further modifications of the device.

Referring in the first instance to Fig. 1 the numeral 1 designates a boiler of the type above referred to, through which extends horizontally a relatively large flue 2, constituting the furnace or at least the element through which the products of combustion are carried to heat the water therein.

As above stated, the water above this furnace or flue becomes heated very quickly, whereas the water below the flue remains relatively cold, for the reason that nothing is present to induce or

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accelerate circulation from the bottom to the top of the boiler.

An efficient and inexpensive way of producing better boiler circulation is to place a plurality of vertically disposed water conduits 4, 5, within the flue 2 to form direct passages from the lower to the upper portion of the boiler. It is readily seen that the combustion products passing through the flue will quickly heat these conduits and thereby cause the water to rise rapidly from the lower to the upper portion of the boiler.

In present day engineering practice it is becoming more and more common to substitute modern methods of welding for the more antiquated and cumbersome methods of riveting or bolting parts together. But because boilers are subject to inspection and approval by the authorities, the use of this more modern welding method still remains more or less restricted and it becomes necessary so to design, proportion and install such water circulating tubes that the installation thereof will meet with the approval of the authorities. It is a dominant feature of the present invention so to design, proportion and weld such water circulating tubes that they will pass inspection in various parts of the country.

Reference is now invited to Fig. 2 wherein the simplest form of my invention is illustrated. The flue of the boiler is in this case designated by the numeral 2 and it is noticed that openings 11 and 12 are cut through the wall of the flue in vertical alignment with each other.

It is furthermore important to note that the upper opening 11 is much smaller than the bottom opening 12. This is done in order to make it possible to pass a circulating tube 4 upwardly into the flue through the opening 12. To the upper end of this tube is affixed a flange 14, the upper surface of which is curved to register with the inner surface of the flue wall to the end that, when the tube is completely inserted, this flange will come to rest against the inner wall of the flue. A similar flange 15 is secured to the lower end of the tube for engagement with the outer surface of the flue wall when the tube is fully inserted. It then merely remains to weld the outer edges of these flanges to the wall of the flue to complete the installation of the tube.

It is now seen that the lower opening 12 is made large enough to permit the upper flange 14 to pass therethrough when the tube is inserted and that the flange 15 must be large enough to overlap the edges of the perforation 12. It is to be understood that as many tubes may be seated

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as found necessary and a second tube 16 is for this reason shown similarly mounted in position within the flue. The rims of the flanges 14, 15 are welded in position, as indicated at 17, 18.

In some sections of the country the authorities are more liberal, permitting the placing of larger openings in the flues of boilers for installation and welding in position of more complex circulating tube assemblies. Such assembly is, in Fig. 3, shown to include a plurality of tubes, the upper ends of which are secured to a common flange 21, while the lower ends thereof are similarly secured to a flange 22. In this case, as in the above described installation, the opening 23 at the bottom of the flue must be large enough to pass therethrough the flange 21, the upper surface of which is shaped to come to rest against the inner surface of the flue when the assembly is completely installed substantially as indicated in dotted outline at 24. The lower flange 22 must, of course, be shaped to come to rest against the outer surface of the flue when the assembly is completely seated, whereupon the outer edges of the two flanges are welded in position on the flue.

In the modification of Fig. 4, vertically aligned nipples 30, 31 are welded in position within openings 32, 33 of the flue, or each nipple may be fitted with a flange engaging the wall of the flue in the same manner that the tubes of Fig. 2 are flanged and may be similarly welded in position. A piece of pipe 34 of the proper length is then pushed between the two nipples and welded in position therebetween. In this case, three sets of nipples and three lengths of pipes are employed, but it is to be understood that the quantity may be varied to suit individual installations.

In order to facilitate the welding operation, it is preferred to bevel the ends of the nipples and tubes to form therebetween circular grooves 35 the depth of which is nearly equal to the thickness of the walls of these parts, substantially as shown at 36, to provide a guide and a seat for the welding material 37.

The modification of Fig. 5 differentiates from the foregoing merely in the manner in which the nipples 40 are placed. By placing the axis of each diametrically opposed pair of nipples in continued alignment, as indicated, it is found not only that all the nipples may be alike but also that the upward flowing current of water will be spread more uniformly over the space within the upper position of the boiler.

It is seen from the foregoing description that I have produced a very simple, inexpensive and efficient means of installing water circulating tubes within a boiler furnace or flue. It is also important to note that these tubes may be individually mounted within the flue or may be combined to form assemblies of two or more tubes, as above described. Furthermore that, whether individual tubes or tube assemblies are employed, it is important to note that as many of these single tubes or tube assemblies may be placed throughout the length of the flue as may be found most advantageous in each particular installation.

The reason for placing flanges on the ends of the tubes is that in many localities it is required to provide reinforcement of the wall of the flue

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at the points where they are to be welded in position. But where it is not convenient to mount such flanges on the tubes, it may be preferred to flare the end thereof, substantially as indicated at 42, in Fig. 6, this flared portion of the nipple 41 being substantially equivalent to the flanged portions above referred to. It is to be understood that this modified shape is applicable to the tubes of Fig. 2 also.

I claim:

1. Water circulating means for the furnace flue of a boiler, said flue having axially aligned perforations through the upper and lower portions of the wall thereof on a vertical diameter of the flue and identical axially aligned perforations on diameters symmetrically inclined right and left relative to said vertically aligned perforations, said means comprising identical nipples coaxially seated in said perforations and inwardly projecting therefrom and parallel vertically directed tubes spanning the distances between the upper and lower nipples, the ends of the tubes being shaped fittingly to contact the ends of the nipples and tightly secured in positions thereon.

2. Water circulating means for the furnace flue of a boiler, said flue having axially aligned perforations through the upper and lower portions of the wall thereof on a vertical diameter of the flue and identical axially aligned perforations on diameters symmetrically inclined right and left relative to said vertically aligned perforations, said means comprising identical nipples coaxially seated in said perforations and inwardly projecting therefrom, a tube spanning the distance between said vertically aligned nipples, and tubes in parallel relation to said tube and spanning the distance between the upper and lower nipples on each side thereof, the ends of all of the tubes being shaped fittingly to contact the ends of the nipples and tightly secured in position thereon.

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