

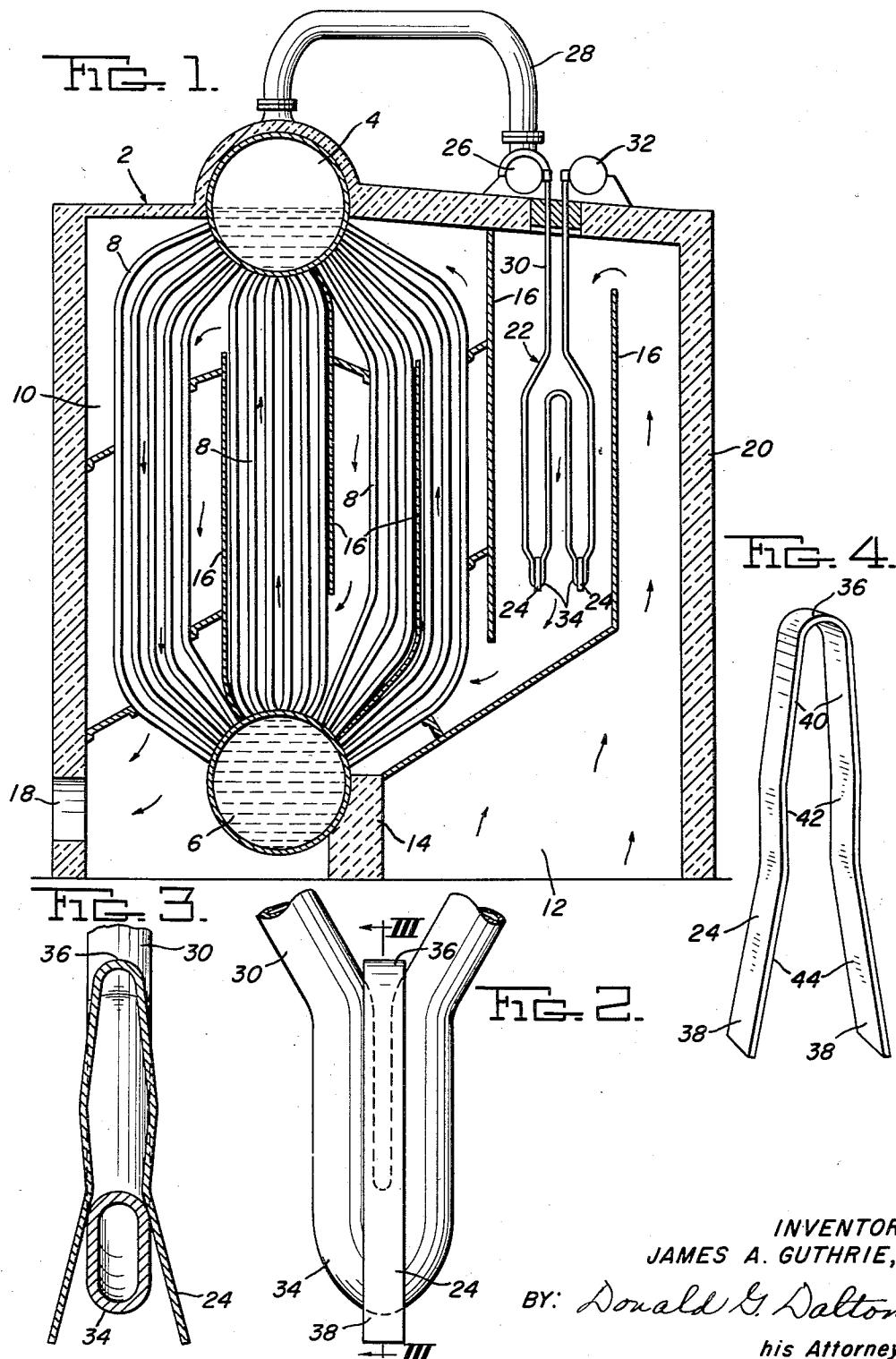
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SHIELD FOR SUPERHEATER

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SHIELD FOR SUPERHEATER

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2 Claims. (Cl. 257—248)

The present invention relates generally to steam boilers and more particularly to the superheater elements of steam boilers.

The superheater element of a steam boiler ordinarily consists of at least two spaced parallel pipe or tube lengths having a U-shaped return bend at their lower end. The superheater element depends from the roof of the steam boiler downwardly into its combustion chamber adjacent the water-and-steam drums and tubes.

The gas currents in the area of the combustion chamber surrounding the superheater elements move downwardly and carry with them considerable quantities of fly ash and other minute solid products of combustion. Prior to my invention, the exposure of the superheater to the ash-laden gases resulted in abrasion of the superheater tubes particularly at the return bends thereof. This abrasive action caused the superheater tubes to wear thin at the return bends resulting in failure and steam leakage in a relatively short time after installation. Such failure necessitated plugging of the superheater tubes thereby reducing the efficiency of the steam boiler until the boiler could be shut down and the worn superheater tubes replaced.

It is, accordingly, an object of my invention to provide a shielding device which may be incorporated in the structure of the steam boiler superheater to protect it from the abrasive action of the atmosphere surrounding the same in the combustion chamber of the boiler.

This and other objects will become more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is an elevational view partly in section of a steam boiler provided with the shields of my invention;

Figure 2 is an enlarged detail view of the return bend portion of the superheater shown in Figure 1 with the shield of the invention installed thereon;

Figure 3 is a vertical sectional view taken on the line III—III of Figure 2; and

Figure 4 is a perspective view of the shield of the invention.

Referring more particularly to the drawings, reference numeral 2 designates generally a steam boiler of conventional design having an upper drum 4 and a lower drum 6 connected by water tubes 8 all disposed in a combustion chamber 10 of a furnace 12. The furnace 12 is separated from the lower drum 6 of the boiler by a refractory wall 14. Baffles 16 are provided for directing the products of combustion in several passes, as shown by the arrows in Figure 1, along the tubes 8 as these products pass toward a stack connection 18. An insulated enclosure 20 surrounds the boiler structure.

The boiler structure just described and its function are conventional and are not affected by the present invention.

The steam boiler 2 also includes a superheater, design-

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nated generally by reference numeral 22, which is of conventional structure with the exception of the protecting shields 24 of my invention which are incorporated therein and which will be described in detail hereinafter.

5 The superheater 22 includes a header 26 which receives steam from the drum 4 by means of a pipe 28 and delivers it to the pipe length 30 of the superheater. The pipe length 30 of the superheater loops from the header 26 downwardly into the combustion chamber 10 and then out 10 again to a connection with a central header 32. The portion of pipe length 30 in the combustion chamber includes at least two loops which results in the formation of at least two return bends 34 in the lower end of the superheater 22, as best shown in Figure 1. It will be noted that the size and number of loops in the superheater may be varied as desired in accordance with the size of the steam boiler, the amount of steam to be produced, etc.

15 The steam is superheated as it passes through the looped pipe length 30 of the superheater and is then delivered to the central header 32 from which it is conducted by suitable lines (not shown) to the point of use.

In the position necessarily occupied by the superheater 22 in the combustion chamber of the furnace it is exposed to the downwardly moving currents of the abrasive fly ash-laden gases as they pass toward the tubes 8 and the stack connection 18. The U-shaped return bends 34 in the pipe length are particularly susceptible to damage by the abrasive action of the downwardly flowing fly ash-laden gas currents and are protected by having fitted theron the protective shields 24 of my invention.

20 Each of the shields 24 is a strap, preferably made of steel having spring characteristics, shaped in substantially U-shaped hairpin form having a closed end or crown 36 and a pair of spaced legs 38 extending from the crown. The legs 38 have slightly diverging initial portions 40 immediately adjacent the crown, intermediate converging portions 42, and diverging terminal portions 44.

25 The thickness of the strap making up the shield is sufficient to provide rigidity, and also to enable the shield to effectively resist the damaging effects of the abrasive matter in the atmosphere of the combustion chamber. 30 The width of each shield is slightly greater than the distance between loops of the pipe length 30 at the plane of the return bends 34.

35 A shield 24 is clipped on each return bend 34 with its crown projecting upwardly and the return bend engaged between the legs 38. The springy characteristic of the shield and the configuration of the legs permit quick installation and positive retention thereof on the return bend without the need for extraneous installing or retention means. In the position just described, the shields function to divert the fly ash and other solid particles carried by the gas currents and thereby provide protection for the heretofore exposed return bends.

40 While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

45 I claim:

46 1. The combination with a superheater tube adapted to depend into the combustion chamber of a steam boiler, said tube comprising two pipe lengths converging downwardly into a connecting U-shaped return bend, of an abrasion shield for said bend comprising a resilient metal strap of hairpin shape having its open end applied down-

wardly over said bend with one of its legs on each side of the bend and its other end overlying the interior of said bend, said strap having a width greater than the minimum distance between said pipe lengths.

2. The combination as defined by claim 1 characterized by the legs of said strap including slightly diverging initial portions adjacent the closed end, intermediate converging portions adjacent said initial portions, and diverging terminal portions adjacent said intermediate portions.

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