March 11, 1941. E. A. BAERER 2,234,222

BOILER TUBE SHIELD

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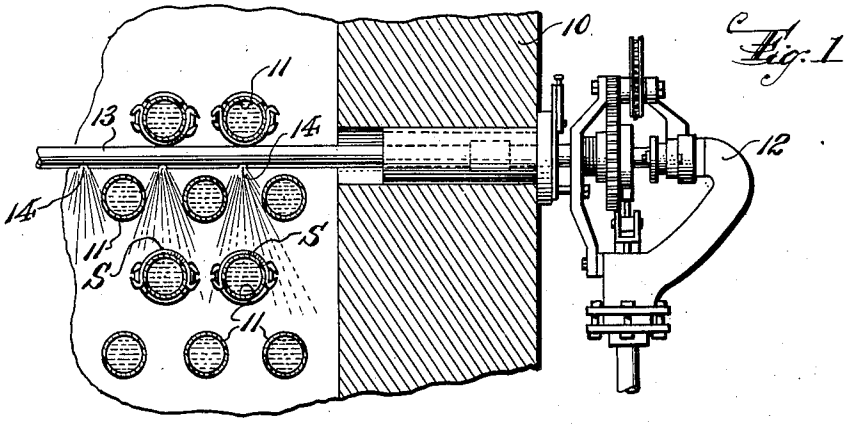


Fig. 1

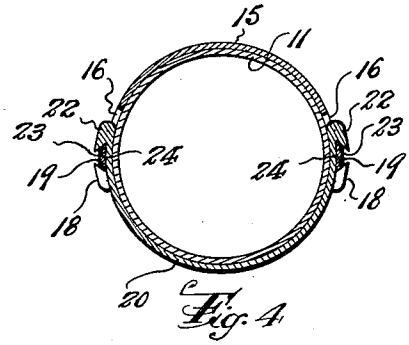


Fig. 4

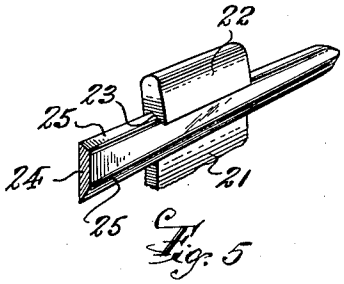


Fig. 5

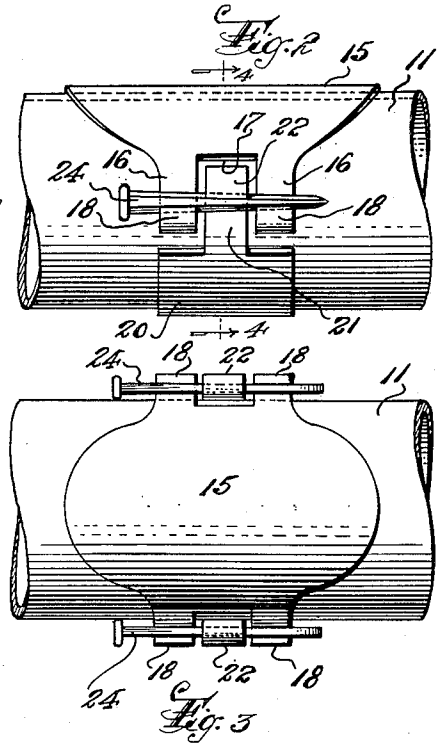


Fig. 2

Fig. 3

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BOILER TUBE SHIELD

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2 Claims. (Cl. 122—392)

This invention relates to improvements in boiler tube shielding means for cooperation with soot blowers with which the boiler is equipped.

In tubular boilers, wherein the hot products of combustion are circulated along and about the tubes through which the water from which steam is to be generated is passed, the exterior surfaces of the water tubes are exposed to accumulation of soot thereupon which, if not removed, soon obstructs the transfer of heat through the tube walls to the contained water, thereby considerably impairing the efficiency of the boiler. To avoid this, means have been employed for blowing soot accumulations off and away from the water tube surfaces, so that the soot is carried away through the draft system of the boiler. Such soot blowers usually comprise rotatable blower elements into which dry, high pressure steam is delivered to be discharged from lateral nozzles or ports with which said elements are provided. The steam thus discharged from the nozzles of the blower elements provides high velocity blasts which contact the water tube surfaces so as to dislodge and sweep away the accumulations of soot therefrom. Both the soot and the products of combustion circulating through the boiler contain a considerable amount of fly ash and other like hard gritty particles, which, when caught up and propelled by the high velocity steam blasts discharged by the blower elements, are caused to impinge upon the water tube surfaces with abrading or sand-blast like effect thereupon. This abrasion and resultant wear, unless guarded against, may greatly reduce the useful life of the water tubes to the extent of requiring replacement thereof long before their break down would otherwise be normally expected.

To guard boiler tubes against wearing attrition of soot blowing steam blasts, shield devices have been externally applied to the boiler tubes at points where exposed or subjected to more or less direct or substantially head-on impingement thereof by said blasts. In the most common form heretofore provided, such shields have merely comprised cylindrical sheet metal plates or bands applied to encircle desired areas of the boiler tubes to be protected. These bands are either discontinuous or made in half sections provided at their meeting ends with radially projecting flanges secured together by bolts, whereby the bands are retained in encircling attachment to the boiler tubes. Such form of shield device is very awkward to manipulate when applying or removing the same relative to the tube, especially when the tubes are closely spaced or grouped; furthermore, owing to the projection of the radial flanges thereof away from the boiler tube sides and out of direct contact with the comparatively cool walls of the tubes, said flanges are subjected to the unrelieved high heat of the hot products of combustion flowing through the boiler, whereby the same are frequently fused together, rendering removal of the shield extremely difficult when it may be desired to remove and renew the same.

Having these things in mind, my present invention has for an object to provide a simple, efficient and easily manipulatable boiler tube shield device, wherein the means for securing the same in service position upon a boiler tube comprises compact and close lying cooperating coupling elements with which the shield body and its attachment strap are provided, together with removable wedge key means for interlocking cooperating coupling elements in shield securing attached relation to a boiler tube; all whereby said coupling elements and cooperating wedge key are maintained comparatively cool by close contact with the relatively cool boiler tube so as to be free from tendency to fuse together.

Another object of the invention is to provide in combination with a boiler tube shield and attachment strap therefor, coupling means for uniting these parts in operative assembled relation which is very easy to actuate in either applying or removing the shield from a tube, especially in close quarters, i. e. in installations where the tubes are closely grouped and working space consequently very limited.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of the invention is shown in the accompanying drawing, in which:

Fig. 1 is a fragmentary sectional view of a portion of a boiler equipped with soot blowing apparatus, and showing tubes of the boiler having applied thereto protective shield devices made according to this invention.

Fig. 2 is an enlarged side elevation of the novel shield device of this invention as applied to a boiler tube; Fig. 3 is a top plan or face view of the same; Fig. 4 is a sectional view through the same, taken on line 4—4 in Fig. 2; and Fig. 5 is a fragmentary perspective view of parts of the coupling means for uniting the elements of the shield device.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

Referring to Fig. 1 of the drawing, the reference character 10 indicates the wall of a boiler structure, and 11 the water tubes which extend through the interior of said boiler structure. The reference character 12 indicates the means mounted exteriorly of the boiler wall 10 through which high pressure steam is supplied to soot blower elements 13 which project into the boiler

interior intermediate ranks of the tubes 11, and by which said soot blower elements 13 may be rotated, all as well known and familiar to the art. The soot blower element is provided with spaced lateral nozzles or ports 14 through which the soot blowing blasts of steam are discharged to sweep along the water tube surfaces so as to dislodge and carry away any accumulations of soot deposited thereon.

The protective shield device, for application to suitable areas of the water tubes 11 desired to be protected against abrading effects of the soot blowing blasts emanating from the blower element 13, comprises, a shield plate or body 15 of suitable peripheral shape, as e. g. of the oval shape shown in Fig. 3, and of curvilinear contour substantially conformable to the curved external surface of a tube 11 to which said shield plate or body is to be applied. Integrally formed therewith to project outwardly from opposite marginal sides of said plate or body 15 are laterally spaced legs or tongues 16 providing an intermediate indenting space 17. Said legs or tongues 16 are provided with thickened extremities adapted to provide coupling bosses 18 somewhat raised or stepped up from the external face surfaces of the legs or tongues 16. The inner marginal sides of said bosses 18 are shaped to provide undercut shoulders 19. Cooperative with said shield plate or body 15 is an attachment strap member 20 which is bowed to a curvature substantially conformable to the curved external surface of a tube 11 to which the shield device is to be applied. Integrally formed therewith to project outwardly and endwise respectively from the opposite extremities of said attachment strap member 20 are legs or tongues 21. Said legs or tongues 21 are likewise provided with thickened extremities adapted to provide coupling bosses 22 somewhat raised or stepped up from the external face surfaces of the strap member. The inner marginal sides of said bosses 22 are shaped to provide undercut shoulders 23. Said legs or tongues 21 are of widths somewhat less than the widths of the indenting spaces 17 intermediate the legs or tongues 16 of said shield plate or body 15.

Said shield plate or body 15 and its cooperative attachment strap member 20 when operatively assembled, are so dimensioned circumferentially as to fit more or less snugly in encircling relation to and around a tube 11 to which they are to be applied. When the shield plate or body 15 and attachment strap member 20 are assembled together around a tube 11, the endwise projecting legs or tongues 21 of the latter enter the indenting spaces 17 lying between the legs or tongues 16 of the opposed ends of the former so as to interlap said legs or tongues 21 and legs or tongues 16, and so as to bring the coupling bosses 18 of the latter into opposed staggered relation to the coupling bosses 22 of the former. When the parts of the shield devices are thus arranged tapered wedge keys 24 are driven across and between the opposed coupling bosses 18 and 22 so as to engage the undercut shoulders 19 and 23 thereof. Owing to the tapering wedge shape of the keys 24, the same, when driven home, operate to draw the opposed ends of the shield plate or body 15 and attachment strap member 20 together, thus constricting the shield device circumferentially so as to bind the same in firm close hugging relation to the tube 11 embraced thereby, thus firmly and securely holding the shield device against displacement from the area of the tube to which it is applied, and which is desired to be shielded or protected thereby. If desired, the sides of the wedge keys 24 may be chamfered, as at 25, to correspond and conform to the formation of the undercut shoulders of the coupling bosses with which they are engaged; thus so interlocking these parts that all risk of lateral outward displacement of the key wedges is avoided.

As shown in Fig. 1 the shield devices (which as a whole are indicated by the reference letter S applied thereto in said Fig. 1) are applied to and so located on desired tubes 11 as to cover areas thereof which are opposed more or less directly to head-on impingement of the steam blast, discharged from the nozzles or ports 14 of the blower element 13.

It will be obvious that the shield plate or body 15 and cooperating attachment strap member 20, when mounted on the tube 11 in close hugging relation thereto, will so contact the same as to readily and quickly transfer the heat absorbed from the hot products of combustion to which they are exposed to the comparatively cool water tube 11; and since the coupling bosses 18—22 are also in flat lying close contact with the comparatively cool tube 11, likelihood of fusing, softening or deformation thereof is avoided.

Owing to the low or close lying disposition of the coupling bosses and wedge keys in parallel relation to the sides of the tube 11, adequate clearance space between adjacent tubes is assured for access to these devices when locking up or releasing the same, and consequently the shield devices may be more easily and conveniently manipulatd for application to or removal from a tube 11.

Having described my invention, I claim:

1. A boiler tube shield device for cooperation with soot blowing apparatus comprising, a uniformly thin and flat lying arcuate shield plate of suitable peripheral shape adapted to snugly engage the external surface of a tube to which it is applied, a separable and correspondingly uniformly thin arcuate attachment strap member likewise adapted to snugly engage the tube surface, said plate and strap member having at opposed portions thereof interfitting tongues extending in the planes thereof and provided at their extremities and in the planes thereof with slightly thickened transverse coupling bosses, and a flat removable key device for engagement between opposed coupling bosses, thus providing shield fastening means closely contiguous to the tube surface and of minimum projecture therefrom.

2. A boiler tube shield device for cooperation with soot blowing apparatus comprising, a uniformly thin and flat lying arcuate shield plate of suitable peripheral shape adapted to snugly engage the external surface of a tube to which it is applied, a separable and correspondingly uniformly thin arcuate attachment strap member likewise adapted to snugly engage the tube surface, said plate and strap member having at opposed portions thereof interfitting tongues extending in the planes thereof and provided at their extremities and in the planes thereof with slightly thickened transverse coupling bosses, said bosses having inwardly facing undercut shoulders, and a removable tapered wedge key for engagement across and between the shoulders of opposed bosses, thus providing shield fastening means closely contiguous to the tube surface and of minimum projecture therefrom.

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