Dec. 5, 1939. T. E. MURRAY, JR. 2,181,950

TUBULAR UNIT FOR BOILER WALLS

Filed March 21, 1936

Fig. 1.

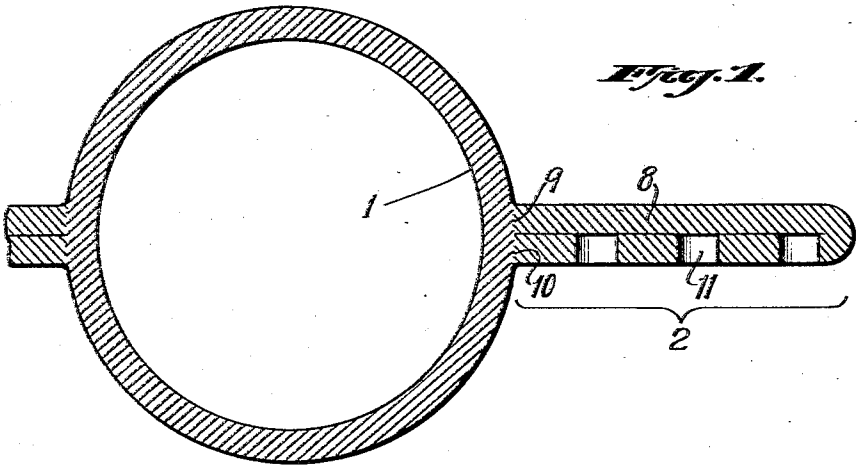


Fig. 2.

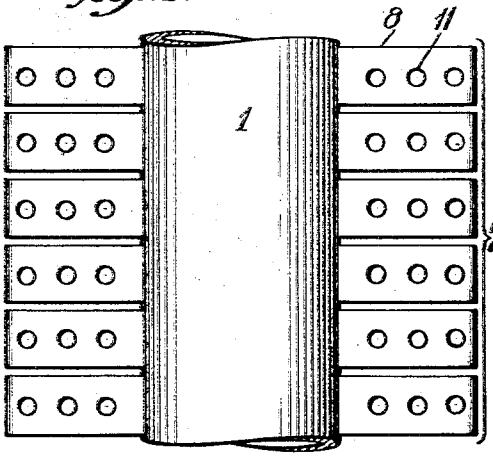


Fig. 3.

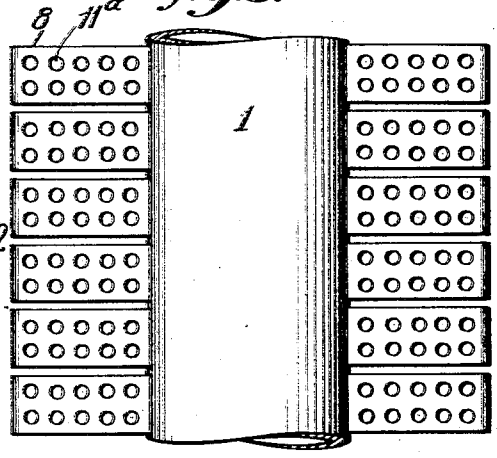
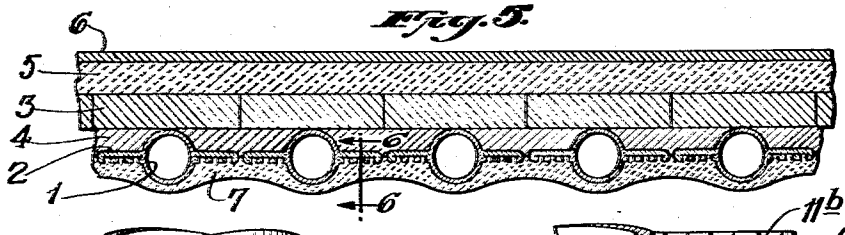


Fig. 5.



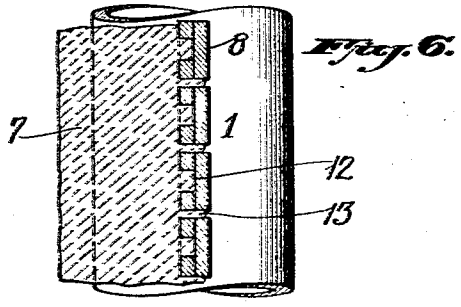


Fig. 6.

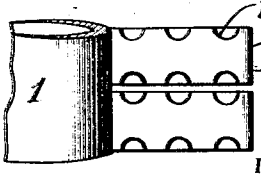


Fig. 4.

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TUBULAR UNIT FOR BOILER WALLS

Thomas E. Murray, Jr., Brooklyn, N. Y.

Application March 21, 1936, Serial No. 70,033

9 Claims. (Cl. 257—262)

In certain prior patents of Thomas E. Murray, and others, there is described a construction for the walls of boiler furnaces consisting of upright tubes spaced apart with longitudinal flanges or fins in the spaces between them whereby large quantities of steam have been generated at a high velocity. Such boilers have been found to be particularly efficient when fired with fuel in suspension like gas, oil, or powdered coal, particularly the last.

When using powdered coal there is a certain quantity of ash which is incombustible but is melted or softened in the flame and is deposited on the walls.

The present invention provides a style of wall and a tubular unit for building the same in which special provision is made for keying or anchoring to the wall the slag or ash which is deposited there in the operation of the furnace. The same construction is useful in case it be desired to cover the face of such a water wall with refractory material applied deliberately and before putting the furnace to use.

Referring to the embodiments of the invention illustrated—

Fig. 1 is a horizontal section through one of the tubular units. Fig. 2 is a face elevation of a portion of such a unit. Fig. 3 is a similar view illustrating a slight modification. Fig. 4 is a similar fragmentary view of another modification. Fig. 5 is a horizontal section of a portion of a water wall. Fig. 6 is a vertical section on an enlarged scale on the line 6—6 of Fig. 5.

Referring first to Fig. 5, a water wall or screen is made of a succession of tubes 1 placed alongside of each other and spaced apart slightly, having fins 2 extending into the spaces between them and practically filling the width of such spaces. These are backed by a wall of refractory bricks 3, generally with a plastic filling 4 of even greater refractoriness in the spaces between the bricks 3 and the fins. The wall is completed by an outer layer of insulating material 5 and a metal casing 6 holding the refractories in place.

On the inner, or fire, side of the wall of water tubes is a coating 7 of highly refractory material which has the advantage of shielding the tubes to some extent and preventing overcooling of the flame, and also of maintaining an incandescent surface in operation which may be beneficial in securing complete combustion of the fuel. This coating 7 may be applied to the face of the water wall by hand or may be accumulated thereon from molten slag or ash. And even if such a coating be applied beforehand it will collect additional molten slag or ash.

For keying the plastic coating and holding it in place, the fire face of the fins is formed with openings or recesses. This keying is sufficiently strong to hold not only the coating which is in direct contact with the fins, but also that which spreads over the plain face of the tubes. The natural slight roughness of the tubes is assisted by the recesses in the fins. The recesses may be of various sizes and depths and locations and may be secured by various constructions.

In previous patents, for example, Murray Patent 1,886,214, November 1, 1932, apertured flanges have been applied to boiler tubes for keying to them a plastic outer portion of the wall. The present invention, however, is for a very different purpose, the keying of a refractory coating on the fire-side of a tubular water wall. And for this purpose the fins, as shown in Fig. 5, are located inward (that is toward the fire-side) at least as far as the line through the centers of the tubes. In this line they are close enough to the inner faces of the tubes themselves to hold the plastic coating on the tube face as well as on the fins.

According to Fig. 1, a number of fin segments 8 are welded separately to the tube as at 9. The segments have considerable width (radially of the tube) but comparatively little length along the tube and little thickness so that the welded joint is a separate one for each fin segment. The segments are spaced close together, however, so as to secure the practical effect of a fin which is continuous in the lengthwise direction of the tube and forms with the tubes themselves a practically continuous metallic wall exposed to the fire.

By making the fins in small segments separately welded we avoid the distortion and strains which have occurred in tubes and fins themselves when made in substantially continuous lengths and welded along their entire lengths. Also each small fin segment is capable of distortion under the heat of use separately from the others and without putting any strain on the others.

The projection or fin segment 8 is bent around at its outer end as shown at Fig. 1 and brought back to the tube and welded thereto at 10 at the same time as at 9. The front portion of the strip, however, is provided with a number of perforations 11 which in the finished shape of the fin constitute recesses extending half way through the depth thereof.

In Fig. 1 there are three such recesses along the length of each segment. According to Fig. 3

there are ten recesses 11[a] similarly produced but smaller and closer together.

According to Fig. 4 the recesses 11[b] are half round perforations on the top and bottom edges. The effect is substantially the same in any of these cases.

The term "recesses" is used herein to define openings in the faces and extending only partly through the fins into which the plastic material can enter a sufficient depth to key and hold it in place while the faces of the fins between the recesses are smooth.

It is not only the circular recesses 11 illustrated in the faces of the fins which grasp and hold keying portions of the plastic coating as illustrated at 12, Fig. 6. The spaces extending clear through from front to back between the separate segments 8 also serve to receive and hold key portions 13 of the plastic coating 7 and thus supplement the recesses 11.

The fused slag from the burning fuel varies in quantity and in consistency with different fuels. Differences are found also when running the furnace hotter or cooler. Differences, of course, may be made in the character of coatings applied before firing the furnace.

The recesses are designed to take care of these varying conditions in the coatings. The spaces between the fin segments 8 are so close to each other (that is the length of the segments is so slight) that the keys formed in such spaces or recesses will hold a very considerable weight of plastic coating so as to supplement the weight-supporting effect of the recesses in the faces of the fins.

Various other modifications may be made by those skilled in the art without departing from the invention as defined in the appended claims.

What I claim is:

1. A unit for building walls of boilers and the like comprising a tube having a longitudinal fin which is welded directly to the tube and which is formed with recesses open on one face only and adapted to receive portions of a plastic coating so as to key the coating and hold it in place.

2. A unit for building walls of boilers and the like comprising a tube having a longitudinal fin which comprises an integral piece of metal with recesses open on one face only and adapted to receive portions of a plastic coating so as to key the coating and hold it in place.

3. A unit for building walls of boilers and the like comprising a tube having a longitudinal fin which comprises a metal strip with recesses in it open on one face only and adapted to receive portions of a plastic coating so as to key the coating and hold it in place.

4. A unit for building walls of boilers and the like comprising a tube having a longitudinal fin which comprises a multiple-ply metal strip, one ply constituting a face intended for exposure to the fire and having holes through it which are adapted to receive portions of a plastic coating so as to key the coating and hold it in place.

5. A unit for building walls of boilers and the like comprising a tube having a longitudinal fin made of separate closely spaced segments the faces of which have recesses open on one face only and adapted to receive portions of a plastic coating so as to key the coating and hold it in place, the spaces between the segments serving also to key the coating and help to hold it in place.

6. A unit for building walls of boilers and the like comprising a tube having a longitudinal fin made of separate closely spaced segments each of which comprises a metal strip with recesses in it open on one face only and adapted to receive portions of a plastic coating so as to key the coating and hold it in place.

7. A unit for building walls of boilers and the like comprising a tube having a longitudinal fin made of separate closely spaced segments each of which comprises a multiple-ply metal strip, one ply constituting a face intended for exposure to the fire and having holes through it which are adapted to receive portions of a plastic coating so as to key the coating and hold it in place.

8. In a boiler wall the combination of a plurality of tubes in line with each other spaced apart and having longitudinal fins in the spaces between them and located at least as far inward as the line of the centers of the tubes, the inner faces of the tubes being plain, and retaining means on the fins designed and adapted to make a keyed engagement with a plastic coating and to hold it to the entire inner face of the wall, including the faces of the tubes between the fins as well as the faces of the fins.

9. The boiler wall of claim 8, each of said fins being made of separate closely spaced segments, the spaces between which serve also to key the coating and hold it in place.

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