

May 15, 1945.

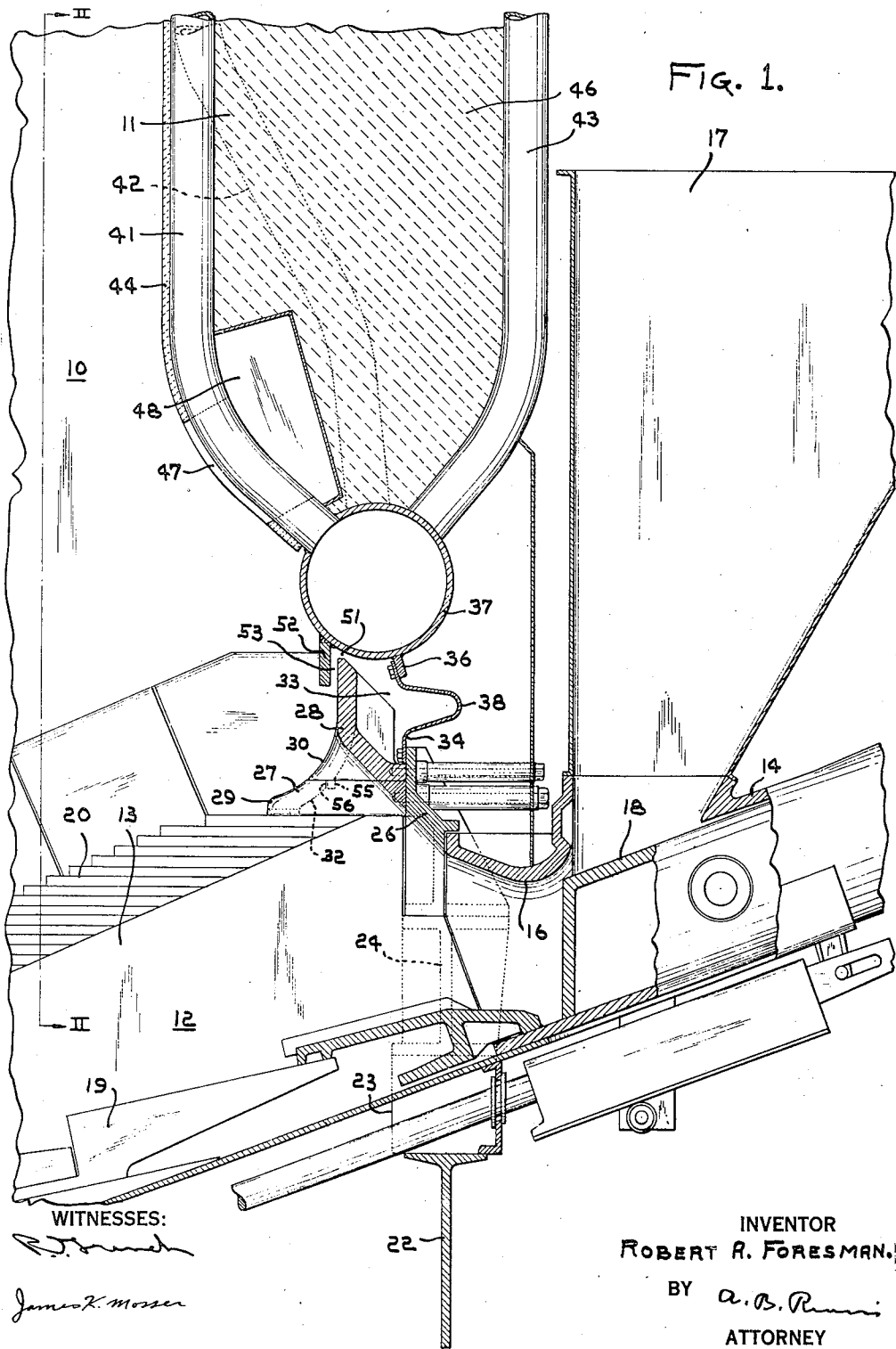
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2,375,841

FURNACE WALL CONSTRUCTION

Filed May 12, 1942

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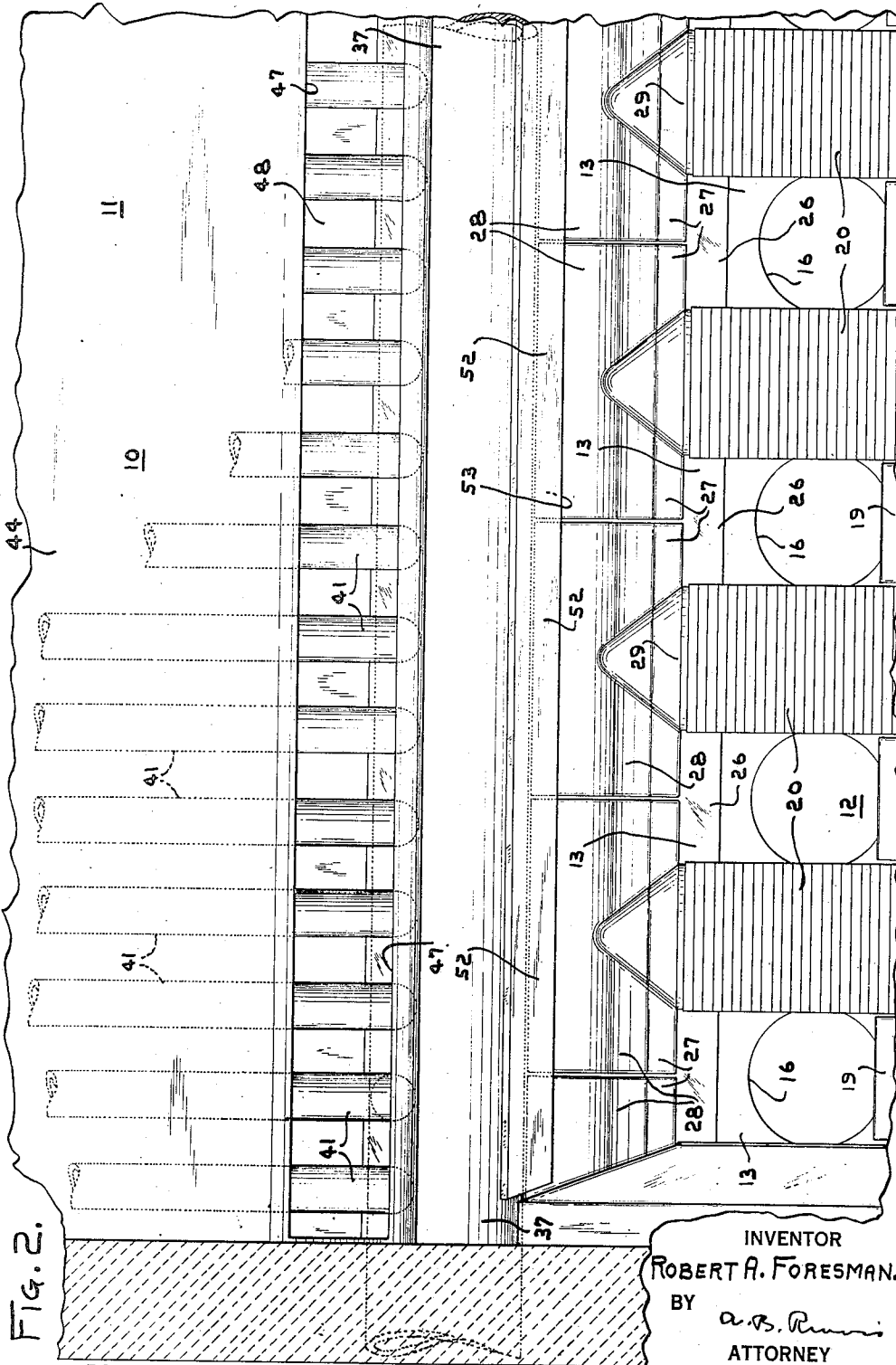
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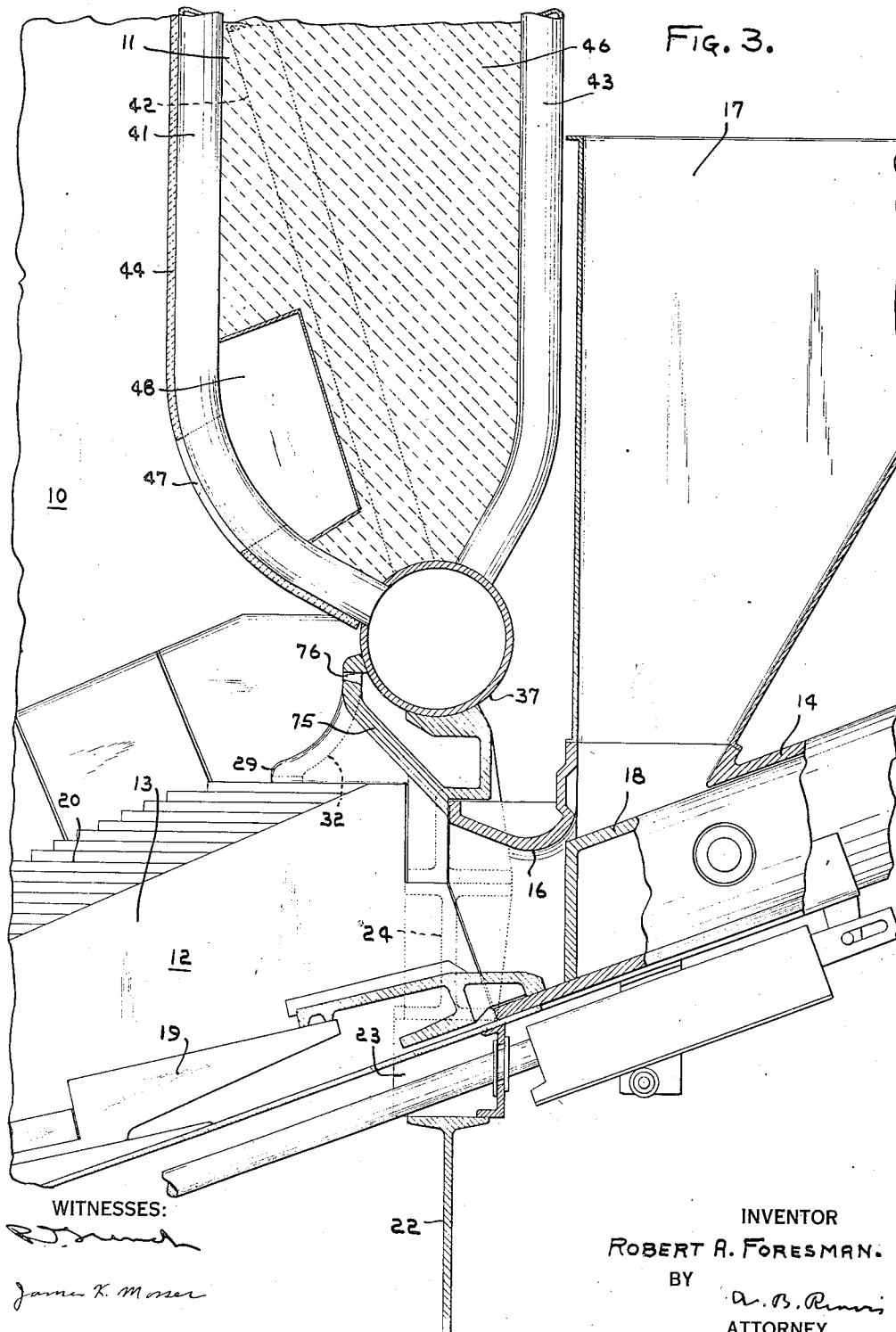
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UNITED STATES PATENT OFFICE

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FURNACE WALL CONSTRUCTION

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4 Claims. (Cl. 122—235)

This invention relates to stoker-fired boiler furnaces, more particularly to water-cooled front walls therefor, and has for an object to provide improved constructions of this character.

Another object of the invention is to provide a front wall construction for a stoker-fired furnace which wall has a water-cooled interior surface extending downwardly to the stoker structure.

Yet another object of the invention is to provide an indestructible water-cooled front wall construction for a stoker-fired furnace, which construction combines the water wall bottom header with the stoker structure and eliminates the refractory wall heretofore used for connecting these parts.

Another object of the invention is to provide, in a stoker-fired furnace, a wall structure contiguous to the upper edge of the grate surface to which slag and clinker will not attach themselves to extend outwardly therefrom over the fuel bed, thereby adversely affecting ignition and burning of the fuel.

A further object of the invention is to provide, in a stoker-fired boiler furnace, a water-cooled front wall movable vertically relative to the stoker.

Another object of the invention is to provide, in a stoker-fired furnace, a flexible seal between the lower edge of the furnace front wall and the stoker, whereby the former may move vertically relative to the latter.

Yet another object of the invention is to provide improved air distributing box structure for a furnace fired by a multiple retort underfeed stoker.

These and other objects are effected by the invention as will be apparent from the following description and claims taken in accordance with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a fragmentary transverse sectional view through the front wall of a stoker-fired furnace at its point of connection with the stoker;

Fig. 2 is a view taken along the line II—II of Fig. 1, looking in the direction of the arrows; and,

Fig. 3 is a view similar to Fig. 1, but showing a modified construction.

Referring now to the drawings more in detail there is shown, at 10, a furnace having a front wall 11, the furnace being fired by an underfeed stoker 12 downwardly inclined from the front wall of the furnace toward the rear wall thereof.

The stoker includes a plurality of retorts 13

having aligned therewith stoker ram boxes 14 including throat members 16 adjacent the upper ends of the retorts and providing for passage of fuel from the hopper 17 to said retorts. Fuel is fed through the throat members 16 by the usual primary ram 18, and along the retorts by the secondary ram structures 19, to overflow laterally onto the rows of tuyère members 20 which separate the retorts 13.

The upper or forward end of the stoker 12 is supported by the usual structural members 22, 23, and 24. A special supporting bracket 26 is mounted upon the structural member 24 and serves to support not only the ram boxes 14 but also lower and upper sections 27 and 28, respectively, of an air distributing box structure. In addition to being divided horizontally into the upper and lower sections 27 and 28, the air distributing box structure is divided vertically at the centerlines of the retorts, for ease in manufacture, assembly and replacement. The lower and upper sections 27 and 28 are provided with inwardly directed nose portions 29 and 30, respectively, overlying the upper ends of the rows of tuyère members 20 and being open at the bottom to provide a passage 32 for flow of air from beneath the tuyère rows to the interior 33 of the air distributing box structure. The reason for forming the air distributing box structure in lower and upper sections 27 and 28 will be explained later.

The forward or outer wall of the air distributing box structure is formed by a flexible wall portion 34 secured at its lower edge to the supporting bracket 26 and at its upper edge to a depending flange 36 carried by a horizontal header 37 of the furnace front wall 11. The flexible wall member 34 is provided intermediate its edges with a U-bend 38 or the equivalent to permit of vertical movement of the furnace front wall 11 with respect to the upper end of the stoker, to allow for expansion and contraction of the front wall due to temperature changes occurring in the latter.

The furnace front wall 11 includes a plurality of tubes 41, 42, and 43, extending upwardly from the header 37 to a boiler (not shown). The tubes 41 extend vertically along the inner face of the wall and preferably are covered at the furnace sides with suitable refractory material 44. If desired, the space between the various tubes may be filled with brick work 46, although the presence or absence of such brick work is immaterial to the present invention. Preferably, the refractory material 44 is omitted from a por-

tion 47 of each tube 41 to provide for passage of auxiliary air from the air passage 48.

The upper end of the inner or rear wall of the air distributing box structure is spaced slightly from the overlying horizontal header 37 to provide a passage 51 for flow of air from the distributing box to the interior of the furnace. To provide for uniform flow of air at this point regardless of the relative vertical position of the header 37 with respect to the stoker 12, there is provided a baffle 52 depending vertically from the header 37 and disposed in parallel but spaced relation with respect to the rearward wall of the air distributing box structure, thereby providing a passage 53 constituting a continuance of the passage 51. It will be apparent that there is thus provided an exit passage for air from the air distributing box structure which will be of constant cross-sectional area regardless of changes in the dimension of the passage 51 resulting from vertical movement of the header.

Because of the presence of the depending baffle 52 it becomes necessary, for the purposes of assembly or disassembly, to form the air distributing box rear wall structure in upper and lower sections 27 and 28, as previously described. These sections, in addition to being bolted, or otherwise secured, to the supporting bracket 26, are interlocked by a depending lug 55 on the upper section 28 adapted to mate with a corresponding recess 56 formed in the lower section 27. In order to remove the sections 27 and 28 after they have been unbolted from the supporting bracket 26, it is only necessary to raise the upper section 28 sufficiently to permit the depending lug 55 to clear the upper surface of the lower section 27, whereupon the latter may be withdrawn rearwardly to the interior of the furnace, after which the upper section 28 can be dropped sufficiently to clear the depending baffle 52.

In Fig. 3, there is illustrated a construction differing from that illustrated in Figs. 1 and 2 in that the air distributing box 75 is made in unitary sections and serves as a fixed support for the horizontal header 37. Air from the distributing box structure is supplied to the interior of the furnace through spaced discharge openings 76. It will be apparent that in this arrangement expansion occurring in the furnace front wall 11 must take place in the upper portion thereof by bends in the tubes where they enter the furnace boiler, in the conventional manner (not shown).

While the invention has been shown in several forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifi-

cations without departing from the spirit thereof, and it is desired, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What is claimed is:

1. In a boiler furnace fired by a multiple retort underfeed stoker providing a fuel-supporting surface within the furnace and downwardly inclined from the front toward the rear of said furnace, a water-cooled front wall comprising water tubes extending downwardly from a boiler, a horizontal header receiving the lower terminal portions of said water tubes and disposed in close proximity to the upper end of the stoker, air distributing box structure associated with the upper end of the stoker, and means providing a flexible air-tight seal between the horizontal header and said air distributing box structure whereby the header and associated water wall structure may move vertically with respect to the stoker structure

2. In a boiler furnace fired by a multiple retort underfeed stoker providing a fuel-supporting surface inclined downwardly from the front toward the rear of the furnace; throat members aligned with the upper ends of the retorts for passage of fuel to the latter; a water-cooled front furnace wall comprising water tubes extending downwardly from a boiler and terminating in a horizontal header; and air distributing box structure associated with the throat members and the upper ends of the stoker tuyère rows and comprising a rear wall spaced along its upper edge from the horizontal header to provide a passage for flow of air from the air distributing box structure to the interior of the furnace, and a flexible front wall in airtight engagement with the horizontal header and the upper ends of the stoker tuyère row structures, whereby said header and its associated wall structure may move vertically relative to said upper ends of the stoker tuyère row structures.

3. Structure as specified in claim 2, including baffle means carried by the horizontal header in parallel, spaced overlapping relation to the rear wall of the air distributing box structure with the space between said baffle means and said rear wall constituting a continuation of the air passage, whereby the cross-sectional area of said passage will remain constant during vertical movement of the horizontal header with respect to the upper ends of the tuyère rows.

4. Structure as specified in claim 2, including baffle means carried by the horizontal header for directing air flowing from the air distributing box structure.

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