

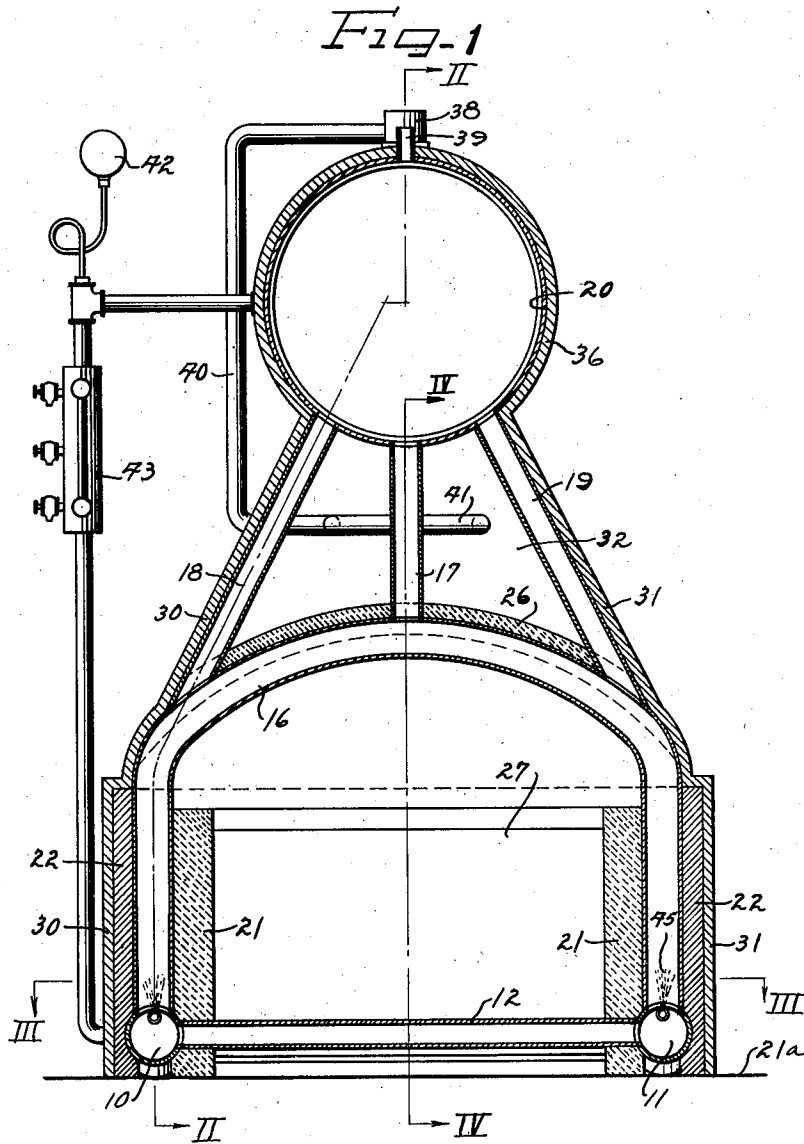
Aug. 30, 1949.

F. BERWANGER
BOILER CONSTRUCTION

2,480,440

Filed July 7, 1945

3 Sheets-Sheet 1



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By *The Firm of Charles H. Hill & Co.* Attys

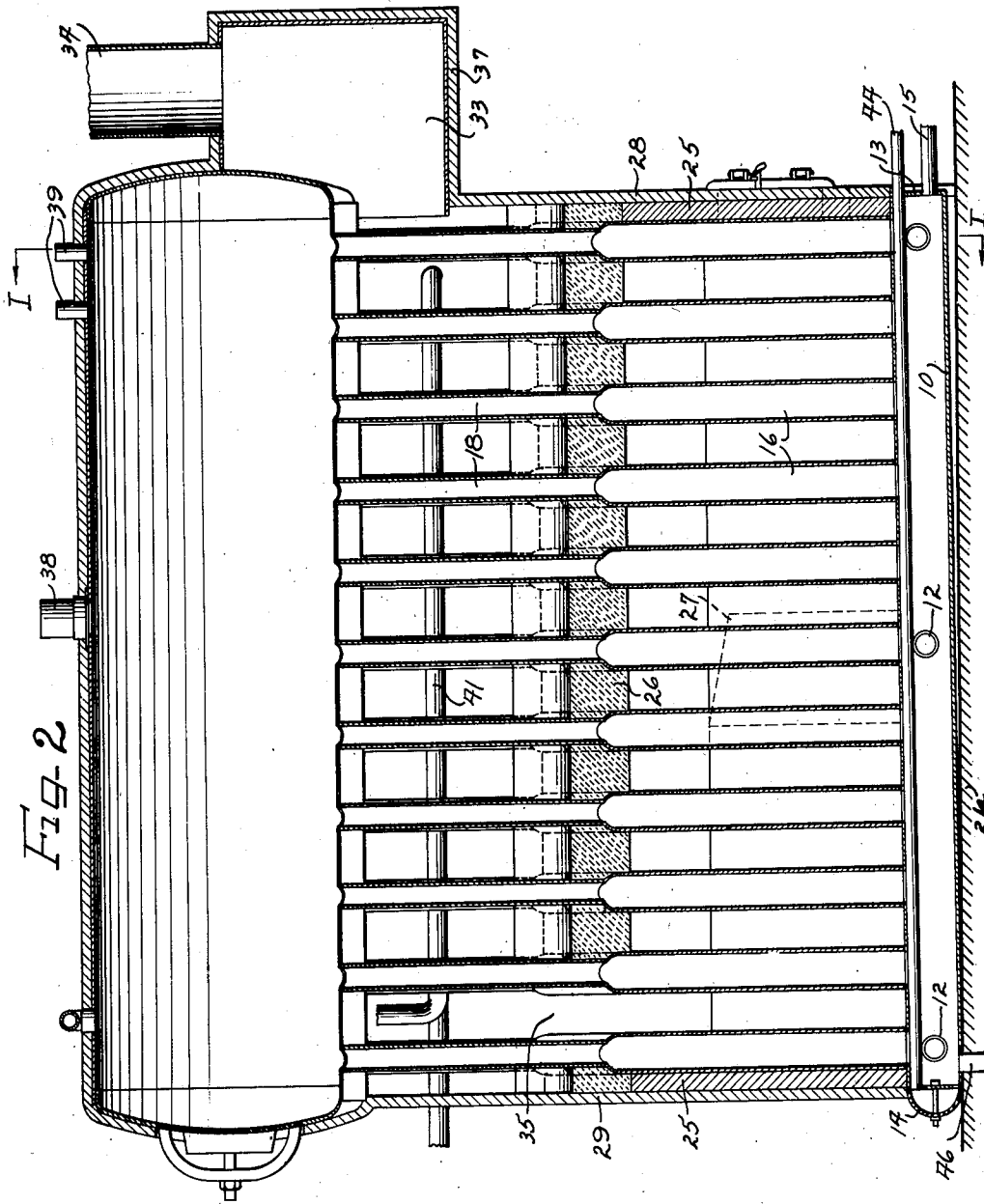
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3 Sheets-Sheet 2



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Fig-3

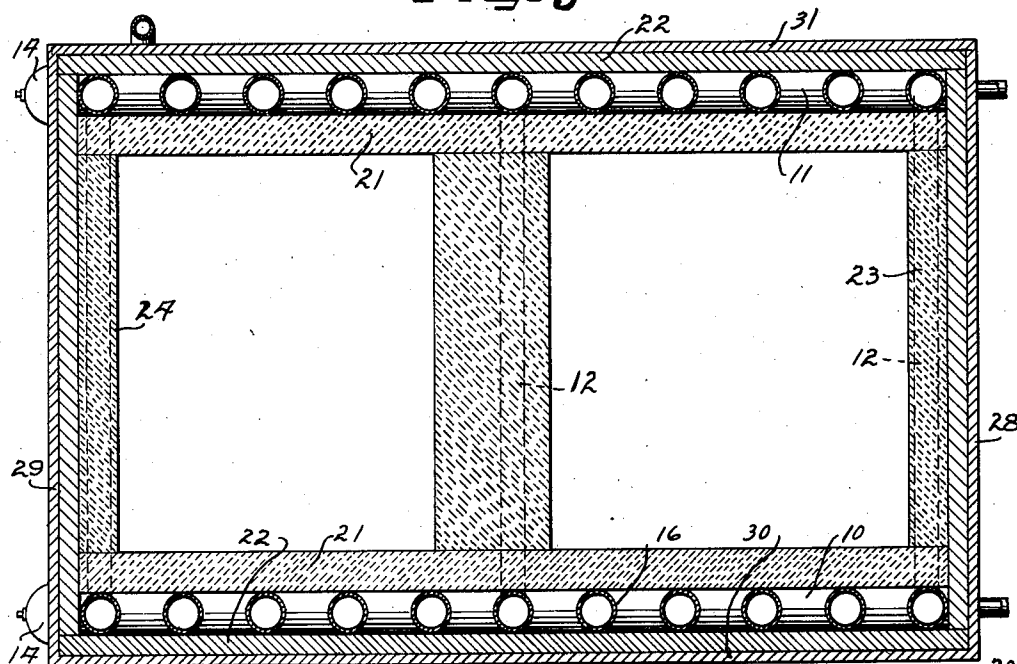
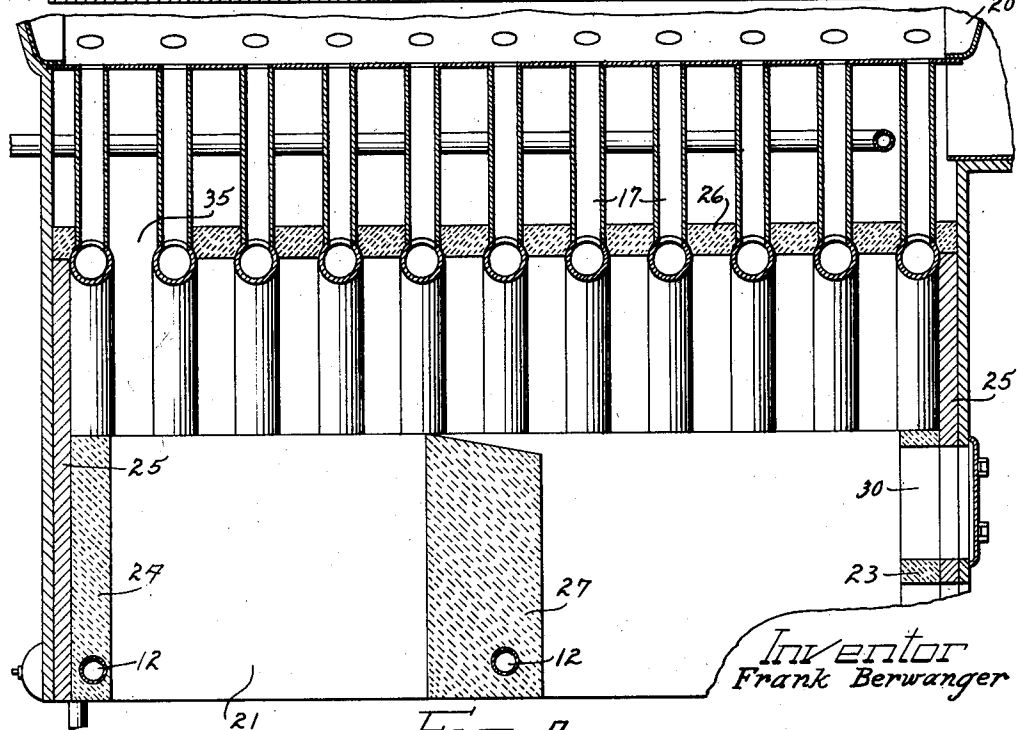


Fig-4

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UNITED STATES PATENT OFFICE

2,480,440

BOILER CONSTRUCTION

Frank Berwanger, Dubuque, Iowa

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1 Claim. (Cl. 122—328)

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My invention relates to steam boilers, particularly to improved construction thereof which will facilitate assembly and reduce the cost of construction.

An object is to provide an improved boiler construction which is easy to assemble and install.

An important object of the invention is to provide a boiler which can be constructed substantially entirely of seamless pipe or tubing members connected together, as by welding, to provide the various water or steam flow passages.

A further object is to construct a metallic skeleton structure in the form of seamless tubing parts connected to provide the various water and steam flow passageways, and with brick, tile, and plastic or other material, associated with this skeleton frame to form a firebox, flue passageways and other passageways for the flow of products of combustion.

In accordance with the features of this invention there is to provide a supporting structure for a firebox and combustion chamber comprising a horizontal row of inverted U- or arch-shaped elements in the form of seamless tubing and with additional tube members extending upwardly from the arch members for supporting a steam dome or tank and for defining with the arch members an outlet flue passageway to smokestack for the products of combustion from the firebox and combustion chamber.

The above referred to and other features of the invention are embodied in the structure shown on the drawings, in which:

Figure 1 is a transverse section through my boiler structure on plane I—I of Figure 2;

Figure 2 is a section on plane II—II of Figure 1;

Figure 3 is a section on plane III—III of Figure 1; and

Figure 4 is a fragmentary section on plane IV—IV of Figure 1.

The metallic skeleton supporting structure for the boiler comprises the horizontally extending base members 10 and 11 each in the form of a length of seamless tubing, and the base members being cross connected by a number of tube members 12. The front end of the base tube 10 may be closed as by end walls 13, while the rear end of the tube may be closed by removable cover structures 14. A water inlet pipe 15 connects with the front end of the base tubes 10 and 11.

Mounted on and spanning the base tubes 10 and 11 is a row of inverted U- or arch-shaped members 16 each in the form of a length of seamless tubing. Extending upwardly from each arch member 16 at the middle thereof is a tube 17.

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From the opposite corners of each arch member 16 tubes 18 and 19 extend diagonally inwardly, and the tubes 17, 18 and 19 form supports for a steam dome or tank 20, Figures 1 and 2.

The boiler structure is mounted on a cement floor or foundation 21^a. The vertical portions of the arch members 16 are embedded in side wall structures of preferably fireproof or ceramic material. As shown, the inner portion 21 of the side walls may be formed of firebrick and the outer portion 22 of tile. These side wall structures are connected at their ends by the front and rear end wall structures 23 and 24 and these wall structures may embed the front and rear cross tubes 12, as shown on Figures 3 and 4. The walls 23 and 24 may be of firebrick and may be faced on their outer sides by tile 25. These tile facings 25 extend between the front and rear ends of the tile portions or facings 22 of the side wall structures 21. Extending between the tops of the side wall 21 and across and partially embedding the upper portions of the arch members 16 is the wall 26 (Figures 1 and 2) which is preferably of firebrick. This wall 26 forms the roof of the boiler fire and combustion space. Extending across this space is a fire wall 27 preferably of firebrick, and in this wall the middle cross tube 12 may be embedded. This fire wall is between the fire pot chamber 28 and the combustion chamber 29. The fuel feed opening 30 is provided through the front wall 25 (Figure 3).

An outer wall or shell, which may be of plastic material, has the front and rear end walls 28 and 29 and the side walls 30 and 31. The side walls 30 and 31 extend along and against the outer side of the tubes 18 and 19 and with the end walls of the shell define the flue passageway 32 leading at one end to the smokebox 33 (Figure 2) from which the smokestack 34 extends. At the rear end of the boiler an outflow passage 35 (Figures 2 and 4) is provided for flow of the products of combustion through the flue passage and to the chimney. The products of combustion from the firebox and the combustion chamber flow along the undersurface of the upper portion of the arch tubes 16 and through the passage 35 into the flue passageway, these products of combustion serving to heat, by contact, the tubes 17, 18 and 19. The water maintained in the arch members and in the tubing 17, 18 and 19 to a predetermined level, will thus be heated by the products of combustion and converted into steam which flows into the steam tank or dome 20. The side and end walls of the shell structure may extend around the tank, as shown

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at 36, and also around the smokebox 33, as shown at 37 (Figures 1 and 2).

The main steam outlet 38 is provided for the steam tank and nipples 39 may serve to support safety valves or other structure (Figures 1 and 2). Provision is made for superheating part of the steam. A pipe 40 extends from the steam tank for delivering steam to the superheater loop 41 extending through the flue passageway 32, the end of the loop extending through the end wall 29 for delivery of the superheated steam (Figure 1). A steam gauge 42 is connected with the steam tank and a gauge 43 will indicate the water level in the boiler structure.

Provision is made for washing out the water passageways of the boiler structure. For this purpose pipes 44 extend through the base tubes 10 and 11 (Figure 2) and have orifices 45 (Figure 1) for directing steam, water or other cleaning fluid under pressure from the pipe 44 into the arch tubes. As shown on Figure 2, the base tubes 10 and 11 incline slightly rearwardly so that during a washing operation the washed out material may flow down for discharge through a tube 46 into the sewer. A valve (not shown) could be provided for the drain tube 46 so it could be closed during service operation of the boiler.

I have thus produced a simplified but efficient boiler structure which can be economically constructed of lengths of ordinary steel piping or seamless tubing shaped and connected together to form the skeleton or supporting frame work for the boiler structure and at the same time providing the flow passageways for the water to be converted into steam.

I have shown a practical and efficient embodi-

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ment of the features of my invention, but I do not desire to be limited to the exact construction or arrangement shown and described, as changes and modifications may be made without departing from the scope of the invention as defined in the appended claim.

I claim as my invention:

A boiler structure comprising a plurality of inverted U-shaped water tubes, a steam drum spaced vertically above the arch of said U-shaped tubes, laterally arranged upwardly converging tubes forming upper continuations of the vertical legs of the U-shaped tubes and opening into said drum on opposite sides of the bottom thereof, vertical tubes connecting the upper parts of the bights of said U-shaped tubes to the bottom of said drum, said laterally arranged and vertical tubes constituting the support for said steam drum, continuous lateral walls enclosing said vertical legs and said upwardly converging tubes and a segmental cylindrical wall surrounding the upper portion of said drum and continuous with said lateral walls to concentrate the heat of the combustion gases against the underside of said drum.

FRANK BERWANGER.

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