Nov. 20, 1951 B. W. MANDELBURG 2,575,723

VERTICAL FLUE BOILER

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Fig. 1

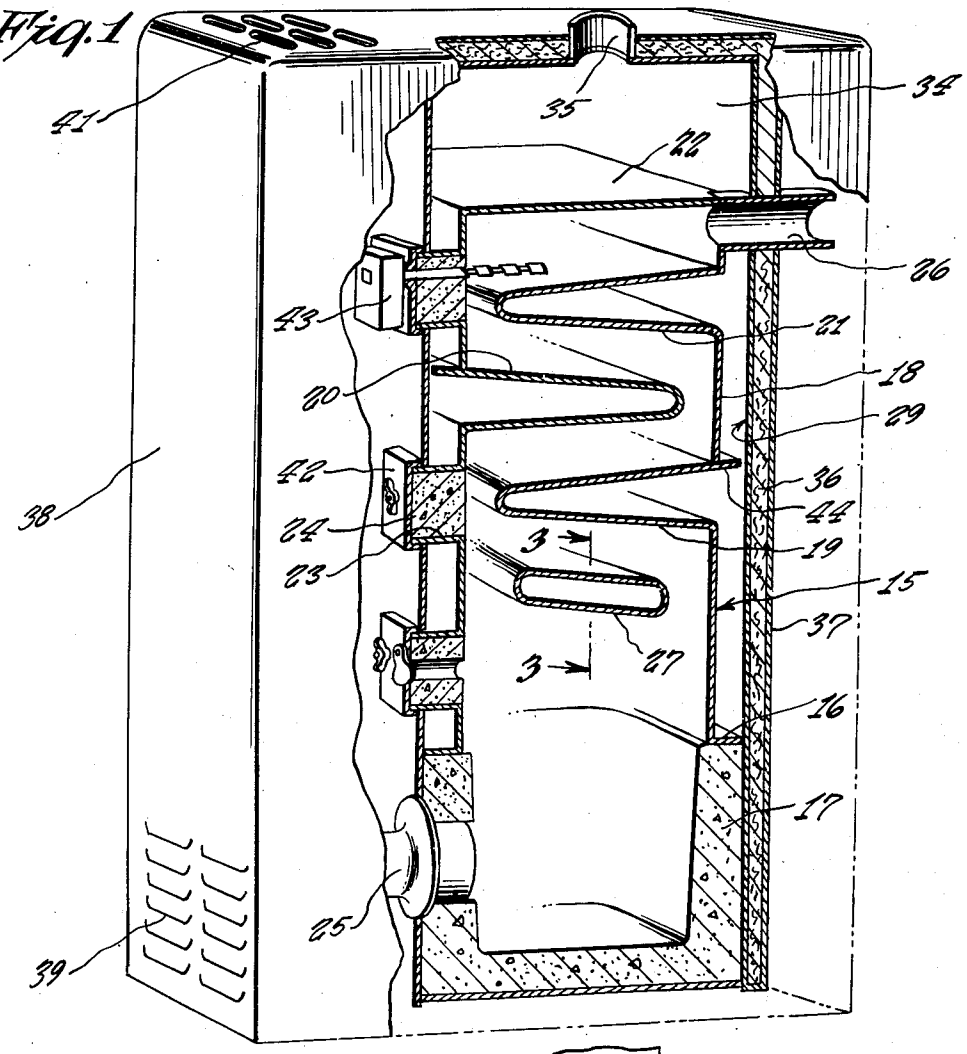
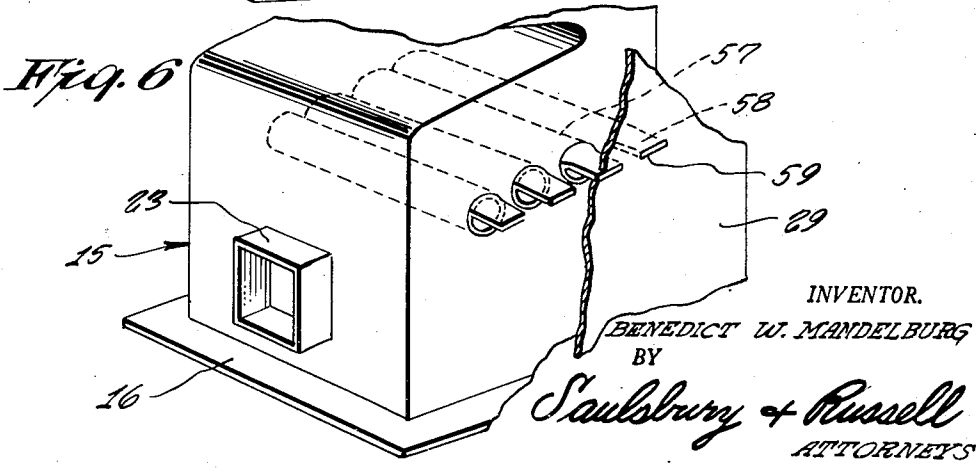


Fig. 6



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Fig. 2

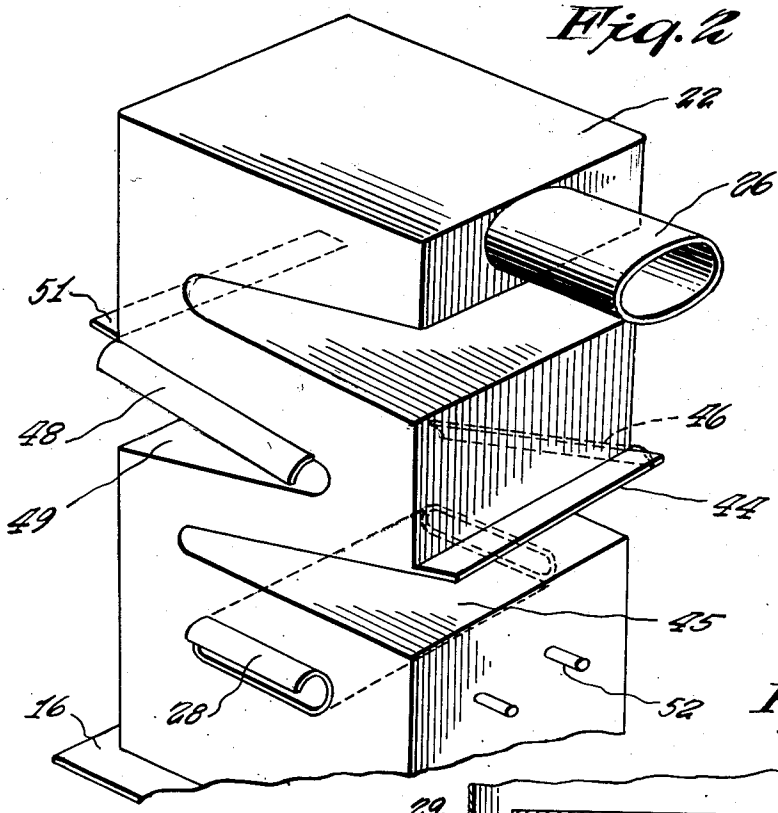


Fig. 5

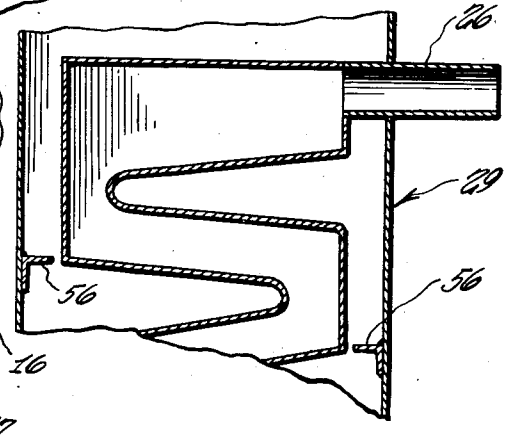


Fig. 3

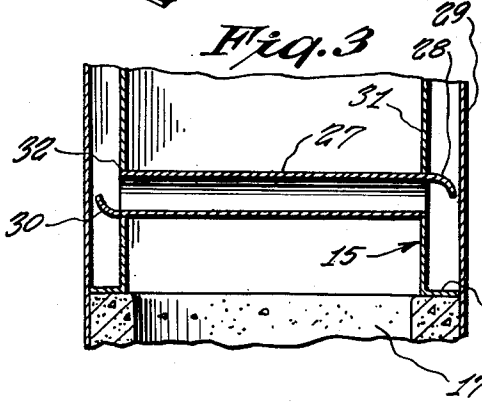
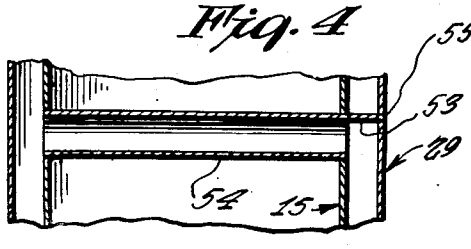


Fig. 4



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Fig. 7

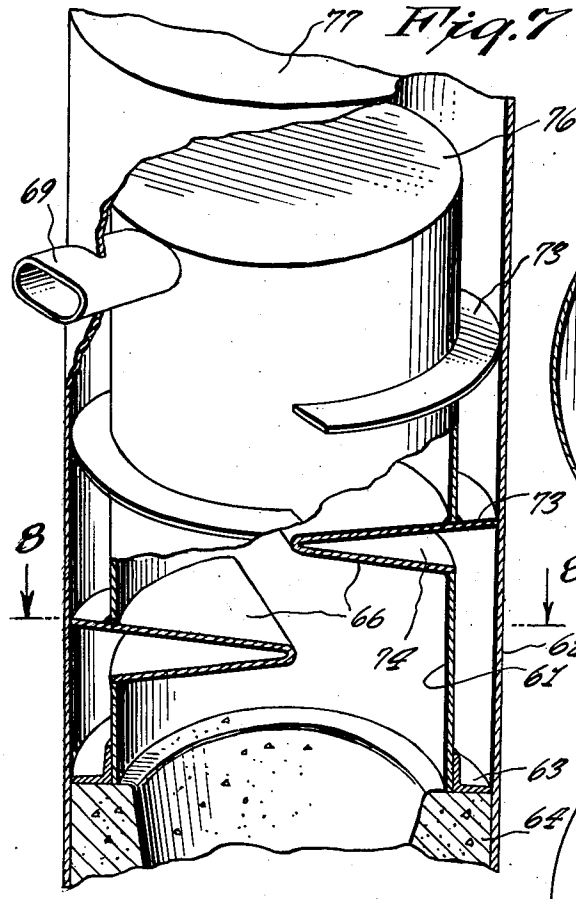


Fig. 8

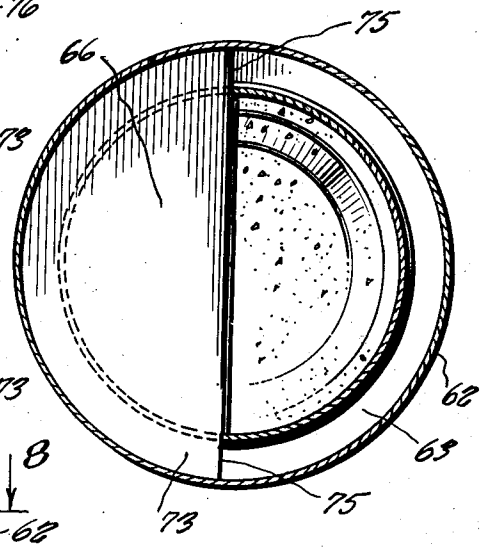


Fig. 9

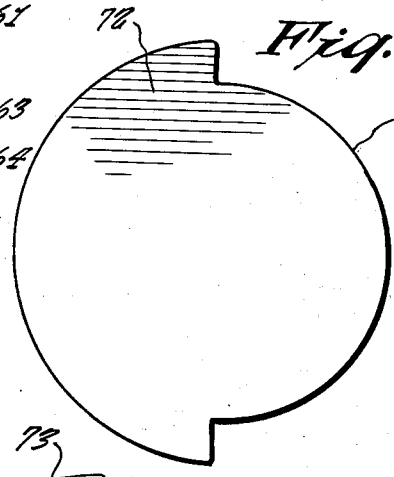


Fig. 10

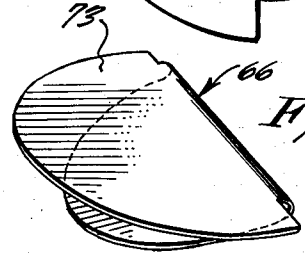
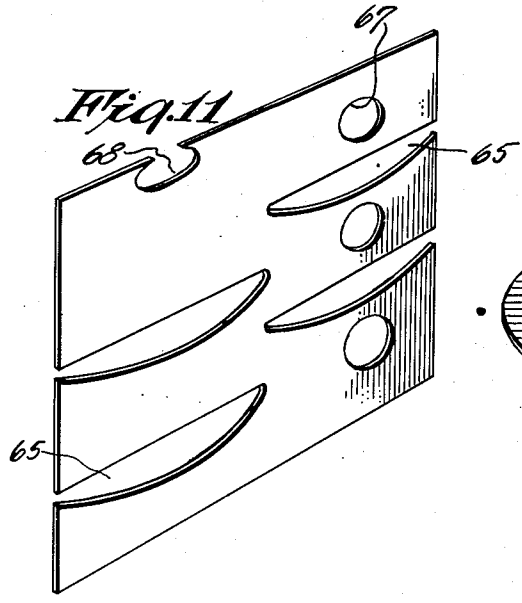


Fig. 11



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VERTICAL FLUE BOILER

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Application June 18, 1948, Serial No. 33,857

4 Claims. (Cl. 122—155)

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This invention relates to heating boilers for steam vapor and hot water systems and more particularly to the detail construction of the same.

It is an object of the present invention to provide a heating boiler with an improved and directed internal fluid circulation, comprising inner and outer shells wherein water baffles will be provided between the shells to direct the flow of water or other fluids in their upward passage from side to side and into contact with the flue baffles and wherein the water baffles or projections may be integral with the flue members and may be extended through slits in the outer shell and welded thereto whereby to eliminate the necessity for stay bolts.

Other objects of the present invention are to simplify the construction of heating boilers, improve the water flow through the boiler and its efficiency, to render the boiler inexpensive to manufacture and to provide a heating boiler adaptable for hot water systems utilizing forced circulation and a pump in the return or flow pipe for delivering the water to or from the boiler under pressure.

For other objects and for a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which

Fig. 1 is a perspective view of a heating boiler having the baffles of the present invention and with the portion of the exterior casing, the inner and outer shells being broken away to show the interior of the boiler.

Fig. 2 is a fragmentary and perspective view of the inner shell with the water baffles protruding therefrom.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1, the baffle being an extension of a flue baffle.

Fig. 4 is a fragmentary sectional view of the water baffle extending through a slit in the outer shell and welded thereto thereby to eliminate stay bolts.

Fig. 5 is a fragmentary sectional view of a still further form of the present invention wherein angle members are welded to the inner faces of an outer shell and according to a modified form of the invention.

Fig. 6 is a perspective view wherein multiple water tubes are provided and wherein each of the tubes have an integral baffle projection extending through the outer shell and welded thereto.

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Fig. 7 is a fragmentary perspective view of a heating boiler employing cylindrical shaped inner and outer shells.

Fig. 8 is a transverse sectional view of the heating boiler shown in Fig. 7, the view being taken on line 8—8 thereof.

Fig. 9 is a plan view of the flue member before it has been bent across its diameter.

Fig. 10 is a perspective view of the bent flue member illustrating how it is shaped before it is inserted through the slots provided in the inner shell.

Fig. 11 is a perspective view of the plate which is used to form the inner shell, the slits and openings being provided therein to receive other members forming a part of the boiler, shown in Fig. 7.

Referring now particularly to Figs. 1, 2 and 3, 15 represents an inner shell which comprises a foot 16 adapted to rest on a fire box 17, upright portions 18, flue projections 19, 20 and 21 extending inwardly from the upright portions and causing water to circulate across them, a top portion 22 and clean out projections 23 extending from the upright portions of one side and adapted to contain fire brick material 24.

A burner 25 is connected to the fire box 17 which will extend flame thereinto for travel upwardly through the inner shell around the ends of the flue projections and in serpentine fashion. The smoke is led out of the shell through a chimney flue 26.

At a low position in the inner shell and between the sides thereof, there is extended a large flattened flue baffle or tube 27 open at its ends and connected within openings on the upright portions of the shell, Fig. 3. This tube 27 has a baffle extension 28 at one end, which is curved downwardly to direct water which rises about the inner shell into the flue baffle or tube 27. This baffle extension 28 is curved and does not engage outer shell 29. The ends of the tube 27 are welded to the exterior of the inner shell 15 as indicated at 31 and 32. The projection 28 extends across substantially the entire width of the tube.

The outer shell 29 extends about the inner shell to provide for the water space between the shells. The lower end of the outer shell 29 extends downwardly along the outer face of the fire box 17 and to the bottom thereof. The upper end of the shell extends a substantial distance above the top portion 22 of the inner shell to provide a large water or steam chamber 34 therein. An outlet pipe 35 extends from the outer shell for the delivery of hot water or steam to the heating radiators or other fixtures.

About the sides, back and top, there is provided insulation material 36 and a casing 37 to retain it. The front side of the outer shell is not insulated. About the entire structure including the burner 25 is a casing 38. This casing is extended at the front or rear of the outer shell and air may enter openings 39 and be heated upon traveling upwardly through the front of the casing 38 for ventilating and providing air for burners. The clean out projections 23 extend to the front of the outer shell and through the same. These projections have cover plates 42 fastened to them. Burner control device 43 extends through the upper clean out opening.

In addition to the baffle extension 28 of the tube 27, the inner shell is provided with a projection 44 at the rear side to direct the water rising about the shell into space 45 within the flue projection 19. A similar baffle projection 46 is provided at the side of the inner shell opposite the side where the baffle extension 28 of the pipe 27 is located. This also serves to deflect inwardly the rising water. The water will leave the space 45 from the side not having the baffle extensions. A similar projection 30, Fig. 3, is provided at opposite end of the flattened water tube 27 to direct water upwardly as it leaves the water tube.

On the flue projection 20, there is a similar arrangement of baffles. A baffle 48 collects and directs the water rising from the outward end of the space 45 and directs the same into space 49. A baffle 51 extends cross the front side of the inner shell 15 to direct the water rising on the front of the shell into the space 49. The inner and outer shells can be held separated from one another by stay bolts 52 disposed at different locations upon the shells.

In Fig. 4, there is shown a form of construction wherein a projection 53 of a tube or flue baffle projection 54, is extended through a slot 55 in the outer shell 29 and welded thereto as indicated whereby to serve a double purpose of a baffle for the water passing between the shells and as a stay bolt for bracing the shells. This provides a simplified construction.

In Fig. 5, the baffles are provided on the outer shell and are in the form of angle irons 56 welded to the inner faces of the outer shell 29 at proper locations throughout the height of the boiler. These projections can thus be provided on the outer shell or on the inner shell and may be an integral part of the water tube or of the plate formations forming the flue projections.

Where tubes are used in the boiler as indicated at 57 in Fig. 6, they may be respectively provided with top extending baffle projections 58 which will pass through slots 59 in outer shell 29 and be welded thereto. These tubes will also pass through holes in the inner shell wall and will be welded thereto. Water rising in the boiler will be directed by these baffles 58 into the tubes 57. The projections 58 will serve as stay bolts.

Referring now particularly to Figs. 7 to 11, there is shown a boiler formed of cylindrical inner and outer shells 61 and 62. On the lower end of the inner shell, there is fixed a ring 63 of angular section which rests upon the top of fire box 64. The outer shell 62 extends downwardly along the exterior of the fire box and below the bottom of the inner shell.

The inner shell 61 is formed from a flat plate which is cut in the manner as shown in Fig. 11. This plate has slits 65 extending inwardly from opposite edges and at different elevations to receive flue projections 66, Fig. 10, when the plate has been rolled into the inner shell. Holes 67 are provided for the connection of clean out projections. A recess 68 is provided at the top edge of chimney flue 69.

The flue projections 66 are formed from a plate 71 having a large half portion 72 providing for a water baffle 73 when the plate 71 has been bent into the shape as shown in Fig. 10. These bent flue projections are extended into the slits 65 of the inner shell plate. These projections 66 are welded to the edges of the slit at the top and bottom and provide space 74 through which water may travel after having been diverted thereinto by the baffle 73. The water will leave the space 74 at the ends of the baffle as indicated at 75, Fig. 8. The water upon leaving these openings will next rise to meet the baffle 73 at the next elevated position. By these baffles, the water will be forced to traverse the spaces 74 and absorb the heat from the projections 66. The inner shell has a top portion 76 and a similar water space as with the previous boiler is provided above the top portion 76. The outer shell 62 has a top portion 77.

The boiler, as shown in Fig. 7, can be similarly insulated as is the square type boiler shown in Fig. 1 and a heater casing can be provided thereabout to enclose the burner entering the fire box 64.

It should be apparent that there has been afforded a simple method of forming a boiler from plate wherein flue projections and water baffles will be provided. Inasmuch as the boiler shown in Fig. 7 is made of cylinders, stay bolts will not be required.

It should be further apparent that with both forms of the invention, the water is forced to take a given path inwardly through the space provided by the flue projections wherein it will be more quickly heated and its rise through the boiler will be at an increased speed. With boilers of this type, the water can be extended through them under pressure, a pump being connected to the return line of a two pipe water system and forced into the boiler at a low point. The baffles have particular use for boilers where the water is being forced through them.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

I claim:

1. A heating boiler comprising an inner shell, a horizontal flue projection extending inwardly into the combustion space, said flue projection providing a water space open on three sides and having an upper portion, an outer shell surrounding the inner shell and providing a water space therebetween and baffle means disposed on two adjacent sides of said water space of the flue projection at the level of said upper portion of the flue projection and in the space between the shells, whereby to direct water moving upwardly between the shells into the projection space from two open sides and outwardly of the projection space from the third open side thereof.

2. A heating boiler comprising an inner shell, horizontal flue projections extending alternately from opposite sides of the shell one above the other, each of said flue projections providing a water space open on three sides and having an upper portion, an outer shell surrounding the inner shell and providing a vertical water space

therebetween and the spaces within the projections being in communication with said vertical water space, baffle means disposed on two adjacent open sides of one of said projections and at the level of the upper portion thereof, and baffle means on an alternate flue projection thereabove disposed on two adjacent open sides and at the level of the upper portion of said alternate projection, said alternate baffle means being oriented to lie on the opposite sides of the boiler from the baffle means of said one flue projection, whereby the water on passing in a serpentine manner through the water spaces will leave the projection water spaces at the opposite sides of the boiler.

3. A heating boiler comprising an inner shell, horizontal flue projections extending inwardly into the combustion space within the inner shell, said flue projections providing water spaces, an outer shell surrounding the inner shell and providing a space therebetween with which the projection water spaces communicate, said flue projections having upper portions with baffle extensions projecting into the space between the shells to direct water moving upwardly between the shells into the water spaces within the flue projections.

4. A heating boiler comprising an inner shell, horizontal flue projections extending inwardly into the combustion space within the inner shell, said flue projections providing water spaces, an outer shell surrounding the inner shell and providing a space therebetween with which the projection water spaces communicate, said flue projections having upper portions with baffle extensions projecting into the space between the shells to direct water moving upwardly between the shells into the water spaces within the flue projections and a water tube extending through two sides of the inner shell below the flue projections, said water tube having an integral baffle extension on one end thereof projecting into the space between the shells to direct water moving upwardly between the shells into the water tube.

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