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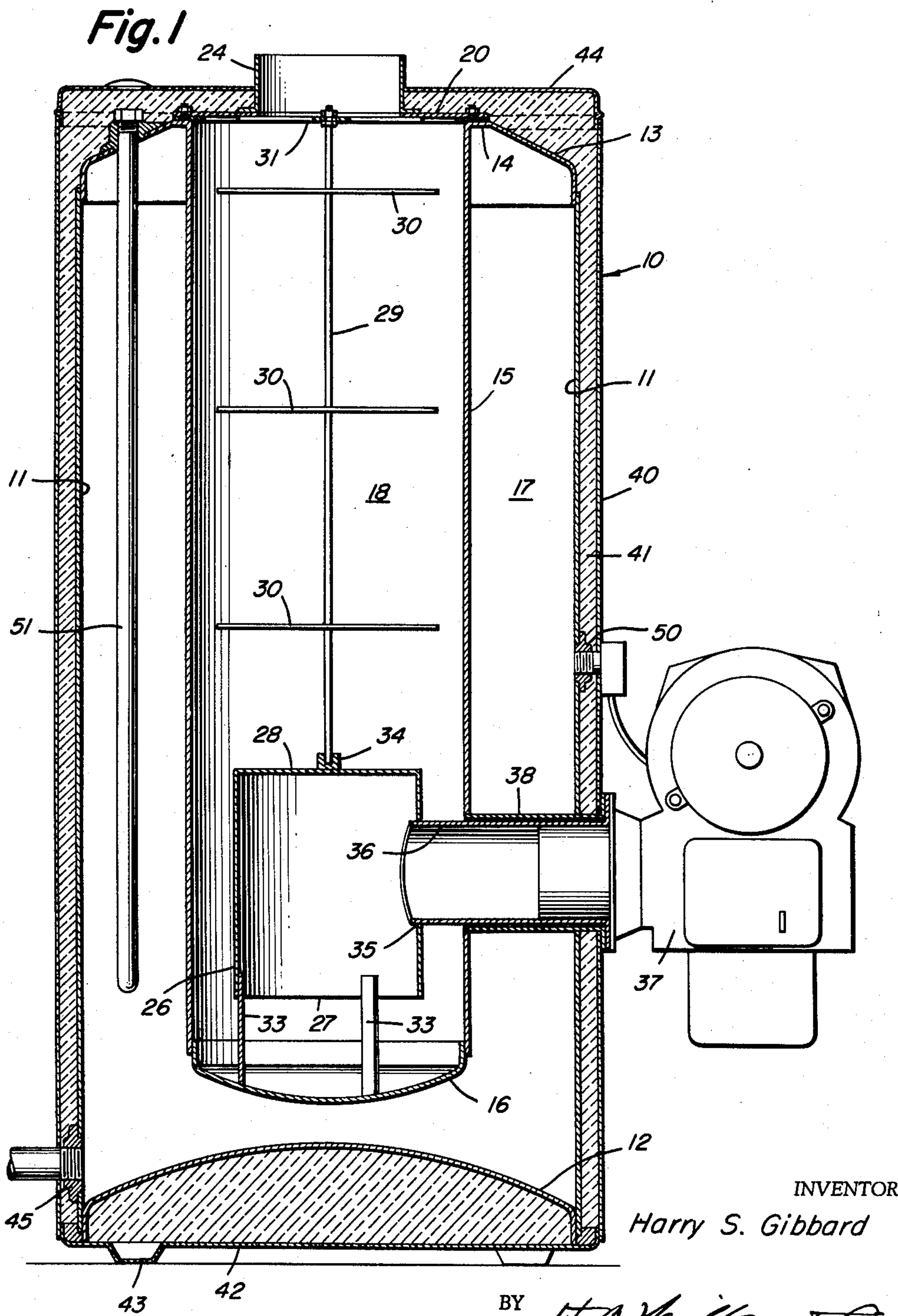
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HOT WATER STORAGE TANK WITH CENTRALLY SUSPENDED HEATING UNIT

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2 Sheets-Sheet 1



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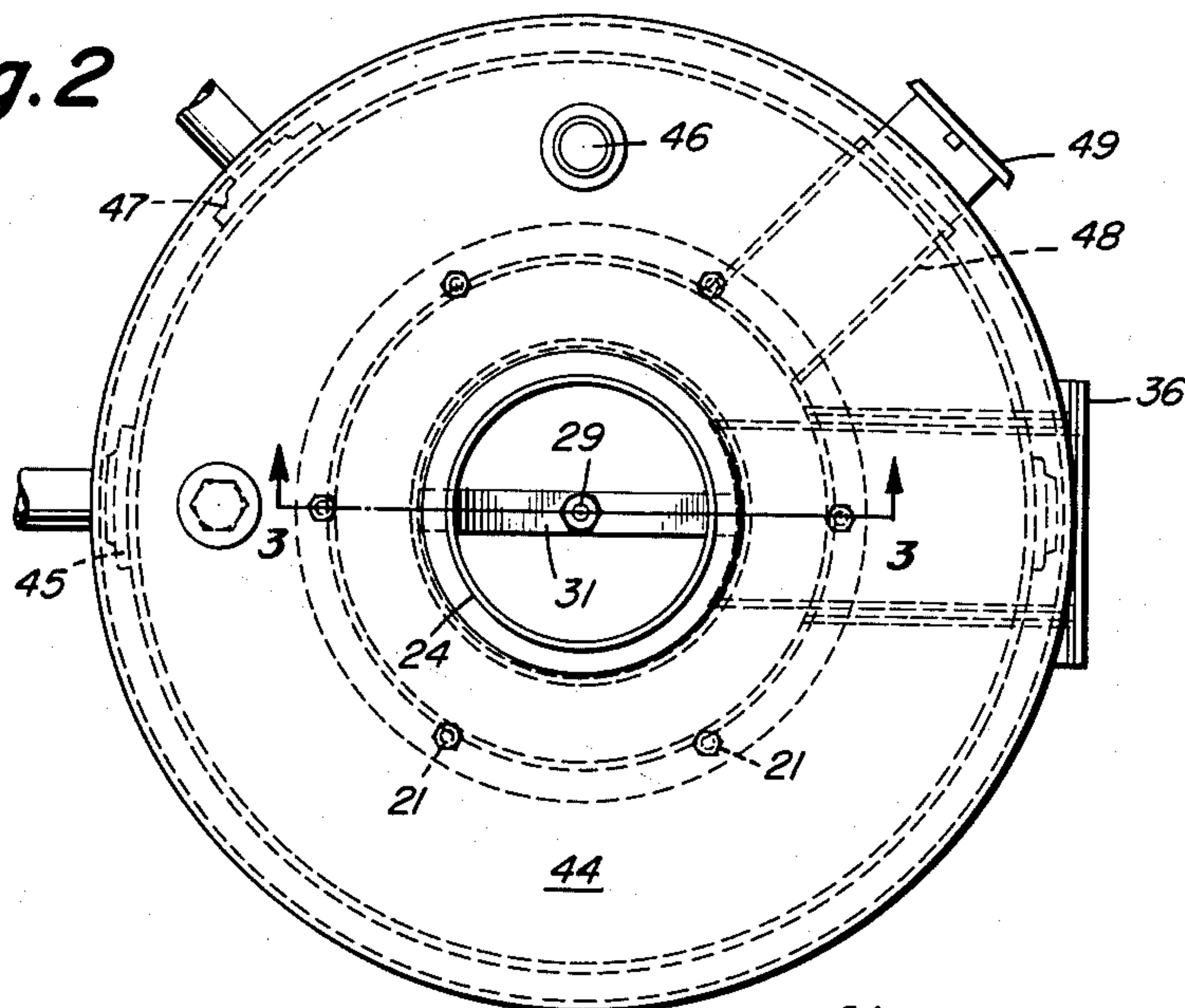
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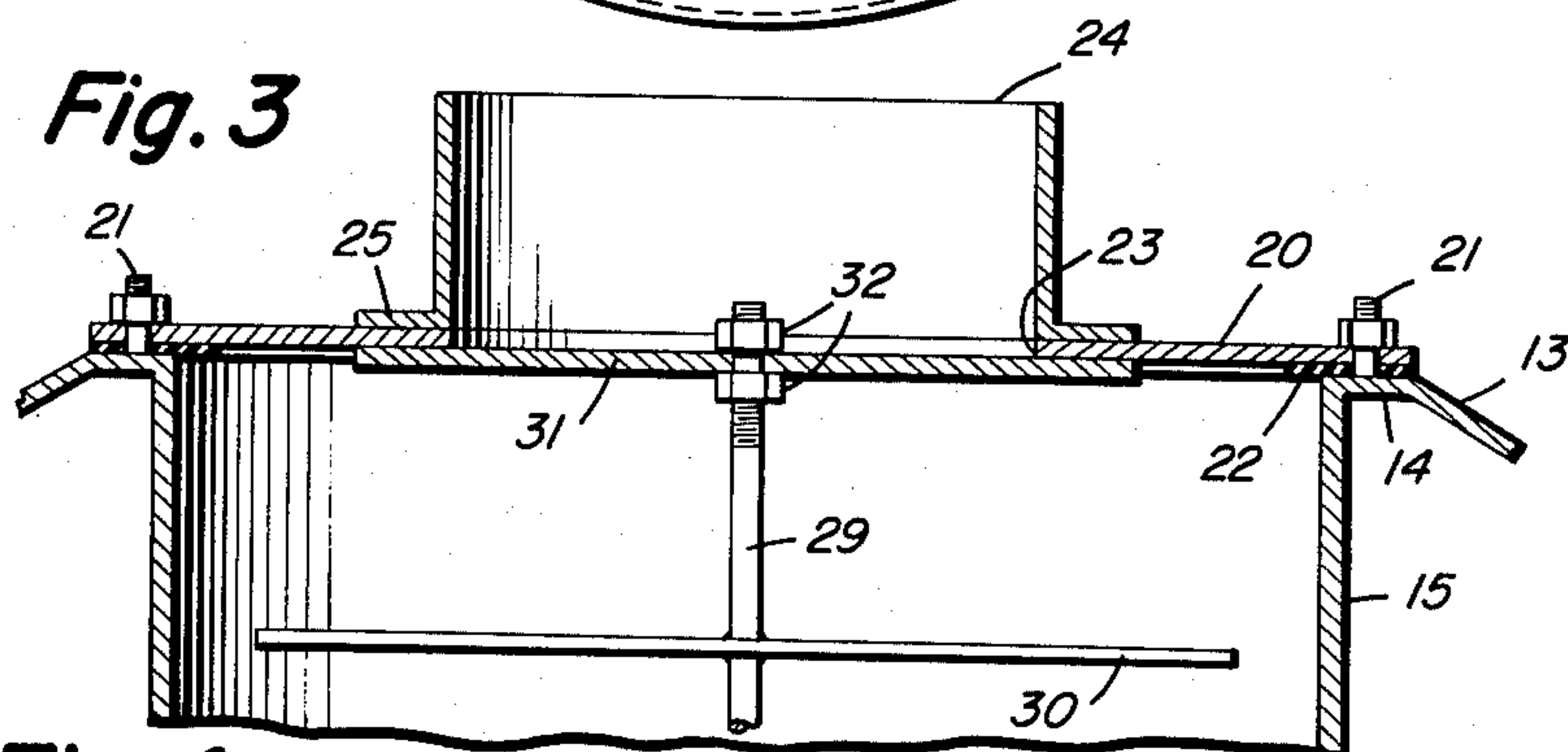
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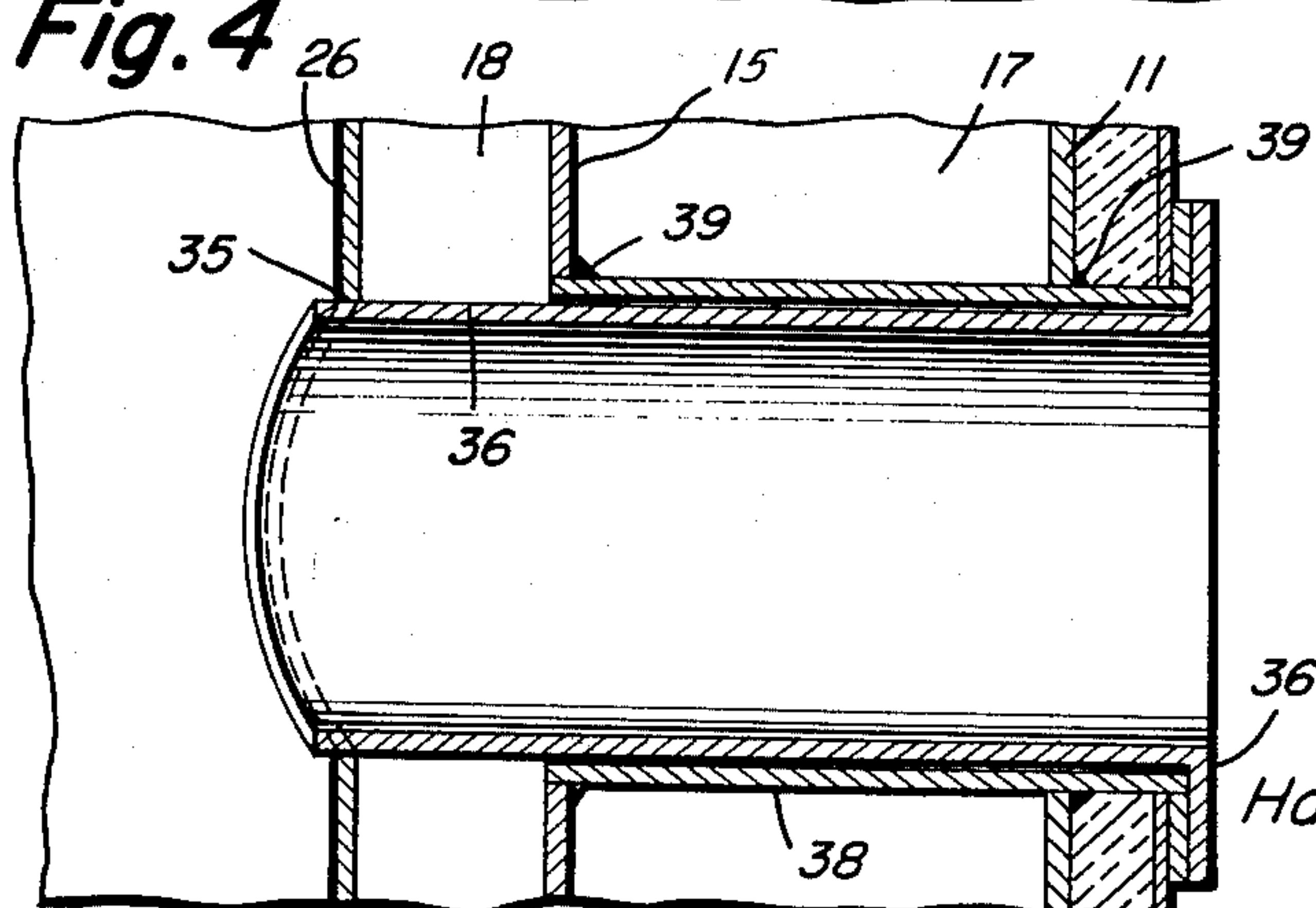
**Fig. 2**



**Fig. 3**



**Fig. 4**



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## HOT WATER STORAGE TANK WITH CENTRALLY SUSPENDED HEATING UNIT

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1 Claim. (Cl. 122-17)

This invention relates to water heaters using oil burners and of the type commonly used for supplying hot water for homes and places of business. Such a heater, commonly called a domestic water heater, usually comprises an upright cylindrical water storage tank arranged within a metal shell, a combustion chamber at the bottom of the shell receiving the blast from an oil burner, and a flue at the upper portion of the shell for the products of combustion which pass over the exterior of the water tank. While oil-fired water heaters with a central flue or combustion chamber extending through the water in the tank have been proposed, the usual domestic water heater has the heat and product of combustion from the oil burner passing over the exterior of the water tank.

The invention contemplates an upright cylindrical water tank with a large concentrically arranged firing tube or heating member suspended from the top of the tank and having a closed bottom spaced slightly above the bottom of the tank, so that with the exception of its top, the entire outer surface of the fire tube is surrounded by the storage water in the tank. It further contemplates an open-bottom cylindrical combustion chamber concentrically arranged in the lower part of the firing tube to receive the blast from an oil burner, and a central rod carried by a removable top on the firing tube, the rod carrying a plurality of vertically spaced baffle disks of slightly less diameter than the interior of the firing tube, so that the heat and products of combustion will be directed first downwardly against the entire area of the bottom of the tube and then be caused by the baffles to scrub the entire inner surface of the firing tube before escaping through a restricted flue collar on the removable top plate that closes the upper end of the firing tube.

The principal object of the invention is to provide an improved oil-fired combined water heating and storage tank of the above indicated character which will be highly efficient and reliable in operation.

Another object is to provide a water heater of this character in which the parts within the central combustion space or firing tube may be readily removed to facilitate cleaning or other servicing of the heater.

A further object is to provide a water heater of this character in which there are no horizontal heating surfaces in the upper part of the water tank on which precipitated solids may be deposited to cause burnouts.

With the above and other objects and advantages in view, the invention resides in the novel combinations and arrangements of parts and the novel features of construction hereinafter described and claimed, and illustrated in the accompanying drawings which show the present preferred embodiment of the invention.

In the drawings:

FIG. 1 is a vertical sectional view through the improved water heater;

FIG. 2 is a top view of the heater shown in FIG. 1, the burner being omitted;

FIG. 3 is an enlarged detail vertical section taken through the top or cover plate of the firing tube and the associated parts; the plane of the section being indicated by the line 3-3 in FIG. 2, and

FIG. 4 is an enlarged detail vertical section taken

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through the removable sleeve that receives the oil burner tube, and the associated parts.

Referring more in detail to the drawings, the numeral 10 denotes as a whole an upright cylindrical water tank having an outer side wall 11, an upwardly dished bottom wall 12, and an annular top wall 13 which may be upwardly dished but has a flat annular portion 14 from which is suspended an inner cylindrical wall 15 with a closed bottom wall 16. These outer walls of the tank form a water storage space 17 that completely surrounds the inner walls 15 and 16. The walls 15 and 16 form a centrally suspended firing tube with a chamber 18 through which the heat and products of combustion from an oil burner or the like pass as later described. The size of these parts will vary according to the water capacity of the tank but for a 40 gallon heater the tank may have a height of about 44" and a diameter of about 20", and the firing tube 15 may have a height of about 39" and a diameter of about 11". It will therefore be seen that the firing tube 15 provides a relatively large combustion space or chamber 18 which is open at its top and has its bottom 16 spaced only a few inches from the tank bottom 12.

The open top of the fire tube 15 is closed by a circular top plate or cover 20 which rests on the flat portion 14 of the top of the tank and is removably secured thereto. The top plate 20 has an annular series of holes to receive a similar series of screw studs 21 welded to the part 14 and receiving clamping nuts, as seen in FIG. 3, a sealing gasket 22 being disposed between the parts 14 and 20. At the center of the cover plate 20 is a circular opening 23 surrounded by an upwardly projecting flue collar 24 to which the smoke pipe may be connected. The cylindrical collar 24 has at its lower end an outwardly projecting annular flange 25 welded or otherwise secured to the top of the cover plate 20.

Within the lower part of fire tube 15 is an upright cylindrical combustion chamber housing 26 with an open bottom 27 and a closed top wall 28, and above the latter is a centrally positioned upright metal rod 29 which carries a plurality of vertically spaced baffle or deflector plates 30. Three of the baffles 30 are preferably used and they may be flat circular metal plates of slightly less diameter than the wall 15. The rod 29 has its upper end secured to the center of a flat cross bar 31 extending diametrically across the opening 23 in the cover plate 20 and its end portions welded or otherwise secured to the bottom of that plate. If desired the rod may be removably secured to the bar 31, as seen in FIG. 3, by means of nuts 32 on the screw threaded upper end of the rod. Since the rod and baffles are carried by the removable cover plate 20, they may be readily removed from the firing tube for cleaning and repairs.

While the combustion chamber 26 may also be suspended from the lower end of the rod 29 so as to be removable therewith, the combustion chamber is preferably supported on the bottom wall 16 by 3 or more depending legs 33; and in order to insure that the rod 29 is centrally positioned, its lower end may be removably seated in a socket member 34 welded at the center of the wall 28 of the combustion chamber.

In order to permit the combustion chamber 26 to be removed through the open top of the tube 15, it has formed in its side wall an opening 35 into which the inner end of a removable cylindrical sleeve 36 may be inserted, as seen in FIGS. 1 and 4. The flanged outer end of this sleeve has telescoped into it the discharge pipe or sleeve of an oil burner 37 of any suitable construction. The sleeve 36 fits in a cylindrical sleeve 38 that extends through aligned openings in the wall of the fire tube 15 and the side wall 11 of the tank. The



sleeve 38 is secured to these walls by welds 39 as shown in FIGURE 4.

The entire exterior of the water tank is enclosed by a heat insulating jacket made in sections each of which has an outer metal covering 40 on the fiber glass or other heat insulating material 41. The metal portion of the bottom section 42 on which the water tank rests may have stamped out supporting feet 43. The top section 44 is readily removable so that the cover plate 20 may be unbolted and removed.

The water tank has near its bottom a threaded spud 45 for the cold water return pipe and in its top a similar spud 46 for the hot water outlet pipe. It may also have near its lower end a relief valve and drain cock spud 47 and in its side a fire inspection passage 48, similar to the oil burner passage or sleeve 38 and closed by a door 49. It may further have a burner control spud 50 in its side wall and from its top there may be suspended in the water an anode rod 51.

It will be seen that the invention provides a very simple and relatively inexpensive compact water heater which will give high thermal efficiency since all the heat and products of combustion from the oil burner will be directed downwardly over the entire bottom wall 16 and will then be caused to scrub the wall 15 by the vertically spaced baffles 30 before they pass through the flue collar 24. Since the entire upper end of the combustion chamber is closed by the removable cover plate 20 which carries the baffles, the latter may be readily removed for cleaning or replacement. The combustion chamber 26 may likewise be readily removed through the open top of the combustion chamber so that the heater will have a long life expectancy. It will also be noted that in the upper part of the water space 17 there are no horizontal surfaces to collect precipitated solids that may cause burnouts.

From the foregoing, taken in connection with the accompanying drawing, it will be seen that novel and advantageous provision has been made for carrying out the objects of the invention, and while preferences have been disclosed, attention is invited to the possibility of making variations within the scope of the invention as claimed.

I claim:

A water heater comprising  
an upright water storage tank having bottom, top and side walls defining a chamber, said top wall containing a centrally-arranged opening;

an upright cylindrical fire tube suspended from the top wall of said tank in communication with the opening therein, said fire tube being of uniform diameter throughout its length and having side and closed bottom walls spaced from the side and bottom walls of said tank, respectively, whereby a water space is defined in said tank, said tank including passage means for supplying cold water to and for removing hot water from said water space;

a cover plate removably connected with the top wall of said tank, said cover plate containing an opening colinear with the vertical axis of said fire tube;

an annular flue collar projecting upwardly from said cover plate around the opening contained therein;

an upright cylindrical combustion chamber housing arranged in the lower portion of said fire tube, said housing having a top wall closing the upper end of said combustion chamber, the lower end of said housing being open;

means supporting said combustion chamber housing in spaced relation relative to the bottom and side walls of said fire tube, said supporting means comprising a vertical rod arranged colinearly with respect to the longitudinal axis of said fire tube, means rigidly connecting the upper end of said rod with said cover plate, means connecting the lower end of said rod with the top wall of said combustion chamber housing, and a plurality of legs depending from the open lower end of said combustion chamber housing in engagement with the bottom wall of said fire tube;

a plurality of vertically spaced baffle plates carried by said rod; and

means for introducing the blast from a burner into said combustion chamber housing between its top and bottom.

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