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J. C. JOHNSON

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VERTICAL FLUE DOWNDRAFT BOILER

Filed Aug. 3, 1946

2 SHEETS—SHEET 1

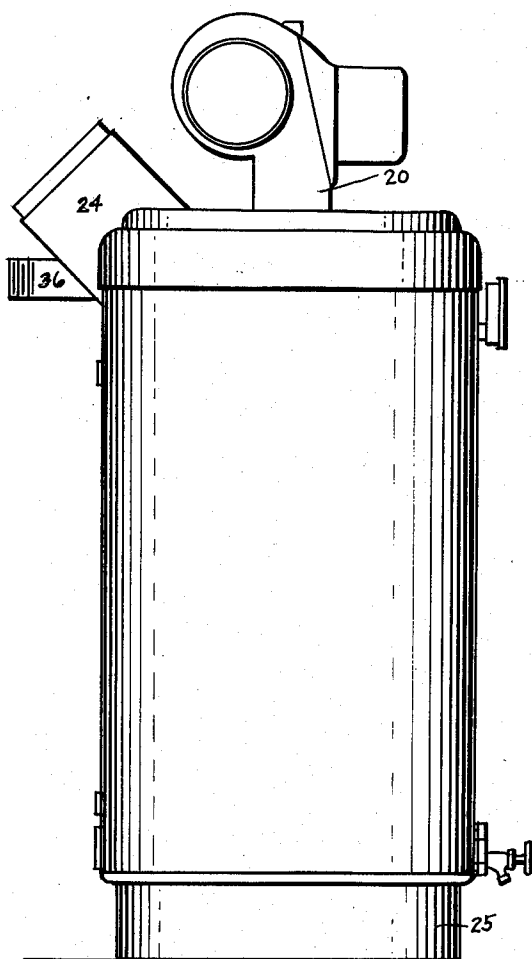


Fig. 1

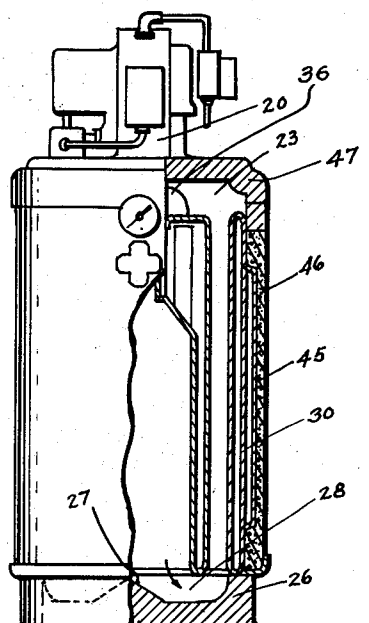


Fig. 2

INVENTOR.

Jesse C. Johnson

BY

Luther W. Hawley ATTY.

April 15, 1952

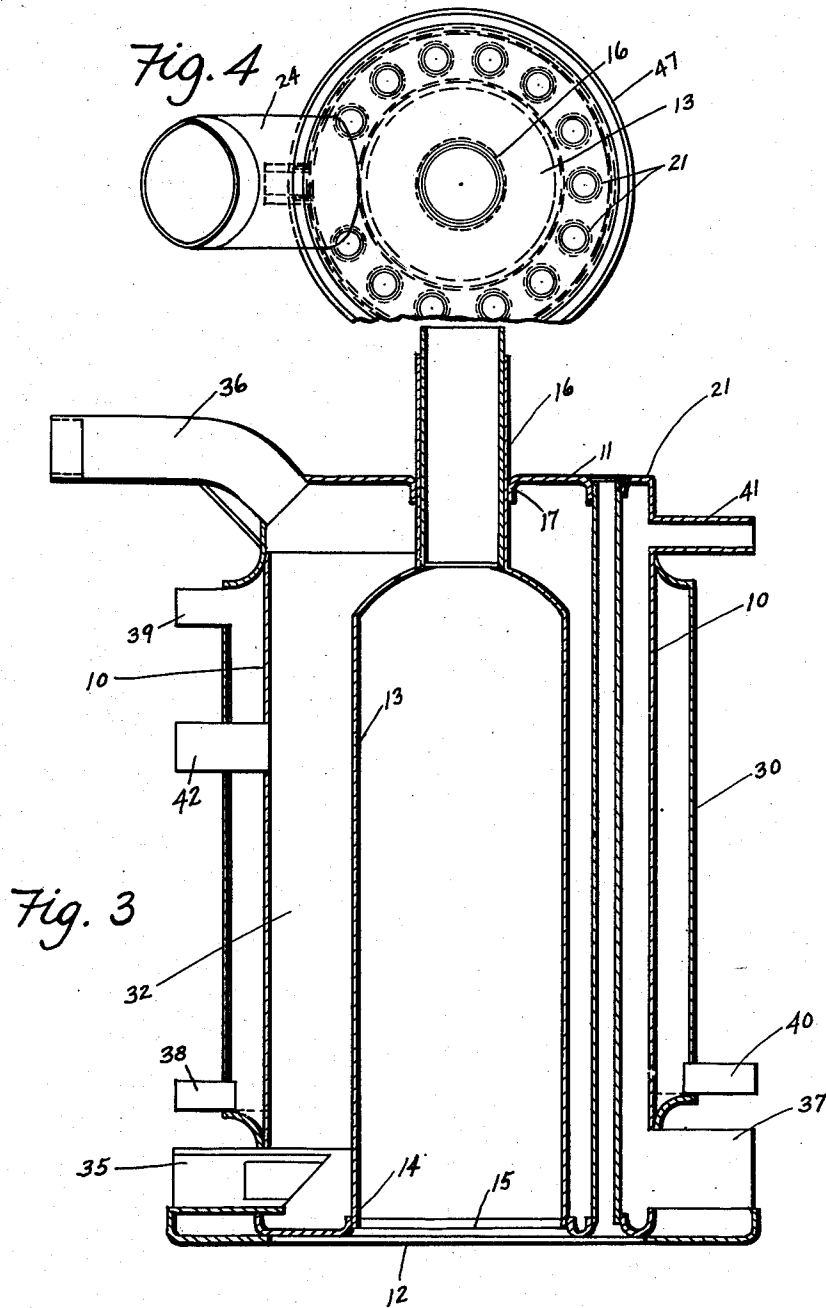
J. C. JOHNSON

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VERTICAL FLUE DOWNDRAFT BOILER

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2 SHEETS—SHEET 2



INVENTOR.

Jesse C. Johnson

BY

Luther W. Stanley
ATTY.

UNITED STATES PATENT OFFICE

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VERTICAL FLUE DOWNDRAFT BOILER

Jesse C. Johnson, Oakland, Calif.

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4 Claims. (Cl. 122-156)

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This invention relates to house vertical flue downdraft boiler or boilers.

The invention has for its salient object to provide a heater that is simple and practical in construction and efficient in operation.

Another object of the invention is to provide a heater of the character specified, so constructed and arranged that an especially high percentage of the potential heat in the fuel will be utilized.

Another object of the invention is to provide a house heating unit having incorporated therein efficient means for providing domestic hot water or tap water for kitchen, laundry and bath.

Another object of the invention is to provide a heater of the type specified, so constructed and arranged that the refractory lining in the base can be removed and replaced without dismantling the shell or boiler.

Further objects of the invention will appear from the following specification taken in connection with the drawings which form a part of this application, and in which:

Fig. 1 is an elevational view of a heater constructed in accordance with the invention;

Fig. 2 is a view similar to Fig. 1 but partly in section and taken at right angles to Fig. 1;

Fig. 3 is a sectional elevation of the shell of the heater shown in Figs. 1 and 2, with the outer casing, base and top removed; and

Fig. 4 is a top plan view of the shell shown in Fig. 3.

In the particular form of the invention illustrated in Figs. 1 to 4 inclusive, the heater shell is constructed in the manner particularly shown in Fig. 3. This shell comprises a vertical, cylindrical casing or wall 10, to the upper end of which is secured a top head 11, and to the lower end of which is secured a bottom head 12.

A central cylinder 13 is mounted centrally in and spaced from the casing 10 and is secured at 14 to the bottom head, such head having a central opening 15 in which the cylinder 13 is secured. The upper end of the central cylinder has secured thereto a conduit or pipe 16 which extends upwardly through a central opening 17 in the top head 11 and is welded thereto. The cylinder 13 forms a combustion chamber and the oil burner is mounted on the top of the heater, as shown at 20 in Figs. 1 and 2, and is preferably an automatic pressure atomizing type of burner and the burner fires downwardly through the conduit or pipe 16 into the said central cylinder 13.

The top and bottom heads are provided with a plurality of concentric openings in which are

secured tubes 21. From the showing in Fig. 2 it will be noted, as indicated by arrows, that the hot gases of combustion pass downwardly in the cylinder 13 and laterally in the base and upwardly through the tubes 21 to a chamber 23 and thence outwardly through an outlet pipe 24.

The shell shown in Fig. 4 is mounted on a base 25 which encloses a refractory lining 26 and it will be noted from Fig. 2 that this lining has a conical central portion 27 which deflects the combustion gases laterally through the space 28 and thence upwardly into the tubes 21.

In order to provide domestic hot water without the requirement for a separate hot water heating unit, a hot water jacket 30 surrounds the casing 10 and the heat communicated to the casing 10 by the hot water in the chamber 32 which surrounds the cylinder 13 effectively and quickly heats the water in the hot water jacket 30, thus providing a supply of hot water for domestic use, such as kitchen, laundry and bathrooms, at all times.

The casing 10 has a conduit 35 at the bottom thereof for returning the hot water to the chamber 32 from the heating system and to the upper end and the water heated by the boiler is conducted to the heating system from the chamber 32 through a flow pipe 36.

A drain pipe 37 is also connected to the casing 10 for draining the water from the boiler. A pipe 38 is connected to the jacket 30 at the bottom thereof for the cold water inlet and the hot water is withdrawn therefrom at the top of the jacket through a pipe 39. A drain pipe 40 is also connected to the bottom of the jacket for draining out the water therefrom.

Various other conduits or pipes of the usual character are, connected to the boiler, such as a conduit 41 for the pressure gauge and conduit 42 for the aquastat, both of these pipes extending through the wall of the casing 10.

The casing 10 is surrounded by insulating material 45 which also surrounds the water jacket 30 and is enclosed within a sheet metal shell 46 which forms the outer covering of the heater.

On the upper end of the shell or heater unit there is mounted a cap or cover 47 which is also lined with insulating material.

From the foregoing description it will be seen that the heater illustrated in Figs. 1 to 4 inclusive operates in substantially the following manner. The gases of combustion from the oil burner 20 are directed downwardly through the pipe 16 into the combustion chamber formed within the cylinder 13 and at the bottom of the cylinder

these gases are directed laterally and upwardly through the tubes 21 to the chamber 23 above the top head 11 and thence outwardly through the outlet pipe 24 to the chimney. In this manner the maximum use is made of the potential heat in the fuel since this heat effectively heats the water in the chamber 32 by contact with the wall of the cylinder 13 on its downward path of movement and through contact with the walls of the tubes 21 in its upward path. Furthermore, the water heated in this manner effectively heats the water enclosed in the water jacket 30, thus furnishing hot water for domestic uses. Moreover, the pipe 16 which extends upwardly through the top head 11 and through the chamber 23, acts to support and strengthen the top head and the firing chamber above the top head. Furthermore, attention is directed to the fact that the water jacket 30 and the water therein are heated by the hot water in the boiler or in the space 32 disposed inside the water jacket and no flame comes in contact with the heating surface which heats the hot water in the jacket and for this reason there is no stratification or accumulation of lime or other minerals on the heating surface of the water jacket.

The shell surrounding the refractory material 26 is so constructed as to provide for the removal and replacement of the refractory lining 26 without dismantling the boiler shell mounted on the base. The boiler shell shown in Fig. 3 is supported on blocks and the base 25 is then removed and the lining can be withdrawn and cleaned or replaced.

Although a preferred embodiment of the invention has been particularly shown and described it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. A heater comprising a vertical cylindrical casing as an outer shell, a combustion chamber within and spaced from said outer shell and delimited by an inner cylindrical shell shorter than the outer shell and having a closed, apertured top and an open bottom, a top head for said outer shell having a central opening and a plurality of tube-receiving openings therein and a bottom head for said outer shell having a central opening therein approximately equal to the diameter of said inner, cylindrical shell and in which the bottom of the inner, cylindrical shell is received and secured, a conduit extending downwardly through the central opening of the top head and connected into the closed, apertured top of the inner shell for conducting hot gases from an associated burner downwardly through said combustion chamber, a plurality of tubes secured in the tube-receiving openings of said top head and terminating in said bottom head and a refractory lined base having its upper surface shaped to deflect said gases laterally from the open bottom of the inner shell and then upwardly into the lower ends of said tubes.

2. A heater comprising a vertical cylindrical casing as an outer shell, a combustion chamber within and spaced from said outer shell and delimited by an inner cylindrical shell shorter than the outer shell and having a closed, apertured top and an open bottom, a top head for said outer shell having a central opening and a plurality of

tube-receiving openings therein and a bottom head for said outer shell having a central opening therein approximately equal to the diameter of said inner, cylindrical shell and in which the bottom of the inner, cylindrical shell is received and secured, a conduit extending downwardly through the central opening of the top head and connected into the closed, apertured top of the inner shell for conducting hot gases from an associated burner downwardly through said combustion chamber, a plurality of tubes secured in the tube-receiving openings of said top head and terminating in said bottom head and a base on which said heater is supported, said base having a refractory lining of concave form with a conical central portion for receiving hot gases from the open bottom of said inner shell and for deflecting them laterally and then upwardly into the lower ends of said tubes.

3. A heater comprising a vertical cylindrical casing as an outer shell, a combustion chamber within and spaced from said outer shell and delimited by an inner cylindrical shell shorter than the outer shell and having a closed, centrally apertured top and an open bottom, a top head for said outer shell having a central opening in alignment with the central aperture in the inner shell and a plurality of circularly disposed, spaced tube-receiving openings therein and a bottom head for said outer shell having a central opening therein approximately equal to the diameter of said inner, cylindrical shell and in which the bottom of the inner, cylindrical shell is received and secured, a conduit extending downwardly through the central opening of the top head and having its lower end connected into the closed, apertured top of the inner shell for conducting hot gases from an associated burner downwardly through said combustion chamber, a plurality of tubes secured in the tube-receiving openings of said top head and terminating in said bottom head and means beneath the bottom head against which the downwardly conducted gases are adapted to impinge and by which they are adapted to be deflected into the lower ends of said tubes.

4. A vertical flue downdraft boiler comprising a vertical cylindrical casing constituting an outer shell, a combustion chamber within and spaced from said outer shell and delimited by an inner cylindrical shell shorter and narrower than the outer shell and having a closed, apertured top and an open bottom, a top head for said outer shell having a central opening and a plurality of tube-receiving openings therein and a bottom head for said outer shell having a central opening therein approximately equal to the diameter of said inner, cylindrical shell and in which the bottom of the inner, cylindrical shell is received and secured, a conduit extending downwardly through the central opening of the top head and connected into the closed, apertured top of the inner shell, for mounting an oil burner at its top end and conducting the air blast and oil under pressure from said burner downwardly through said combustion chamber, a plurality of vertical, open-ended tubes secured in the tube-receiving openings of said top head and terminating in said bottom head and a base on which said boiler is supported, said base having a refractory lining of concave form with an upstanding conical central portion for receiving hot gases from the open bottom of said inner shell and for deflecting them laterally outwardly and then upwardly into the lower ends of said tubes and then upwardly

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through said tubes and into a chamber above said top head.

JESSE C. JOHNSON.

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