

June 19, 1945.

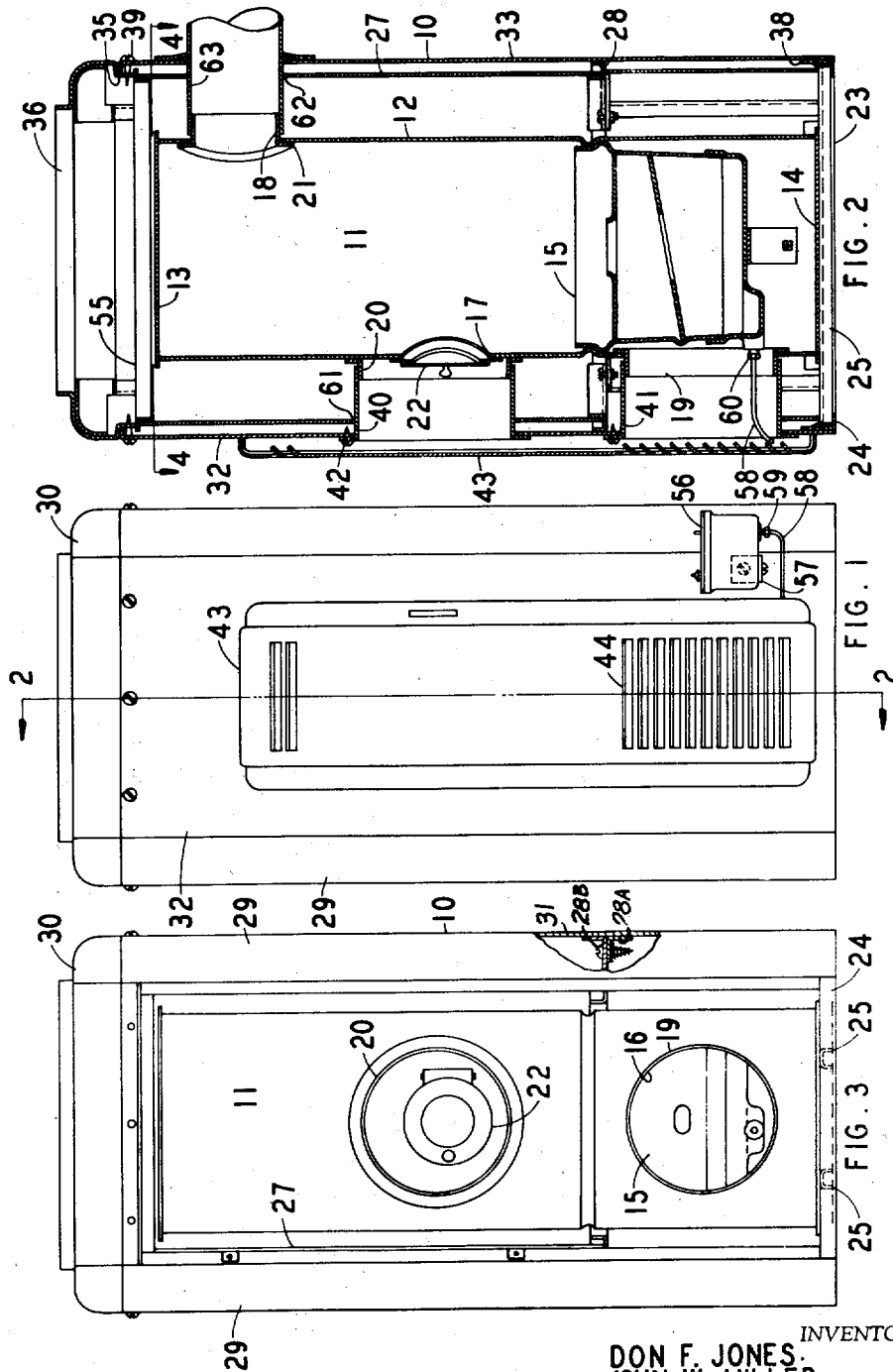
DON F. JONES ET AL

2,378,485

HEATING APPARATUS

Filed Aug. 15, 1942

2 Sheets-Sheet 1



INVENTOR.
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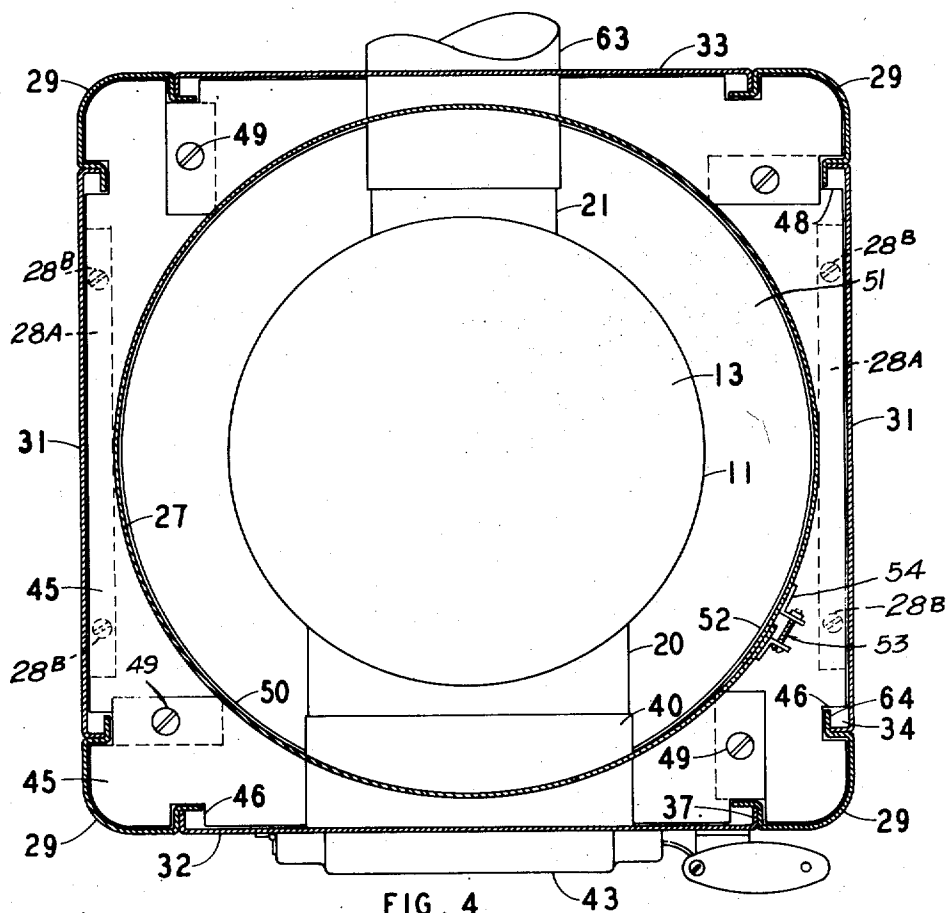


FIG. 4

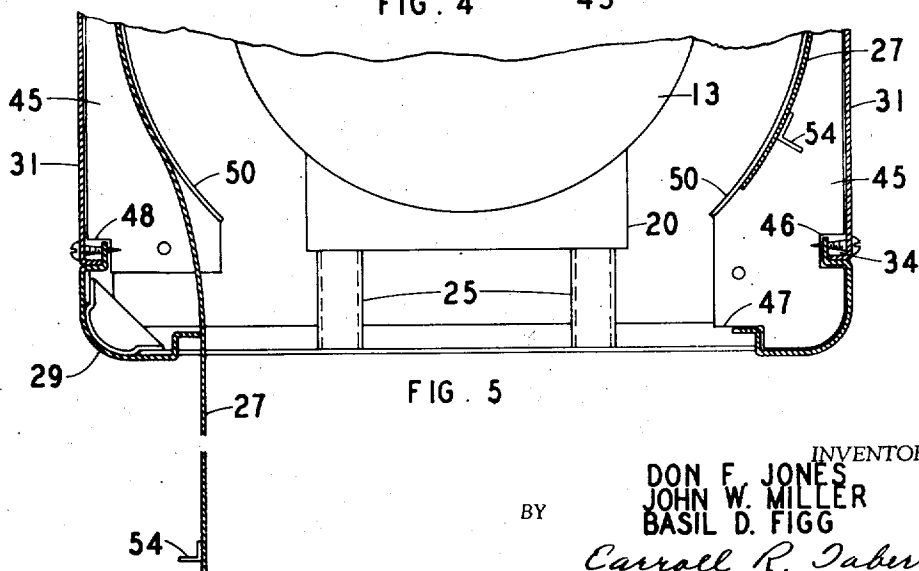


FIG. 5

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UNITED STATES PATENT OFFICE

2,378,485

HEATING APPARATUS

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Lansing, Mich., assignors to Motor Wheel Corporation, Lansing, Mich., a corporation of Michigan

Application August 15, 1942, Serial No. 454,946

8 Claims. (Cl. 126-99)

This invention relates to heating apparatus and more particularly to the other casings thereof.

The principal object of the invention is to provide a heater comprising a heat exchanger and an outer casing constructed so as to permit ready installation or removal of the heat exchanger.

Another object of the invention is to provide a heater of generally rectangular horizontal cross-section so constructed that the circulation of air therethrough is substantially uniform about the heat exchanger.

For a more thorough understanding of the invention and the objects thereof reference is made to the accompanying drawings, wherein:

Figure 1 is a front elevational view of a furnace embodying the invention;

Figure 2 is a cross-sectional view of the same taken on substantially the line 2-2 of Figure 1;

Figure 3 is a front elevational view of the furnace with the front panel removed;

Figure 4 is a cross-sectional view taken on substantially the line 4-4 of Figure 2; and

Figure 5 is a fragmentary cross-sectional view similar to Figure 4 showing the furnace in condition ready for removal of the heat exchanger.

The invention is illustrated in the drawings as applied to a circulating hot air furnace. The furnace in general comprises an outer casing 10, a cylindrical lining 27, an air stop 28, and a heat exchanger 11. These parts are constructed and arranged to permit ready removal of the heat exchanger from the heater, as will appear more fully presently.

The heat exchanger comprises a tubular heat chamber shell 12 formed of sheet metal and closed at the ends by top and bottom walls 13 and 14 respectively. An oil burner 15 of the vaporizing pot type is located in the lower portion of the heat chamber shell. The upper part of the heat chamber shell 12 constitutes a combustion chamber, while the lower portion surrounding the burner 15 forms an air jacket. Suitable openings 16, 17 and 18 are formed in the shell 12 for admission of air to the burner, for access to the combustion chamber and interior of the burner, and for the escape of products of combustion, respectively. All three openings are surrounded by flanged collars 19, 20 and 21 respectively, for a purpose that will appear presently. Opening 17 is provided with a closure 22 for closing the same.

The heat exchanger 11 is mounted on a base 23 composed of angle iron side members 24 and a pair of intermediate cross members 25. The

heat exchanger rests on the latter and is removably secured thereto by bolts or screws.

The outer casing 10 is rectangular in plan. The outer casing comprises four upright corner posts 29, a top frame 30, two side panels 31, a front panel 32 and a back panel 33. The corner posts 29 are of generally arcuate cross-section (Figures 4 and 5) and are provided with inwardly offset flanges 34 at their upright edges forming rabbets 34. The top frame 30 has depending flanges 35 also forming rabbets, and is provided with an opening 36 to permit air to rise upwardly therethrough. The corner posts 29 are secured at their lower ends to the base 23 and at their upper ends to the corners of the top frame 30. The height of the corner posts and the lateral spacing of the front corner posts are such as to provide an opening in the front of the casing of greater vertical and horizontal extent than the heat exchanger 11. (See Figure 3).

The panels 31, 32 and 33 are rectangular and are provided with peripheral flanges 37 extending inwardly therefrom. The panels are of a size to fit within the rabbets 34 in the corner posts and the top frame and fill the openings between the corner posts. All of the panels are provided adjacent their lower ends with Z-shaped clips 38 which hook over the upstanding flanges on the side members 24 of the base 23. The upper ends of the panels have openings therein registering with similar openings in the flanges 35 for the reception of hardened screws 39. All of the panels 31, 32 and 33 are attached to the rest of the outer casing by hooking the clips 38 over the member 24 on the base and then swinging the upper ends of the panels against the flanges 35 where they are fastened by the screws 39.

The front panel 32 has a circular opening therein receiving a sleeve 40 flanged at its outer end. The sleeve 40 telescopes over the collar 20. Another opening below the sleeve 40 registers with opening 16 and receives a sleeve 41. The sleeve 41 is flanged at its outer end and telescopes over the collar 19. Both sleeves are fastened to the panel 32 by screws 42 passing through the flanged ends thereof. Access to closure 22 is obtained through sleeve 40 while sleeve 41 and collar 19 provide a passageway for air to the burner 15.

A door 43 is hinged to the front panel to conceal the openings 16 and 17 and sleeves 40 and 41. The door 43 is provided with louvers 44 to admit air to the sleeve 41 and thence to the burner 15.

The air stop 28 is secured to the outer casing

above the base and near the upper end of the burner. It supports the lining 27 in a manner to be described presently. The air stop is composed of four separate pieces or baffles 45. All of the baffles are substantially identical. They are identical if the outer casing is square, otherwise the front and back baffles vary in length from the side baffles. Each baffle 45 is notched at three places 46, 47 and 48 to fit around the flanges 64 and 34. Each baffle is shaped at one end to conform to the cross-sectional contour of the corner posts. The other end of each baffle terminates short of the adjacent corner post. All baffles overlap each other and are secured together by screws 49. The inner peripheral edges of the baffles are provided with upstanding flanges 50 which together form a substantial, continuous cylindrical flange defining a circular opening 51 receiving the heat exchanger 11.

An angle member 28a is secured to each side 31 on which the air stop 28 is mounted. One flange of each angle member 28a is welded or otherwise secured to the corresponding panel 31 while the other flange projects laterally inward. The two side baffles 45 rest upon the horizontal flanges of the angle members 28a and may be secured thereto by bolts or screws 28b. The front and rear baffles 45 are indirectly supported on angle members 28a through their connection with the side baffles 45.

The lining 27 preferably is a single sheet of metal coiled into a cylindrical tube. It is of lesser vertical extent and of greater horizontal extent than the opening in the front of the heater. The upright edges of the lining overlap at 52 and are so arranged that the joint occurs adjacent one upright side of the opening in the front of the casing formed when the panel 32 is removed. The edges of the lining are held in that position by bolts 53 inserted through angle clips 54 welded to the lining. The lining is coiled about the flanges 50 on the baffles 45 and tightened thereagainst by the bolts 53. The upper end of the lining is open, but is maintained in circular shape by a ring 55 of angular cross-section inserted therein.

The lining 27 is provided with two circular openings 61 and 62 to receive the sleeve 40 and a flue outlet 63 respectively. The flue outlet 63 is connected to the collar 21 by telescopic engagement therewith.

A fuel regulating device 56 is mounted on a bracket 57 secured to the front panel 32. The fuel regulating device is connected by a conduit 58 to the burner 15. Preferably the conduit is removably connected to both the fuel regulating device and the burner by means of threaded couplings 59 and 60.

When it becomes necessary to remove the heat exchanger for replacement or repair, the fuel regulating device 56 is disconnected from the conduit 58. The screws 39 at the top of the front panel 32 are then removed. The top of the panel 32 is tilted outwardly sufficiently to pull the sleeves 40 and 41 from the respective collars 20 and 19 and the panel lifted to release the clips 38 from the base 22. The two screws 49 at the front of the air stop which connect the front baffle 45 to the two side baffles are removed. Then the bolts 53 are removed from the clips 54 and the front portion of the lining pulled out through the opening in the front of the casing, as shown in Figure 5. This can be done because the joint in the lining is adjacent the

opening in the front of the heater casing, and the lining is of less height than the opening. The front baffle 45 is lifted out. This procedure leaves an unobstructed opening through the casing large enough to permit the passage therethrough of the heat exchanger. The latter can then be disconnected from the base and removed bodily from the casing. It can be reinstalled or replaced by reversing the above described procedure.

From the foregoing it will be seen that the invention provides for ready installation of the heat exchanger in the casing, or the removal thereof for replacement or repair. The casing need not be dismantled to obtain access to the heat exchanger.

Furthermore, the provision of the cylindrical lining and air stop keeps the outer shell cool and maintains a uniform circulation of air about the heat exchanger. This result is due to the fact that the annular space about the heat exchanger is of uniform radial width. If the lining were not employed the air in the corners of the shell would not be heated as much as elsewhere within the shell and would not circulate upwardly in the same manner as the more highly heated air.

The scope of the invention is indicated in the appended claims.

We claim:

1. In a heater, a unitary heat exchanger, an outer casing surrounding the heat exchanger in spaced relation thereto, one upright side of said casing including a panel detachable from the rest of the casing to provide an opening through which said heat exchanger can be bodily removed, and a tubular lining surrounding the upright sides of the heat exchanger in spaced relation thereto and to the sides of the casing, said lining having a portion thereof movable to provide an opening in registry with said opening in the casing to permit removal of the heat exchanger from the heater.

2. In a heater, a unitary heat exchanger, an outer casing surrounding the heat exchanger in spaced relation thereto, one upright side of said casing including a panel detachable from the rest of the casing to provide an opening through which said heat exchanger can be bodily removed, and a tubular lining surrounding the upright sides of the heat exchanger in spaced relation thereto and to the sides of the casing, said lining having a portion thereof movable to provide an opening in registry with said opening in the casing to permit removal of the heat exchanger from the heater, and supporting means for the lining mounted on the side of the casing.

3. In a heater, a unitary heat exchanger, an outer casing surrounding the heat exchanger in spaced relation thereto, one upright side of the casing including a panel detachable from the rest of the casing to provide an opening through which the heat exchanger can be bodily removed, a tubular lining surrounding the upright sides of the heat exchanger in spaced relation thereto and to the sides of the casing, said lining having a portion movable to provide an opening in registry with said opening in the casing, the lower end of the lining terminating above the lower end of the opening, and baffle means between the lower end of the lining and the sides of the casing for preventing the circulation of air between the lining and the casing, a portion of said baffle means being removable to permit removal of the heat exchanger from the heater.

4. In a heater, a heat exchanger, a casing surrounding the heat exchanger in spaced relation thereto, the casing having a section thereof movable to provide an opening in the side thereof, and a liner interposed between the sides of the heat exchanger and the casing in spaced relation to the heat exchanger, the liner having a section thereof movable to provide an opening in registry with the opening in the casing, the openings in said casing and liner being of such size as to permit removal and installation of the heat exchanger therethrough.

5. In a heater as defined in claim 4 wherein a portion of the movable section of the liner is adapted to extend through the opening provided in the casing by the movable section thereof.

6. In a heater as defined in claim 4 wherein the liner consists of a single sheet of metal coiled into the shape of an open ended tube with its adjacent edges detachably connected together.

7. In a heater, a casing having an opening in one side thereof, closure means for said opening mounted on said casing, and a lining disposed within the casing, said lining comprising a sheet of metal coiled into tubular form and having its adjoining edges detachably connected to each

other, the axial extent of said lining being less than the corresponding dimension of the opening, said lining being arranged within the casing with the said adjoining edges disposed adjacent said opening whereby upon disconnecting said edges from each other a portion of the lining may be swung through the opening.

8. In a heater, a casing having an opening in one side thereof, closure means for said opening mounted on said casing, and a lining disposed within the casing, said lining comprising a sheet of metal coiled into tubular form and having its adjoining edges detachably connected to each other, the axial extent of said lining being less than the corresponding dimension of the opening and the radial extent of the lining being greater than the corresponding dimension of the opening, said lining being arranged within the casing with the said adjoining edges disposed adjacent said opening whereby upon disconnecting said edges from each other a portion of the lining may be swung through the opening.

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CERTIFICATE OF CORRECTION.

Patent No. 2,378,485.

June 19, 1945.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 2, for the word "other" read --outer--; page 2, first column, line 10, for the numeral "34" read --37--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of October, A. D. 1945.

Leslie Frazer

First Assistant Commissioner of Patents.

(Seal)

4. In a heater, a heat exchanger, a casing surrounding the heat exchanger in spaced relation thereto, the casing having a section thereof movable to provide an opening in the side thereof, and a liner interposed between the sides of the heat exchanger and the casing in spaced relation to the heat exchanger, the liner having a section thereof movable to provide an opening in registry with the opening in the casing, the openings in said casing and liner being of such size as to permit removal and installation of the heat exchanger therethrough.

5. In a heater as defined in claim 4 wherein a portion of the movable section of the liner is adapted to extend through the opening provided in the casing by the movable section thereof.

6. In a heater as defined in claim 4 wherein the liner consists of a single sheet of metal coiled into the shape of an open ended tube with its adjacent edges detachably connected together.

7. In a heater, a casing having an opening in one side thereof, closure means for said opening mounted on said casing, and a lining disposed within the casing, said lining comprising a sheet of metal coiled into tubular form and having its adjoining edges detachably connected to each

other, the axial extent of said lining being less than the corresponding dimension of the opening, said lining being arranged within the casing with the said adjoining edges disposed adjacent said opening whereby upon disconnecting said edges from each other a portion of the lining may be swung through the opening.

8. In a heater, a casing having an opening in one side thereof, closure means for said opening mounted on said casing, and a lining disposed within the casing, said lining comprising a sheet of metal coiled into tubular form and having its adjoining edges detachably connected to each other, the axial extent of said lining being less than the corresponding dimension of the opening and the radial extent of the lining being greater than the corresponding dimension of the opening, said lining being arranged within the casing with the said adjoining edges disposed adjacent said opening whereby upon disconnecting said edges from each other a portion of the lining may be swung through the opening.

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