J. REID.

OIL BURNING FURNACE FRONT.

APPLICATION FILED MAR. 8, 1920.

1,374,682.

Patented Apr. 12, 1921.

2 SHEETS—SHEET 1.

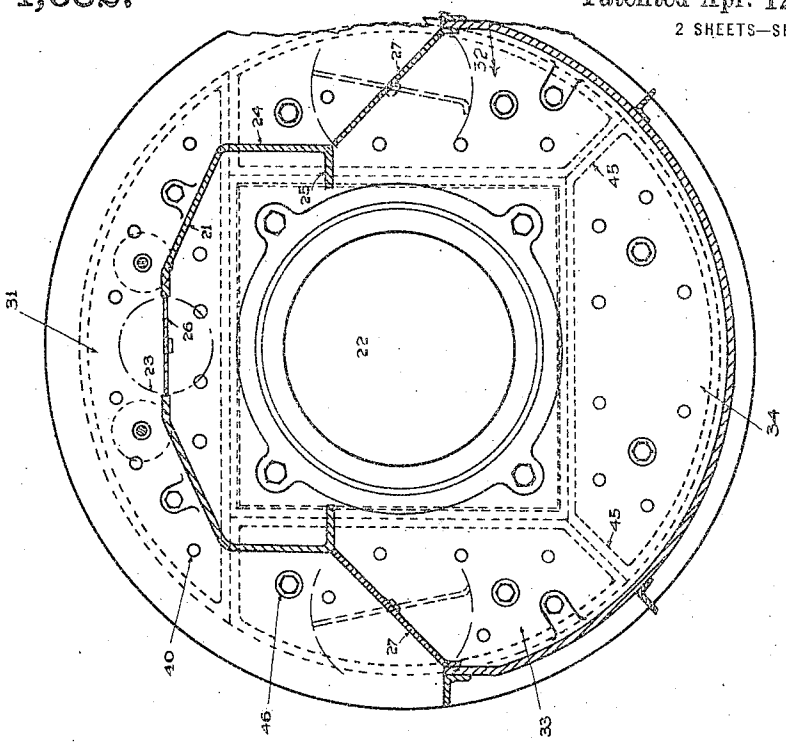


Fig. 2

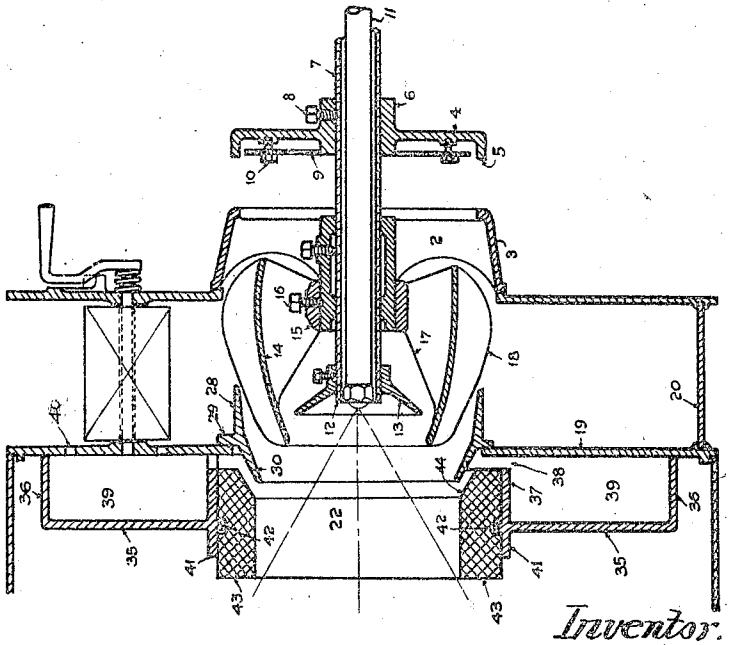


Fig. 1

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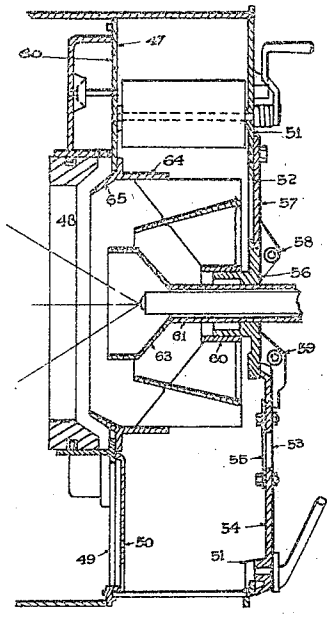


Fig. 3

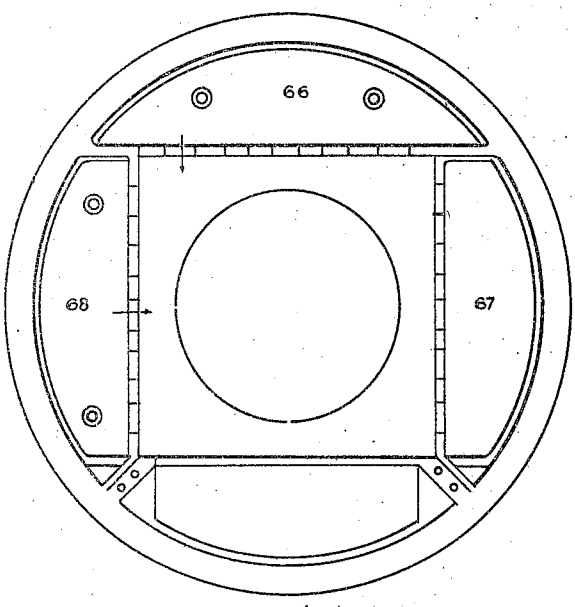


Fig. 4

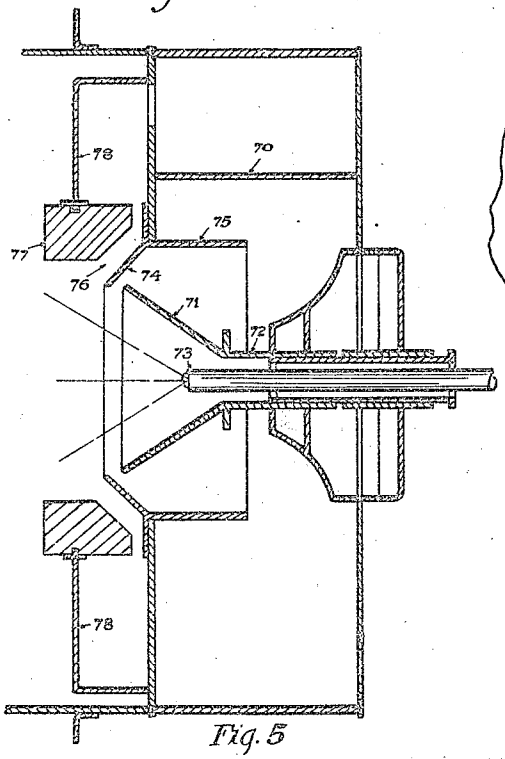


Fig. 5

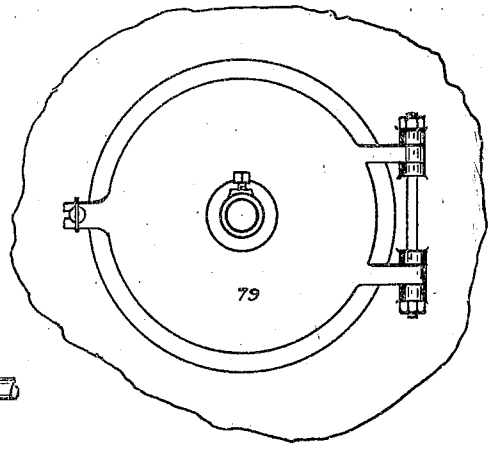


Fig. 6

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UNITED STATES PATENT OFFICE.

JOHN REID, OF NEW YORK, N. Y.

OIL-BURNING-FURNACE FRONT.

1,374,682. Specification of Letters Patent. Patented Apr. 12, 1921.

Application filed March 8, 1920. Serial No. 364,342.

To all whom it may concern:

Be it known that I, JOHN REID, a subject of the King of Great Britain, and residing at 30 Church street, in the city of New York, in the State of New York, in the United States of America, have invented a new and useful Oil-Burning-Furnace Front, of which the following is the specification.

The invention relates to oil burning furnace fronts, as described in the present specification and illustrated in the accompanying drawings that form part of the same.

The invention consists essentially of the novel construction of the parts pertaining to the air circulation, whereby the firebox lining of the front wall is maintained in comparatively cool condition and the flame fed with air at a comparatively high temperature.

The objects of the invention are, primarily, to promote the combustion of the oil and preserve the furnace front from damage due to excessive heat; also to simplify the construction and assembly of furnace fronts, particularly in the matters of installation and repairs; also to increase the facilities for the air circulation by either forced draft or natural draft; and generally to provide in a furnace front parts of a very durable nature and so combined as to materially assist in maintaining an efficient steam generating plant.

In the drawings, Figure 1 is a vertical sectional view, showing one form of the invention.

Fig. 2 is a front elevation of the back plate, showing the arrangement of the intermediate parts and the furnace lining in dotted lines.

Fig. 3 is a vertical sectional view of a slightly modified form of the invention.

Fig. 4 is a rear elevation of the back plate of the form of the invention illustrated in Fig. 3.

Fig. 5 is a vertical sectional view of another modification of the invention.

Fig. 6 is a fragmentary view of the front plate, showing the swinging door carrying the oil burner and parts.

Like numerals of reference indicate corresponding parts in the several different forms of the invention respectively.

Referring to the drawings, and particularly to Figs. 1 and 2, the front plate is formed with the central opening 2, from which projects the lid flange 3, the latter being preferably separate from the front plate and rigidly secured thereto around said opening 2. The lid 4 meets the inturned outer end of the flange 3 by means of the annular flange 5 projecting therefrom, and is formed with the central boss 6, which carries the sleeve 7 forming part of the oil burning apparatus. The set screw 8 secures said sleeve rigidly to the boss 6 and the lid lining 9 is secured to the inner side of the lid and spaced therefrom by the bolts 10.

The oil pipe 11 extends through the sleeve 7 and terminates in the burner 12 and at the end around said burner, the inner cone deflector 13 is carried by the sleeve 7. The outer cone deflector 14 is supported from the hub 15 rigidly secured to the sleeve 7 by the screws 16 by means of the spider 17 and the blades 18 project outwardly from the cone 14 in either a spiral or straight direction from beyond the opening in the front plate 1 inwardly beyond the inner cone deflector 13 forming air passages leading to the flame projected from said burner 12.

The back plate 19 is spaced from the front plate 1 by the lower arc-shaped wall 20 forming a deflector for the air and corresponding to the flare in furnace front construction, and the wall 21 forming an air shield above the opening 2 in the front plate and 22 in the back plate, the air shield 21 being formed with a central valve opening 23, inclined sections leading to the vertical sections 24 having lower inturned ends 25. The valve 26 closes the valve opening 23 and the valves 27 close the openings between the lower end of the vertical sections 24 and the upper ends of the arc wall 20.

The air cylinder 28 encircles the outer cone 14 adjacent to the edges of the blades 18 between the front and back plates, the flange 29 from said cylinder abutting the outer face of the said back plate and the deflecting flange 30 extending inwardly and converging in the direction of the furnace.

The lining of the front wall of the firebox, which is the back plate 19 of the furnace front, is formed of the pieces 31, 32, 33 and 34, each piece having a wall 35 facing the firebox, an outer side wall 36 extending to the back plate 19, an inner wall 37 extending part way to the back plate 19, and in each case forming an elongated air port 38 through which the air flows from the chambers 39 formed by said lining to the flame from the burner, said chambers 39 having the air inlet holes or ports 40 through the back plate and dotted here and there in a path around said back plate in front of said lining chambers.

The inner side walls 37 extend beyond the face plate 35 in the flanges 41 and a bead 42 extends outwardly from the inner side walls of the several pieces in alinement with the face walls 35, these beads forming keepers for the fire bricks 43 that form the flame passage into the firebox as well as air deflectors at their inner beveled ends 44 for the air flowing out of the elongated ports 38, which flow first meets the deflecting flange 30 of the air cylinder and is guided between said flange 30 and said beveled edge 44 substantially at right angles to the spread of the flame.

The fastening of the bricks 43 to the furnace lining through the beads 42 is by no means arbitrary, as these bricks may be secured by angle clips, screws, clamps or any acceptable means of fastening.

The pieces 32 and 33 and 34 of the lining have also walls 45, but these are similar to the outside walls 36 and extend to the back plate accordingly. The several lining pieces are fastened to the back plate by the bolts 46, which are secured in the most suitable manner.

In Figs. 3 and 4, the construction is much the same as in Figs. 1 and 2, but the piece 34 of the lining is omitted and consequently there is no elongated port 38 at the lower side. In this form of the invention, the back plate 47 is made with the central opening 48 and the lower draft opening 49, which is closed by a door 50 and the front plate 51 is made with a large opening 52, the lower part of which is the natural draft opening 53, closed by the door 54 in which there is also a minor draft opening 55. The remainder of the opening 52 is closed by the closure plate 56 and the damper or access door 57, the latter being secured to the closure plate 56 by the hinges 58, the lower hinges 59 forming the hangers for the door 54.

The sleeve 60 extends inwardly from the closure plate 56 and encircles the oil pipe sleeve 61, the latter containing the oil pipe 62 and the sleeve 60 supporting the cone air deflector 63, which extends toward the back plate and enters the air cylinder 64 having a deflecting flange 65 similar to the flange 30.

The lining in this form of the invention comprises the pieces 66, 67 and 68, that is to say, top and sides, and these pieces are similarly formed to the pieces 31, 32 and 33 and communicate with the air pocket between the plates by means of the air holes or ports 69.

In Fig. 5 the air shield 70 is permanent and without a valve, therefore in the distribution of the air, the cone deflector 71, which terminates the sleeve 72 and extends beyond the burner 73, extends into proximity with the converging flange 74 of the air cylinder 75, which is here shown as turning inwardly at a much sharper incline, therefore the air, which comes into the air cylinder 75, is deflected both by the cone 71 and the flange 74, and reaches the flame from the burner approximately at a right angle and parallel to the stream of air flowing through the passage 76 between the outer surface of said flange 74 and the bricks 77 from the lining chambers 78.

In Fig. 6, simply the door 79 is shown, which carries the burner cone deflector and pipe. This door may also be used for natural draft by removing the pin 80, of the hinge and just sliding the door outwardly on the pipe, otherwise, that is to say, when the door is hinged, it will carry the oil burning equipment with it in opening. Of course the hinge may be arranged in various ways according to the depth of the oil burning equipment as may be well understood by anyone familiar with such equipments.

In the operation of a furnace, fired by oil and having a front of this description, the space between front and back plates forms an air pocket which is customarily connected to an air heater supplied by forced draft system of air circulation. This pocket completely surrounds the air cylinder and cone deflector, which forms a means of guiding the air to the flame. As the air enters the pocket aforesaid, it is naturally deflected by the intermediate walls aforesaid, the upper wall forming an air shield to avoid too great a draft on the flame at one place, therefore this draft is regulated by an upper valve in some cases but the great volume of air flows around this air shield and its further flow is controlled by the side valves, if these are used, though they are not an absolute necessity by any means. The air continuing to flow around, thus becomes distributed completely around the front and a certain quantity of it flows through the inlet holes or ports to the lining chambers, and there it serves the purpose of cooling the lining pieces, thereby

avoiding their rapid destruction by the great heat. The large volume of air spread about in the air pocket, flows onwardly and finds its outlet through the cone deflector and air cylinder and is thus directed on to the flame, but a considerable volume of air has also passed into the lining pieces and this flows outwardly either through elongated ports or divided ports, as the case may be, between the bricks and the outside of the projecting flange from the air cylinder and reaches the side of the flame at a comparatively wide angle thereto.

It will be thus seen, that in this air circulation the air does not lose any heat from the heater, in fact to a large extent the benefit of the heater is minimized, because the temperature of the air reaching the flame is very much higher than when it left the heater, as for instance, the considerable volume of air which flows in from the lining pieces becomes quite hot in passage, as its mission is to cool said lining pieces. This air feeds directly to the flame and nowhere in leaving the lining chambers does it come in contact with anything which might tend to cool it. The larger volume of air in the air pocket between the plates of a furnace front not being distributed therearound, also becomes hotter and reaches the flame at quite a high temperature.

In another application accompanying this application for a patent, this feature of heating the air in the air pocket is more specifically shown and described, but on account of the particular construction, it must be made the subject of a separate application, especially as in many instances the furnace front will be made very much as shown in the accompanying drawings and described in the present specification, but without departing from the spirit of the invention considerable change may be made in all the parts thereof and so long as these changes are within the scope of the claims for novelty following, the protection accorded shall not be invalidated.

What I claim is:

1. In a furnace front of the forced draft type having front and back plates distanced by intermediate walls and forming an air pocket having front and rear openings, a furnace lining attached to the back plate and forming air chambers having inlets through said back plate from said pocket and outlets leading to the firebox, and a burner suitably shut in from the outside to said air pocket and connected to a suitable oil feed and emitting a flame crossing the path of the air delivery.

2. In a furnace front of the forced draft type having front and back plates distanced by intermediate walls and forming an air pocket having front and rear openings, a furnace lining attached to the back plate and forming air chambers having inlets through said back plate from said pocket and outlets leading to the firebox, a burner, an air deflector and an air cylinder shut into said pocket from the outer side, the latter having a projecting deflector from said cylinder for the air streams.

3. In a furnace front of the forced draft type having front and back plates distanced by intermediate walls and forming an air pocket having front and rear openings, a furnace lining attached to the back plate and forming air chambers having inlets through said back plate from said pocket and outlets leading to the firebox, a burner, an air deflector, an air cylinder having a converging flange projecting into the firebox and forming an inner and outer deflecting surface and fire brick associated with said flange in directing the streams of air from the lining chamber to the flame from the burner.

4. In a furnace front of the forced draft type having front and back plates distanced by intermediate walls and forming an air pocket having front and rear openings, a furnace lining attached to the back plate and forming air chambers having inlets through said back plate from said pocket and outlets leading to the firebox, a burner, an air deflector, an air cylinder having a converging flange projecting into the firebox and forming an inner and outer deflecting surface, and firebrick secured between the several pieces to said furnace lining and forming a flame passage and at the inner ends thereof beveled off to form with said deflecting and converging flange passages for the air streams flowing into the flame from the burner at a wide angle to the line of spread of said flame.

5. In a furnace front of the forced draft type having front and back plates distanced by intermediate walls and forming an air pocket having front and rear openings, a lining for the front wall of the firebox formed of several pieces having outer side and end walls extending to the said front wall or back plate of the front and inner side walls shortened to form air outlet passages from the air chambers thus formed by said pieces, said chamber having inlets through the back plate, a burner, an air deflector and an air cylinder shut into said pocket from the outer side, the latter having a projecting deflector from said cylinder for the air streams.

6. In a furnace front of the forced draft type having front and back plates distanced by intermediate walls and forming an air pocket having front and rear openings, a closure plate supporting contiguous pieces and closing said opening in the front

plate and formed for natural draft effects, a closure for a lower opening in the back plate, an oil pipe terminating in a burner and supported by said front plate closure, a cone deflector, an air cylinder forming air passages with said cone, furnace lining forming air chambers having inlets from said pocket and outlets to the flame from said burner, and bricks forming a flame passage and contributing to an air passage to said flame from the lining chambers.

Signed at the city of New York, in the State of New York, in the United States of America.

JOHN REID