J. REID.

OIL BURNING FURNACE FRONT.

APPLICATION FILED APR. 17, 1920.

1,374,683. **Patented Apr. 12, 1921.**

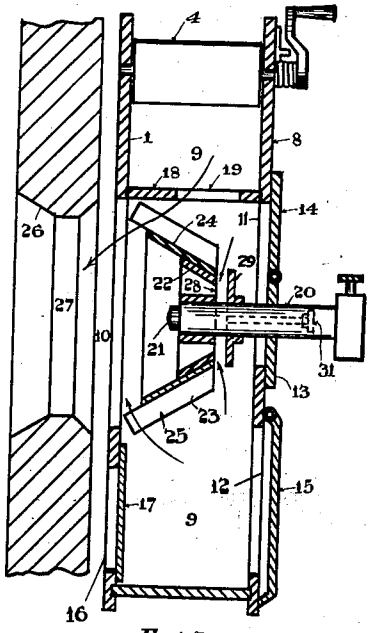


FIG. 2

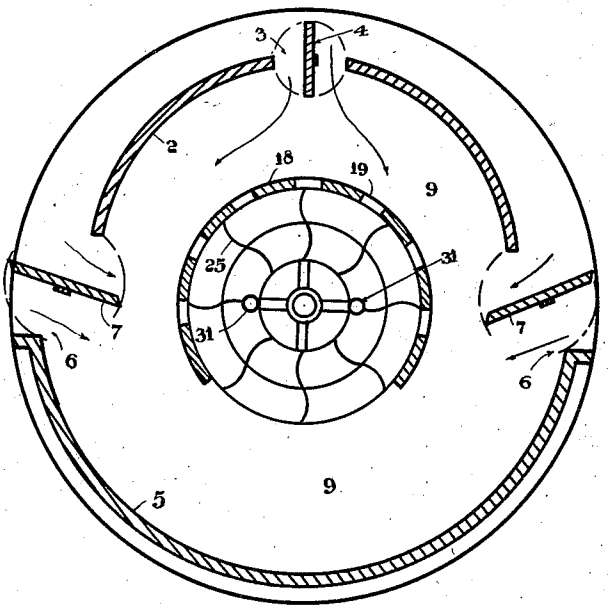


FIG. 1

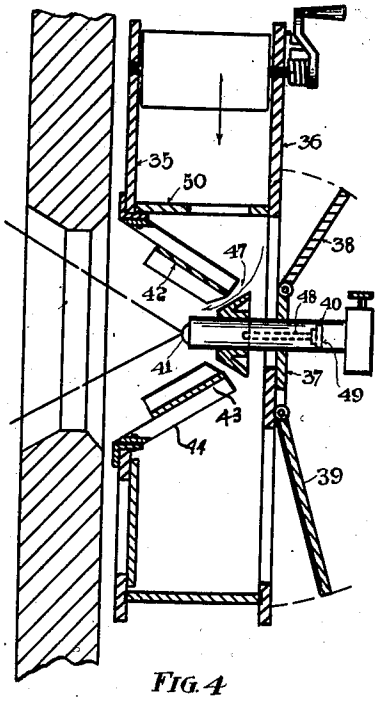


FIG. 4

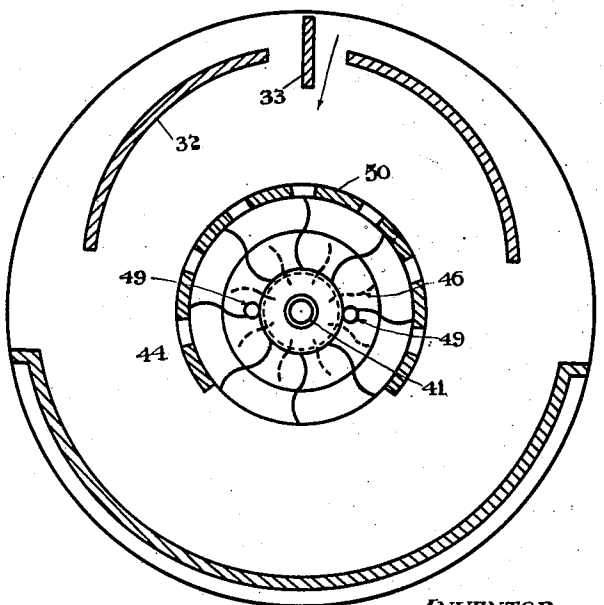


FIG. 3

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OIL-BURNING-FURNACE FRONT.

1,374,683. Specification of Letters Patent. Patented Apr. 12, 1921.

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To all whom it may concern:

Be it known that I, JOHN REID, a subject of the King of Great Britain, and residing at 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 an oil burning furnace front as described in the present specification and illustrated in the accompanying drawings that form part of the same.

The invention consists essentially in the novel construction and arrangement of parts whereby the sweep of the stream of air through the air pocket formed by the plates of the front is diverted in a flowing bend that effectually clears the corners and accelerates the delivery.

The objects of the invention are to materially promote the combustion of the fuel by insuring a good mixture; to facilitate the delivery of the air from both forced draft and natural draft sources; to economize in the consumption of fuel and increase the steaming properties of furnaces, especially in marine installations; to assist materially in carrying out the proposals and generally improve the constructions as set forth in the following applications for patents: Convertible furnace front Serial Number 299,361 filed May 23rd, 1919, Serial Number 323,177 filed September 11th, 1919, Serial Number 334,355 filed October 29th, 1919, Serial Number 315,904 filed August 7th, 1919, Serial Number 345,396 filed December 16th, 1919, Serial Number 291,362 filed April 19th, 1919, Serial Number 364,343 filed March 8th, 1920, Serial Number 364,342 filed March 8th, 1920, and the following patents: Number 1,321,555 dated November 11th, 1919, Number 1,322,343 dated November 18th, 1919, and Number 1,297,247 dated March 11th, 1919; and generally to provide an efficient and serviceable furnace front which may readily be converted to a coal burning furnace front without removing the main parts from the furnace mouth.

In the drawings, Figure 1 is a front elevation of the back plate showing the intermediate walls in section.

Fig. 2 is a vertical sectional view showing same construction of front as illustrated in Fig. 1.

Fig. 3 is a front elevation of the back plate showing a slightly modified form.

Fig. 4 is a vertical sectional view of a modified form also showing the natural draft effects.

Like numerals of reference indicate corresponding parts in the two groups of figures respectively.

In this invention, it will be shown herein that it is desirable in the many forms of furnace fronts already developed by me to successfully create efficient draft effects. One of the most important aims throughout the development of the inventions has been and is at the present the passage of the air through the air pocket formed by the front and back plates and intermediate walls.

In both forced draft and natural draft, the tendency of the air in passage is to accumulate and form pockets of dead air, which generally disarrange the feed of air to the combustion chamber in either oil or coal burning furnaces, and it is to avoid any such happening that this invention has been made by directing the flow, so that a natural bend will be imparted to the stream of air through the internal arrangements of the front; the pocket is thoroughly swept and the air delivered in the most propitious manner for the furthering of the combustion.

Referring to the drawings, the back plate 1 is shown in Fig. 1 with the shield wall 2 projecting forwardly therefrom and having a central port 3 closed by the valve 4 and a flare wall 5 surrounding the lower portion of the front and forming the side port 6 closed by the valve 7.

The front plate 8 completes the air pocket 9 and from this air pocket the flame opening 10 for an oil burning furnace, as this front primarily is intended for, leads to the fire-box. There is a corresponding opening 11 in the front plate as well as a lower opening 12.

The opening 11 is covered by the closure plate 13, which is here shown as having the upper part hinged in the form of a natural draft door 14.

The lower opening 12 is closed by the natural draft door 15.

The back plate 1 also has a lower opening 16, which is closed by the plate 17 under normal conditions.

The baffle wall 18 extends between the

front and back plates at the upper ends of the openings 10 and 11 and is formed with the ports 19 through which in the forced draft arrangement, a certain proportion of the air reaches the flame area.

The oil pipe sleeve 20 is mounted in the closure plate 13 and extends inwardly part way across the distance between the front and back plates and at the end carries the burner 21.

The spider 22 is mounted on the oil pipe sleeve 20 at the burner end and carries at the end of its legs the air director 23.

This air director 23 is preferably in the form of a cone shell 24 having the curved vanes 25 projecting outwardly therefrom forming the plurality of air passages along the outer side of the shell frequently termed spiralized passages, though as in former inventions of mine mentioned in the foregoing these vanes may be perfectly straight. In any event they project outwardly beyond the shell into proximity with the flame opening 10.

The burner 21 is well within the cone shell 24 and therefore the spread of the flame occupies a considerable area beyond the flame opening, which is the point where the air reaches it between the end of the cone shell and the edge of the flame opening.

The delivery of the air is further improved by the slight construction of the opening through the brick work 26 at 27, which corresponds to the Venturi tube effect so well known in furnace construction.

The openings 28 through the spider are closed by the cap 29 which is adjustable along the sleeve 20 and operated by the rods 30 terminating in the handles 31.

This feature of the invention is most important for not only is the creation of a vacuum avoided but facilities are provided by this cap for eliminating the choking off of the flame at the burner mouth and the feed of air through the cone shell to the flame, each at its proper time.

In Figs. 3 and 4 slight changes in the construction only, are shown and in this form of the invention side valves are omitted and the shield wall 32 shown with the central port and valve 33 as in Fig. 1 and the flare wall also as in Fig. 1.

The back plate 35 and the front plate 36 have the same opening as shown in Figs. 1 and 2, but the closure plate 37 is shown with the natural draft door 38 open to permit air to pass through the front plate opening and also the natural draft door 39 open to permit air to pass through the lower opening.

The oil pipe sleeve 40 is mounted in the closure plate and extends inwardly for part of the distance to the back plate and at its inner end carries the burner 41.

The air director 42 is formed with the body in form of a cone shell 43 flaring from around the oil pipe sleeve in the direction of the flame opening and having the vanes 44 projecting from the upper side thereof and extending in the direction of the flame opening forming a plurality of passages along the cone shell and therebetween.

The vanes 44 or certain ones of them are rigidly secured to the angle brackets 45 which are secured to the back plate 35 at the edge of the flame opening and by this means the air director 42 is rigidly supported quite clear of the oil pipe sleeve.

The inner vanes 46 project from the interior wall to the cone shell 43 and form passages therealong for the air, the vanes 46 being cut away at the entrance of the shell for the cone cap 47 to move into and close said entrance, this cone cap being operated by the rods 48 terminating in the handles 49.

The baffle wall 50 is precisely the same as the baffle wall 18, as described hereinbefore.

It will be seen that in the operation of this invention that the usual course to take is to start the fire with natural draft and by opening the natural draft doors in the closure plate and at the bottom, a stream of air flows in which takes a bend that will much facilitate the flow particularly as shown by the arrow through the opening in the front plate.

The lower stream feeds much as usual until it comes to the air director, when the stream is bent to flow through the opening beyond the cone shell and the back plates.

Just as soon as the flame gets a fair start the cap at the entrance of the cone shell may be opened, this naturally increases the flow of air to the flame, in fact in the customary way of air streams, the heated air will naturally expand as it enters the cone shell, which as explained flares outwardly and as it flows on, it joins the stream of air flowing in from the outer side and both reach the flame at the most satisfactory point for the betterment of the condition surrounding the combustion of the fuel.

This particular construction is as before explained most effective in the direction of air but it also has material advantages in so far as the structural features are concerned merely because of conversion of a furnace for coal burning purposes, for it will be readily understood it is an easy matter to remove the closure plate and oil pipe sleeve therewith and when the air director is mounted on the sleeve take it and the air director off at one time and when the air director is bolted to the back plate simply remove the bolts and take it away. The building up of the front then is a matter of detail and it is not at all necessary to remove the main parts for the air shield wall

and flare wall may remain just the same though the side valves are omitted. These must be installed for coal burning purposes.

Also it may be said that the plainest construction has been shown in the drawings in regard to the frame of the front simply because any one of the sectional forms may be used no matter in how many pieces or where joined for the results will be similar in regard to the direction of air with which this particular invention has more to do than with the actual building up of the main parts of the front; therefore, the air pocket between the plates can be made to suit the conditions of installation and the inclinations of the engineers in charge of the construction.

Some changes may be made in regard to the specified features shown herein and it must be clearly understood that the parts may be altered considerably and the same result obtained in the flow of air without departing from the spirit of the invention and so long as these changes are within the scope for novelty following the protection accorded shall not be invalidated.

What I claim is:—

1. In an oil burning furnace front having front and back plates forming an air pocket, a closure for the front opening to said pocket, a burner supported from said closure and an air director in cone shell form flaring toward the flame opening and having outer and inner vanes forming passages in the direction of the outlet to the flame situated at the extremity of said shell.

2. In an oil burning furnace front having front and back plates forming an air pocket, a closure for the front opening to said pocket, a burner supported from said closure and an air director having outer vanes extending from the inner open end of a shell body in the direction of the edge of the flame opening and terminating in that vicinity and beyond said shell body and inner vanes forming short passages to the flame opening within the shell body.

3. In an oil burning furnace front having front and back plates forming an air pocket, a closure for the front opening to said pocket, a burner supported from said closure and an air director having vanes from the outer side of a shell body extending to the flame opening and rigidly secured by brackets to the back plate at the edge of said flame opening.

4. In an oil burning furnace front having front and back plates forming an air pocket, a closure for the front opening to said pocket, a burner supported from said closure and an air director formed on a cone shell body having its inlet and smaller end surrounding the burner support and its outlet and larger end surrounding the flame in the vicinity of the flame opening, a plurality of vanes projecting outwardly from the shell body and secured to the back plate and a closure for the cone inlet.

5. In an oil burning furnace front having front and back plates forming an air pocket, a closure for the front opening to said pocket, a burner supported from said closure and an air director formed of a cone shell body having its inlet end circling the burner support and rigid therewith and its outlet end in the vicinity of the edge of the flame opening, vanes extending from the outside of said body and therebeyond at the larger end and a closure for the cone inlet.

6. In an oil burning furnace front having front and back plates forming an air pocket, a closure for the front opening to said pocket, a burner supported from said closure, an air director having an inlet into said shell and vanes in the outer side forming passages leading to the flame opening adjacent to the edge thereof, and a spider rigidly mounted on the burner support and supporting said cone shell body at its smaller end and a cap in plate form closing the inlet to said shell body and having operating rods and handles also secured thereto.

7. In an oil burning furnace front having front and back plates forming an air pocket, a closure for the front opening to said pocket, a burner supported from said closure, an air director having its body flaring in the direction of the flame opening and an inlet end and vanes outside and inside, and a cone cap fitting into said inlet end and having rods and handles operable from the exterior of the front plate.

Signed at the city of New York, in the State of New York, in the United States of America, this 7" day of April, 1920.

JOHN REID.