April 23, 1929. J. McDONALD 1,710,370

OIL BURNING FURNACE

Filed Sept. 22, 1927

Fig. 1.

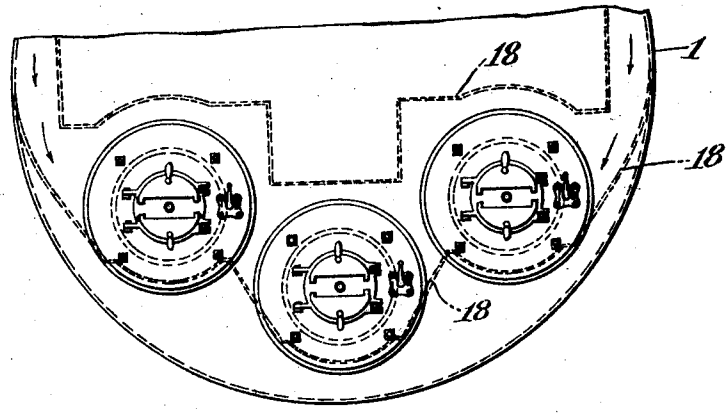


Fig. 2.

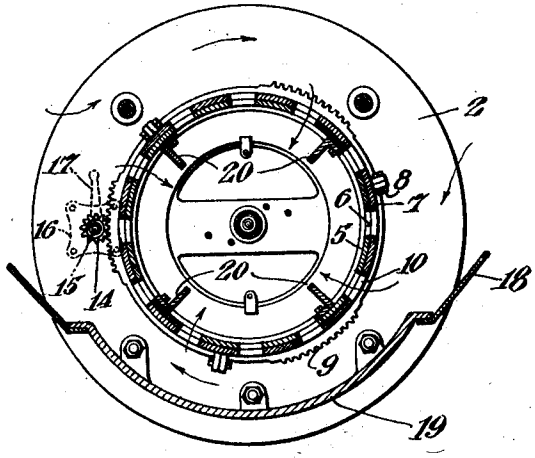
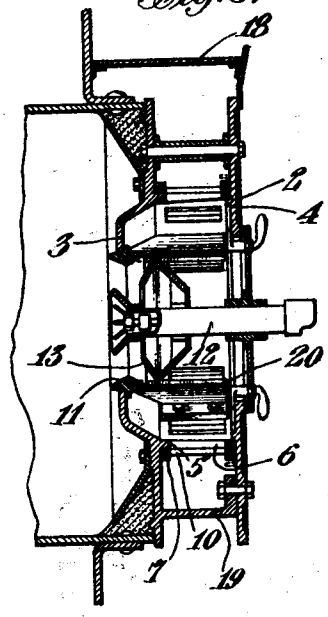


Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES McDONALD, OF BROOKLYN, NEW YORK, ASSIGNOR TO TODD DRY DOCK ENGINEERING & REPAIR CORPORATION, OF BROOKLYN, NEW YORK.

OIL-BURNING FURNACE.

Application filed September 22, 1927. Serial No. 221,190.

This invention relates to oil burning furnaces, and my improvement is directed to means within the furnace fronts for preventing centrifugal motion of the air supply as it passes therethrough for delivery to the furnace, to thereby promote economy in fuel oil combustion.

Practice has shown me that the air coming from a pressure source to support combustion in an oil burning furnace, due to the relative position of the supply source is caused to whirl in its passage through the furnace front and the whirling motion thus set up is maintained in the flow of air entering the furnace, with the result that the air thus introduced rotates and enters the furnace with an increased velocity at its outer diameter as it passes through the restricted circular opening to the furnace. This whirling motion of the entering air produces a variable vortex in the flame centre, causing the flame to back on the burner and pulsate, with the consequent overheating of the burner parts, thus increasing the temperature of the incoming oil and further accentuating the liability to pulsate and cause damage to the boiler breeching and uptakes.

The object of my invention therefore is to straighten out the air streams within the furnace fronts so that the flow therefrom may be in forwardly directed lines, thereby promoting evenness in the resulting flame, making it possible to effect a finer adjustment on the incoming air supply and achieving a high degree of efficiency in combustion.

This object is attained by the use of longitudinally straight, centrally directed vanes that extend from the circular, air ported wall of the front, the effect of said vanes being to check any circulatory motion of the air entering the front, and to direct the air flow forwardly therefrom, as stated.

Other features and advantages of my invention will hereinafter appear.

In the drawings:

Figure 1 is a partial front elevation of a boiler having a number of furnaces.

Fig. 2 is a sectional view on a larger scale, looking toward the inner surface of the front plate of the middle front appearing in Fig. 1, and

Fig. 3 is a side sectional view through one of the furnace fronts, including a portion of its furnace.

The representation in the drawing is that of Todd type burners and furnace fronts, three furnaces equipped therewith being shown as serving a Scotch marine boiler 1. The general organism of the furnace fronts includes the spaced, forward and back plates 2 and 3, the plate 2 having the annular rib 4, upon which is seated, in fixed relation, a circular wall 5 that extends from the plate 3 and is provided with ports 6, for the admission of air that flows thereto from the boiler casing, in the manner known in the art as the Howden draft. The wall 5 is encircled by a revoluble ring 7, here shown as composed of three segments, united by bolts as at 8, each segment provided with a set of external gear teeth 9, for a purpose to be described hereinafter. The ring 7 is also provided with ports 10 which are adapted, in the rotation of the ring, to co-act with ports 6 to regulate the quantity of air flowing into the furnace front.

Fig. 3, which shows on a relatively large scale the structure of a furnace front, includes the Venturi tube 11, burner tube 12, and the cone 13 which is movable longitudinally thereof to regulate the air passage through the Venturi tube, these elements forming no part of the present improvements.

Meshed with the gear teeth of a segment of the ring 7 is a pinion 14, carried by a shaft 15 that is journalled in a plate 16, secured to forward plate 2, the shaft 15 having a lever 17 by which it and pinion 14 may be rotated, to thereby rotate ring 7, for opening and closing ports 6, also for varying the extent to which said ports are opened.

The parts thus far described form no part of the present invention but are included herein as representing the character of furnace front with which my improvement is applicable. As is well known in this art air is supplied from a suitable pressure source to the interiors of the furnace fronts upon a boiler and is directed thereto by means of an air casing such as that indicated at 18, which connects with curved peripheral walls 19 spaced respectively from the circular walls 5 at their lower portions. The air thus supplied and directed enters the respective fronts of a group, such as that shown for example in Fig. 1, through the ports 6 under the control of the ported rings 7. The fact will be readily appreciated that the tangential

direction of the flowing air streams, as represented by the arrows in Figs. 1 and 2, causes them to whirl within the fronts, and the rotary effect thus induced continues in the air flow as it issues from the venturi, with the deleterious results set forth in the fore part of this specification. Therefore I provide baffles or vanes 20, being straight plates located in spaced relation within the front, said plates extending inwardly for a suitable extent from the circular wall 5, bridging the forward and back plates 2 and 3. These plates it will be perceived serve to check circulatory motion of the air entering through ports 6, and cause the flowing stream to straighten out for passage past the cone 13 and issuance through venturi 11 into the furnace.

The straightening out of the air currents in the furnace front has the desired effect of preventing the air from entering the furnace with a whirling motion and consequent vortex and enables the fuel mixture to burn evenly, without pulsations.

Variations within the spirit and scope of my invention are equally comprehended in the foregoing disclosure.

I claim:

1. In an oil burning furnace front including back and forward plates and a ported circular wall therebetween, a plurality of vanes located in spaced relation within the front and extending inwardly from said wall, bridging the back and forward plates, and adapted to cause the normal circulatory flowing stream of air entering from the ports to straighten out for passage into the furnace.

2. In an oil burning furnace front including back and forward plates and a ported circular wall therebetween, a plurality of vanes disposed in spaced radial relation within the front and bridging the back and forward plates, and being arranged substantially parallel with the moving stream of air entering through the ports and adapted to straighten the same out for passage into the furnace.

Dated, New York, September 1st, 1927.

JAMES McDONALD.