W. A. WHITE.

FURNACE FRONT.

APPLICATION FILED MAR. 9, 1914.

1,130,124. Patented Mar. 2, 1915.

Fig. 1.

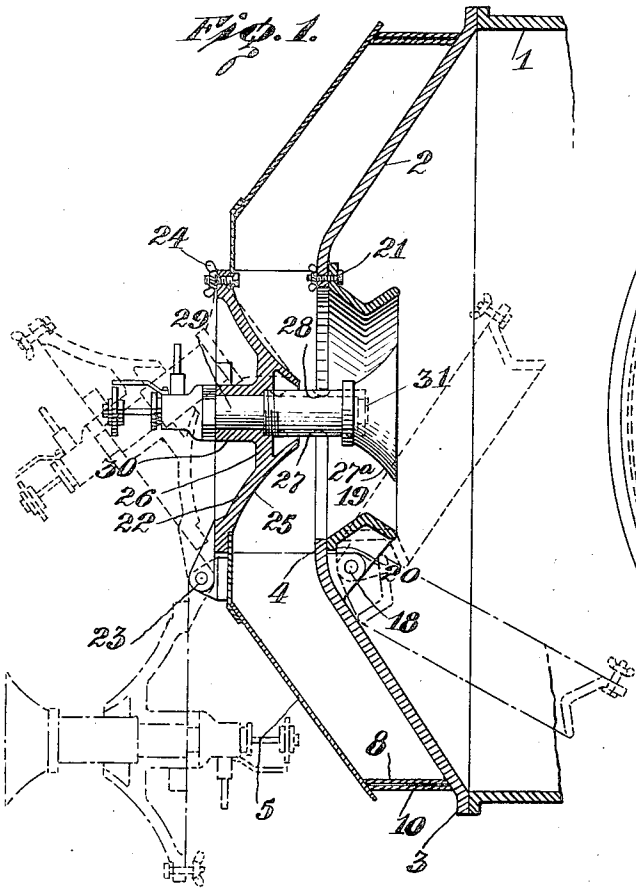


Fig. 2.

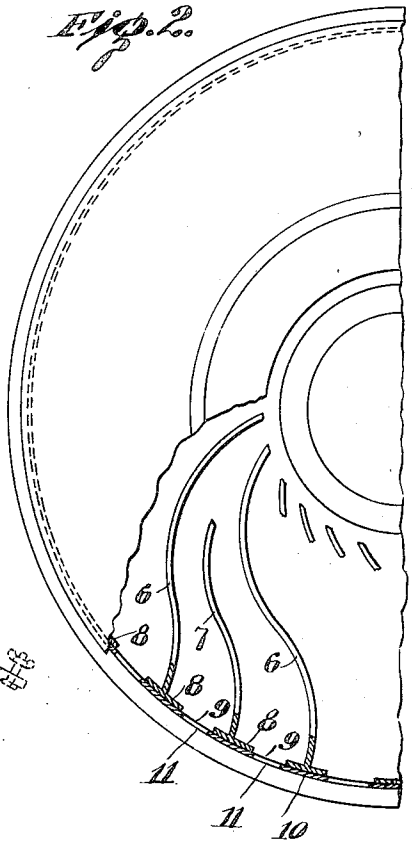
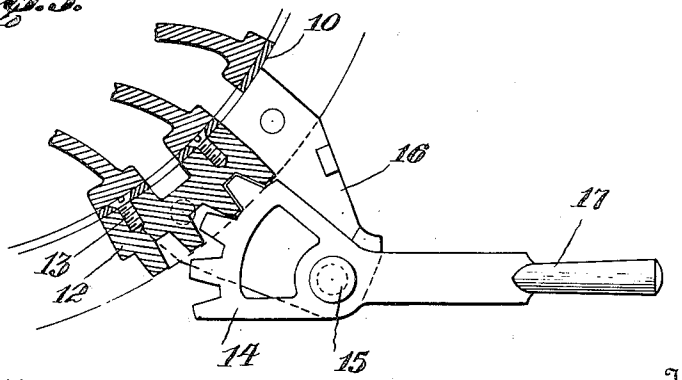


Fig. 3.



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FURNACE-FRONT.

1,130,124. Specification of Letters Patent. **Patented Mar. 2, 1915.**

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To all whom it may concern:

Be it known that I, WILLIAM A. WHITE, a citizen of the United States, and resident of the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Furnace-Fronts, of which the following is a specification.

This invention relates to furnaces for burning liquid hydrocarbon and my improvements have particular relation to a novel construction of furnace front; the arrangement thereof whereby the air supplied to the furnace is conducted through said front to be preheated therein prior to combustion, and the novel and conveniently handled means whereby the admission of air is regulated and controlled.

With these objects in view my invention consists of a hollow front which is convex or extended outwardly from the forward portion of the furnace in concentrically diminishing area, to thereby increase the air heating capacity and the furnace capacity with the sacrifice of a minimum amount of stokehold space in so doing. The said hollow front is adapted to receive air, whether under natural draft or forced draft, at its periphery, which has spaced inlets extending completely around it, and I provide a revolving shutter to regulate the size of said inlets, also a rack upon said shutter and a gear segment with handle to operate the same.

The inner wall of the hollow, air conducting front has a circular opening into the furnace, from which opening there extends inwardly a constricted air supply tube, which is hinged to said inner wall of the front in manner to swing inwardly, to leave a clearance into the furnace the full diameter of said circular opening. The outer wall of said front has a circular opening of equal diameter, which is occupied by an approximately cone faced closure which is hinged to said outer wall in manner to swing outwardly, so that when the air supply tube and closure are both swung, upon their hinges, access of maximum capacity can be had to the furnace interior. The closure aforesaid supports a tube, inwardly directed, and carrying at its inner end, a deflector whose major diameter is normally approximately in the transverse plane of the inward periphery of the air supply tube. Said deflector is capable of adjustment along its support, but I am relying mainly upon the correct dimensions and proportions of the fuel and air supply members together with the arrangement of the constricted air supply tube in substantially the position shown in the drawings relatively to the air supply tube, in order to provide for a proper deflection of the regulated air. I have found that with the design shown, and by allowing an air passage and supply tube of capacity suited to the furnace, it is better to avoid as far as possible the opportunity for users, who may be unskilled, from tampering with the adjustment.

The hollow front may be provided with main vanes in shallow S-curves, extending from the periphery of said front, at which the air is admitted, tangentially to the central space which is bounded by the inner peripheries of the walls of the front, whereby the air moves circularly in said central space and in its passage through the air supply tube. Shorter vanes are provided intermediate the outer portions of the main vanes to afford additional heating surface.

Other features and objects of my invention will appear in the following description.

In the drawings:—Figure 1 is a vertical section of my improved furnace front. Fig. 2 is a partial face view thereof, partly broken away, and Fig. 3 is a detail of the air regulating means.

The furnace or combustion chamber to which my improved front is applied may be of ordinary character, the forward portion only of such furnace being here shown and represented by the numeral 1. To the forward end of said furnace is attached, in usual manner, the inner wall 2 of the front, which may be a casting, of outwardly convexed or extended contour, forming an inclined annulus, whose concave surface is presented to the furnace, thereby providing increased furnace space for combustion within the confines of such extended contour. Said inner wall 2 may be of straight inclined section from the point of its greatest inward diameter to a point near its central periphery, as seen in Fig. 1, in solid lines. Or it may be of outwardly curved section, as seen in dotted lines in said Fig. 1, or it may be of other suitable outwardly extended, diminishing contour. As shown, said wall has an

outward, annular, vertical flange 3 by which the front is secured to the furnace, and an inner, centering, vertical portion 4 whose periphery forms the centering terminal thereof. An outer wall 5 is shown as following the contour of wall 2, being spaced therefrom correctly to provide an air passage of proper capacity. Said wall 5 may be of sheet metal and is connected to wall 2 by being mounted on vanes 6, 7 which project edgewise from wall 2. Said vanes 6, 7, may be cast integrally with said wall 2, that being the mode of construction found most desirable. The wall 5, being also in form of an annulus, has its outer periphery lying near the outer periphery of wall 2, and between the two walls, around them, the vanes 6, 7, have enlarged heads 8, separated circumferentialy from each other, to provide spaces 9 therebetween to serve as peripheral air inlets to said hollow front. A circular band or shutter 10, encircling the heads 8 and spaces 9, has openings 11, to register with spaces 9 to open the latter wide, or to close or partially close said spaces in turning, to thereby shut off or regulate the supply of air to the front and furnace. A rack section 12 is secured as by screws 13, to band 10 at a given point in its circumference, and a gear sector 14, fulcrumed at 15 to a bracket 16, and having a handle 17, is meshed with said rack, to move said rack and band and thereby regulate the air supply to the front.

The vanes 6, which extend inwardly to divide the space between walls 2 and 5 into inwardly directed passages, are tangentially arranged relatively to the central space bounded by the inner peripheries of said walls. Said vanes 6 are of substantially sLallow S conformation and provide heating surfaces besides directing tangentially inwardly the air which is received at the regulated peripheral openings. Because of the greater circumferential distance between the vanes 6 at their outer portions than exists between their inner portions, I supplement said vanes with a series of shorter vanes 7, which extend inwardly only about half way through the diameter compassed between the walls 2, 5, the vanes 7 providing still further heating surfaces for the entering air.

Mounted upon the inner wall 2, as by a hinge 18, is a constricted air supply tube 19 which extends from the interior surface of said wall, or that surface thereof which is directed toward the furnace interior, the abutting portion of said tube 19, which may be a flange 20, lying normally against said wall interior surface about its edge, and having fastening means therewith of usual character, as the bolt and winged nut 21 indicated. With said fastening released the tube 19 is adapted to swing inwardly within the furnace upon its hinge 18 to remove it as an obstruction to the full clearance of the circular opening in wall 2. The dotted lines in Fig. 1 show the tube 19 as fully opened inwardly.

A substantially cone faced member 22 is hinged as at 23 to the external surface of wall 5, near its inner peripheral edge, said member 22 normally filling and closing the circular opening in said wall 5, said member 22 having a fastening of usual character as the bolt and winged nut 24, with said wall, and being adapted to swing outwardly, when released, to fully uncover said circular opening in wall 5, to remove said member 22 as an obstruction to the full clearance of the circular opening in said wall 5. Dotted lines in Fig. 1 show the fully opened position of member 22.

The inwardly directed, substantially cone-shaped central portion 25, of member 22 is directed toward the rear portion of the constricted tube 19, and forms therewith an annular passage for the air received from the tangential passages in the front for delivery to the furnace through the constricted tube 19. Mounted in a central hub portion 26 of member 22 is a tube 27 which is thus axially arranged with respect to the furnace front, the inner end of said tube lying in substantially the vertical plane of the constricted portion of tube 19. Said tube 27 has internal protuberances or points 28 whereby a burner tube 29 carried within said tube 27 may be centered therein, said burner tube, which is introduced to said supporting tube 27 through an outer tubular passage 30 therefor in the member 22, is of such length, and so adjusted, that its nozzle 31 is about even with the inner end of tube 27, and thus is also in substantially the vertical plane of the constricted portion of tube 19. The tube 27 has mounted thereon, about its forward end, a bell shaped deflector 27^a for the passage therethrough of fuel from the burner nozzle, the larger diameter of said deflector being directed toward the furnace interior, and the major peripheral diameter of said deflector lying substantially in the vertical plane of the inward peripheral edge of the tube 19.

Under the construction disclosed the parts being proportioned and arranged substantially in the manner indicated an efficient mixture of fuel and air is provided at the mouth of the deflector, the heated air traveling in a spiral about the axis formed by the tube 27 and deflector 27^a, acquiring increased velocity at the constricted portion of tube 19 and maintaining that velocity in its further inward travel between the outwardly flaring inward wall of said tube 19 and the concentric, correspondingly inclined wall of deflector 27^a, some of this air entraining over the peripheral edge of the deflector to meet the fuel issuing from its

mouth. As is known, the fuel may be traveling in a spiral opposite to the direction of spiral travel of the air.

I claim:

1. A hollow furnace front having regulated means all around its periphery for the reception of air, passages in said front, said passages extending inwardly from said reception means through the major portion of the radius of said front, and conducting the received air tangentially therethrough with respect to its axis, and a central opening communicating from the front to the furnace.

2. A hollow furnace front having regulated means all around its periphery for the reception of air, passages in said front, said passages extending inwardly from said reception means through the major portion of the radius of said front, and conducting the received air tangentially therethrough with respect to its axis, and a constricted supply tube communicating from the center of said front to the furnace.

3. A hollow furnace front having air passages directed inwardly thereof from peripheral inlets, a centrally disposed constricted supply tube, a burner, a bell shaped deflector supported about said burner with its mouth directed toward the furnace and with its major peripheral edge lying substantially in the vertical plane of the inwardly directed peripheral edge of said supply tube, the passage between said supply tube and deflector communicating between said air passages and the furnace.

4. The combination with a furnace of a hollow front therefor, and a supply tube for conducting air from said front to the furnace, said supply tube being hinged to the inner wall of said front, to swing into the furnace.

5. The combination with a furnace of a hollow front therefor and a constricted supply tube for conducting air from said front to said furnace, said constricted supply tube being hinged to the inner wall of said front to swing into the furnace.

6. The combination with a furnace of a hollow front therefor of outwardly tapering contour, and a constricted supply tube for conducting air from said front to said furnace, said supply tube being hinged to the inner wall of said front to swing into the furnace.

7. The combination with a furnace of a hollow front therefor of outwardly tapering contour, a constricted supply tube for conducting air from said front to said furname, and a cone like member carried by the outer wall of said front to co-act with said constricted tube in providing an annular inclined passage communicating from said front to the furnace, said cone like member being hinged to said outer wall to swing outwardly therefrom.

8. The combination with a furnace of a hollow front for the passage of air to the furnace, an air supply tube hinged to the inner wall of said front to swing into the furnace, and a front closure hinged to the outer wall of the front to swing outwardly.

9. The combination with a furnace of a hollow front for the passage of air to the furnace, a constricted supply tube hinged to the inner wall of said front to swing into the furnace, and a cone faced closure hinged to the outer wall of the front to swing outwardly, said tube and closure, when closed, co-acting to form an annular inclined passage between the front and furnace.

10. A hollow furnace front having regulated peripheral inlets and air passages extending tangentially inwardly from said inlets, an inwardly opening constricted supply tube hinged to the inner wall of the front, an outwardly opening closure hinged to the outer wall of said front, said closure having a cone-like face directed toward said supply tube, a tube axially borne by said closure to support a burner, the nozzle of said burner and inward end of said tube lying substantially in the vertical plane of the constricted portion of said supply tube, and a bell shaped deflector, carried by said burner supporting tube with its peripheral edge lying substantially in the vertical plane of the inward periphery of said supply tube.

Signed at the borough of Manhattan in the city, county, and State of New York this 5th day of March A. D. 1914.

WILLIAM ALBERT WHITE.

Witnesses:
CLARENCE S. ASHLEY,
F. W. BARKER.