E. W. TUCKER.

FUEL OIL BURNING APPARATUS.

APPLICATION FILED OCT. 3, 1912.

1,136,849.

Patented Apr. 20, 1915.

Fig. 1.

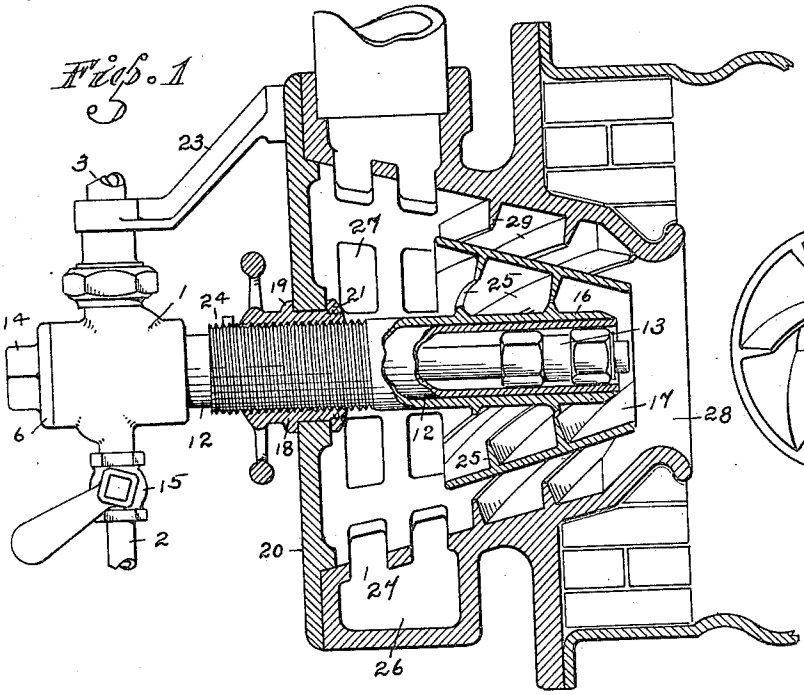


Fig. 3.

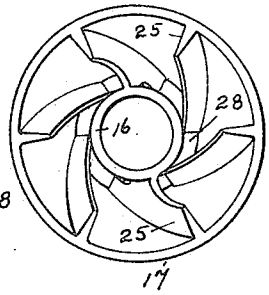
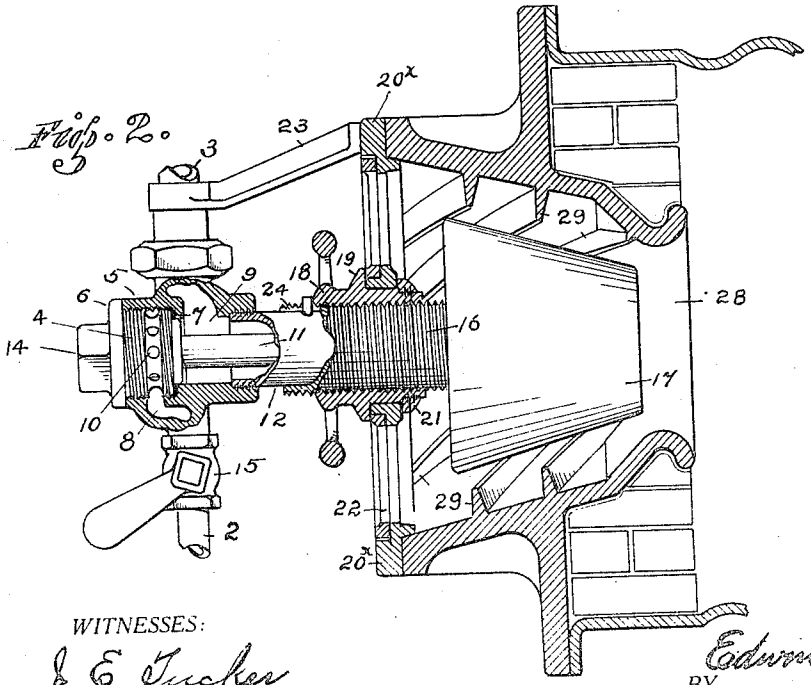


Fig. 2.



WITNESSES:

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FUEL-OIL-BURNING APPARATUS.

1,136,849. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed October 3, 1912. Serial No. 723,736.

To all whom it may concern:

Be it known that I, EDWIN W. TUCKER, a citizen of the United States, and a resident of the city and county of San Francisco, State of California, have invented new and useful Improvements in Fuel-Oil-Burning Apparatus, of which the following is a specification.

This invention relates to improvements in fuel oil burning apparatus and has for its object the proper combination of the atomized fuel with the air admitted through the furnace front; and includes the combination of the atomizing burner and an adjustable ventilator front adapted to control the whole volume of air admitted to the furnace, of dividing a portion of the air from the main body of ventilation and diverting it into combination with the atomized fuel and to give to the whole mass of admitted air a whirling or cyclone motion.

Other objects and advantages will appear as the description progresses.

I shall outline in full that form of the invention selected for illustration in the drawings accompanying and forming part of the present specification. The novelty of the invention will be included in the claims succeeding said description. From this it will appear that I do not restrict myself to the showing made by said description and drawings, as I may adopt many variations within the scope of my invention as expressed in said claims.

I have discovered in connection with the burning of fuel oil, that given a whirling motion the air admitted through the furnace front will more completely fill the furnace, eliminating troublesome "air-pockets", or dead spaces, invariably present when the air is drawn in by stack suction or forced draft through the conventional furnace front or damper door. This trouble is easily traceable to the disposition of a mass of air in motion to eddy and "tumble" due to friction set up in passing a static mass, unequal expansion and contraction, etc. This is further taken advantage of by releasing the atomized fuel in the center or vortex of the column, insuring the proper oxidization of the atoms of fuel and even combustion throughout the furnace, eliminating the sudden stoppage and reignition of the flame when an air pocket withholds the necessary oxygen to support combustion. These shocks are so frequent that a rapid vibration is set up in the furnace very deleterious to the whole mechanism particularly under boilers.

In the drawings: Figure 1 is a vertical cross-section of a forced draft furnace front and fuel oil burner constructed and combined in accordance with the invention. Fig. 2 is a similar view of the same as applied to a natural draft furnace front. Fig. 3 is an end elevation looking into the big end of the aspirator hood surrounding the burner.

In detail the construction consists of the fuel oil burner comprising the base fitting 1 provided with the fuel inlet 2 and the air inlet 3. The plug 4 is screwed into the neck 5, the flange 6 abutting the end of the neck to form an outer seal. The inner end of the plug compresses the gasket 7 against the edges of the center opening formed between the chambers 8 and 9 in the base fitting, to form an inner seal.

The plug 4 is chambered and provided with the holes 10 communicating with the fuel chamber 8. The fuel tube 11 is fixed in the end of the plug and extends forward within the shell 12 screwed into the base and forming the body of the burner. The atomizing elements of the burner are confined within the head 13 fixed on the end of the fuel tube. The specific nature of the atomizing elements are not germane to this present invention, that is, not limited to any particular form of atomizing burner. The squared portion 14 provides a wrench hold for withdrawing the whole fuel conduit assembled in the plug 4. The fuel feed is controlled by the valve 15.

The body 12 of the burner acts as a guide for the threaded tubular stem 16 of the aspirator hood 17 that is threaded into the swivel sleeve 18. This sleeve is provided with the flange 19 bearing against the front plate 20, within which it is rotatably secured by the fixed flange 21 secured to the sleeve and abutting the inside of the plate. This front plate is fixed to the ventilator to form a front seal in the forced draft type illustrated in Fig. 1, or is perforated and provided with a louver 22 in the natural draft type shown in Fig. 2.

The aspirator hood 17 formed integral with or fixed to the stem 16 is conical in shape concentric with and spaced from the

stem with the larger outlet facing the incoming air and the smaller focal end converging toward the burner tip.

The burner is held in fixed position by the bracket 23 attached to the ventilator front, and is centered by passing through the tubular stem 16 of the hood. This stem is slidable on the body 12 of the burner or it may be guided by other means provided within the ventilator. The interior of the hood is provided with the spiral vanes 25 that are adapted to impart a whirling motion to the column of air drawn through the hood. The hood can be combined with the burner and used in any kind of a furnace front, with or without spiral vanes.

The ventilator front illustrated as applied to the fronts of internally fired marine boilers consists of an outwardly flared substantially conical shell provided with a distributing chamber 26 with ports 27 and a sealed front for forced draft practice, as in Fig. 1, or with an open front plate and louver controls for natural draft, as in Fig. 2.

The essence of the present invention is the passing of all air admitted to the furnace through the ventilator fronts in intimate combination with the burning fuel, with the twofold object of insuring proper oxidation of the fuel, and to save the furnace from the deleterious effect of vagrant currents of cold air. Gradually tapering from the inlet the ventilator front terminates in a restricted outlet opening 28 slightly greater in diameter than the smaller diameter of the aspirator hood. The interior of the front is provided with the spiral vanes 29 terminating at the outlet to give the inrushing air a whirling motion parallel with the column whirling through the hood.

The particular function of the hood is to concentrate a whirling column of air around the flame issuing from the burner tip. The presence of fresh air in immediate proximity to the initial ignition point insures perfect combustion preventing gulping and sputtering of the flame. To control the quantity of air deflected to the burner, the hood can be moved forward by rotating the threaded sleeve 18 until the body of the hood chokes the approach to the outlet 28 deflecting an increased quantity of air through the hood, without materially lessening the discharge area of the outlet 28. Inversely by backing off the threaded sleeve 18 and the hood, the greater volume of air taking the line of least resistance, will pass directly through the outlet 28. To prevent the rotation of the hood, the stem is provided with the slit 24 engaging a pin fixed in the burner shell. The whirling motion being always present, the atomized particles are are more uniformly suspended and a better mechanical mixture formed, insuring better combustion and a more even radiation of heat throughout the furnace. Under water tube boilers, or in square or peculiarly shaped fire boxes, the whirling motion may not be desirable, and can be omitted.

Modifications and omissions within the scope of this invention will suggest themselves in suiting this invention to the practice of this art.

Having thus described this invention, what is claimed and desired to be secured by Letters Patent is:

1. In a fuel oil burning apparatus, the combination with a tapered ventilator body provided with interior spirally disposed vanes, of a threaded sleeve, means for rotatably supporting said sleeve, a tubular stem engaging said threaded sleeve, an oil burner within said sleeve provided with a tubular shell forming a guide for said sleeve, and a tapered hood carried by said tubular stem and provided with internal spirally disposed vanes.

2. In a fuel oil burning apparatus, the combination of a tapered ventilator body, a burner provided with a tubular shell, a bracket for supporting one end of said burner, a tapered hood slidably mounted upon and guided by said shell, said hood serving to center said burner, and means for adjusting said hood on said shell with respect to said ventilator body.

3. In a fuel oil burning apparatus, the combination with a tapered ventilator body provided with internal spirally disposed vanes, a burner provided with a tubular shell, means for supporting said burner, a tapered hood slidably mounted upon and guided by said shell, said hood being also provided with internal spirally disposed vanes, and means for adjusting said hood on said shell with respect to the ventilator body.

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Witnesses:
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