March 10, 1931. J. VAN BRUNT 1,795,454

PULVERIZED FUEL BURNER

Filed Aug. 6, 1926

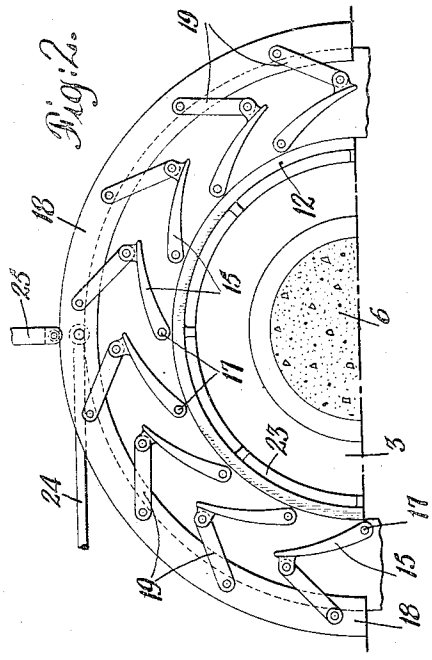


Fig. 2.

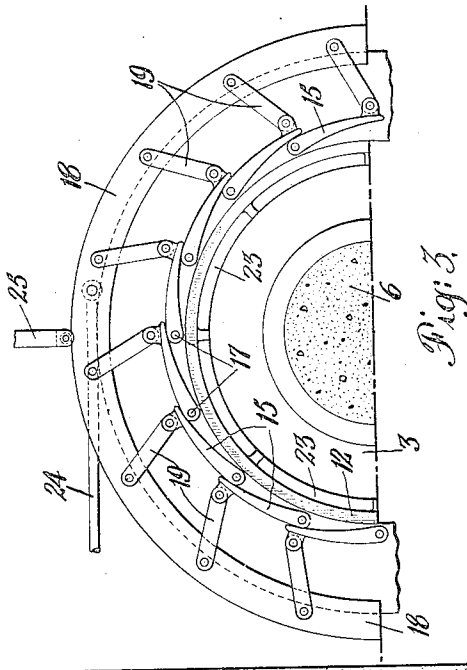


Fig. 3.

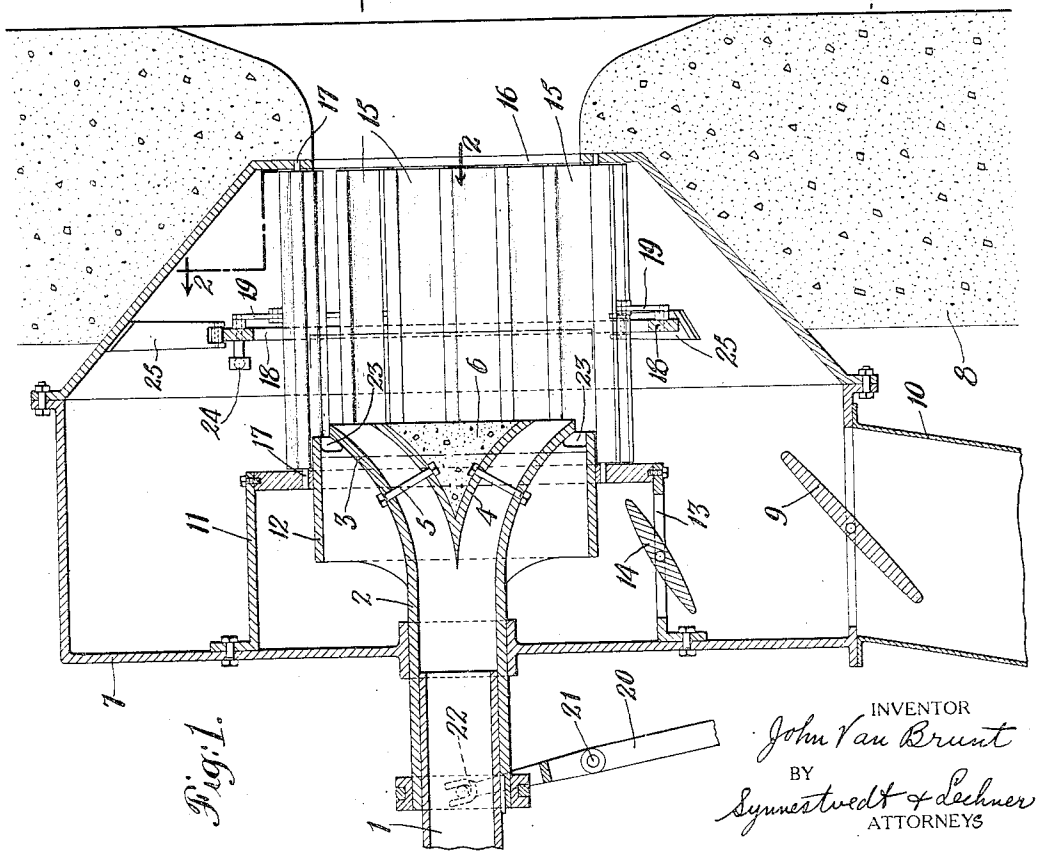


Fig. 1.

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UNITED STATES PATENT OFFICE

JOHN VAN BRUNT, OF FLUSHING, NEW YORK, ASSIGNOR TO INTERNATIONAL COMBUSTION ENGINEERING CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

PULVERIZED-FUEL BURNER

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This invention relates to pulverized fuel burners, and is particularly useful in the type of pulverized fuel combustion in which substantially all the air for combustion is admitted at the burner.

The main disadvantage with burners of this type heretofore used was that it was found very difficult to supply and thoroughly mix sufficient air with the fuel for complete and efficient combustion at various rates of firing. The primary object of the present invention is to provide an apparatus which will deliver air and fuel in the proper proportions at any rate of firing, and to deliver a stream of air and fuel always thoroughly mixed, regardless of the rate of firing.

How the foregoing, together with such other objects and advantages as may hereinafter appear, are realized will be clear from the following description of the preferred embodiment of the invention known to me at present.

In the drawings:

Fig. 1 is a vertical longitudinal section of a burner constructed in accordance with my invention;

Fig. 2 is an elevation taken on the line 2—2 of Fig. 1, showing the air inlet louvers or vanes in a partially open position, and

Fig. 3 is a view similar to Fig. 2, but showing the vanes in closed position.

Referring now to the drawing, the fuel supply line is indicated by the reference numeral 1, and extends into the fuel nozzle proper 2, forming a slip connection therewith. The nozzle 2 has a flaring portion 3 at its delivery end in which a conical deflector 4 is positioned, and secured in some suitable manner, as by the bolts 5, to deliver the fuel in a sheet substantially from the periphery of the nozzle. The deflector 4 may be constructed of a metal cone filled with a refractory material, such as indicated by the reference numeral 6, to protect parts of the nozzle 2 from the intense heat of the furnace.

The burner, as a whole, is surrounded by a casing 7 extending partway through the furnace wall 8, and is provided with an opening through which the supply end of the nozzle extends with freedom of longitudinal motion. A damper 9 controls the air admitted from the air supply line 10, to the interior of the burner casing 7. A supplementary casing 11 surrounds the burner nozzle 2, and is provided with an opening through which the cylinder 12, secured to the delivery end of the nozzle, is free to move. Air is admitted from the interior of casing 7 to the interior of supplementary casing 11 through the opening 13, which is controlled by the auxiliary damper 14.

A circumferential set of vanes 15 extends within the casing 7 from the opening 16, into the interior of the furnace, to the opening in the casing 11 through which the delivery end of the nozzle extends, and forms, when the vanes are in closed position, a cylindrical passage from the nozzle into the combustion chamber. Each vane 15 has a pivot pin 17 at each end thereof positioned near or at one edge. The pins 17 at the ends of the vanes toward the combustion chamber have bearings in the casing 7 around the opening to the chamber, and the pins 17 at the other ends of the vanes have bearings in the casing 11 around the opening through which the nozzle extends. The free edges of the vanes 15 have link connections 19 to a ring 18 around the vanes, on rotation of which the amount of air admitted, from the interior of the housing 7 through the vanes, may be controlled (see Figs. 2 and 3). The ring 18 has a suitable link connection 24 to the exterior of the casing 7 for control of the openings between the vanes 15, and has bearing means 25 secured to the casing 7 to keep the ring in a concentric position with relation to the vane bearings 17.

A burner nozzle control lever 20 is pivoted at 21, and has a double fork and pin connection 22, of a well known type, with the nozzle 2 providing for control of the longitudinal adjustment of the nozzle.

Openings 23 are provided between the periphery of the delivery end of the nozzle and its surrounding cylinder 12 for admission of air from the auxiliary casing 11 into the fuel stream.

In operation of the burner of the present invention, pulverized coal is admitted

through the nozzle 2 with substantially no more air than is sufficient for carrying purposes. If the furnace is being fired at a low rate, the nozzle may be moved, by means of the lever 20, toward the combustion chamber, the cylinder 12 advancing through the opening in the casing 11 and thus blocking off a part of the vanes 15. The openings between the vanes 15 may also be reduced, or the vanes may be closed entirely for very low rates, in which instance all the air for combustion is admitted through the openings 23. In the case of high rates of firing the nozzle with its cylinder 12 is moved away from the combustion chamber, thus exposing the entire surface of the openings between the vanes 15.

The vane construction admits the air substantially tangentially, causing a violent swirling of fuel and air, which results in complete and thorough admixture, and the vanes 15, together with the dampers 9 and 14, admit of very accurate control of the air for all rates of firing.

Of course, it will be understood that the relative pressure conditions are such that the streams of air entering between the louvers have at least sufficient velocity to prevent any coal from discharging peripherally into the casing 7. I prefer relatively high velocities of such air to insure thorough admixture.

I claim:—

1. A burner for pulverized fuel furnaces comprising a cylindrical set of air admission louvers one end of which opens into the furnace; a fuel nozzle extending into the other end of said cylindrical set of louvers discharging therethrough into the furnace; means for advancing and retracting said nozzle with respect to the furnace; and means carried by said nozzle for blocking off a part of the air admission louvers when said nozzle is in advanced position.

2. A burner for pulverized fuel furnaces comprising in combination, a nozzle adapted to discharge a stream of fuel, means for admitting air into the fuel stream substantially tangentially thereto, means for admitting air into the fuel stream substantially longitudinally thereto, means for advancing or retracting said nozzle toward or away from the furnace and means carried by said nozzle for blocking off a portion of said first mentioned air admission means when the nozzle is in advanced position.

3. A burner for pulverized fuel furnaces comprising in combination, a nozzle adapted to discharge a stream of fuel, means for admitting air into the fuel stream substantially tangentially thereto, means for admitting air into the fuel stream substantially longitudinally thereto, means for advancing or retracting said nozzle toward or away from the furnace and means carried by said nozzle for blocking off a portion of said first mentioned air admission means when the nozzle is in advanced position, together with independent means for controlling the air admitted longitudinally.

4. A burner for pulverized fuel furnaces comprising a casing having an air inlet and an opening into the furnace; a cylindrical set of louvers in said casing, one end of which is adjacent said opening; a supplementary casing in said first mentioned casing having an air inlet and an opening communicating with the other end of said cylindrical set of louvers; a nozzle having a cylindrical sleeve around its delivery and extending through said second mentioned opening into said cylindrical set of louvers; passages in said sleeve for admission of air from said supplementary casing into the fuel stream around the edge of said nozzle; and means for moving said nozzle with its sleeve longitudinally with respect to said set of louvers to control the air admission therethrough.

In testimony whereof I have hereunto signed my name.

JOHN VAN BRUNT.