B. R. PHILLIPS.

LIQUID FUEL BURNER.

APPLICATION FILED SEPT. 15, 1909.

969,978. Patented Sept. 13, 1910.

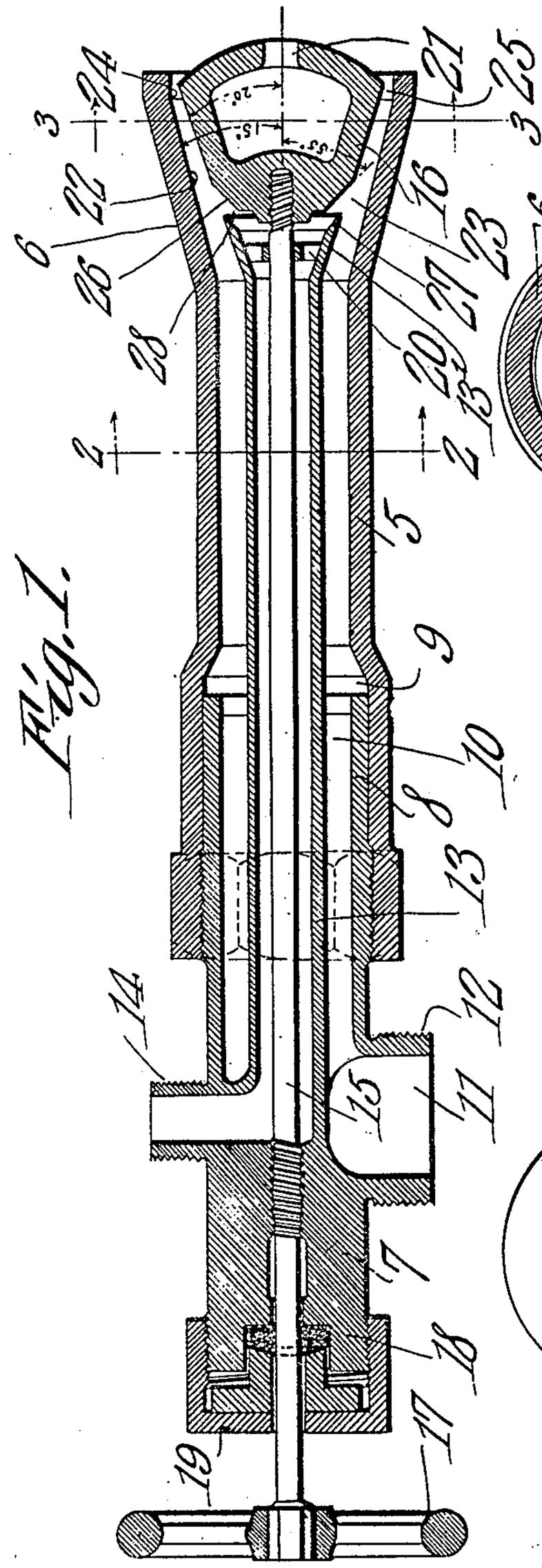

Fig. 1.

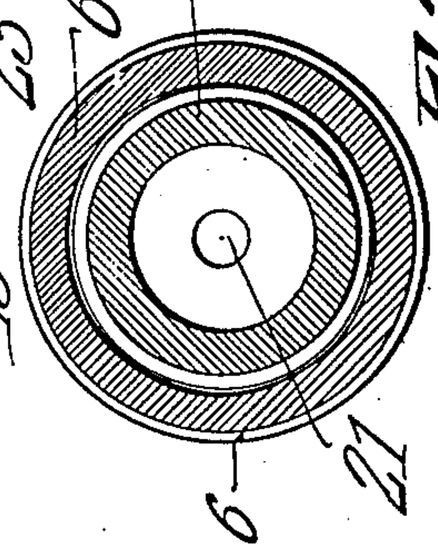

Fig. 3.

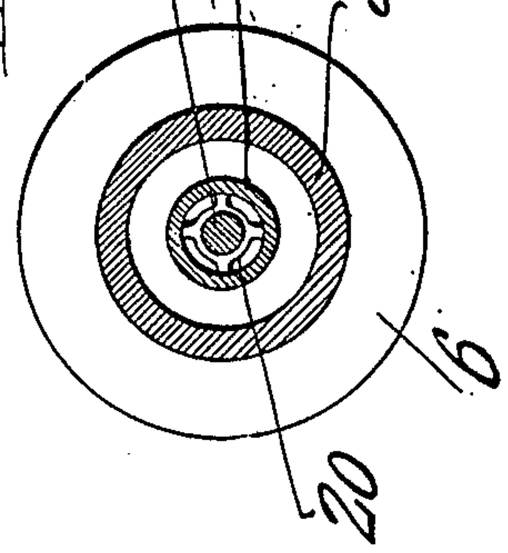

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

BRADFORD R. PHILLIPS, OF CEMENT, TEXAS.

LIQUID-FUEL BURNER.

969,978. Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed September 15, 1909. Serial No. 517,926.

To all whom it may concern:

Be it known that I, BRADFORD R. PHILLIPS, a citizen of the United States, residing at Cement, in the county of Dallas and State of Texas, have invented a new and useful Liquid-Fuel Burner, of which the following is a specification.

This invention relates to liquid fuel burners of that type which spray or inject atomized oil into the combustion chamber of the furnace.

The invention resides more particularly in the structure of the burner nozzle, its object being to provide a nozzle in which a more thorough mixture of the oil and atomizing fluid is effected, and also to provide improved means for controlling the size of the flame, so that combustion may take place at any desired distance from the tip of the burner nozzle.

The invention also has for its object to provide a burner nozzle embodying certain novel and improved structural details to be hereinafter described and claimed.

In the accompanying drawing: Figure 1 is the central longitudinal sectional view of the burner. Figs. 2 and 3 are transverse sections on the lines 2—2 and 3—3, respectively, of Fig. 1.

In the drawing, 5 denotes a tubular casing which forms the main body of the burner nozzle. The casing is open at both ends, one end being flared as indicated at 6, this end being the discharge end of the casing. To the other end of the casing is connected a head 7 having a tubular portion 8 which screws into the bore 9 of the casing. The bore 10 of the tubular portion 8 has a side opening 11 through which the atomizing fluid enters, a nipple 12 being provided for connection of the supply pipe of said fluid.

Through the bore 10 extends a tube 13 which is spaced from the wall of said bore, and also extends through the bore 9 of the casing 5, in spaced relation with its wall. The tube 13 terminates in a flared discharge end 13′ extending for a short distance into the flared discharge end 6 of the casing 5. The tube is formed preferably integral with the head 7, and opens through one side thereof, a nipple 14 being provided for connection of the oil supply pipe.

Into the head 7 is screwed a valve stem 15 which extends lengthwise through the tube 13, and carries a valve 16 located within the flared discharge end of the casing 5. The valve stem is provided with a hand wheel 17 for operating the same, and the head 7 is provided with a stuffing box 18 and a gland nut 19. In the flared discharge end of the tube 13 is a spider 20 for supporting the valve stem 15. Said stem screws into or is otherwise connected to the valve 16. That end of the casing 5 into which the tubular portion 8 of the head 7 extends is slightly enlarged, so that the bore of said tubular portion may have the same diameter as the bore of the casing, and the air therefore flows in a straight line through the nozzle. The outer surface of this end of the casing, is made angular to permit the application of a wrench.

The valve 16 is a hollow tapered body into the smaller end of which the valve stem 15 screws, the larger end of the body being outwardly presented, and this end is convex, and has an opening 21 leading to the interior of the valve body. As already stated, the valve is located in the flared portion 6 of the casing 5, and it is spaced from the inner surface 22 thereof. The valve is made hollow to reduce its weight.

The atomizing fluid, which may be compressed air or steam, flows through the bores 10 and 9, and through the space 23 between the valve 16 and the surface 22. The oil flows through the tube 13 and is discharged from the flared end 13′ thereof into the space 23 in which it meets the air flowing therethrough, and is mixed therewith, and then discharged from the nozzle in a fine spray.

The surface 22, and the surface of the valve body 16 extend at different angles, the former at an angle of approximately 15 degrees and the latter at an angle of approximately 20 degrees to the horizontal. By this arrangement, the space 23 is tapered in the direction of the discharge end of the nozzle. The surface 22 terminates in a narrow portion 24 which extends parallel to the longitudinal axis of the nozzle, whereby the annular space 25 between said surface and the valve body, is abruptly contracted.

The valve body is beveled at its inner end as indicated at 26, and the discharge end of the tube 13 is beveled at the same angle, as indicated at 27, these bevels extending at an angle of approximately 55 degrees to the horizontal. The space 28 between these two beveled surfaces extends forwardly

obliquely to the space 23. The flow of oil may be shut off by turning the hand wheel 17 so as to engage the beveled surface 26 with the beveled surface 27, the latter thus forming a valve seat. The outer surface of the flared end 13′ extends at the same angle as the outer surface of the valve body.

By the herein described construction of the discharge end of the nozzle, the oil is deflected obliquely across the space 23, which results in a more intimate mixture of the oil with the air passing through said space, and the atomized fuel is discharged from the nozzle through the contracted space 25 in the form of a fine spray. The length and circumference of the flame, as well as the distance from the tip of the nozzle at which combustion takes place, may be varied by adjusting the valve. This is especially desirable in cement kilns, retorts and steam boiler furnaces. The valve and the discharge end of the nozzle are shown as circular in cross section, but the parts may be made in any other cross-sectional shape according to the shape of the flame desired. As the atomized fuel is discharged in an annular stream, there is a tendency toward the formation of a vacuum within the space inclosed by the stream for a short distance from the discharge end of the nozzle were it not for the convex end of the valve 16. This end extends into the space in which the vacuum would form if the end of the valve were flat, and a vacuum at this point is therefore prevented.

The burner produces a maximum amount of heat, with a minimum expenditure of fuel, and it therefore effectually serves the purpose for which it is designed.

What is claimed is:—

1. In a liquid fuel burner, a tube having a flared discharge end, a tube arranged concentrically within said tube and discharging into its flared discharge end, and a valve in the discharge end of the first-mentioned tube in front of the discharge end of the other tube, said valve comprising a tapered body, the surface of the same, and the inner surface of the flared discharge end of the first-mentioned tube extending at different angles relative to each other, and at oblique angles to the longitudinal axes of the tubes, the said inner surface of the aforesaid flared discharge end terminating in a portion which extends parallel to said axes, and into which portion the end of the valve extends.

2. In a liquid fuel burner, a tubular casing having a flared discharge end, and enlarged at its other end, a head having a tubular portion entering the enlarged end of the casing, there being an inlet to the bore of the said tubular portion, said bore having the same diameter as the internal diameter of the casing intermediate its ends, a tube in said bore opening through one side of the head, and extending through the bore of the casing into the discharge end thereof, and discharging thereinto, and a valve located in the flared discharge end of the casing.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

BRADFORD R. PHILLIPS.

Witnesses:
E. O. Bursing,
Eugene Couch.