

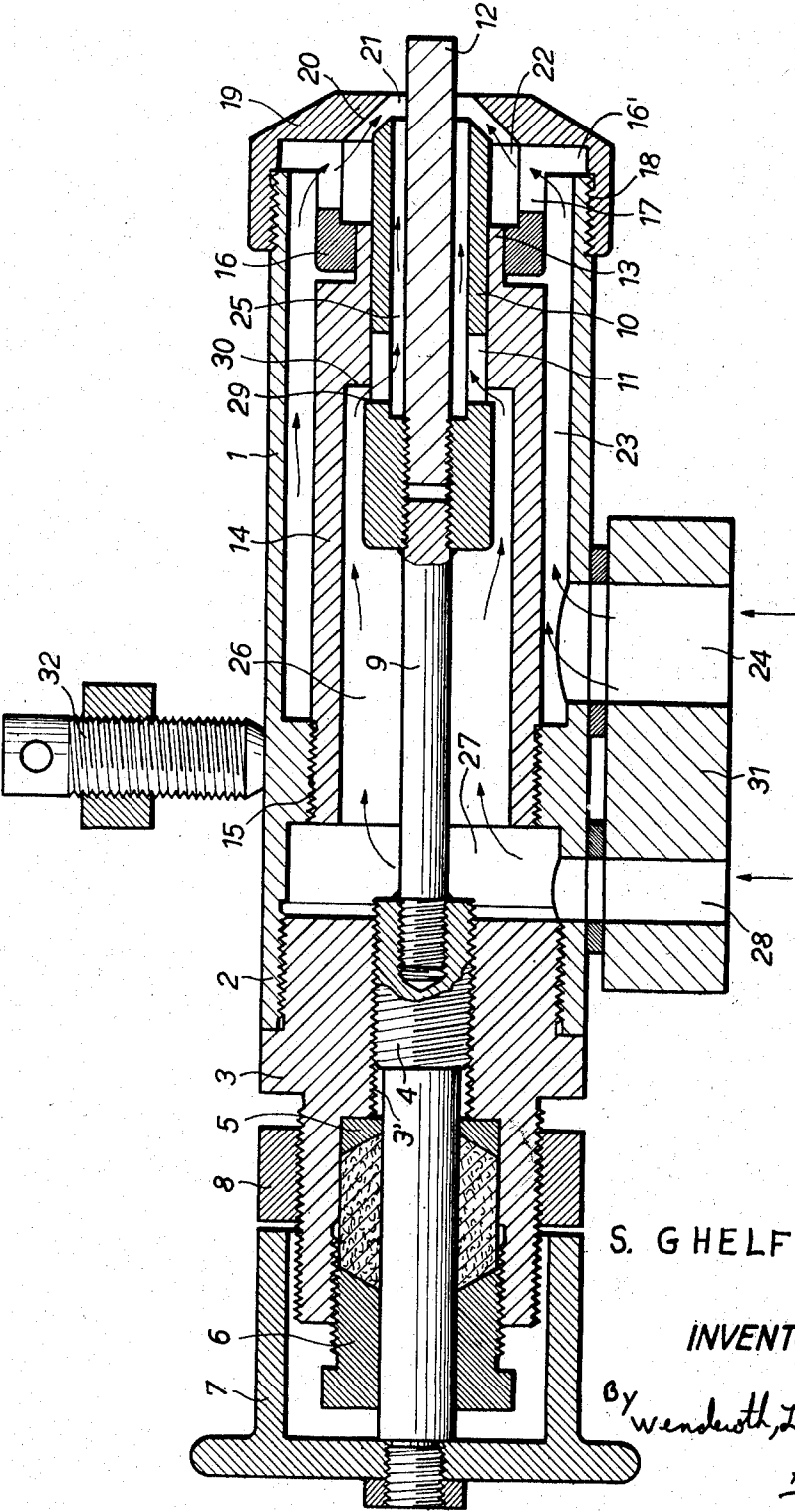
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LIQUID FUEL BURNER

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This invention relates to liquid fuel burners, of the type having an atomiser head, in which the operating fluids, such as oil or fuel, and an atomising medium, such as compressed air or steam, can mix within or outside of an atomising chamber, or partly within and partly outside of this chamber, without creating any modification in operating pressure of the compressed air, steam or other gas used for atomisation, and without effecting any variation in the sectional area of flow of the discharge opening of the atomising head.

The liquid fuel burner according to the invention comprises an axially movable and adjustable nozzle body, a nozzle bar extending coaxially through the nozzle and having its front end projecting out of the nozzle body, an atomising head having a discharge opening giving passage to said nozzle bar, and a vortex chamber situated in the atomising head, said nozzle body having an axial passage opening into the atomising chamber, into which compressed air or steam is supplied in tangential direction and caused to flow past the opening of the nozzle passage, while fuel flows through said passage, adjustment of the nozzle together with the nozzle bar permitting the nozzle opening to be advanced towards the discharge opening of the atomising head or to be retracted into the interior of the vortex chamber, while the end portion of the nozzle bar always remains in the center of the discharge opening of the atomising head to maintain a constant sectional area of flow at the discharge opening of the atomising head for all positions of the nozzle.

This arrangement results in a constant velocity of the atomised fluid at the discharge opening of the atomising head, even when the fuel discharge opening of the nozzle is displaced with respect to the atomising head. In this manner any spraying of incompletely atomised fuel and condensation of fuel owing to a decrease of pressure of atomising air or steam can be prevented, as also any undesired lengthening of the flame, or an extinction of the flame owing to a sudden increase of air pressure, as it is liable to occur in conventional burners when the adjusting member is actuated, causing variations in the sectional area of flow of the discharge opening and accordingly variations in pressure of the atomising fluid.

The accompanying drawing illustrates a preferred example of a burner according to the invention in axial section.

The represented burner comprises a cylindrical casing 1 into one end 2 of which a supporting member 3 is screwed. This member 3 is provided with an axial threaded bore 3' containing an axially movable regulating screw 4. 5 and 6 indicate a stuffing box.

The outer end of the regulating screw 4 is secured to a hand wheel 7. A counter nut 8 serves for locking the hand wheel in the adjusted position. The regulating screw 4 carries a screw stud 9 having its forward end screwed into a tubular nozzle member 10. The nozzle member 10 is provided with longitudinal slots 11. A cylindrical nozzle bar 12 is screwed with its rear end into

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the nozzle member 10 and extends coaxially through the hollow nozzle. This latter is slidably supported in the forward end 13 of a tubular member 14 having its rear end 15 screwed to the casing 1.

5 The forward end 13 of the tubular insert member 14 carries an annular member 16 serving to impart rotary motion to the atomising medium. This annular member comprises a circular slotted disc portion 16' by which it is clamped between the front end of the casing 1 and the atomising head 19. The annular member 16 is provided with inclined or spiral slots 17 opening tangentially into a cavity 22. The atomising head 19 comprises an inner conical wall 20 and a discharge opening 21, and the annular cavity 22 formed between the head 19, member 16 and tubular nozzle 10, forms a vortex chamber and communicates by the slots 17 with the annular space 23 between the casing 1 and the tubular member 14. This space 23 serves for admission of atomising air or steam.

20 An annular space or passage 25 is provided between the nozzle bar 12 and the nozzle 10 and communicates by the slots 11 with the fuel chambers 26 and 27, into which fuel is admitted through the conduit 28.

The shoulder 29 of the nozzle 10 cooperates with an abutment 30 of the tubular insert member 14 to stop the advancing movement imparted to the nozzle bar 12 by means of the regulating screw 4, before the outer end of the nozzle 10 makes contact with the conical wall 20 of the head 19 which would prevent the flow of atomising medium. The shoulder 29 at the same time controls the amount of fuel admitted into the nozzle 10.

25 In position of operation, the burner is clamped by means of a screw 32 to a base plate 31 in which the inlet ports 28 for fuel and 24 for compressed air or steam are provided.

30 During operation of the burner air or steam flows through port 24 into the annular chamber 23 and through the tangentially directed slots 17 inwardly into the vortex chamber 22; the tangentially directed slots impart a rotary movement of high velocity to the atomising medium. From the chamber 22 the air or steam flows along the conical wall 20 past the edge of the discharge opening of the nozzle 10 and through the discharge opening 21 into the combustion chamber of a furnace or the like while the rotary movement of the air or steam is maintained.

35 Liquid fuel under pressure is supplied for example by a pump through the inlet port 28 and arrives in the chambers 27 and 26, from where it passes through the slots 11 into the chamber 25 of the nozzle 10. At the discharge end of the nozzle the fuel intermingles with the compressed air or steam, either in the chamber 22 when the nozzle is retracted, or in proximity of the discharge opening 21, when the nozzle is positioned at the outer end of its axial stroke.

40 Owing to the rapid rotary movement of the air or steam passing the discharge end of the nozzle 10, a complete atomisation of the discharged fuel is obtained. Owing to the possibility of axial displacement of the nozzle, the point in the chamber 22 where atomising medium and fuel is mixed can be determined by longitudinal adjustment of the nozzle 10 and the nozzle bar 12. When the nozzle is completely retracted towards the rear, the mixture of the two components is effected within the vortex chamber 22 in the atomising head. When the nozzle 10 is in its extreme forward position as determined by the cooperating abutments 29 and 30, mixing of the fuel with air or steam is effected only outside of the head 19, and when the nozzle 10 is in an intermediate position, the mixing is effected partly within the chamber 22 and partly outside of the head 19. The angle under which the atomised fuel is discharged from the opening 21 depends of the position of the discharge edge of the

nozzle 10 relatively to the conical wall 20 of the atomising head, and of the position of the nozzle bar 12 with respect to the discharge opening 21. When the bar 12 is in its forward position and projects beyond the opening 21, as illustrated in the drawing, the resulting flame of the ignited combustible mixture is elongated, and when the nozzle is so far retracted that the end of the bar 12 is situated just within the opening 21, the flame will be short and large.

It will be appreciated that in the innermost position of the nozzle 10, as determined by the regulating screw 4 abutting against the stuffing box part 5, the free end of the nozzle bar 12 is just within the opening 21 of the atomising head, so that the sectional area of flow through this opening remains always constant, resulting in a constant discharge pressure of the fluids.

Owing to the nozzle bar 12 being screwed to the nozzle body 10, the bar 12 can be easily exchanged or replaced without requiring dismantling other parts of the burner.

While the foregoing is a description of a specific embodiment of the invention, it is obvious that various changes and modifications may be made without departing from the scope of the invention as defined in the appended claims.

I claim:

1. A liquid fuel burner comprising a casing, an axially adjustable nozzle body within and spaced from said casing to define an atomising fluid passage therein, a nozzle bar axially extending through said body and projecting therefrom, said nozzle bar being spaced from said nozzle body to define an axially extending passage therein, an atomising head on said casing having a discharge opening in axial alignment with said nozzle body to permit passage of said nozzle bar through the discharge opening, said atomising head, casing and nozzle body defining a vortex chamber adjacent the atomising head into which said atomising fluid passage opens, said axially extending passage in said nozzle body opening into said vortex chamber, means in said atomising fluid passage for supplying atomising medium into said vortex chamber in a direction tangential to the chamber so as to create a high velocity rotary motion in the chamber, means connected to said nozzle body for supplying fuel to said axially extending passage in the nozzle body, and regulating means connected to said nozzle body for axially moving said nozzle body and nozzle bar for causing said nozzle body to approach said discharge opening in the atomising head or to retract the nozzle body into said vortex chamber, the end portion of said nozzle bar always remaining in the center of the discharge opening for maintaining a constant sectional area of flow at the discharge opening for all positions of the nozzle body.

2. A liquid fuel burner as claimed in claim 1, wherein said nozzle bar is screwed to said nozzle body for adjustment together with the nozzle body by said regulating

means, whereby the nozzle bar is replaceable without dismantling of other burner parts.

3. A liquid fuel burner as claimed in claim 1, wherein the adjustable nozzle body has a shoulder thereon, and said nozzle body has a fixed abutment thereon with which said shoulder cooperates to limit the forward stroke of the nozzle body and preventing said body from making contact with the atomising head and from closing the discharge opening in said head.

4. A liquid fuel burner comprising a casing, an axially adjustable nozzle body within and spaced from said casing to define an atomising fluid passage therein, a nozzle bar axially extending through said body and projecting therefrom, said nozzle bar being spaced from said nozzle body to define an axially extending passage therein, an atomising head on said casing having a discharge opening in axial alignment with said nozzle body to permit passage of said nozzle bar through the discharge opening, said atomising head, casing and nozzle body defining a vortex chamber adjacent the atomising head into which said atomising fluid passage opens said axially extending passage in said nozzle body opening into said vortex chamber, means in said atomising fluid passage for supplying atomising medium into said vortex chamber in a direction tangential to the chamber so as to create a high velocity rotary motion in the chamber, means connected to said nozzle body for supplying fuel to said axially extending passage in the nozzle body, and regulating means connected to said nozzle body for axially moving said nozzle body and nozzle bar for causing said nozzle body to approach said discharge opening in the atomising head or to retract the nozzle body into said vortex chamber, the end portion of said nozzle bar always remaining in the center of the discharge opening for maintaining a constant sectional area of flow at the discharge opening for all positions of the nozzle body, and a fixed insert member having a shoulder thereon in said casing in which said nozzle body is slidably guided, said nozzle body having inlet slots therein between said shoulder and said abutment for admission of the fuel to said nozzle body, the sectional area of flow through said slots being controlled by cooperation of said shoulder with said abutment, the passage of fuel through said slots being prevented when said shoulder makes contact with said abutment.

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