Oct. 3, 1939. J. H. FRICKIE 2,174,695

OIL BURNER

Filed May 21, 1937

FIG. 1

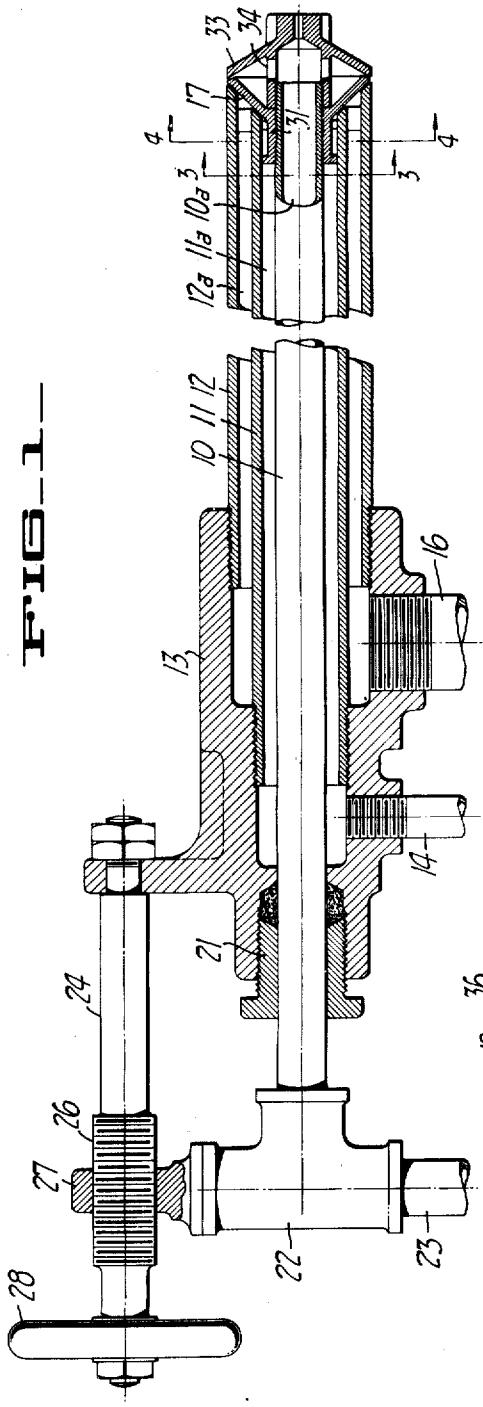


FIG. 3

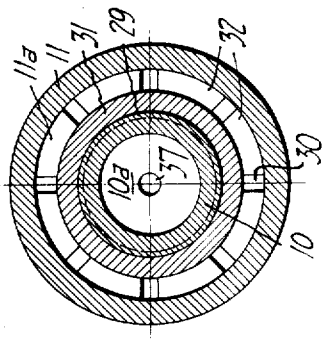


FIG. 4

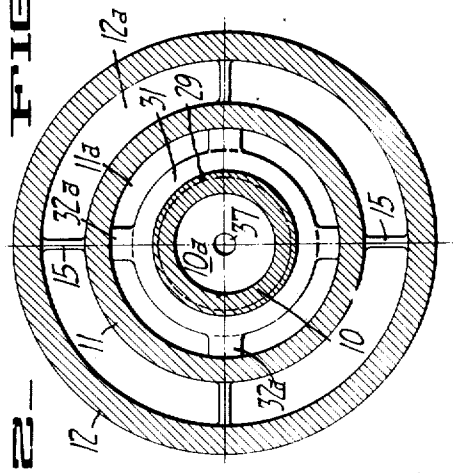
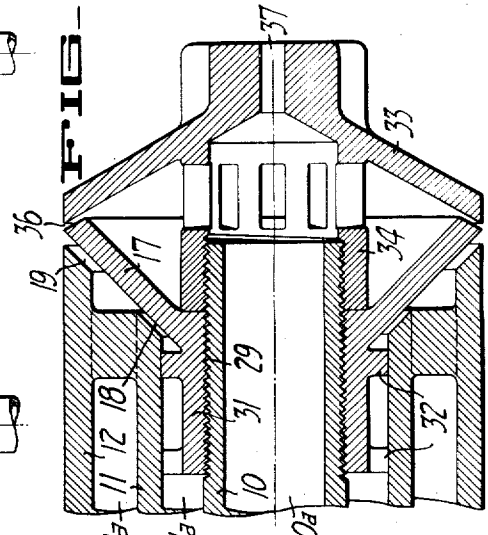


FIG. 2



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OIL BURNER

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4 Claims. (Cl. 299—141)

This invention relates generally to burners used in conjunction with fuel oil, and is particularly applicable for steam boiler installations, as for example boilers of the stationary type.

It is an object of the invention to provide a burner nozzle which will afford a wide degree of flexibility with respect to the type of flame obtained. For example with my device I can secure relatively wide flame, which is desired under certain conditions, or I can obtain a relatively long narrow flame.

A further object of the invention is to provide novel means enabling adjustment of the various orifices utilized in my device, thus facilitating its adaptability to varying conditions.

Further objects of the invention will appear from the following description in which the preferred embodiment of the invention has been set forth in detail, in conjunction with the accompanying drawing.

Referring to the drawing:

Fig. 1 is a side elevational view, in cross section, illustrating a device incorporating the present invention.

Fig. 2 is an enlarged cross sectional detail, illustrating more clearly the elements to form the various discharge orifices.

Fig. 3 is a cross sectional detail taken along the line 3—3 of Fig. 1, but on the same scale as Fig. 2.

Fig. 4 is a cross sectional detail taken along the line 4—4 of Fig. 1.

The construction illustrated in the drawing makes use of a plurality of concentric pipes 10, 11 and 12, which can be termed a mounting means for parts forming the discharge orifices. These pipes are of sufficient length to extend into a fire box or combustion chamber, with certain parts to be presently described, located exterior of the combustion chamber and available for manual adjustment. The pipes provide a plurality of passages designated by numerals 10*a*, 11*a*, and 12*a*. Passage 10*a* is for the flow of an expansible fluid, like steam, passage 11*a* is for oil, and passage 12*a* is for an expansible fluid like steam. Exterior of the combustion chamber pipes 11 and 12 are shown attached to the casting or like body 13. An oil supply pipe 14 is shown connected to body 13, in order to supply oil to the passage 11*a*. Also a pipe 16 is shown connected to the body for supplying steam to passage 12*a*. Pipes 11 and 12 are maintained concentric by the guide vanes 15.

Attached to the inner or combustion chamber end of pipe 10, there is a conical shaped member 17. Extending about the outer periphery of member 17, are the annular orifices 18 and 19. Orifice 18 receives oil from passage 11*a*, while orifice 19, receives steam or like expansible fluid from pasage 12*a*. While special parts can be utilized to form the orifices 18 and 19, it is satisfactory to make use of the ends of pipes 11 and 12 in the manner illustrated, it only being necessary in this instance to properly machine the ends of the pipes, in order to afford a proper clearance with respect to the outer machined periphery of conical member 17. The clearance afforded between the faces forming the orifice 19 is substantially greater than the comparable clearance forming orifice 18, for any adjustment of the device.

In order to afford means to adjust the position of pipe 10 longitudinally, thus adjusting the sizes of orifices 18 and 19, representative means is illustrated as follows: Exterior of the fire box or combustion chamber, pipe 10 slidably extends through a packing gland 21. A suitable fitting 22 connects the outer end of pipe 10 with the steam supply pipe 23. An adjusting screw 24 has its one end attached to casting 13, and has a threaded portion 26 engaging a nut 27, which is attached to the fitting 22. Thus upon turning the hand wheel 28, which is attached to screw 24, the setting of pipe 10 can be adjusted with respect to casting 13, and therefore with respect to pipes 11 and 12. The inner end of pipe 10 has a threaded connection 29, with the sleeve portion 31 of conical shaped member 17. Guide studs 32 and 32*a* are formed upon the sleeve portion 31, to contact the inner peripheral surface of the pipe 11, and thus maintain proper alignment of the conical shaped member 17. Flow of fuel oil is controlled mainly by the flow resistance through the restricted slots or orifices 30, between the guide studs 32. Opening 18 serves as a secondary discharge outlet or orifice, and can be closed or completely shut off.

Extending over the end of the conical shaped member 17, there is a cap 33, which in this instance is annular in contour and generally conical shaped. This cap is attached to the adjacent end of pipe 10, as by means of an inner ported sleeve 34. The outer edge portion of the cap 33, together with the cooperating end face of conical shaped member 17, afford an annular orifice 36 which is directed laterally at an angle of nearly 90° to the direction of discharge from orifice 19. Cap 33 is also shown with a supplemental central discharge orifice 37, for discharg-

ing a solid jet of expansible fluid into the core of the flame, thus promoting combustion.

Operation of my device can now be outlined as follows: Pipe 14 is connected to a supply of fuel oil, so that the fuel oil is delivered through passage 11a at a sufficient constant pressure to insure proper flow through slots 30. At the same time steam under pressure is supplied to pipe 16, and this steam discharges as a conical shaped jet from the orifice 19. The steam supply can be suitably controlled as to pressure by conventional means such as a pressure reducing regulator, the setting of which can be adjusted according to requirements. The jet from orifice 19 consists of steam together with atomized particles of oil, received from the orifice 18. Oil from orifice 18 flows at least in part as a sheet of outwardly moving oil upon the outer periphery of member 17, and is picked up from the outer lip of member 17 in the form of atomized particles, by the steam jet.

The amount of oil introduced into the spray can be readily and closely adjusted by turning the hand wheel 28, which in effect simultaneously increases or decreases the size of orifices 18 and 19. Steam is also supplied from another suitable source through pipe 23 and this steam discharges as a jet from orifice 36, and intermingles with the jet being discharged from orifice 19. An increase in the amount of steam supplied to orifice 35, which can be readily accomplished by a throttling valve introduced in pipe 23, causes a lateral spreading of the flame, while a decrease in the supply of steam through to pipe 23 causes the flame to be more concentrated. Thus the flame can be spread in order to secure optimum operations under given operating conditions, or for given installations, and in order to form a combustion supporting mixture in close proximity to the tip of the nozzle. The combustion chamber with which my device is used should be provided with proper provision for supplying combustion supporting air, as is well understood by those skilled in the art.

It will be apparent from the above that my device is capable of a wide latitude of flexibility, and by virtue of the adjustments afforded, it can be adjusted to operate at optimum efficiency for various types of installations and operating conditions. The fuel oil is efficiently atomized to promote good combustion, and good combustion will be retained for the various adjustments afforded.

It will be apparent that in installations where steam is not available, compresed air can be employed instead. It is also possible to employ a source of fuel gas, like natural gas, in place of fuel oil, provided the burner is proportioned with due regard to the volume of gas required.

I claim:

1. In a fuel oil burner, a nozzle structure comprising at least three concentric pipes, the innermost pipe forming a passage for steam, the space between the innermost pipe and the middle pipe forming a space for flow of fuel oil, and the space between the middle pipe and the outermost pipe forming a passage likewise for flow of steam, a conical shaped member carried by one end of the innermost pipe, the adjacent ends of the intermediate pipe and the outermost pipe forming together with the outer peripheral surface of said conical member, two annular discharge orifices, the smaller orifice being for the discharge of oil and the larger orifice being for the discharge of steam and oil, a cap extending over the end face of said conical shaped member and secured to the innermost pipe, said cap forming together with the forward end of said conical shaped member an annular orifice arranged to direct a discharge of steam outwardly and laterally of the discharge from said previously mentioned orifice of larger diameter, and means for adjusting the position of the innermost pipe relative to the intermediate and outermost pipe, in a direction longitudinally of the same.

2. In a fuel oil burner, a nozzle structure comprising a mounting adapted to extend into a combustion chamber, orifice means carried by said mounting, said orifice means comprising two substantially concentric orifices, the outer orifice being substantially in the form of a truncated cone and serving for the discharge of an expansible fluid, the inner orifice serving for the discharge of fuel oil, said mounting affording passages for the supplying of a fuel oil and expansible fluid to said orifices, and means for discharging an annular and outwardly directed jet of expansible fluid against the inner side of expansible fluid discharging from said outer orifice.

3. In a fuel oil burner, a burner nozzle comprising a conical shaped member, means forming a mounting for said member and also forming at least two passages, one for fuel oil and the other for an expansible fluid under pressure, and two annular discharge orifices formed about the periphery of said conical member and communicating respectively with said passages, both of the orifices being substantially concentric with the axis of the cone shaped member and the fluid discharge orifice being of a diameter substantially larger than the oil discharge orifice, whereby oil delivered from the oil discharge orifice is caused to pass through the fluid dlischarge orifice and is atomized, means enabling adjustment of the effective sizes of said orifices, and means comprising a supplemental fluid discharge orifice for adjusting the spreading of the burner flame.

4. In a fuel oil burner, a nozzle structure comprising at least three concentric pipes, the innermost pipe forming a passage for steam, the space between the innermost pipe and the middle pipe forming a space for flow of fuel oil, and the space between the middle pipe and the outermost pipe forming a passage likewise for flow of steam, a conical shaped member carried by one end of the innermost pipe, the adjacent ends of the intermediate pipe and the outermost pipe forming together with the outer peripheral surface of said conical member, two annular discharge orifices, the smaller orifice being for the discharge of oil and the larger orifice being for the discharge of steam and oil, said conical member having an outer peripheral edge which is outside the outermost pipe and of a diameter greater than the adjacent inner diameter of the outermost pipe, a cap extending over the end face of said conical shaped member and secured to the innermost pipe, said cap forming together with the forward end of said conical shaped member an annular orifice arranged to direct a discharge of steam outwardly and laterally of the discharge from said previously mentioned orifice of larger diameter, and means for adjusting the position of the innermost pipe relative to the intermediate and outermost pipe, in a direction longitudinally of the same.

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