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LIQUID FUEL BURNER

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Fig. 1

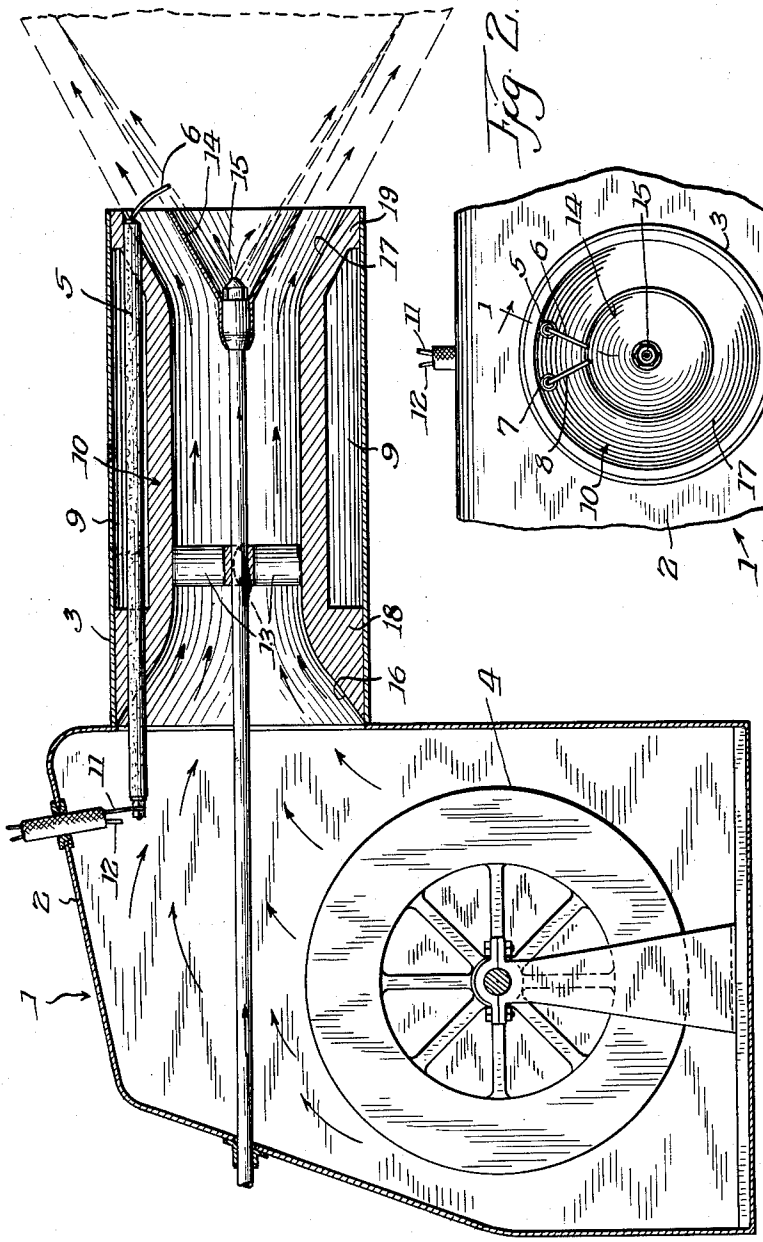


Fig. 2.

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LIQUID FUEL BURNER

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This invention relates generally to oil burners, and more particularly it is concerned with a novel mechanism therefor having for its purpose the production of an efficient and quiet oil burning assembly.

At the outset, in order to acquire a better appreciation of the accomplishment of this invention, it should be understood that a major cause of noise in oil burners is the fluctuating and poorly distributed air patterns around and adjacent to the oil burner nozzle resulting in an oscillating or unstable flame. Noise is an objectionable characteristic of many presently known domestic burner constructions, and here the term "noise" means the relatively loud reverberations or pulsations resulting from interruptions and fluctuations in the oil combustion process. Such pulsations frequently arise from spasmodic alternations of the fuel air mixture ratio, say, between adequate and inadequate oxygen supply, and there may also be other causes related to flame instability.

Therefore, it is one of the more important objects of this invention to provide greater stability in the burner flame and more efficient and quiet combustion.

Another object is to provide a mechanism in which the mixture of fuel and air takes place in such a manner that a minimum of noise would be produced by the turbulence of the mixing process itself.

A further object of the invention is to reduce low frequency air turbulence prior to said fuel and air mixing and thereby reducing the amount of noise which would be produced by the combustion.

A still further object is to provide a liquid fuel burner construction in which a venturi-shaped burner head assembly is employed and in which a cone structure serves as a guide for the air.

Another important object is to provide an oil burner construction or the like in which the air delivered to the burner for combustion takes place in the form of a hollow cone and that the fuel is delivered in a second hollow cone inside the air cone preferably having a slightly greater included angle than the air cone. It has been discovered that such structural arrangement causes the fuel and air to mix gradually and in a relatively laminar manner, thereby producing an efficient and quiet burning flame.

A further object is to provide an oil burner construction in which the mixing of the fuel and air may be conveniently controlled and changed by varying the relative position of the air distributing cone with respect to the outlet side of the venturi.

With these and other objects in view, our invention consists in the construction, arrangement and combination of the various parts of my oil burner whereby the objects contemplated are obtained as hereinafter more fully set forth, pointed out in our claims and illustrated in the accompanying drawing, wherein:

FIG. 1 is a sectional assembly view of an oil burner assembly embodying our invention.

FIG. 2 is an end elevational view, looking in the direction of the nozzle and throat shown in FIG. 1.

Referring now to the drawing, the numeral 1 is used to designate generally a gun-type oil burner constructed in accordance with the present invention, having a casing 2, to which is attached in any suitable manner the blast tube 3. The casing 2 includes a lower portion thereof

for receiving an air blower 4 attached in the well known manner and supplying air thereto as indicated by the arrows. The upper portion of the casing 2 is provided with the air outlet port which is in communication with the outer end of the blast tube as illustrated.

Upon the inside of the said blast tube and at an upper annular portion the longitudinally extending electrode wires 6 and 8 are mounted in the respective insulated supports 5 and 7.

Suitably carrying the said insulated supports and lining the inner peripheral surface of the blast tube 3 for substantially its entire length is the cylindrical insert member generally designated 10 having an annular recessed or chamber portion 9 for a substantial part of the length of the said insert member. Thus the length of the chamber portion 9 is defined by the space between the respective end disposed protruded portions 18 and 19, the latter portions being of annular configuration and snugly received within the blast tube 3 at outer and inner ends of said tube as indicated.

At the inner end of the electrode wires 11 and 12, the respective connections are made at 11 and 12 to a source (not shown) of electrical ignition for the said electrode wires.

Within the liner or insert member 10 and mounted in transverse relation thereto is the fixed spider having the radially extending spokes 13 as illustrated and with the central apertured hub portion provided to carry the feed piping to the fuel spray nozzle 15. The location of the latter member is in proximity to the end portion of the blast tube and has the hollow cone 14 extending to the inner end of the blast tube 3. The latter construction is a significant feature of this invention and particularly so when considered with the frusto-conical inner surface 17, the latter surface being substantially of the same length as the hollow cone 14. It will be now appreciated that the air is thus delivered in the form of a hollow cone and that the fuel is delivered in a second hollow cone inside the air cone and preferably having a slightly greater included angle than the air cone.

At the outer end of the cylindrical insert 10, the frusto-conical surface 16 is provided.

It will of course be appreciated that the drawing is largely diagrammatic in character, and therefore changes may be made in the construction and arrangement of the parts of our oil burner without departing from the real spirit and purpose of our invention. It is therefore our intention to cover by our claims any modified forms of structure or use of mechanical improvements which may be reasonably included in their scope.

What we claim as new and desire to obtain by Letters Patent of the United States is:

We claim:

1. A liquid fuel burner comprising an elongated air blast tube having inner and outer peripheral end portions and with its outer end portion ported to receive inlet air flow, the other end portion thereof being adapted to discharge into a combustion chamber, a hollow sleeve-like insert member of substantially elongated cylindrical configuration cooperating with the inner peripheral surface of said air blast tube to bear against the inner and the outer peripheral end portions of the tube, the said insert member having at least the inner end portion thereof with an annular surface of outwardly flaring form, the remaining portion of the insert member merging with the outwardly flaring inner end portion of the insert member, a fuel nozzle mounted in spaced apart longitudinally coaxial relation adjacent to the point of merger of the outwardly flaring inner end portion with the remaining portion of the said insert member, ported means mounted within the hollow insert member cooperating with said fuel nozzle to centrally position the latter mem-

ber in spaced relation to the inner wall of the said insert member, a substantially frusto-conical hollow outwardly flaring cone member cooperating with said nozzle and being of a length approximating the said outwardly flaring inner end portion of the insert member, the included angle of said frusto-conical cone member being approximately equal to the included angle formed by the outwardly flaring annular surface of the inner end portion of the said insert member whereby to form a ring-like continuously outwardly flaring passage between said hollow cone member and the outwardly flaring annular surface of the inner end portion of the insert member.

2. A liquid fuel burner comprising an elongated air blast tube with inner and outer peripheral end portions and with its outer end portion adapted to receive inlet air flow, the opposite end portion thereof being adapted to discharge into a combustion chamber, a hollow insert member in the tube with an inner wall surface of substantially cylindrical configuration and with the outer peripheral end portions thereof cooperating with the inner and the outer peripheral end portions of the said air blast tube to line the inner peripheral wall surface of the latter member, the said insert member having at least the inner end portion thereof of outwardly flaring form merging with the remaining inner peripheral wall surface of said hollow insert member, a fuel nozzle mounted in spaced apart longitudinally coaxial relation adjacent to the point of merger of the outwardly flaring inner end portion with the remaining portion of the said insert member, ported means adjacent the outer end portion of the said blast tube cooperating with said fuel nozzle to position the latter member in spaced relation to the said inner peripheral wall surface of the said insert member, a substantially hollow cone member fitted over an inner end portion of said nozzle, the said cone member being of a length to extend to the inner end portion of the air blast tube and forming with the said inner portion of the insert member an annular continuously flaring passage over the said nozzle of substantially frusto-conical configuration, the included angle of the cone member being approximately equal to the included angle of the outwardly flaring portion of the insert member, the said fuel nozzle entering said cone member at the outer reduced end of the latter member.

3. A liquid fuel burner comprising an elongated cylindrical air blast tube having inner and outer peripheral end portions and with its outer end portion adapted to receive inlet air flow, the opposite end portion thereof being adapted to project into a combustion chamber, a hollow insert member of substantially cylindrical configuration fitted over the inner peripheral wall surface of said air blast tube, the said insert member having at least the inner end portion thereof outwardly flared to merge with the remaining portion of the insert member, a fuel nozzle mounted in spaced apart longitudinally coaxial relation adjacent to the point of merger of the outwardly flaring inner end portion with the remaining portion of the said insert member, ported means within

said insert member axially spaced from the said outwardly flared portion of said insert member and cooperating with said fuel nozzle to position the latter member in spaced relation to the inner end portion of the said insert member, a frusto-conical hollow cone mounted over said nozzle with its reduced end connected to said nozzle and being in substantially the same transverse plane as the said point of merger of said insert member and having an included angle approximating that of the outwardly flared inner end portion of the said insert member.

4. A liquid fuel burner comprising an elongated air blast tube having inner and outer peripheral end portions and with its outer end portion adapted to receive inlet air flow, the inner end portion thereof being adapted to discharge into a combustion chamber, a hollow insert member of substantially cylindrical configuration cooperating with the inner peripheral wall of said air blast tube, the said insert member having at least the inner end portion thereof of outwardly flaring form with a curved annular surface merging with a wall inner surface defining an elongated substantially cylindrical chamber in said insert member, a fuel nozzle mounted in spaced apart longitudinally coaxial relation to said outwardly flaring inner end portion of the said insert member, fixed means engaging the insert member and cooperating with said fuel nozzle to position the latter member in spaced relation to the inner wall of the said insert member and being axially removed from the outwardly flaring portion of the insert member, a substantially hollow outwardly flaring cone mounted over an end portion of said nozzle and cooperating with the outwardly flaring portion of the insert member to form a passage around the outer sloping surface of the cone adapted to direct a flaring air stream forwardly from the said outer end portion of the blast tube into a combustion chamber, said passage being of continuous outwardly flaring annular configuration, the hollow cone being of a length sufficient to extend inwardly at least to the said inner end portion of the said air blast tube, the included angle of said hollow cone being approximately equal to the included angle of the outwardly flaring portion of the said insert member.

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