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COMBUSTIBLE PREPARING DEVICE

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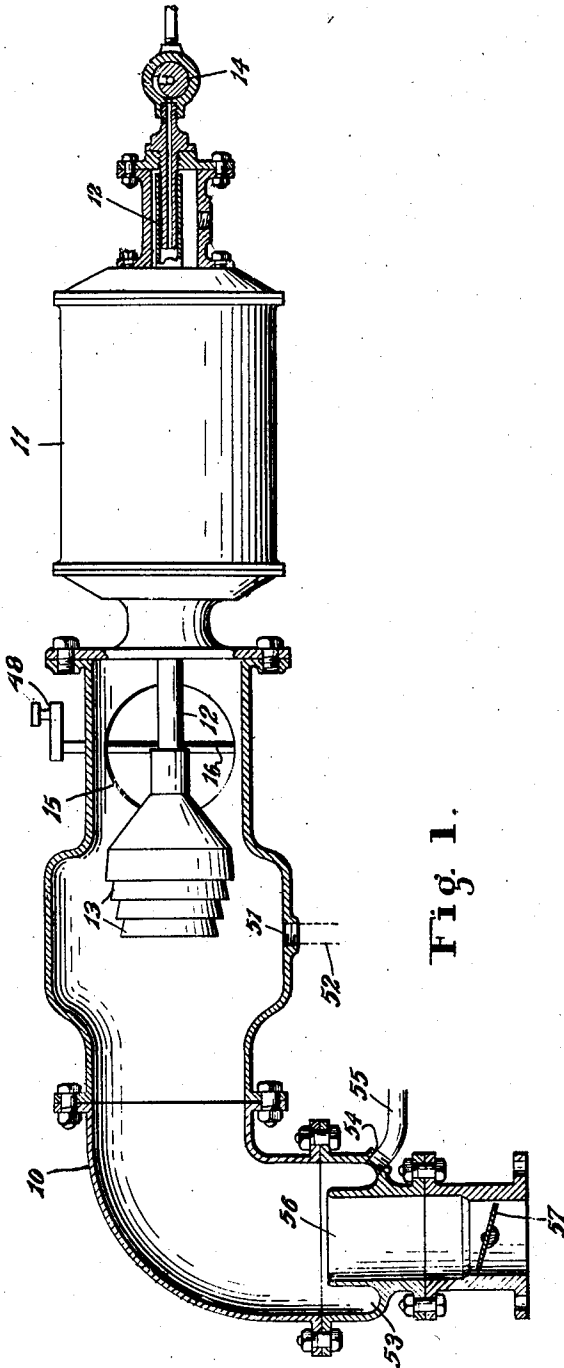
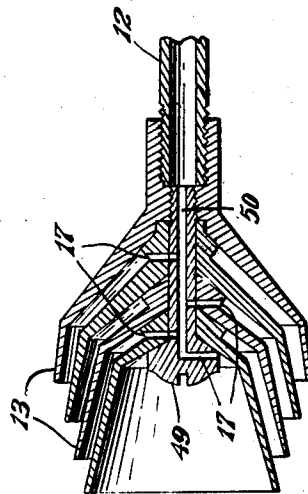


Fig. 1.



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COMBUSTIBLE PREPARING DEVICE

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3 Claims. (Cl. 299-63)

This invention relates to combustible preparing devices, and is related particularly to such devices for preparing combustible mixtures of fuel oil and air for such purposes as use as the explosive mixture in internal combustion engines, as the combustible mixture for furnaces, and as the combustible mixture for other mechanisms requiring the same.

Numerous efforts have heretofore been made to utilize fuel oil as the fuel for internal combustion engines primarily designed for use with hydrocarbons, particularly gasoline, of a more volatile character. The principal difficulties encountered have their inception in the unsuccessful or imperfect atomization of the fuel, and the results have been slow or uncertain starting of the engine, high carbon deposit, development of excessive carbon monoxide, inefficiency and other deficiencies.

An object of the present invention is to overcome the above-enumerated and other difficulties.

A further object of the invention is to obtain maximum atomization of and maximum power from the fuel.

Another object of the invention is to minimize temperature conditions in its effect upon atomization of the fuel.

Yet another object of the invention is to take care of condensate and avoid its being forced into the engine manifold or engine.

Still further objects of the invention will appear to those skilled in the art as the description progresses, both by direct statement thereof and by implication from the context.

Referring to the accompanying drawing in which like numerals of reference indicate similar parts throughout the several views;

Figure 1 is a sectional elevation of a preferred embodiment of the invention; and

Figure 2 is a longitudinal section of the bank of centrifugal vanes shown in elevation in Fig. 1, and on a scale increased over that of Fig. 1.

In the specific embodiment of the invention illustrated in said drawing, the reference numeral 10 designates a casing body portion of the mixing and discharge part of the device, said casing body portion being composed of a plurality of sections for convenience of fabrication. At the fuel inlet end of this casing, bolted at the end thereof coaxial therewith, is an electric or other motor 11 having a hollow shaft 12 therethrough and protruding from both ends of the motor. Within the casing body and mounted upon the end of the shaft protruding thereinto are a plurality of centrifugal vanes 13. At the opposite

or outer end of the shaft 12 is coupling means for effecting appropriate fuel-conveying transfer to the rotating shaft from a non-rotating feed-line. Said feed-line includes a valve 14 for regulating the fuel supply permitted to pass to the hollow shaft and vanes.

Said casing body portion 10, in proximity to the vanes, but not in the centrifugal path from the edges thereof, provides an air inlet 15. This inlet is shown rearwardly of the vanes and substantially at the end of the casing nearest the motor. Suitable butterfly or other regulating valve 16 is utilized to control the quantity of air admitted. Beyond the vanes, the casing is suitably shaped and constructed for conveying the mixed fuel and air to the manifold of an engine (not shown).

Continuing the general reference to the disclosure, it may be further said that operation of the device contemplates continuous and substantially constant-speed operation of motor 11 and utilization of the said hollow shaft 12 as the armature shaft thereof. Fuel, such as fuel oil of suitable grade, is introduced in regulated amounts through valve 14, shaft 12 and thence through lateral openings 17 onto the inwardly directed surfaces of the vanes 13. By virtue of the vanes flaring toward their free edges in conjunction with the high speed of rotation thereof imparted by the motor 11, the fuel oil spreads into a film and the film becomes thinner toward the edges of the vanes by virtue of the surface dimensional increase resulting from the geometry of the said vanes. Finally, the rarified film reaching the edges of the vanes is centrifugally and violently expelled in a direction outwardly in a highly atomized condition.

Normal suction of the engine draws air into the casing body through air inlet 15 behind the atomized fuel which is thereby both mixed with the air very thoroughly and carried by it to the engine with the mixture in a highly explosive state. Regulation of the proportions of air and fuel enable full utilization of the potential explosive power of the fuel and minimum condensation in transit and formation of minimum carbon monoxide and carbon in the engine.

As will be understood by those skilled in the art, the valve crank 48 on the air-inlet butterfly and a crank on the fuel inlet valve 14 may be linked together for maintaining proper proportion of fuel and air.

The atomizing and air mixing portion of the device includes the heretofore mentioned bank of vanes 13 within body portion 10. Said vanes are

preferably individually formed, providing each a hub portion and a flaring portion with the vanes partially nested but with space for oil film and escape provided between the overlapping flaring portions. A stud or other means 49 extending axially through the hub portions of the vanes to the first or larger one is threaded into that one thereby clamping all of the vanes in a bank. The inner or larger one of the vanes has its hub appropriately socketed and threaded and screwed onto the end of the motor shaft. From its end next the shaft said stud is longitudinally provided with a duct 50 as far as the stud head. A plurality of radial ducts 17 are provided from the longitudinal duct to the several spaces between the flaring vanes.

In use, the motor turns continuously and therefore centrifugal action is continuously operative upon the fuel oil in the longitudinal duct of the stud. When the valve is operated to admit only a small amount of fuel oil, the centrifugal action will discharge that oil from the first radial duct 17, but as more and more fuel oil is admitted by adjustment of the valve for that purpose, the flow is more copious and oil flows in increasing quantity in the longitudinal duct so the first radial duct only discharges a part thereof and the next radial duct receives and discharges some, and so on for the several radial ducts as the valve is opened to maximum flow. The atomization from the vane or vanes is just as complete whether one or all of the vanes are receiving and discharging the oil, so the engine will function effectively when throttled down or when receiving maximum fuel supply. The portion of casing 10 surrounding the discharging edges of the vanes, is somewhat larger in diameter than adjoining portions of the casing, thereby pocketing excess or non-atomized fuel. An outflow opening 51 is provided at the bottom of this enlarged part of the casing for draining the accumulation of oil therefrom to return it to the tank or otherwise dispose of it through suitable piping, such as indicated at 52.

The part of casing 10 through which the mixture of fuel and combustion air passes after leaving the enlarged portion last described, turns downwardly and is provided with an internal peripheral trough 53, also provided with a drain opening 54 and suitable pipe connection, as 55, to carry the excess or condensed fuel back to the tank or otherwise dispose thereof. The several drain openings and connections enable all liquified condensate or fuel oil to be diverted from entry into the engine. A tubular outlet neck

56, the upper end of which helps to form said trough 53, is provided at the extreme outlet end, the same being appropriately flanged for attachment to the engine manifold or for other purpose as may be found desirable. A throttling butterfly valve 57 is situated in this neck for governing the outflow of the mixture, and if so desired, this butterfly may also be linked with the air and fuel controls as will be understood by those skilled in the art.

I claim:

1. A combustible preparing device comprising a casing, a rotatable hollow shaft in said casing, a plurality of nested funnel-like vanes secured at the end of said shaft and rotatable therewith, each vane having a flaring portion proximate to the axis of rotation and a differently flaring forward discharge portion more distant from said axis, each said proximate portion of successive vanes sloping more abruptly from the axis than the preceding one and at greater angles than the angles of slope of the forward discharge portions, and the forward discharge portions successively projecting further from their respective proximate portions than the preceding one and having successively smaller diameters of forward edges than the preceding one.

2. A combustible preparing device comprising a casing, a rotatable hollow shaft in said casing, a plurality of nested funnel-like vanes secured at the end of said shaft and rotatable therewith, each vane having a flaring portion proximate to the axis of rotation and a differently flaring forward discharge portion more distant from said axis, each said proximate portion of successive vanes sloping more abruptly from the axis and of less length than the preceding one and at greater angles of slope of the forward discharge portions, and the forward discharge portions successively projecting further from their respective proximate portions than the preceding one and having successively smaller diameters of forward edges than the preceding one.

3. A combustible preparing device comprising a casing, a rotatable hollow shaft in said casing, a plurality of nested funnel-like vanes at the end of said shaft and rotatable therewith, the vane most proximate to said shaft having a hub portion receiving said shaft therein, and a stud secured in said hub portion and passing through the other vanes for securing said vanes together, said stud having a flow passage therein from the hollow of said shaft and with lateral openings between the vanes.

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