Oct. 2, 1956 R. R. KIENLE 2,765,028

AIR TURBULENCE PRODUCING DEVICE

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FIG. 1

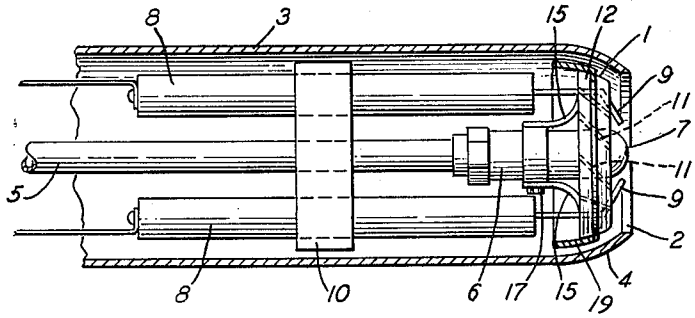

FIG. 4

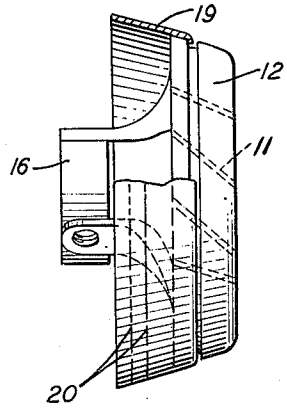

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FIG. 2

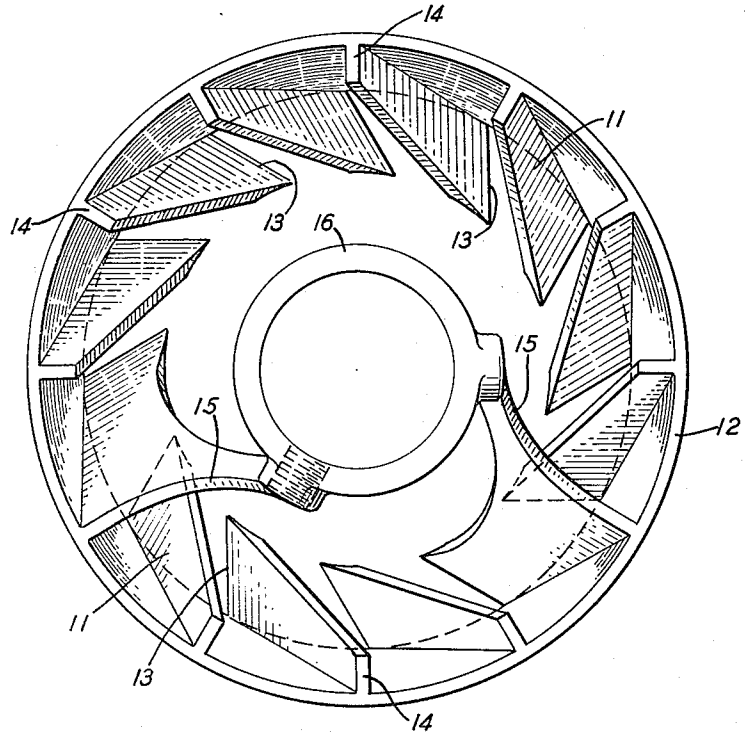
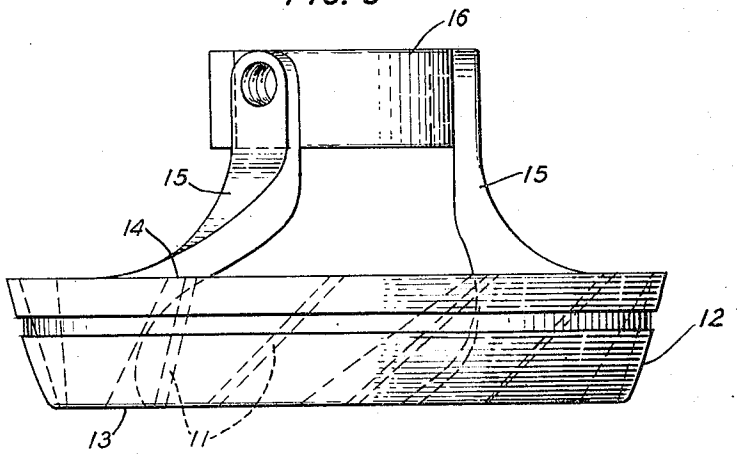


FIG. 3



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AIR TURBULENCE PRODUCING DEVICE

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2 Claims. (Cl. 158—76)

The instant invention relates to air turbulence producing devices for gun-type oil burners.

An object of the invention is to provide an air turbulence producing device for gun-type oil burners which will thoroughly mix the air and oil at or near the burning region.

Still a further object is to provide such an air turbulence producing device which will result in the highest combustion efficiency of the oil fuel.

Still another object is to provide such an air turbulence producing device which is readily installable and adaptable to practically all makes of such burners on the market.

Still another object is to provide such an air turbulence producing device in which the supports of the device do not interfere with the turbulence in the region of the supports.

Still another object is to provide such an air turbulence producing device in which substantially all the air delivered by the oil burner fan is rendered turbulent at the oil spray.

The instant invention will be readily understood from the following description of illustrative embodiments of my invention taken in conjunction with the annexed drawing in which:

Figure 1 is a schematic diagram as viewed from the top of the blower mouth region of a gun-type oil burner incorporating the air turbulence producing device of my invention in an illustrative embodiment thereof;

Figure 2 is a top view of the air turbulence producing device of my invention in the illustrative embodiment thereof;

Figure 3 is an elevational view of the embodiment of Figure 2; and

Figure 4 is an elevational view of the first illustrative embodiment with an integral adapter.

The air turbulence producing device of my invention, hereinafter called a turbulator, is shown in Figure 1 as it is installed in the mouth 2 of the blast or blower tube 3, having outlet member 4, for example cone shaped, of a gun-type oil burner. Oil pipe 5 extends substantially centrally and longitudinally of the blast tube and is terminated by the adapter 6 and the nozzle 7. The longitudinally disposed insulators 8, through which the ignition electrodes 9 pass, are supported together with the oil pipe 5 by the bracket 10 extending transversely of the blast tube.

Turbulator 1 has a plurality of narrow vanes 11, some twelve in number in the first illustrative embodiment of Figures 2 and 3, extending inwardly from the inner surface of the hollow frustoconical body 12 and substantially perpendicular thereto. The vanes 11 are preferably trapezoidal with the longer one of the parallel sides, 13 and 14, thereof at the outlet (i. e., the smaller base) side of the turbulator, and are also preferably streamlined in the air flow direction although shown as of uniform thickness in the figures of the drawing for ease of illustration. The shorter ends 14 of the vanes are substantially radial to the body portion 12 at such ends while the longitudinal plane of the respective vanes is at substantially 45 degrees to the base of the body. Two arms 15, comprising integral continuations of two non-adjacent vanes 11, support the integral collar or ring 16 which is essentially a hollow cylinder coaxial with the frusto-conical body 12. The inner diameter of the collar 16 is such that it fits readily over the nozzle adapter 6, of which the outer diameter is standardized. In the drawing, the arms 15 are spaced from each other by three intervening vanes. Set screw 17 extending through the ring 16, preferably through the region of joinder of an arm 15 thereto, permits tightening the collar on the nozzle adapter at the desired position of the turbulator.

The atomizer of my invention, as shown in greater detail in Figure 4, is provided with an adapter 19 of a thin material and attached to the frusto-conical body 12 of the turbulator in the region of the larger base in any well known manner, as for example, by a turn bayonet arrangement or by swaging over an edge thereof into a circumferential groove in the exterior surface of the body 12, etc. Adapter 19 is essentially a frusto-conical hollow section of which the conical surface is a continuation of the conical exterior surface of atomizer body 12. The thin metal thereof, for example sheet tin, is scored circumferentially by a plurality of spaced grooves 20 so that excess metal of the adapter 19 at its free end may be readily removed to regulate the width of the unobstructed annular passage between its edge and the interior surface of the particular blast tube to which the turbulator of my invention is being added. The purpose of the adapter 19 is accurately to fit the turbulator to any size blast tube opening within the usual commercial ranges so that an appropriately wide gap, through which an optimum quantity of air delivered by the burner fan flows and then has its direction diverted to the burning region, may readily be provided.

Referring particularly to Figure 1, it will be noted that the turbulator in operative position has its collar slipped over the nozzle adapter with both the supporting arms of the collar directed downwardly so that they do not in any way interfere with the electrodes 9. The set screw 17, tightened down on the nozzle adapter 6, holds the turbulator in proper position, that is, with the larger base of the body 12 facing the onrushing air stream. The air, propelled by the burner fan, not shown, through the blast tube 3 essentially longitudinally therein, is divided into two air streams by the body of the turbulator, the main stream flowing through the hollow interior thereof, and a smaller stream flowing through the annular space formed by the inner surface of the blast tube outlet member 4 and the outer surface of the turbulator body 12. The peripheral portion of the main stream strikes the facing surface of the atomizer body 12 (and of adapter 19 if used) and thus has its direction changed to converge inwardly and is simultaneously imparted a whirling motion by the vanes 11. The smaller annular stream, passing between the outer conical surface of the turbulator body (and adapter 19) and the inner surface of the outlet member 4, has its flow direction diverted to converge inwardly and meets the whirling main stream to be thoroughly mixed and rendered turbulent therewith in and about the flame region. Since the arms 15 present the identical surface width to the main stream of the blast air as do any of the vanes of the turbulator, there is no dead spot region where the air does not thoroughly mix with the oil. Actual observation of my turbulator in operation confirms that the flame is wholly uniform on proper installation of my turbulator in domestic gun-type oil burners and that a hotter, cleaner and more efficient fire is produced thereby.

It is expressly understood that the embodiments here-

in disclosed in detail are by way of illustration only and not in any manner by way of limitation, and that various modifications in the turbulator of my invention will suggest themselves to the skilled worker in the art without departing from the spirit and scope of my invention.

What I claim is:

1. A turbulator for gun type oil burners comprising a hollow frusto-conical body, a plurality of spaced vanes integral with the inner conical surface of the body and at an angle to the bases of the body, a hollow cylindrical collar coaxially disposed relative to the body and spaced from the adjacent ends of the vanes, at least one arm integral with a vane and of the same width as the vane integrally connected to the collar and supporting the collar so that the ends of the collar and of the body are substantially parallel to each other, a circumferential groove in the outer conical surface of the body, and a frusto-conical adapter of thin metal attached at one end in the groove and having its other end extending axially

a predetermined but variable distance beyond the larger base of the body, the conical outer surfaces of the body and the adapter being continuations of each other.

2. A turbulator according to claim 1 in which the portion of the adapter extending beyond the larger base of the body has a plurality of spaced circumferential grooves in its outer surface whereby portions of the adapter between its larger end and any of the plurality of spaced circumferential grooves in such adapter portion may readily be removed.

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