

Feb. 7, 1950

A. CADELLA
GUN TYPE OIL BURNER

2,496,775

Filed June 20, 1946

2 Sheets-Sheet 1

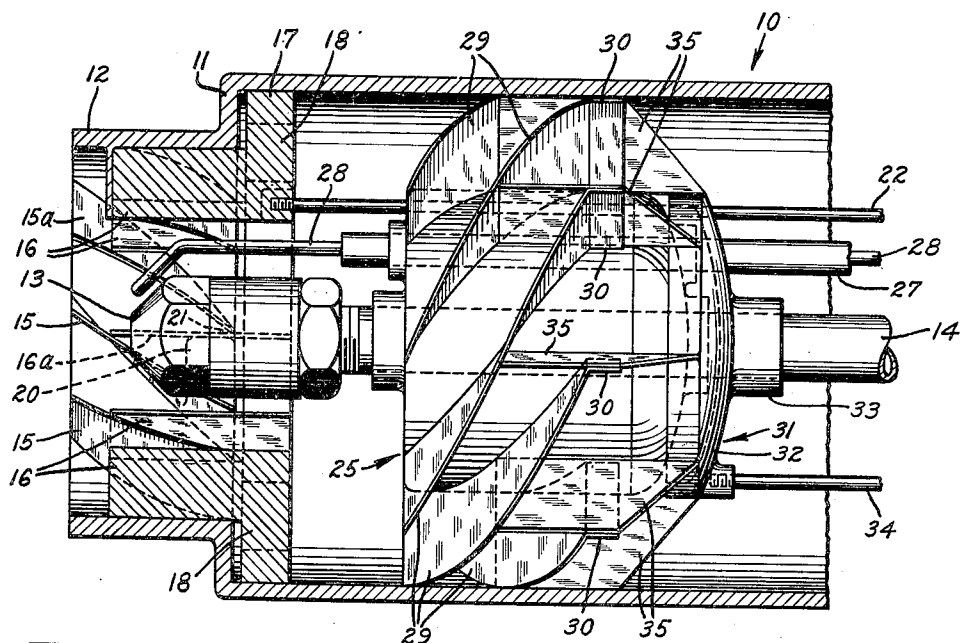


Fig. 1

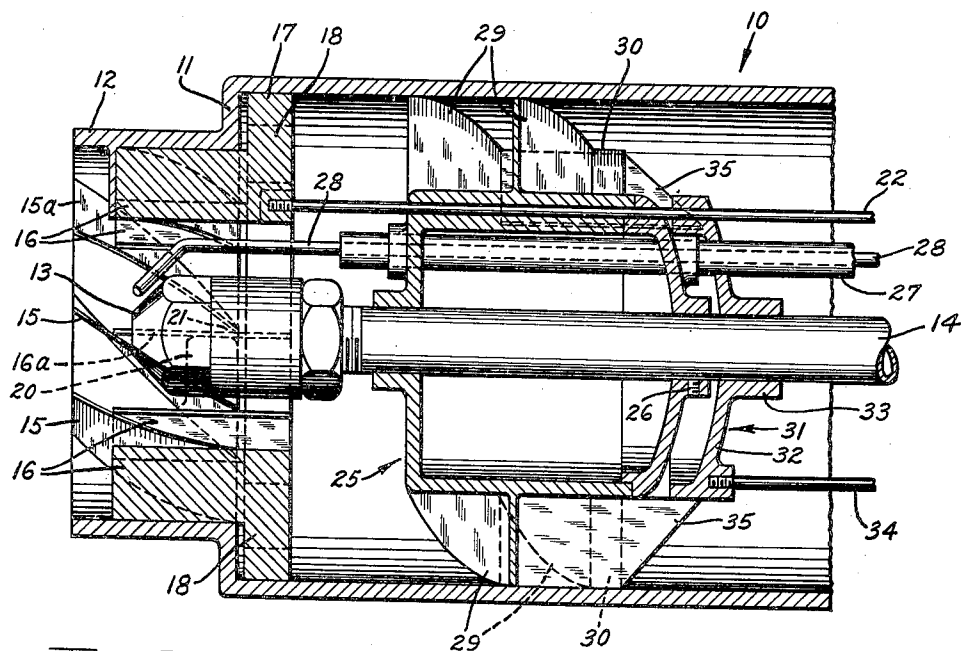


Fig. 2

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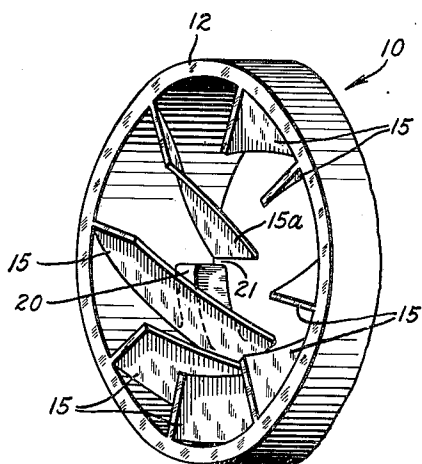


Fig. 3

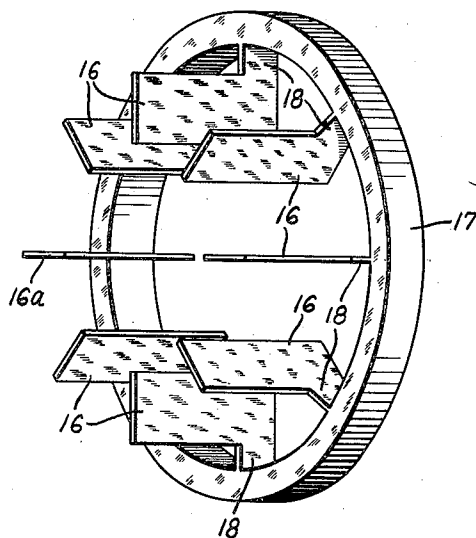


Fig. 4

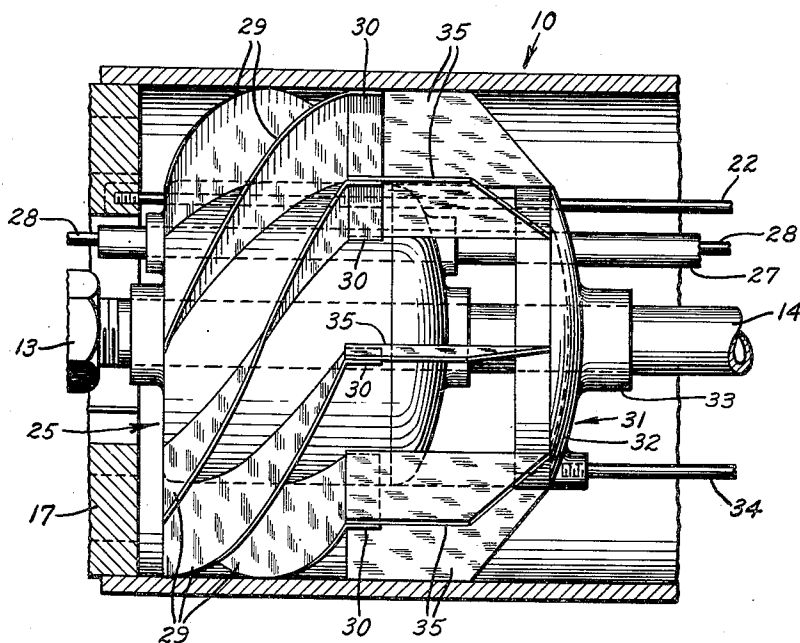


Fig. 5

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GUN TYPE OIL BURNER

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4 Claims. (Cl. 158—76)

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This invention relates to new and useful improvements in liquid fuel burners and has particular relation to means for controlling the air flow through the air blast pipe of a gun type oil burner.

An object of the invention is to provide a readily adjustable means for controlling the air flow through the air blast pipe of a gun type burner whereby to regulate said air flow in accordance with the requirements of various capacities of nozzles, the latter being used in accordance with the requirements of a particular installation. The present control means is adapted to be adjusted at the time of installation and to thereafter remain in fixed position, the air then being supplied in accordance with the fuel volume to the end that air is supplied in the proper amount for the support of a clean and more efficient flame.

Other objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a view partly in section and partly in elevation through the forward or discharge end of an air blast pipe of a gun type oil burner showing the present means in closed position;

Fig. 2 is a view similar to Fig. 1 but showing the parts in central vertical section;

Fig. 3 is an isometric view of the discharge end portion of the air blast pipe;

Fig. 4 is a similar view of a means operable in said pipe; and

Fig. 5 is a sectional view through the forward portion of the pipe and illustrating a portion of the air regulating means in open position.

Referring in detail to the drawings, at 10 is generally indicated the forward end portion of an air blast pipe of a liquid fuel burner, as an oil burner of the gun type. As is customary and conventional in these structures means (not shown) will be connected with the rear end of the pipe 10 for the purpose of supplying air thereto. Toward its forward end, pipe 10 is carried inwardly at 11 and then continued forwardly providing a reduced diameter discharge end portion 12. Located centrally within this portion 12 is a fuel supply nozzle 13 connected with the forward end 55

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of a fuel supply tube 14 which latter extends rearwardly through the longitudinal center of the pipe 10.

Integral with the inner surface of pipe discharge portion 12 is a series of helical vanes 15 adapted to impart a spiral twist to the air passing between them. If desired, the vanes 15 may be formed separate from the pipe 10 and thereafter mounted in the pipe portion 12. In addition to functioning for the purpose of imparting a twist to the air, these vanes also function as portions of a means for varying the effective cross sectional area of the opening in the pipe portion 12. Thus vanes 15 cooperate with straight blade-like vanes 16 carried by an annulus or ring device 17 located within the pipe 10 inwardly of the reduced diameter end portion 12 thereof.

The ring 17 is of substantially the internal diameter of the main or body portion of pipe 10, as clearly shown in Figs. 1 and 2, but the vanes 16 are connected with such ring by radially extending portions 18 whereby the vanes 16 are adapted to enter between the adjacent helical vanes 15. To prevent turning of the ring 17 and its vanes relative to the vanes 15, a lug 20 is formed in association with one of the helical vanes, as the helical vane 15a, whereby there is a narrow passage 21 between the rear end of said vane 15a and the free edge of the lug 20, such passage being of a width to accommodate one of the vanes 16, as the vane 16a. Since the vane 16a is received in the space 21, it will be clear that such vane may have only a rectilinear movement and therefore the ring 17 and the other vanes on such ring are prevented from turning in the pipe 10.

A rod 22 is connected to the ring 17 for adjusting the same longitudinally of the pipe 10 so as to position the vanes 16 more or less within the pipe portion 12. This rod extends rearwardly to any desired position or connection in the pipe 10. As this rod is moved longitudinally forwardly, the ring 17 may be carried forward to the extreme position of Figs. 1 and 2. In such instance, blades 16 are moved forwardly until they are in engagement with longitudinally spaced portions of opposing sides or faces of adjacent pairs of the helical blades. Thus, in Fig. 1 and 2 any blade 16 is engaged by rear corner portion of one helical vane and then a forward corner portion of such blade engages or substantially engages the side surface of the next adjacent helical vane. Therefore when the ring 17 is in this forward position the spaces between the helical vanes are blocked or substantially blocked

and there is substantially no passage of air through such spaces.

However, by drawing rearwardly on the rod 22, the ring 17 and the vanes 16 are drawn rearwardly to the extent desired and as the vanes 16 are drawn rearwardly their forward corner portions are immediately taken out of engagement with the side faces of the helical vanes 15 providing openings for the passage of some air between them. Preferably the rearwardmost position of ring 17 is such that the vanes 16 are not wholly withdrawn from the pipe portion 12 and especially so that the vane 16a is still entered into the restriction space 21 so as to guide the ring 17 and the other vanes should it be necessary to again adjust them forwardly.

With this described construction it will be seen that the effective internal diameter of the discharge portion 12 of the pipe 10 may be changed from a maximum, when the blades 16 are substantially entirely withdrawn from between the blades 15, to a minimum, when the blades 16 are in their forwardmost positions. At this latter time, the effective internal diameter of the pipe portion 12, that is, the internal diameter of such pipe portion available for the passage of air, is only the diameter measured between the inner longitudinal edges of a pair of oppositely disposed helical vanes. In this connection, it will be understood that the helical vanes extend entirely about the inner periphery of pipe portion 12 and that the vanes 16 are provided in like number so the effective cross sectional area of the opening in the pipe portion 12 may be reduced to the extent indicated.

Within the main body of the pipe 10 is a body or head-like means generally indicated 25, mounted on the tube 14 and secured in the desired position thereon as by a set screw 26. This body or means 25 has an operating rod 22 slidably passed therethrough and functions as a guide and support for said rod. In addition, the means or body 25 supports insulators 27 for any of the usual electrodes 28.

About the outer side of the head-like means or body 25 are a series of helical vanes 29 extending between said means and the inner surface of the pipe 10 and, in fact, engaging such surface of the pipe whereby the weight of the means is not supported entirely by the tube 14 but such means functions to assist in supporting said tube. It will be clear that the vanes 29 will function to impart a twist to air passing through the pipe 10 about the body of the head-like means or body 25 and in this connection it is noted that while the vanes 29 need not be of the pitch of the vanes 15, both sets of such vanes are preferably shaped and positioned to twist the air in the same general direction. At their rear ends each of the vanes 29 includes a short flat section 30, shown as extending in a direction parallel with the longitudinal axis of the pipe 10.

Mounted on the tube 14 for adjustable sliding movement therealong is an air passage regulating means generally designated 31 and including a disc or plate-like body 32 centrally enlarged to provide a hub-like portion 33 embracing and slidable on said tube. For the purpose of adjusting the air passage regulating means 31 on the tube 14, an operating rod 34 is connected with the body 32 and extends rearwardly in the pipe 10 for operation or for connection with any suitable operating means.

Extending forwardly and radially of the body 32 of means 31 are a series of straight blade-

like vanes 35, the outer edges of which may engage the inner surface of pipe 10 and the inner edges of which are adapted to engage or to just pass over the outer surface of the body of the head-like means 25. The vanes 35 are of course movable with the body 32 of the air regulating means 31. Further, it will be understood from previous description that the vanes 35 are of the height or width of the helical vanes 29. Device 31 is shiftable between a closed position, as shown in Figs. 1 and 2, and an open position as shown in Fig. 5 on manipulation of the rod 34.

In Figs. 1 and 2 air passage regulating means 31 is in its forwardmost or closed position. There it will be noted that each vane 35 of said means is against or substantially against one of the flat portions 30 of one of the vanes 29 and that the forward edge of each of such vane 35 is in engagement with, or substantially in engagement with, a side face of the next adjacent helical vane 29. Therefore in the described forwardmost or closed position of the air passage regulating means 31, it will be seen that air is substantially prevented from moving forwardly through the pipe 10. Head-like means 25 effectively blocks the central portion of the pipe and each of the vanes 35 being in engagement with a pair of adjacent helical vanes 29, air may not move forwardly in the pipe between such helical vanes.

From this extreme forward or closed position the means 31 may be adjusted to any desired extent back to a fully open position. It will be clear that on the first rearward movement of the means 31 from the position of Figs. 1 and 2, the forward ends of the vanes 35 will be carried away from the side faces of vanes 29 providing for the movement of some air through the pipe 10 between such vanes 29. This rearward movement may continue until the means 31 is in fully open position, as suggested in Fig. 5.

There the vanes are only in engagement with the flat extensions 30 of the vanes 29 so that the space between such latter vanes is wide open for the passage of air. In this connection it is noted that the straight vanes 35 will not interfere with the vanes 29 imparting a twist or spiral movement to the air passing forwardly between them. It will be understood that spiral movement imparted to the air by the vanes 29 and the vanes 15 is beneficial in assisting in breaking the oil spray and in the matter of having the burner produce an effective flame.

From the foregoing description it will be understood that the means of the invention provides for the imparting of a twist to the air passing through the pipe 10 and in addition provides means for regulating the volume of air passing about the head-like means 25 and also for effecting the velocity of the air thus passing through. This latter is true since if the blower is going at a single speed, as the passages between the vanes 29 are partly closed and the area of the air reduced, the velocity will be increased.

In addition to the above, the vanes 16 in cooperation with the vanes 15 control the velocity of air moving through the discharge end of pipe 10 immediately about the nozzle and further control the diameter of such a volume of air in addition to imparting a spiral twist to the latter. The vanes 16 and 35 are adjustable each as a unit but each independent of the other unit. Therefore, the volume of air passing through the pipe portion 12 may be carefully regulated to confine the flame or to permit the flame to be larger and the total volume admitted through the

pipe 10 about the head-like means 25 may also be controlled in order to properly support combustion at the nozzle.

With the present construction, a single size burner may be used in a variety of installations each requiring a different fuel capacity. It is not necessary to make up a pipe 10 and accompanying structure for each installation since by applying the proper nozzle and properly manipulating the rods 22 and 34 to adjust the vanes 16 and 35, a flame proper for any particular installation, within a considerable range, is provided for.

Having thus set forth the nature of my invention, what I claim is:

1. In a liquid fuel burner including an air blast pipe having a discharge end portion, a fuel spray nozzle slightly inwardly of the discharge end of said pipe and a fuel supply tube connected with said nozzle, a body of less external diameter than the internal diameter of said pipe and arranged coaxially of the longitudinal center of said pipe inwardly of said discharge end portion and said nozzle and blocking the passage of air through the coaxial center of the pipe, means adjustable in the space between the outer periphery of said body and the inner periphery of said pipe to and from a position substantially closing said space whereby to regulate the volume of air passing through the pipe about said body, spaced helical vanes located about the inner periphery of the discharge portion of said pipe and extending from a point inwardly of the discharge end of said nozzle to a point forwardly thereof for imparting a twist to air passing through the said discharge portion of the pipe about said nozzle, and means movable into and out of the spaces between said vanes for closing the passages therebetween in accordance with the extent to which the means is moved into said spaces to thereby vary the effective internal cross sectional area of said discharge pipe portion whereby the velocity of air moving through said discharge pipe portion may be maintained when the first mentioned means has been adjusted to reduce the volume of air passing about said body.

2. In a liquid fuel burner including an air blast pipe having a discharge end portion, a fuel spray nozzle slightly inwardly of the discharge end of said pipe and a fuel supply tube connected with said nozzle, a body of less external diameter than the internal diameter of said pipe and arranged coaxially of the longitudinal center of said pipe inwardly of said discharge end portion and said nozzle and blocking the passage of air through the coaxial center of the pipe, spaced helical vanes located about said body between the outer periphery thereof and the inner periphery of said pipe, means including a series of spaced straight vanes, means mounting said straight vanes for movement longitudinally of said pipe into the spaces between adjacent pairs of said helical vanes for closing said spaces in accordance with the extent to which the straight vanes are moved into said spaces to thereby regulate the volume of air passing through the pipe about said body, spaced helical vanes located about the inner periphery of the discharge portion of said pipe and extending from a point inwardly of the discharge end of said nozzle to a point forwardly thereof for imparting a twist to air passing through the said discharge portion of the pipe about said nozzle,

and means movable into and out of the spaces between said vanes for closing the passages therebetween in accordance with the extent to which the means is moved into said spaces to thereby vary the effective internal cross sectional area of said discharge pipe portion whereby the velocity of air moving through said discharge pipe portion may be maintained when the first mentioned means has been adjusted to reduce the volume of air passing about said body.

3. In a liquid fuel burner including an air blast pipe having a discharge end portion and a fuel spray nozzle in the coaxial center of said discharge end portion and having its spray opening forwardly of the inner end of said portion and rearwardly of the discharge end of said portion, a series of spaced helical vanes about the inner periphery of said portion and extending for the length thereof, a series of straight vanes in said pipe and shiftable longitudinally thereof to and from positions extending between the vanes of the first series, and said vanes of the second series of a length whereby when they are moved into the spaces between the vanes of the first series to substantially engage at longitudinally spaced points located respectively rearwardly and forwardly of the spray opening of said nozzle the opposing sides of adjacent vanes of the first series to substantially close the passage of air longitudinally between such adjacent vanes of the first series between said points and effectively for the distance between said points change the effective internal cross sectional area of said discharge portion of the pipe.

4. In a liquid fuel burner including an air blast pipe having a discharge end portion and a fuel spray nozzle in the coaxial center of said discharge end portion and having its spray opening forwardly of the inner end of said portion and rearwardly of the discharge end of said portion, a series of spaced helical vanes of uniform depth about the inner periphery of said portion and extending for the length thereof, a series of straight vanes of uniform depth in said pipe and shiftable longitudinally thereof to and from positions extending between the vanes of the first series, and said vanes of the second series of a length whereby when they are moved into the spaces between the vanes of the first series to substantially engage at longitudinally spaced points located respectively rearwardly and forwardly of the spray opening of said nozzle the opposing sides of adjacent vanes of the first series to substantially close the passage of air longitudinally between such adjacent vanes of the first series between said points and effectively for the distance between said points change the effective internal cross sectional area of said discharge portion of the pipe.

ANTHONY CADELLA.

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