

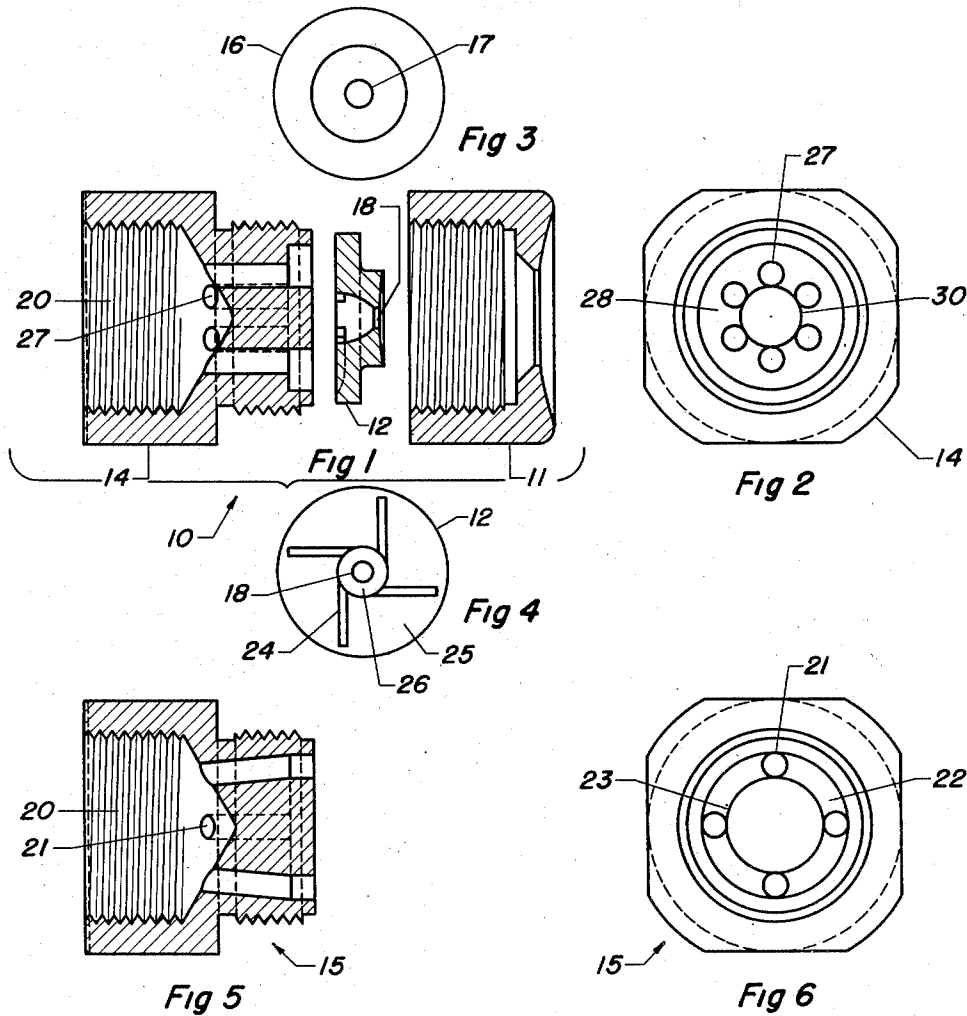
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FUEL OIL BURNER NOZZLE

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FUEL OIL BURNER NOZZLE

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This invention relates to a fuel oil burner nozzle, and has for an object to provide a fuel oil burner nozzle of a semi-wide range capacity, especially intended for use in a fuel oil furnace or boiler of the type where there is a wide range of demand for power, and where it is further essential that the power be supplied as efficiently as possible throughout the range.

At the present time this wide range of power is most efficiently supplied by providing as many as a half dozen or more different sprayer plates for each burner, each plate having a different drill size opening, with each particular drill size opening providing comparative efficiency within a certain range of capacity. This is due to the fact that the oil must be atomized by pressure and beyond a certain comparatively small range in pressure for a certain size sprayer plate opening the oil is no longer being efficiently atomized. Hence, in order to supply the oil at a different rate properly atomized into the furnace, it is necessary with the present burner to use the half dozen or more sprayer plates. One sprayer plate, for instance, will be comparatively efficient when supplying 100 pounds of oil per hour per nozzle. The next size opening sprayer plate takes care of from 100 to 200 pounds, and so on up to the maximum capacity of the furnace.

When such furnaces or boilers are used on naval vessels it is very inconvenient to have to shift the sprayer plates every time the vessel needs more or less power, such as during maneuvering, causing either a loss of time in the maneuver while the shift takes place, or inefficiency by utilizing a sprayer plate already in position beyond its efficient range. The lack of efficiency necessarily results in the cruising range of the vessel being diminished for a given quantity of fuel carried by the vessel.

It is an object of this invention to provide an improved nozzle which cuts down this need for a half dozen or more sprayer plates to only one or two changes in sprayer plates and still provide maximum efficiency throughout the range of capacity of the furnace. With the improved nozzle of this invention instead of needing a different sprayer plate with a different size opening for each 100 pounds per hour capacity or so, a different sprayer plate is needed with this invention for about each 500 pounds range per hour in capacity. Thus with a furnace having a capacity range of 1000 pounds per hour, only two instead of ten sprayer plates will be needed, thereby enabling the vessel to operate at maximum effi-

ciency at all times and greatly increase its cruising range for the same quantity of fuel.

With the foregoing and other objects in view, the invention consists in the construction, combination and arrangement of parts hereinafter described and illustrated in the drawing, in which,

Fig. 1 is a sectional exploded view of a burner including the improved nozzle of this invention.
Fig. 2 is a front elevational view of the improved nozzle block.

Fig. 3 is a front elevational view of a sprayer plate having one size drill opening therethrough.
Fig. 4 is a rear elevational view of a sprayer plate of another size drill opening therethrough.
Fig. 5 is a sectional view of a nozzle block used prior to this invention; and

Fig. 6 is a front elevational view of the old nozzle block of Fig. 5.

There is shown at 10 the oil burner which includes a conventional nut tip 11, a sprayer plate 12, and the improved nozzle block 14 of this invention. At 15 is shown the old style nozzle block, and at 16 is shown a sprayer plate having one size opening 17, while the sprayer plate 12 has a different size opening 18.

The old style nozzle block 15 is used together with a nut tip 11 and either of the sprayer plates 12 or 16, or other sprayer plates having openings of various other sizes than those shown at 17 and 18 to provide the formerly known type of burner.

The old burner thus assembled is efficient only between a range of pressures from 225 to 300 pounds per square inch, and with every change in capacity or quantity of fuel, it is necessary to change the particular sprayer plate in use for a different sprayer plate having the proper size opening therethrough. In this old nozzle block 15 the oil is delivered from a barrel to which it is connected by the internal threads 20, the oil then passing through the outwardly angling feed openings 21 to the narrow annulus 22 about the wide boss 23, this boss 23 being usually one-half inch in diameter, while the annulus 22 has a width substantially equal to the diameter of the openings 21. The fuel then passes from the annulus 22 through the tangential slots 24 in the rear face 25 of the sprayer plate and into the whirling chamber 26, and thence through the opening 18 in atomized condition into the burner, provided the proper range of pressure between 225 and 300 pounds per square inch is maintained. To go above this pressure has no effect in increasing the capacity, while dropping below this pressure causes decreased fineness of atom-

ization and finally drooling, with decreased efficiency. Hence, in order to supply oil to the furnace at a different rate it is necessary to cut off the fuel to this particular burner, remove the nut tip 11 and replace the sprayer plate with one having a different size aperture therethrough.

In this invention the nozzle block 14 has a plurality of feed openings 27 leading straight through to the front face of the nozzle where the openings 27 terminate in an annulus 28 of substantially greater width than the diameter of the openings 27, and surrounding a boss 30 of much lesser diameter than the boss 23 of the old nozzle block 15, this boss 30 being preferably $\frac{1}{8}$ of an inch in diameter and barely larger than the maximum diameter of the whirling chamber 26 in the sprayer plate.

Comparing the improved nozzle 14 with the old nozzle block 15, it will be seen that the nozzle block 14 has its feed openings 27 extending straight through the nozzle block instead of at an angle as at 21 in the old nozzle block 15. The improved nozzle block 14 has six feed openings 27, as compared to the four feed openings 21 of the old nozzle block 15. The improved nozzle block 14 has a wide annulus 28 compared to the narrow annulus 22 of the old nozzle block, and finally, the improved nozzle block 14 has a smaller diameter boss 30 as compared to the wide diameter boss 23 of the old nozzle block 15. These differences, slight though they may appear to be, have the tremendous and unexpected result of enabling a burner to be assembled which needs at the most but one or two sprayer plates 12 and 16, as compared to the half dozen or more sprayer plates of a burner including the old nozzle block 15. Utilizing the improved nozzle block 14 of this invention it has been found that the range in pressure instead of being restricted to between 225 to 300 pounds per square inch may be increased to from 75 to 500 pounds per square inch, and even up to from 50 to 700 pounds per square inch without serious loss of efficiency. It is thus possible with the improved nozzle block 14 to efficiently feed quantities of oil with a range of 500 pounds per hour per sprayer plate as compared with a range of only 100 pounds per hour per sprayer plate with the old nozzle 15. Thus, with the furnace having a range in capacity of 1000 pounds per hour only two sprayer plates would be needed with the improved nozzle block 14, as compared to ten sprayer plates needed with the old nozzle block 15 in order to attain the same efficiency while maintaining the same range in capacity.

There is thus provided a semi-wide range burner utilizing the improved nozzle block of this invention, making it possible to take care of the full range of capacity of a boiler with only one, or at most two, changes in sprayer plate sizes, as compared to the narrow range burner necessitating a half dozen or more changes in sprayer plate sizes.

Other modifications and changes in the proportions and arrangements of the parts may be made by those skilled in the art without departing from the nature of the invention, within the scope of what is hereinafter claimed.

The invention described herein may be manufactured and/or used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. In an oil burner including a nut tip, a sprayer plate having on its rear face a whirling chamber terminating in an opening through the plate, and a nozzle block, the improvement of an annulus in the front face of the nozzle block, and a small diameter boss within said annulus, the diameter of said boss being barely larger than the maximum diameter of the whirling chamber of the sprayer plate.

2. In an oil burner including a nut tip, a sprayer plate having on its rear face a plurality of slots leading tangentially to a whirling chamber, the whirling chamber terminating in an opening through the plate, and a nozzle block, the improvement of an annulus in the front face of the nozzle block of substantial width, and a small diameter boss within said annulus, the diameter of said boss being barely larger than the maximum diameter of the whirling chamber of the sprayer plate.

3. In an oil burner including a nut tip, a sprayer plate having on its rear face a plurality of slots leading to a whirling chamber, the whirling chamber terminating in an opening through the plate, and a nozzle block having a plurality of fuel feed openings leading to the front face thereof, the improvement of an annulus in the front face of the nozzle block of substantially greater width than the width of the fuel feed openings, and a small diameter boss within said annulus, the diameter of said boss being barely larger than the maximum diameter of the whirling chamber of the sprayer plate.

4. In an oil burner including a nut tip, a sprayer plate having on its rear face a plurality of slots leading tangentially to a whirling chamber, the whirling chamber terminating in an opening through the plate, and a nozzle block having a plurality of fuel feed openings leading from the rear face to the front face thereof, the improvement of an annulus in the front face of the nozzle block of substantially greater width than the width of the fuel feed openings, a small diameter boss within said annulus, the diameter of said boss being barely larger than the maximum diameter of the whirling chamber of the sprayer plate.

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