

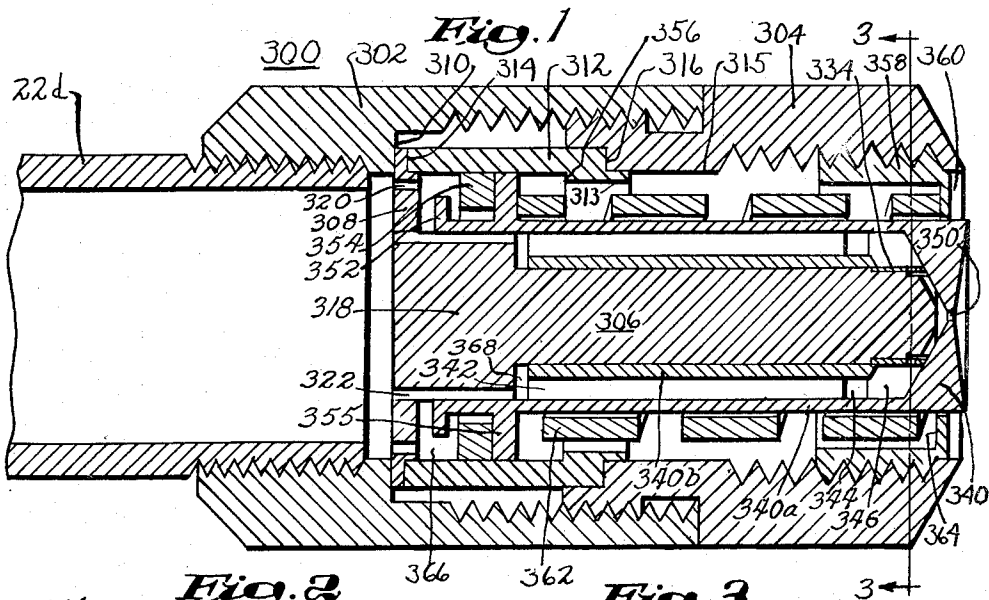
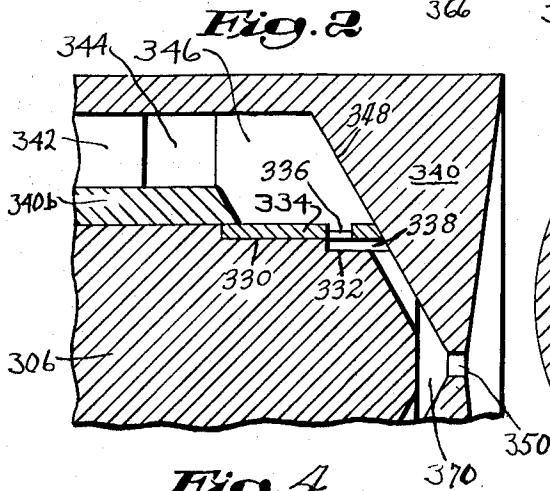
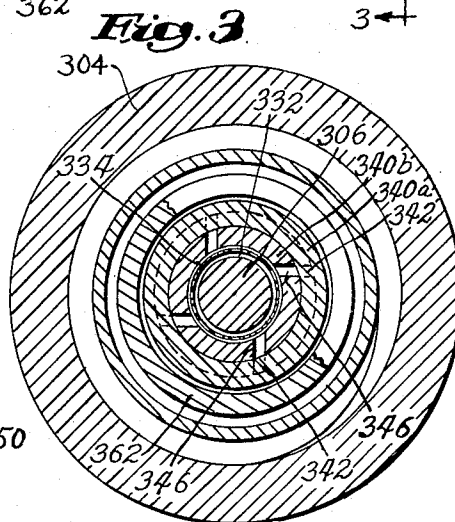
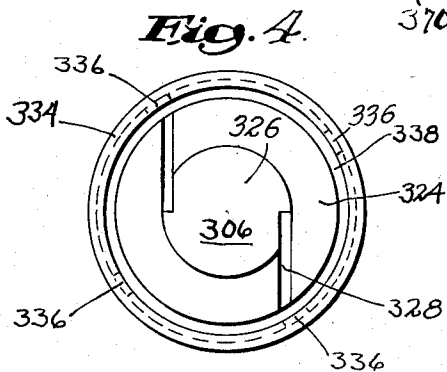
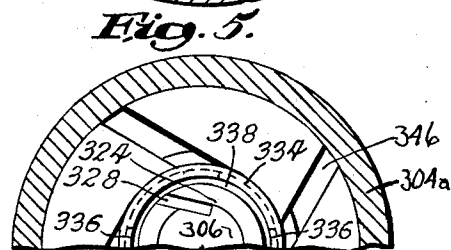
Jan. 12, 1960

W. J. JOHNSYN, JR

2,920,831

FUEL ATOMIZING NOZZLE

Filed Feb. 28, 1957



Inventor:
Wadsworth J. Johnson, Jr.
by **Arnold C. Rood**
Attorney

1

2,920,831

FUEL ATOMIZING NOZZLE

Wadsworth J. Johnsyn, Jr., Milton, Mass.

Application February 28, 1957, Serial No. 643,177

2 Claims. (Cl. 239-464)

This invention relates to combustion equipment, and more particularly to an improved form of fuel nozzle for oil burners and the like.

This is a continuation in part of my copending application Serial No. 425,843, filed April 27, 1954. Application Serial No. 425,843 was a continuation in part of copending application Serial No. 346,101, filed April 1, 1953, now abandoned. Application Serial No. 346,101 was a continuation in part of copending application Serial No. 239,735, filed August 1, 1951, now abandoned.

An object of the invention is to provide fuel nozzles having improved features of construction. Further objects are to provide nozzles which will atomize oil efficiently at a range of capacities, and which are adaptable for use with high pressure units or with those operating at lower oil pressures. Other objects are to provide nozzles of advantageous character which will preclude drip of oil when the burners are not in operation, and additional objects are to provide nozzles which are non-clogging or self-cleaning in character.

Other objects of the invention will be apparent to those skilled in the art from the disclosures herein made.

In the accompanying drawings, illustrating specific embodiments of the invention:

Fig. 1 is a longitudinal section of a nozzle construction of this invention;

Fig. 2 is an enlarged fragmentary longitudinal section of the outlet end of the nozzle shown in Fig. 1;

Fig. 3 is a transverse section taken on line 3-3 of Fig. 1;

Fig. 4 is an enlarged end view of the stem of the nozzle shown in Fig. 1; and

Fig. 5 is an enlarged end view of the forward portion of the feed sleeve and stem of the nozzle shown in Fig. 1 with the nozzle sleeve in section, and showing the tangential oil feed grooves extending inwardly in clockwise direction.

In Figs. 1-5 inclusive is illustrated a form of nozzle construction which advantageously may be used over a wide range of fuel capacity, and with high pressures.

Referring to Figs. 1-5, nozzle 300 is shown as contained within housing members 302 and 304, member 304 being threaded into member 302. Housing member 302 in turn is threaded onto fuel supply pipe 22d. There is no fuel return tube.

Stem 306 is generally cylindrical and solid in character, and at its rearward end has flange 308 which seats on shoulder 310 of housing member 302. Ring 312 seats on shoulder 314 of flange 308 and extends forwardly into contact with shoulder 316 of housing member 304. Furthermore, forward extension 313 of ring 312 seats on inner surface 315 of housing member 304. Stem 306 and ring 312 are held in axial aligned position by axial pressure between housing members 302 and 304. Forwardly of flange 308 is the smaller cylindrical portion 318. A plurality of symmetrically disposed oil passage holes extend through flange 308 at 320 and through flange 308 and cylindrical portion 318 at 322. The forward end

2

of stem 306 is shown as frustoconical in shape with conical surface 324 and central surface 326 (Fig. 4). Conical surface 324 is provided with non-radial tangential grooves 328. At its forward portion, stem 306 is reduced in diameter at 330 and 332, and ring 334 is disposed on reduced section 330 with force fit. Ring 334 extends forwardly so that its leading edge is in alignment with and forms a spaced extension of conical surface 324. Ring 334 is provided with symmetrically disposed radial oil passage holes 336 which lead into the annular passage 338 defined between ring 334 and reduced section 332.

Nozzle sleeve 340 fits over stem 306 and is arranged to move longitudinally with respect to the latter with sliding fit. Nozzle sleeve 340 is shown as formed of outer cylindrical member 340a and inner cylindrical member 340b, the two portions 340a and 340b being assembled with press fit, and moving longitudinally as a unit. Sleeve member 340b is provided with symmetrically spaced, longitudinal oil feed grooves 342 which extend from the rearward end of sleeve member 340b forwardly to and communicating with annular oil feed groove 344 also formed in member 340b. Forwardly of and communicating with an annular groove 344 there are formed in member 340b non-radial tangential grooves 346 which extend forwardly to the conical inner forward surface 348 of outer nozzle sleeve member 340a. Orifice 350 is formed in outer sleeve member 340a.

At the rearward end of outer nozzle sleeve member 340a is retaining flange 352 for oil-sealing gasket 354, conveniently composed of neoprene. Forwardly of flange 352 is the larger flange 355, the forward movement of which, and of the nozzle sleeve 340, is limited by shoulder 356 of ring 312.

At the forward end of the nozzle, end portion 358 is threaded into housing member 304. End portion 358 is centrally apertured to receive nozzle sleeve 340 with clearance fit, and is longitudinally adjustable by means of spanner wrench grooves 360.

Compression spring 362 is disposed in the annular space between nozzle sleeve 340 and housing members 302 and 304, and bears endwise on the forward surface of flange 355 and the rearward shoulder 364 of end portion 358. The compression of the spring may be adjusted by longitudinal adjustment of end portion 358.

In operation, the fuel oil enters from supply pipe 22d, and some oil passes through apertures 320 into pressure chamber 366 and the remainder of the oil passes through feed holes 322 into annular space 368, through longitudinal grooves 342 into annular space 344, and thence into tangential grooves 346.

At oil pressures insufficient to overcome the resistance of spring 362, the oil will pass from tangential grooves 346 through apertures 336, into annular groove 332, through tangential grooves 328, into whirl chamber 370. The oil whirls tangentially in whirl chamber 370 and sprays out of orifice 350 in the form of a cone.

At oil pressures sufficient to overcome the resistance of spring 362 and thus to move the nozzle sleeve forwardly, some of the oil will move as described in the next preceding paragraph, but most of the oil will move directly from tangential grooves 346 into the enlarged whirl chamber 370 formed by the forward movement of nozzle sleeve 340, and thence the oil will move tangentially in the enlarged whirl chamber 370 and outwardly of orifice 350 in the form of a cone.

The nozzle construction shown in Figs. 1-5 provides a smooth flow of oil without turbulence at any capacity. The capacity of the nozzle illustrated in Figs. 1-5 is controlled solely by the pressure of the oil supplied from feed pipe 22d.

The nozzles may be adapted to operate under various conditions by the use of compression springs of predetermined selected characteristics.

It will be understood that various changes and modifications may be made in the nozzle herein disclosed, while still coming within the scope of the invention.

Having disclosed my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a fuel nozzle, in combination, a longitudinally extending stem, a nozzle sleeve movable longitudinally of said stem, spring means resisting forward movement of said sleeve, the forward interior surface of said nozzle sleeve being cone-shaped and provided with an orifice at the apex of said cone, the forward end of said stem being frusto-conical in shape and arranged to seat on the adjacent surface of said nozzle sleeve to define a cone-shaped whirl chamber, the inclined surface of the forward end of said stem being provided with tangential grooves of small capacity, a second set of tangential grooves of larger capacity formed in said nozzle sleeve and communicating with said smaller tangential grooves, said larger tangential grooves communicating directly with said whirl chamber when said nozzle sleeve is moved forwardly and the whirl chamber correspondingly enlarged, and oil supply passages formed in said parts to permit oil to pass from the rearward portion of said stem to said larger tangential grooves.

2. In a fuel nozzle, in combination, a longitudinally extending stem, a nozzle sleeve movable longitudinally of said stem, spring means resisting forward movement of said sleeve, the forward interior surface of said nozzle sleeve being cone-shaped and provided with an orifice at the apex of said cone, the forward end of said stem being frusto-conical in shape and arranged to seat on

the adjacent surface of said nozzle sleeve to define a cone-shaped whirl chamber, the inclined surface of the forward end of said stem being provided with tangential grooves of small capacity, a second set of tangential grooves of larger capacity formed in said nozzle sleeve and communicating with said smaller tangential grooves, said larger tangential grooves communicating directly with said whirl chamber when said nozzle sleeve is moved forwardly and the whirl chamber correspondingly enlarged, oil supply passages formed in said parts to permit oil to pass from the rearward portion of said stem to said larger tangential grooves, a first flange extending outwardly from the rearward portion of said stem, a concentric annular ring extending forwardly from said flange, a second flange extending from said nozzle sleeve outwardly to said ring with sliding fit, a third flange, rearwardly of said second flange, extending outwardly from said nozzle sleeve toward said ring but stopping short thereof, a resilient annular siding member within said ring directly adjacent to the inner surface of said ring and the rearward outer portion of said second flange, means in said nozzle to hold said ring and first flange in assembled relation, and oil supply passages from the rearward portion of said stem to the chamber defined by said ring, flanges and adjacent parts.

References Cited in the file of this patent

UNITED STATES PATENTS

1,326,488	Fisher	Dec. 20, 1919
1,644,372	Gray	Oct. 4, 1927
2,079,430	Bargeboer	May 4, 1937
2,092,519	McLean	Sept. 7, 1937
2,345,402	Lubbock	Mar. 28, 1944
2,595,566	Carey	May 6, 1952
2,660,474	Lee	May 24, 1953