

July 3, 1956

W. E. KELSEY ET AL

2,753,218

NOZZLE

Filed May 3, 1954

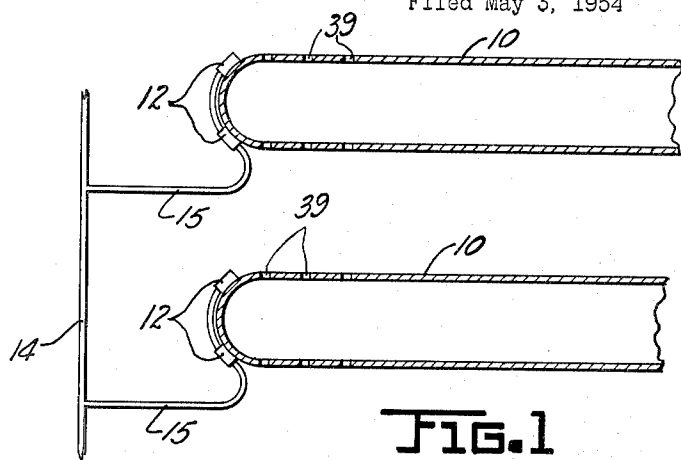


FIG. 1

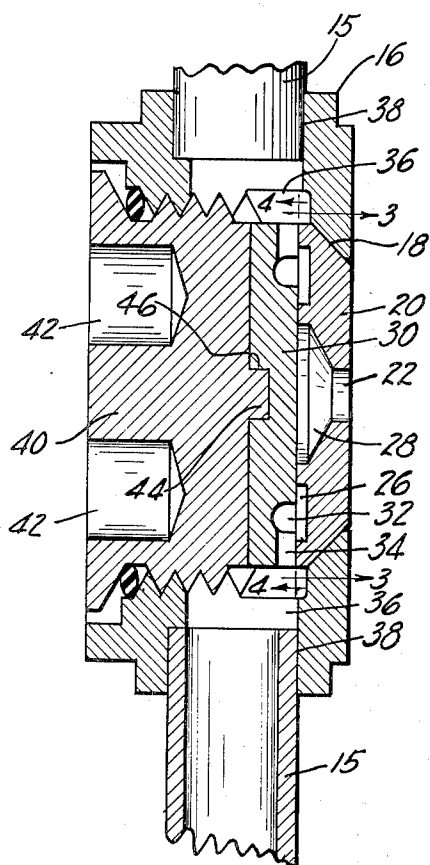


FIG. 2

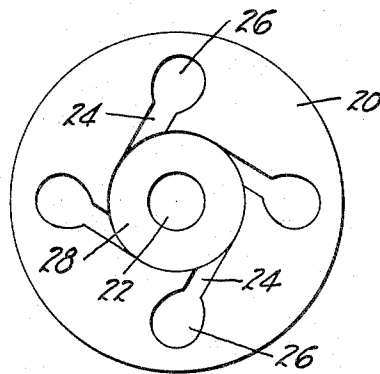


FIG. 3

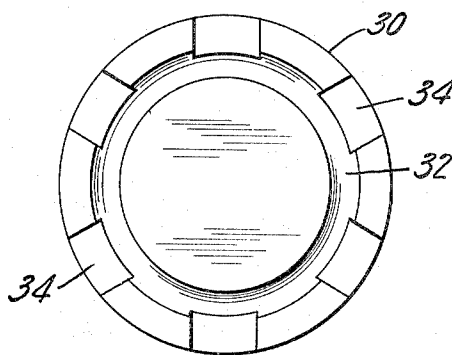


FIG. 4

INVENTOR.
WILLIAM E. KELSEY
ALBERT H. WINKLER
BY
James L. O'Brien
ATTORNEY

1 2,753,218 NOZZLE

William E. Kelsey and Albert H. Winkler, Elmira, N. Y.,
assignors to Bendix Aviation Corporation, South Bend,
Ind., a corporation of Delaware

Application May 3, 1954, Serial No. 427,297

2 Claims. (Cl. 299—120)

This invention relates generally to liquid fuel atomizing nozzles, and more particularly to nozzles of the simplex type for use in gas turbine power plants, and has for an object to provide an improved device of this character.

Another object of the invention is to provide a liquid fuel nozzle having a novel construction which permits the replacement of parts without removing the nozzle from its operative position in the combustion chamber of a gas turbine engine.

A further object of the invention is to provide a liquid fuel nozzle that is readily adapted for simultaneous connection to a plurality of fuel conduits.

A still further object of the invention is to provide a fuel nozzle having parts that are readily interchangeable with parts of different capacity and/or spraying characteristics.

Other objects will become readily apparent from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a longitudinal section of a portion of the combustion chambers of a gas turbine engine showing a plurality of nozzles embodying the present invention in their operative position;

Figure 2 is an enlarged cross sectional view of a nozzle incorporating the invention;

Figure 3 is a view of the inner face of the nozzle tip taken along line 3—3 of Figure 2; and

Figure 4 is an end view of the distributing disc taken along line 4—4 of Figure 2.

Referring now to the drawing, numeral 10 designates the combustion chambers of a jet engine, 12 a plurality of nozzles disposed in the end wall of said chambers and 14 a conduit connecting said nozzles with a source of fuel, not shown. As best shown in Figure 2, numeral 16 designates a nozzle body or housing having an internally bevelled opening 18 adapted to sealingly engage a complementarily bevelled nozzle tip 20 having an orifice 22 coaxial with said opening.

The rear face of tip 20, as best seen in Figure 3, is provided with a plurality of grooves or canals 24 each originating with an oval or tear shaped cavity 26 and secantly or tangentially terminating at a spin chamber 28 which communicates directly with orifice 22.

Adjacent to and in sealing engagement with the rear face of tip 20 is a distributing disc 30, best shown in Figure 4, having an annular groove 32 adapted to register with the tear shaped cavities 26. A plurality of slots 34 connect groove 32 with an annular chamber 36 in the side wall of the housing 16. Chamber 36 is provided with a plurality of radially extending openings 38 which are adapted to receive fuel conduits 15.

The nozzles, as shown in Figure 1, supplying each combustion chamber are connected in series by branch conduits 15 which connect with the main fuel conduit 14. The combustion chambers are provided with a plurality of vents 39 some or all of which may have baffles for directing air into the chamber in the vicinity of the nozzles.

The forward portion of the nozzle body 16 is secured in position in the rear wall of the combustion chamber for more or less permanent connection therewith. The

2

nozzle tip 20 and distributing disc 30 are inserted from the rear of the nozzle and held in operative position by a backing plate 40 threadedly received in the housing. The rear surface of plate 40 is provided with a plurality of tool engageable detents 42 so that the plate may be conveniently tightened into position. The forward face of the plate is provided with a pin 44 which is adapted for engagement with a bore 46 in the rear face of distributing disc 30 for maintaining the parts in proper alignment.

The nozzles 12 for each combustion chamber are connected in series by conduits 15 which connect with main fuel conduit 14. The fuel in each branch conduit 15 passes through annular chamber 36 of the first nozzle to reach the second nozzle. Since all of the nozzles are alike, the description of operation of a single nozzle will suffice.

A portion of the fuel in annular chamber 36 passes through slots 34 to groove 32 in the distributing disc 30. The annular groove 32 is in registration with tear shaped cavities 26 which provide for the smooth transfer of fuel from the groove to canals 24 with a minimum loss of velocity and/or energy. Fuel is secantly or tangentially discharged from the canals into the spin chamber 28 where its angular velocity is greatly increased prior to discharge from orifice 22 in the form of a fine spray.

The nozzle tip 20 and distributing disc 30 are readily interchangeable with corresponding parts having different capacities and spray characteristics which may be inserted from the rear of the nozzle housing without removing fuel connections or removing the nozzle from its operative position in the combustion chamber.

From the above description it will be readily apparent to those skilled in the art that many changes or arrangements of parts may be made without departing from the scope or spirit of our invention.

We claim:

1. A nozzle having a source of liquid supply comprising a housing; a replaceable tip in said housing; a spin chamber in said tip; a plurality of canals secantly arranged about said chamber; a tear shaped reservoir for each canal; a distributing disc adjacent said tip; an annular groove in said disc adapted to register with said reservoirs; an annular chamber in said housing in substantially the same plane as said disk; a plurality of radially extending passages in said disc connecting said groove with said annular chamber; and a plurality of radial ports in said housing in substantially the same plane as and opening into said annular chamber, at least one of said ports adapted to be connected with said source of liquid.

2. A nozzle having a source of liquid supply comprising a housing; a replaceable tip in said housing; a spin chamber in said tip; a plurality of canals secantly arranged about said chamber; a tear shaped reservoir for each canal; a distributing disc adjacent said tip; an annular groove in said disc adapted to register with said reservoirs; an annular chamber in said housing in the same plane as said disk; a radially extending passage in said disc connecting said groove with said annular chamber; and a radial port in said housing in the same plane as said disk opening into said annular chamber and adapted to be connected with said source of liquid.

References Cited in the file of this patent

UNITED STATES PATENTS

584,804	Winton	June 22, 1897
2,378,348	Wilmes	June 12, 1945
2,544,417	Goddard	Mar. 6, 1951

FOREIGN PATENTS

117,884	Great Britain	Aug. 8, 1918
468,653	Great Britain	July 9, 1937