Feb. 4, 1958 J. L. FIZZELL 2,821,976

LIQUID FUEL BURNER AND HOOD

Filed Nov. 29, 1954

Fig. 1.

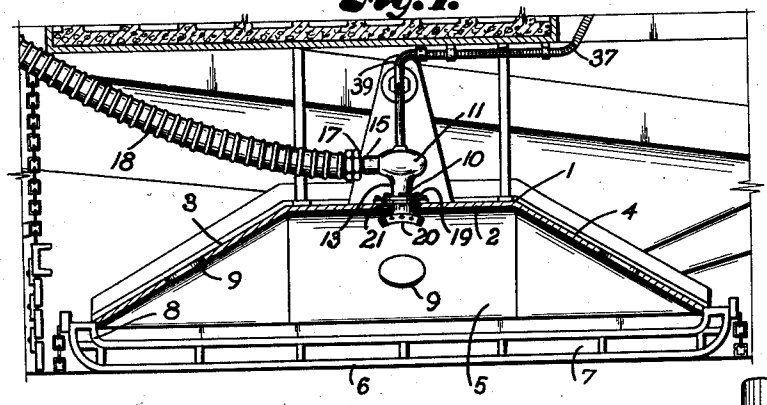


Fig. 2.

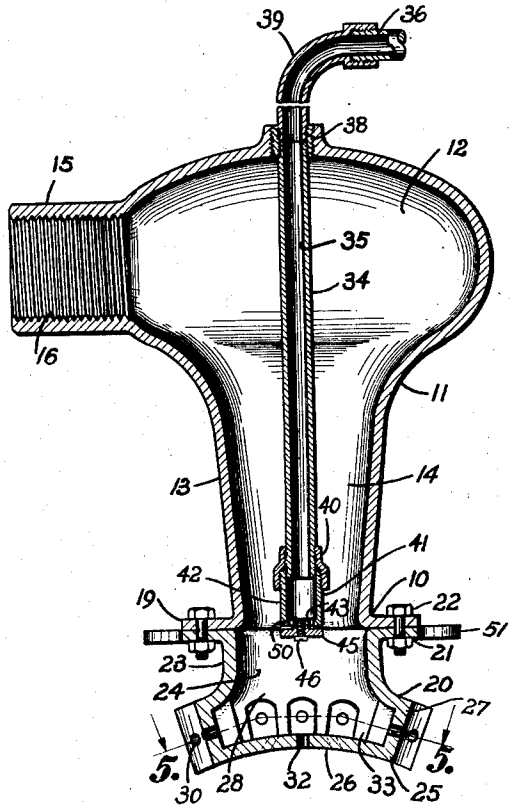


Fig. 3.

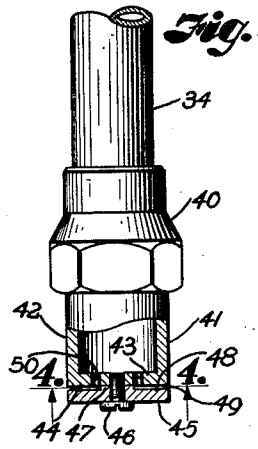


Fig. 4.

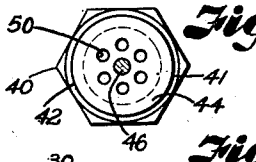
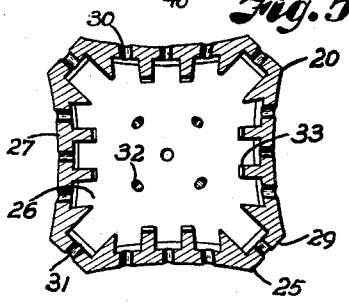


Fig. 5.



INVENTOR.
James L. Fizzell.

BY
Fishburn & Mullendore
ATTORNEYS.

United States Patent Office

2,821,976

Patented Feb. 4, 1958

2,821,976

LIQUID FUEL BURNER AND HOOD

James L. Fizzell, Kansas City, Mo.

Application November 29, 1954, Serial No. 471,770

1 Claim. (Cl. 126—271.2)

This invention relates to liquid fuel burners, and more particularly to oil burners, or the like, and such burners in combination with the hood for use in machines for heating asphalt and like paving prior to planing or scraping the top or irregular surface from such paving.

The objects of the present invention are to provide a liquid fuel burner, which sprays atomized liquid fuel in a passage transversely of a blast of air to thoroughly mix the fuel and air and discharge same in a plurality of streams or jets arranged to provide a substantially uniform heating over a relatively large surface; to provide a combination of a liquid fuel burner and hood having air openings therein, whereby the fuel is burned under the hood and a substantial portion of the heat thereof confined to the area under the hood; to provide a burner structure that may be readily and conveniently taken apart and its parts easily cleaned and reassembled; to provide a burner structure of relatively few parts that is economical to manufacture and efficient in operation in providing relatively high temperatures capable of uniformly softening asphalt pavement under a hood, in which the burner is arranged.

In accomplishing these and other objects of the present invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawing, wherein:

Fig. 1 is a vertical sectional view of a hood with a burner associated therewith for heating surfaces under the hood.

Fig. 2 is a longitudinal sectional view through the burner.

Fig. 3 is an enlarged view of the forward end of the liquid fuel discharge member.

Fig. 4 is a transverse sectional view through the liquid fuel discharge member on the line 4—4, Fig. 3.

Fig. 5 is a transverse sectional view through the forward end of the burner and discharge apertures therein on the line 5—5, Fig. 2.

Referring more in detail to the drawing:

1 designates a hood, adapted for use on an asphalt heater planer mechanism such as shown and described in my co-pending application Serial No. 286,744 filed May 8, 1952, now Patent 2,705,906, issued April 12, 1955, which application shows a machine adapted to be propelled over paving, which machine includes a liquid fuel pump and an air blower. The hood 1 is preferably formed of sheet metal and includes a central portion 2, having downwardly sloping front, rear and side walls 3, 4 and 5 respectively. Skids or runners 6 are fixed on the hood at the lower edge of the side walls and adapted to slide over the paving to be heated. The skids or runners 6 have openings 7 extending longitudinally thereof, and also support the hood, whereby the lower edges of the front and rear walls 3 and 4 respectively, are spaced as at 8 from the surface of the paving. Suitable air inlet openings 9 are arranged in selected walls of the hood for entry of secondary air for supporting combustion of the fuel as later described.

A burner 10 has a shell or housing 11 defining an enlarged air chamber 12 at the rearward portion and a forward extension 13 defining a converging passage 14 circular in cross-section. The shell or housing 11 has a laterally extending tubular portion 15 interiorly threaded as at 16 to receive the end of a fitting 17 on a suitable hose or duct 18 leading to a blower or other suitable supply of air under pressure, whereby said air is delivered to the chamber 12 and forced through the converging passage 14. The extension 13, at the end remote from the chamber 12, terminates in a flange 19.

A distributing cap 20 is arranged at the forward end of the extension 13 and has a flange 21 suitably secured as by bolts 22 to the flange 19. The engaging faces of the flanges 19 and 21 are suitably machined or arranged with gaskets or other treatment to provide an air-tight joint. The distributing cap 20 has a neck 23 extending forwardly from the flange 21 and defining a circular passage 24 coaxially of and slightly larger than the small end of the passage 14, as illustrated in Fig. 2.

The hood 1 preferably defines and overlies a substantially square area and the distributing cap, at the lower end of the neck 23, has an enlarged portion 25 of substantially square configuration with the forward end closed by a concave wall 26, preferably of such radius that a tangent to the outer portions of the curve of the wall 26, is substantially parallel with the adjacent hood walls 3, 4 and 5. The forward end of the neck 23 is belled outwardly and connects with walls 27, substantially perpendicular to the tangents whereby the neck 23 and walls 26 and 27 all cooperate to define a mixing chamber 28.

The generally square configuration of the forward end of the distributing cap preferably has the corners beveled as at 29 and a plurality of orifices 30 are arranged in the side walls 27, and orifices 31 arranged at the corners, each of said orifices being perpendicular to the respective wall 27. A plurality of orifices 32 are preferably arranged in the wall 26 with the center orifice being directed axially of the neck 23 and the other orifices spaced from the center progressively at a greater angle to said axis as they are spaced further from said axis. Also, the orifices are graduated in size, the largest orifice being at the corners and the smallest orifices at the center. The sizes of the orifices are proportioned to the distance to the surface to be heated. Ribs 33 extend from the bell-shaped portion of the neck 23 to the concave wall 26, between each of the orifices in the wall 27 to aid in dividing the flow to the orifices and also to provide a substantially uniform distribution of heat in the mixing chamber.

A liquid fuel pipe 34 is arranged axially in the passage 14, said pipe having a bore 35 in communication with the passage 36 of a fuel supply duct 37 connected with a suitable source of liquid fuel under pressure. In the particular structure illustrated, the casing 11 at the rearward end has a threaded bore 38 extending from the exterior of the casing into the chamber 12. A fitting 39, has one end screwed in to the threaded bore 38 and the other end connected to the duct 37. The pipe 34 has an end screwed into the threaded bore 38 to support the pipe 34 in the casing, and also provide a liquid-type connection with the fitting 39.

The pipe 34 is preferably removably connected by a coupling 40 to a fuel discharge or nozzle assembly 41, the removable connection being for ease of replacement and cleaning of the nozzle assembly. The nozzle assembly 41 includes a cylindrical tubular member 42 having an open end connected to the coupling 40 and the other end closed by a wall 43. The pipe 34, coupling 40 and member 42 are arranged in the casing 11 whereby the outer

face 44 of the wall 43 is substantially co-planar with the forward face of the flange 19. A disk member 45 is suitably secured as by a screw 46 to the cylindrical member 42, said disk having a boss 47 axially thereof and adapted to engage the end face 44 of the wall 43 with the boss being of such height whereby the face 48 of the disk is spaced from the face 44 sufficiently to provide a circumferential slot 49 extending entirely around the nozzle assembly 41. A plurality of orifices 50 are arranged in the wall 43 to provide communication from the interior of the cylindrical nozzle member 42 to the circumferential slot 49 adjacent the boss 47, whereby liquid fuel under pressure moves through the pipe bore 35 and orifices 50 and is forced through the slot 49 in an atomized spray in sheet form that is substantially perpendicular to the axis of the passage 14.

The slot 49 may be varied in width to accommodate liquid fuels of different weights and quality by utilizing disks having different height bosses or by providing shims between the boss and the end wall 43. The sheet spray of liquid fuel is directed outwardly from the nozzle assembly in a plane substantially perpendicular to the flow of the air through the passage 14 whereby said air passing through the spray of liquid fuel, forms a finely divided mixture which is carried into the mixing chamber of the distributing cap and then through the discharge orifices thereof. The flange 21 has extensions 51 that are preferably suitably secured to the wall 2 of the hood 1 whereby the distributing cap portion of the burner is interiorly of the hood.

In operating a burner or burner and hood assembly constructed and assembled as described, the machine carrying the burner and hood is moved to the location where asphalt paving is to be smoothed or planed, then liquid fuel, such as oil under pressure, is forced through the duct 37 and the air under pressure is forced through the duct 18, said air entering the chamber 12 and moving at substantial velocity through the passage 14 as the oil is forced through the pipe bore 35 and nozzle assembly to form a finely atomized spray or mist directed substantially in a plane perpendicular to the flow of the air through the converging passage 14.

It is to be noted that the plane of the fuel spray is at the end of the converging passage where said passage merges with the enlarged passage through the neck 23, or in other words, substantially at point of greatest velocity of the air flow. The air breaks up and finely divides the particles of liquid fuel to effect a very thorough mixture of the air and fuel particles, which moves through the neck and chamber of the distributing cap and is directed in a plurality of jets through the orifices 30, 31 and 32 under the hood 1. The orifices are arranged whereby some of the jets are directed outwardly and downwardly substantially parallel to the walls 3, 4 and 5 of the hood and other jets are directed toward the paving inside of the angle formed by said parallel jets.

The fuel and air mixture is ignited under the hood and secondary air enters through the openings 9 to support substantially complete combustion of the fuel. The hood is then lowered whereby the edges of the runners or skids 6 rest on the paving surface. Then as the machine is moved over the surface, the heat of combustion of the fuel and air mixture heats the asphalt surface to soften same. The flames are directed in such a manner that substantially uniformed heating of all of the surface under the hood is obtained and the products of combustion move outwardly from under the edges of the front and rear walls and also through the opening 7 in the skid. Also the arrangement of the jets of fuel and air mixture and the velocity as they move by the openings under the hood form a draft that draws air inwardly through the openings 9 which are spaced substantially from the burner whereby the secondary air supports the complete combustion of the fuel and air mixture adjacent the surface being heated. Not only is the surface under the hood substantially uniformly heated but also temperatures of from 2,000° to 2,400° F. may be obtained to quickly heat and soften the asphalt in the confined area under the hood without oxidizing the surface thereof.

It is believed obvious I have provided an improved burner and hood structure for efficient burning of liquid fuel and distributing said fuel during the combustion of same in such manner as to obtain substantially uniform heating of the surface confined by the hood to relatively high temperatures in uniform softening of asphalt under the hood without channeling, damaging or burning of the asphalt.

What I claim and desire to secure by Letters Patent is:

The combination of a liquid fuel burner and hood therefor for heating asphalt paving and the like comprising, a hood having a substantially horizontal rectangular central wall terminating at each of its edges in downwardly and outwardly sloping walls, means at the lower ends of certain of the sloping walls adapted to rest on paving to be heated and support said hood whereby the lower ends of the other sloping walls are spaced from said paving, said supporting means having a plurality of openings extending therethrough, said central hood wall having an opening therein, and a burner including a housing having an enlarged air chamber therein and an elongated converging passage smaller in cross-section than the chamber and extending downwardly therefrom, said converging passage terminating in an enlarged portion arranged inside of the hood in vertically spaced relation to the support means thereon, a plurality of jet apertures in the enlarged portion for directing streams substantially parallel with the downwardly and outwardly sloping walls of the hood and at intermediate angles thereto, said jet apertures being proportioned in size relative to the distance from the respective aperture to the surface to be heated by the burning of the fuel and air issuing therefrom whereby the apertures directed toward the more distant surface areas are of greater size than the apertures directed toward the nearer surface areas, means connected with the air chamber for supplying air under pressure thereto for flow through the elongated passage, enlarged portion and jet orifices, means including a tubular member smaller in cross-section than the small end of said converging passage and defining a liquid fuel passage arranged in and axially of said elongated passage, means connected with the liquid fuel passage for supplying liquid fuel under pressure thereto, and a nozzle member at the end of the liquid fuel passage and having a narrow circumferential slot extending therearound substantially in a plane at the terminus of the elongated converging passage whereby liquid fuel is discharged in a substantially flat spray in said plane across the air flowing through the elongated passage in the area of greatest velocity of said air for mixture therewith and discharge through the jet orifices, said hood walls having secondary air openings arranged substantially intermediate the central wall portion and lower ends of the said sloping walls whereby air entering said secondary air openings supports combustion of the air and fuel mixture to substantially uniformly heat the surface under the hood.

References Cited in the file of this patent

UNITED STATES PATENTS

158,316	Robinson	Dec. 29, 1874
1,166,305	Allen	Dec. 28, 1915
1,172,755	Wilson	Feb. 22, 1916
1,184,873	Raymond	May 30, 1916
1,516,141	Bledsoe	Nov. 18, 1924
1,745,329	Hammer	Jan. 28, 1930
2,222,465	Nystrom	Nov. 19, 1940
2,532,851	Meyer	Dec. 5, 1950
2,681,255	Downey	June 15, 1954