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Brödlin

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[54] **BURNER FOR LIQUID FUELS**

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[52] **U.S. Cl.** **431/347,** 431/350, 239/504

[51] **Int. Cl.** **F23d 13/12**

[58] **Field of Search** 431/347, 348, 350, 265; 239/504, 524

[56] **References Cited**

UNITED STATES PATENTS

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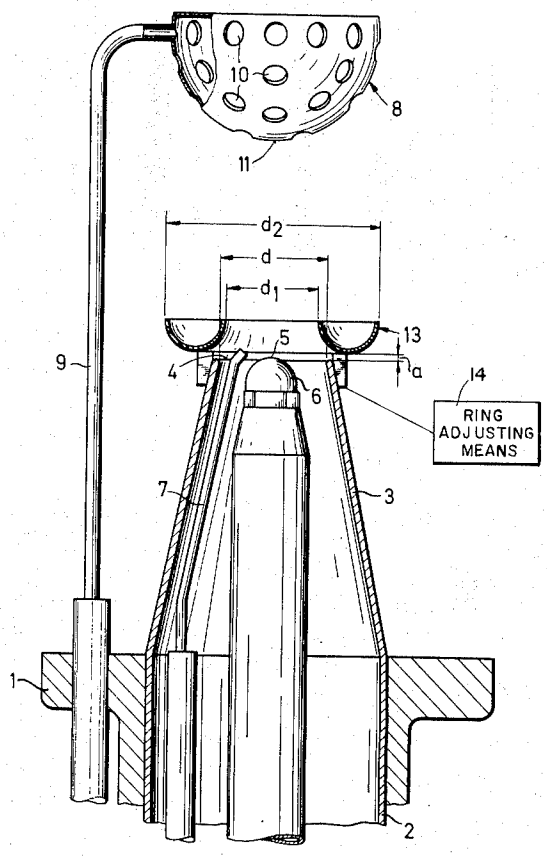
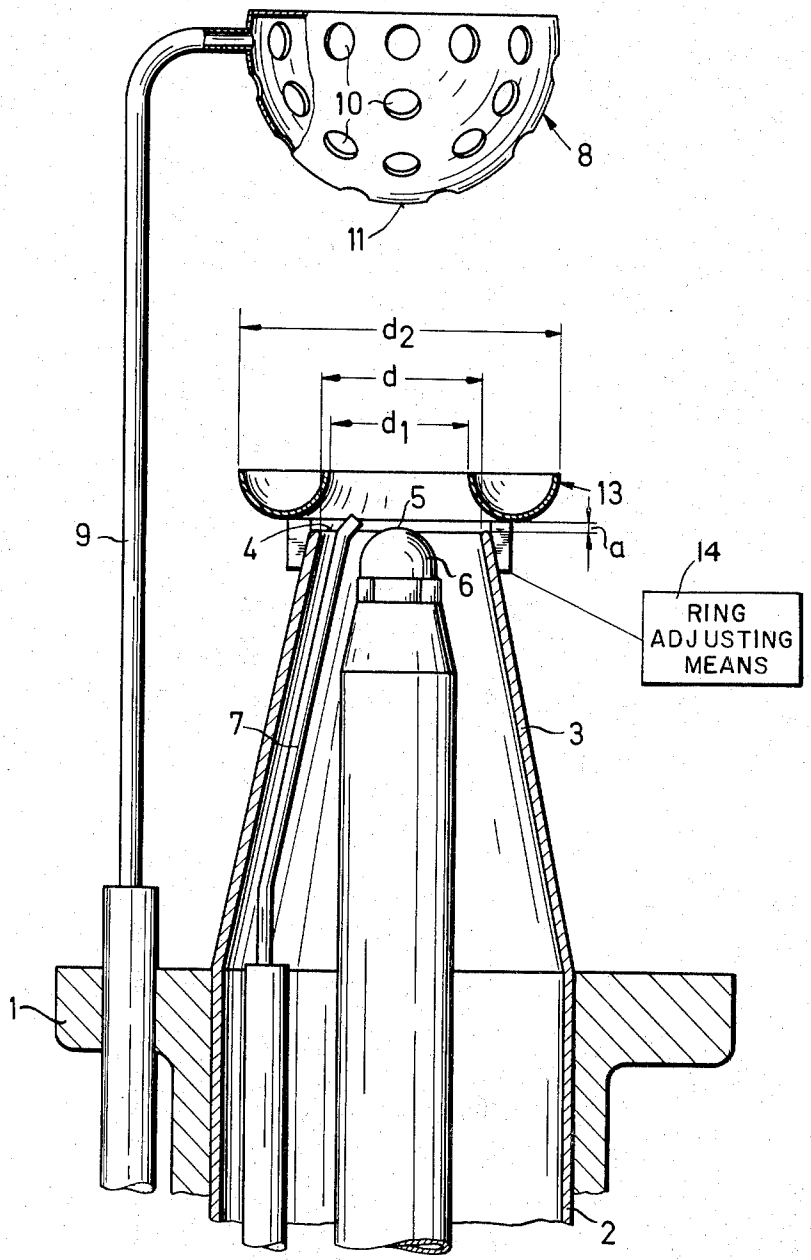
[57] **ABSTRACT**

Disclosed is a liquid fuel burner of the type having a pressure atomizer nozzle arranged concentrically within an air supply tube, the latter being provided on its end with an inwardly tapering truncated terminal cone, and a fuel-air mixture distributing member axially adjustably arranged at an interval in front of the burner nozzle, this member having a convex outer surface provided with openings opposite the nozzle. In order to improve the starting capability of such a burner and to enable its operation at self-cleaning temperatures, a ring member is arranged a small distance in front of the nozzle, between it and the mixture distributing member, this ring member having an inside diameter smaller than and an outside diameter larger than the diameter of the terminal cone orifice.

5 Claims, 1 Drawing Figure




10
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BURNER FOR LIQUID FUELS

BACKGROUND OF THE INVENTION

In German Auslegeschrift No. 1,951,752 a burner for liquid fuels is described having a pressure atomizer nozzle arranged concentrically in an air supply tube. The burner is operated with an approximately stoichiometric quantity of air and has on the end of the air supply tube a conically inwardly tapering terminal cone. At a distance from the burner nozzle is located an axially adjustably mounted mixture distributing member having a convex outer surface which is opposite the nozzle and is provided with openings. In order to vaporize the liquid fuels before combustion, it is therein proposed to provide that the outlet cross-section of the terminal cone of the air supply tube lies in the plane of the pressure atomizer nozzle, that this cross-section is smaller than the diameter of the peripheral contour of the mixture distributing member and/or the cross-section of the surface of this member determined through the peripheral contour, and that this cross-section is dimensioned so that the outflowing air forms a mixture with the fuel at a stream velocity which lies above the flame propagation velocity, and that the openings in the mixture distributing member are shaped like boreholes. According to an additional feature of that invention, it is recommended to coordinate at least two mixture distributing members one behind the other, and if the second such member is used as an ionization probe, to insulate it from the holder of the first distributing member.

It is the primary object of the present invention to further develop the burner according to the above specified Auslegeschrift so that it can not only be started without any difficulty, but also so that the temperature in the mixture distributing member can be substantially raised, namely, so far that the self-cleaning temperature is exceeded. Therefore, any depositing of soot is avoided.

SUMMARY OF THE INVENTION

In accomplishing this and other objects, it is proposed according to the present invention to arrange a ring member a small distance in front of the orifice of the terminal cone inbetween this cone and the mixture distributing member. The inside diameter of the ring is to be smaller than and its outside diameter larger than the diameter of the terminal core in the region of its orifice. Dynamic tests carried out show that, as a result of this, the air jet emerging from the air nozzle experiences a concentration and thereby a small low pressure zone is produced. This low pressure zone effects an intensification of the mixing of the oil and air of combustion and in this manner permits the formation during the ignition process of an incipient flame already in front of the mixture distributing member. After a few seconds have passed, that is, when the distributing member is warmed up sufficiently, and after switching the ignition device off, the flame is firmly set on the distributing member and visibly burns only from this location.

It is suitable to form the ring member as an open hollow body, the open side of which faces away from the terminal cone. By means of this proper flow-producing design of the ring member, hot air of combustion is drawn into the gap between the ring and the terminal cone of the air supply tube, and this hot air aids in preparation of the mixture, especially during the ignition stage. In addition, the result is avoided that, despite the constriction of the stream with subsequent expansion, oil particles of the air-oil mixture are thrown outwardly. A particularly simple design of the ring member results when the ring member which is shaped as a hollow body has a semi-circular cross-section.

Investigation of burners having differently dimensioned terminal cones of the air supply tube showed that the inside diameter of the ring member should be approximately 4 to 6mm smaller than the orifice diameter of the terminal cone and its outside diameter should be approximately 25 to 35 mm larger than its inside diameter.

DETAILED DESCRIPTION OF THE INVENTION

The present invention will be hereinafter illustrated in more detail with the help of a specific embodiment schematically represented in the drawing.

Inside a burner flange **1** is positioned an air supply tube **2** whose conically inwardly tapering truncated terminal cone **3** is formed as an air regulating nozzle. The orifice **4** of this air nozzle lies in the plane of the orifice **5** of the burner nozzle **6** which is arranged coaxially with the air supply tube and respectively also with the terminal cone. The two ignition electrodes provided are designated with reference numeral **7**. Coordinated with the burner is a mixture distributing member **8** which is adjustably positioned by means of a holder or the like **9** in a known manner. The mixture distributing member **8** has bore holes **10**; it is constructed as a hollow sphere.

By means of the terminal cone **3** of the air supply tube **2** which is formed as an air regulating nozzle, air coming from a blower (not shown) is formed into a round, tight air jet which accelerates the injected hydrocarbon in the direction of the mixture distributing member in such a way that a complete mixture of the fuel portion with air of combustion portion results at a stream velocity which lies above the flame propagation velocity and such that the so prepared fuel mixture vaporizes after ignition and burns behind the mixture distributing member with a blue flame, whereby after switching off the ignition, the fuel mixture does not flow as an ignited mixture through the interval between the orifice of the terminal cone of the air supply tube and the distributing member. The cross-section of the terminal cone **3** is smaller than the surface of the mixture distributing member **8** determined through the peripheral contour so that the concentrated air jet impinges upon the outer surface of the mixture distributing member, to the extent that it does not flow through the openings in this member. Hence, it becomes evident, as pointed out above, that the terminal cone of the air supply tube is formed as an air regulating nozzle.

According to the present invention, there is now arranged a ring member **13** a small distance in front of the orifice **4** of the terminal cone **3** between this cone and the mixture distributing member **8**. The ring member **13** may be axially adjusted by a suitable means at **14**. The inside diameter d_1 of this ring member is smaller than and its outside diameter d_2 is larger than the diameter d of the terminal cone **3** in the region of its orifice **4**. The distance a between the orifice of the terminal cone **3** and the ring member **13** suitably amounts to between 1 and 3 mm; the inside diameter

d_1 is approximately 4 to 6 mm smaller than the diameter d of the orifice of the terminal cone **3** and the outside diameter d_2 is approximately 25 to 35 mm larger than the inside diameter d_1. This ring member **13** is designed as an open hollow body with a semi-circular cross-section, the open side of which is turned away from the terminal cone.

Although in the case of the specific embodiment a mixture distributing member **8** of the type shown in the aforementioned Auslegeschrift is presented, this bore-containing member can also be provided on its side facing the burner nozzle **6** with a convex recess in the region designated by reference numeral **11** directed towards the inside of the mixture distributing member **8**, which recess in addition to the provided boreholes **10** has a middle opening whose diameter is smaller than the diameter of the other boreholes **10** of the distributing member.

What is claimed is:

1. A burner for liquid fuels comprising (1) a pressure atomizer nozzle arranged concentrically within an air supply tube, said air supply tube being provided with an inwardly tapering truncated terminal cone, and (2) a mixture distributing means axially adjustably arranged at an interval in front of the said burner nozzle, said distributing means having a convex outer surface provided with openings opposite said nozzle, the outlet cross-section of the said terminal cone (a) lying in the plane of the atomizer nozzle, (b) being smaller than the diameter of the peripheral contour of the mixture distributing means and/or the cross-section of the surface of said means determined through its peripheral contour and (c) being dimensioned so that the outflowing air forms a mixture with the fuel at a stream velocity which lies above the flame propagation velocity, wherein the improvement comprises a ring member arranged a small distance in front of the orifice of the said terminal cone between the cone and the mixture distributing means, the inside diameter of said ring member being smaller than and its outside diameter being larger than the diameter of the terminal cone in the region of its orifice.

2. A burner according to claim **1**, wherein the ring member is formed as an open hollow body, the open side of which faces away from the terminal cone.

3. A burner according to claim **2**, wherein the hollow body has a semi-circular cross-section.

4. A burner according to claim **1**, wherein the inside diameter of the ring member is approximately 4 to 6 mm smaller than the orifice diameter of the terminal cone and its outside diameter is approximately 25 to 35 mm larger than its inside diameter.

5. A burner according to claim **1**, wherein means are provided for axially adjusting the ring member with respect to the terminal cone.

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