

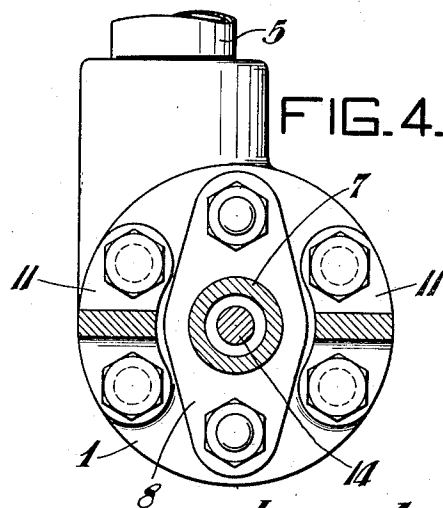
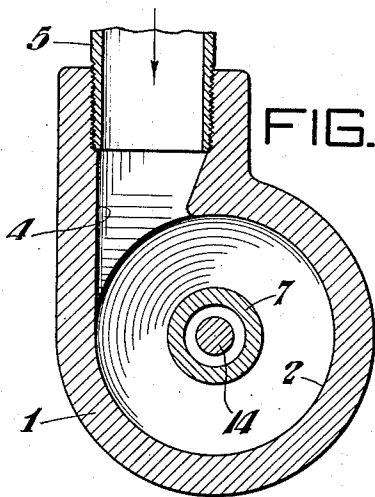
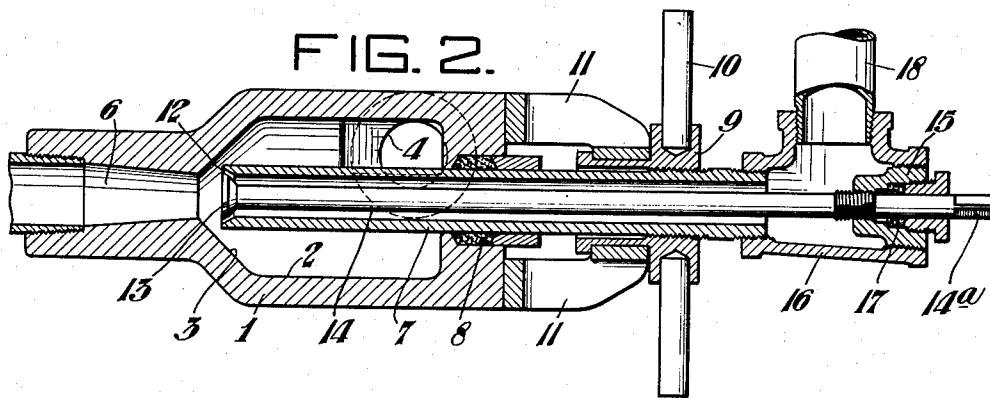
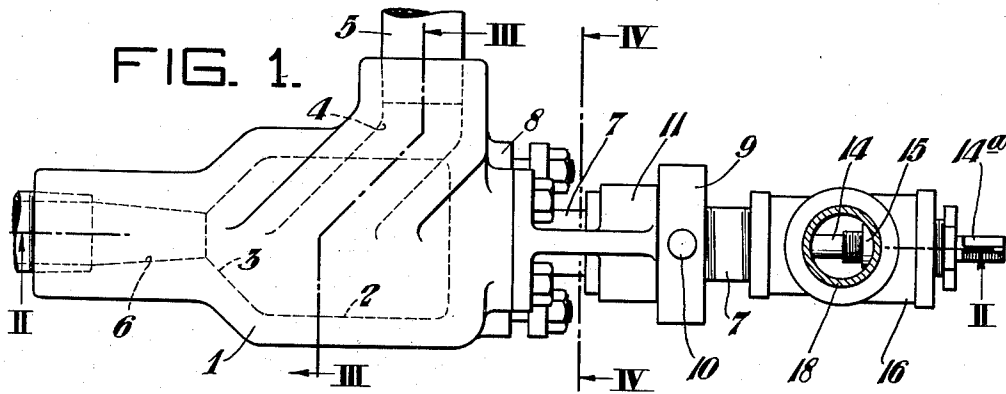
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ATOMIZER

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UNITED STATES PATENT OFFICE

2,351,697

ATOMIZER

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2 Claims. (Cl. 299-118)

This invention relates to atomizers and is particularly concerned with the problem of thoroughly atomizing liquid fuels such as heavy oil or tar, whereby to condition such fuels for burning in industrial furnaces.

A specific example of the invention is illustrated by the accompanying drawing, in which:

Figure 1 is a top view;

Figure 2 is a section from the line II—II in Figure 1; and

Figures 3 and 4 are cross sections from the lines III—III and IV—IV, respectively, in Figure 1.

More specifically, the atomizer illustrated by these drawings comprises a body 1 providing a chamber having an inside 2 of cylindrical contour terminating with a Venturi throat 3, the chamber having an entrance 4 at the end of the inside 2 opposite the throat 3 and which points tangentially respecting the cylindrical inside. This entrance 4 connects with a pipe 5 carrying an atomizing fluid under pressure, this fluid ejecting at the entrance 4 and swirling forwardly along the inside 2, its velocity being greatly increased at the throat 3 while its pressure is decreased. The fluid leaves the chamber by way of an outlet 6, it going to a suitable burner.

A liquid fuel supply tube 7 extends longitudinally of the above described chamber concentrically respecting its cylindrical inside 2, the tube being cylindrical throughout its length inside the chamber and passing through the end of the chamber by way of a stuffing box 8 which permits the tube to slide longitudinally without leakage of the atomizing fluid, the tube being in threaded engagement with a nut 9 turned by a handwheel 10 and rotatively fixed against longitudinal movement by a bracket 11 fixed to the body 1. With this arrangement, the inside end of the tube 7 can be adjustably positioned respecting the throat 3, this being done by turning the handwheel 10.

The end of the tube 7 has a flaring opening 12, and a flaring head 13 cooperates with this opening to form a flaring annular orifice. This annular orifice is adjustable by reason of the flaring head 13 being positioned through the medium of a rod 14 passing longitudinally through the tube 7, the rod 14 being itself positioned by being in screw-threaded engagement with a nut 15 mounted by a pipe fitting T 16 screwed onto the end of the tube 7. The nut 15 is screwed into the fitting sufficiently tightly to be nonrotative, the rod 14 having a squared end 14^a to which a wrench may be applied and a stuffing box 17 serving to seal the rod against leakage. The fuel is introduced by way of a pipe 18 screwed into the fitting

16, the fuel traveling along through the tube 7 and ejecting as a flaring annular film through the orifice between the hole 12 and the head 13, this film ejecting concentrically into the swirling atomizing fluid at the throat 3 where the atomizing fluid is at high velocity and low pressure.

The method of using the atomizer consists in heating the liquid fuel introduced to the atomizer through the pipe 18, to a temperature that is sufficiently high to cause the fuel to vaporize at atmospheric pressure. The fuel is maintained liquid by applying a suitable pressure to it, and it therefore ejects as a flaring annular liquid film into the throat 3. Here the atomizing fluid, which may be steam or air, is moving at its highest velocity but is at a relatively low pressure, the result being that the annular liquid film is mechanically atomized with great violence by the rapidly whirling atomizing fluid and, at the same time, vaporized due to the pressure reduction of the atomizing fluid caused by the increase in its velocity resulting from its constriction by the Venturi throat 3. The result is a very complete atomization of the liquid fuel, this greatly increasing its heating efficiency when it is burnt by a burner of proper design.

Different types of fuels may be accommodated by working the handwheel 10 to adjust the point where the flaring annular film of liquid fuel is ejected respecting the throat 3, to the end of producing the best results. The proper position is best determined experimentally, observation of the flame produced being the best guide. Furthermore, the thickness of the flaring annular film of fuel may be varied by turning the rod 14, this being another adjustment that can be most exactly made by observation of the results produced. Since the liquid fuels sometimes tend to clog orifices, it may happen that the annular orifice provided by the hole 12 and head 13 becomes clogged, but this is easily remedied by turning the rod 14 so as to move the head 13 forward, this opening the orifice so as to permit it to clear.

I claim:

1. An atomizer for liquid fuel, including a chamber having a cylindrical inside contour terminating with a Venturi throat and provided with a tangential inlet spaced from said throat with means for supplying said inlet with atomizing fluid under pressure, and a cylindrical liquid fuel supply tube extending longitudinally of said chamber concentrically therewith with a flaring annular orifice adjacent said throat and pointing theretowards, said orifice being positioned to eject a flaring annular film of liquid fuel into said throat at a position where the velocity of the

whirling atomizing fluid passing therethrough is relatively high.

2. A method of atomizing liquid fuel, comprising creating a whirling flow of atomizing fluid under pressure, constricting said flow to produce a high-velocity, low-pressure zone of whirling fluid, heating the liquid fuel to above its atmospheric

pressure vaporizing temperature while maintaining pressure on said fuel sufficient to keep it liquid and ejecting said heated fuel under pressure in the form of an annular film in said high-velocity, low-pressure zone concentrically respecting the whirling fluid in said zone.

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