July 22, 1941. J. McDONALD 2,250,079

MULTIPLE ATOMIZING SPRAYER PLATE

Filed July 20, 1939

Fig. 1

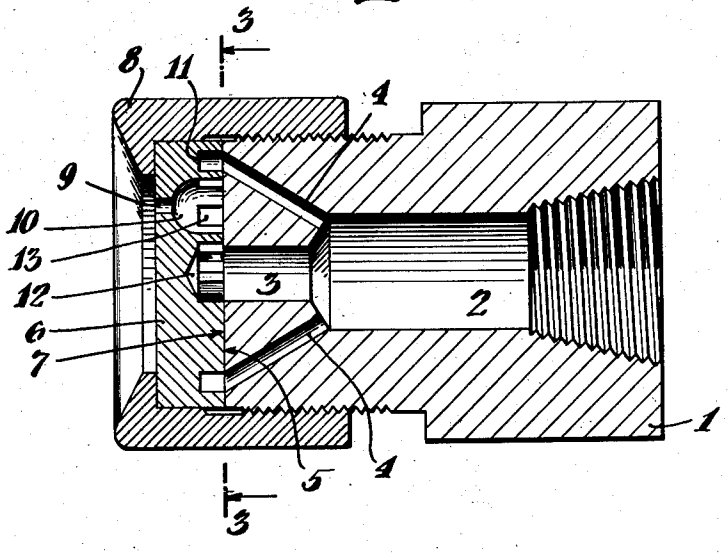


Fig. 2

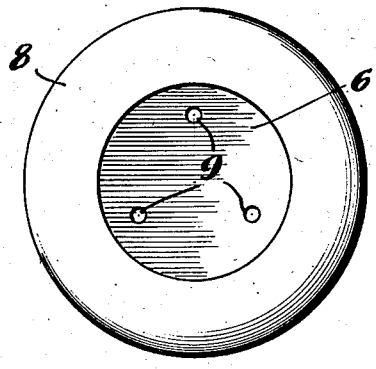


Fig. 3

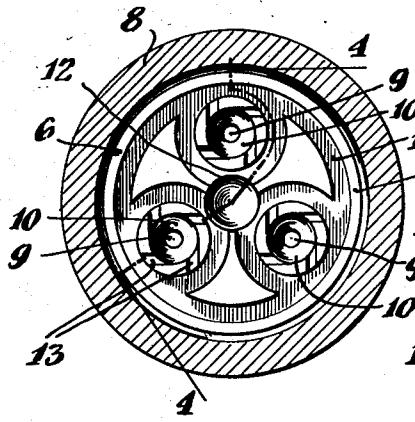
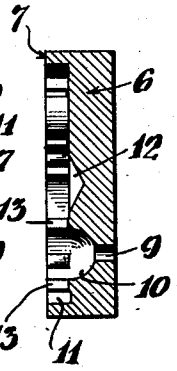


Fig. 4



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MULTIPLE ATOMIZING SPRAYER PLATE

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Application July 20, 1939, Serial No. 285,480

4 Claims. (Cl. 299—120)

This invention relates to the atomizing of liquid fuel for use in furnaces and my present improvement consists in the employment of a burner having a single sprayer plate which is provided with a plurality of atomizing orifices that are supplied with liquid fuel from a supply source by way of individual whirling chambers and tangential slots leading thereinto.

The multiple arrangement of atomizing orifices gives a much shorter flame travel for a given quantity of liquid fuel than does one orifice, also enables much finer atomization to be obtained for that quantity of liquid fuel. This in turn makes it possible to get better intermixture of the liquid fuel and air, and quicker combustion. This is especially noticeable in burning the larger quantities of liquid fuel, say from 2000 pounds per hour up.

The sprayer plate is flat on its inside face and it is thus easy to make a liquid tight joint on the burner end, eliminating possible drooling from the burner.

Other features and advantages of my invention will hereinafter appear.

In the drawing:

Figure 1 is a side sectional view of the forward portion of a liquid fuel burner incorporating my improvement.

Fig. 2 is a front end view thereof.

Fig. 3 is a section on the line 3—3 of Fig. 1, and

Fig. 4 is a section on the line 4—4 of Fig. 3.

In said views let 1 indicate the forward portion of a burner body which has a central passageway 2 for the flow of liquid fuel that is supplied thereto from a pressure source (not shown), said passageway communicating with a continuing, axial orifice 3 and with circumferential, radially divergent orifices 4, said orifices terminating in the flat end surface 5 of said burner body.

The sprayer plate that coacts with the burner end is indicated at 6 and has a flat inner surface 7 whereby it fits snugly against the flat surface 5 of the burner end, said plate 6 being secured to said burner end as by a cap nut 8.

This sprayer plate 6 constitutes the essential feature of the invention, it being pierced with a plurality of atomizing orifices, of which three orifices, indicated at 9, appear in the illustrated example.

Each atomizing orifice 9 is in axial communication with a whirling chamber 10 formed in the inner surface of the sprayer plate, and fuel is supplied into said whirling chambers from an annular groove 11 and from a central depression 12, both also provided at the inner surface of the sprayer plate. The annular groove 11 is in direct communication with the radially divergent orifices 4 when the sprayer plate is fitted against the end of the burner body, and also the central depression 12 is in direct, axial communication with the orifice 3 of said burner body.

Tangential slots 13 lead respectively from the annular groove 11 and the central depression 12, into the plural whirling chambers, whence the liquid fuel, in whirling state, is caused to issue through orifices 9 in finely atomized sprays.

Since the whirling chambers, tangential slots, exit orifices, annular groove and central depression are all in one sprayer plate, thereby misalignment with the radially divergent and axial orifices of the burner body is avoided when assembling, and the correct ratios are insured and maintained between the tangential slots and the whirling chambers.

It should be noted that by reason of the inside and outside connection to the sprayer plate respectively the axial orifice 3 and the radially divergent orifices 4 thereby an ample supply of liquid fuel is insured to the annular groove which surrounds the tangential slots, leading to the whirling chambers, and this in turn enables an even spray formation to issue from the atomizing orifices.

In present day practice, where a single atomizing orifice is employed for a relatively large quantity of liquid fuel, the liquid fuel issuing from the burner end remains in a solid mass for quite some appreciable distance from the burner end before breaking up into a finely divided state. Under some conditions the intermixture of air and liquid fuel is thus delayed and adversely affects combustion. But, with multiple orifices, according to my invention, due to the smaller quantity of liquid fuel issuing from each orifice, the distance at which the liquid fuel remains solid is shortened considerably.

Furthermore, by reason of the proximity of the plural atomizing orifices provided in a single sprayer plate, the sprays from the several orifices are enabled to blend and enhance the atomizing effect, resulting in the production of a relatively short and bushy flame.

Variations within the spirit and scope of my invention are equally comprehended by the foregoing disclosure.

I claim:

1. A sprayer plate for liquid fuel having a plurality of atomizing orifices, said plate having incorporated therein an individual whirling cham-

ber for each orifice, a central depression, an annular groove, and tangential slots communicating with said chambers respectively from said central depression and annular groove.

2. The combination in a liquid fuel burner of a burner body provided with a central passageway, a sprayer plate and means uniting said plate and body, said central passageway continuing in a reduced axial orifice and a number of radially divergent orifices, and said sprayer plate provided with a plurality of atomizing orifices and having incorporated therein an individual whirling chamber for each atomizing orifice and means whereby liquid fuel flowing from said axial and radially divergent orifices is directed tangentially into said whirling chambers.

3. The combination in a liquid fuel burner of a burner body, a sprayer plate and means uniting said plate and body, said body having an axial orifice and radially divergent orifices, and said sprayer plate being provided with a plurality of atomizing orifices and having incorporated therein an individual whirling chamber for each atomizing orifice, an annular groove and a central depression opposed respectively to said radially divergent orifices and said axial orifice, and tangential slots communicating from said groove and depression to said chambers.

4. The combination in a liquid fuel burner of a burner body and a sprayer plate having a face fixed against one end of said body, said face including an outer annular flange and a plurality of eccentrically disposed annular ribs defining portions of individual whirling chambers formed in said plate in communication with atomizing orifices formed in a face of the plate opposite the first mentioned face, each of said ribs being provided with a plurality of tangential slots, there being passages in said body, one terminating centrally of said flange and others terminating just within said flange whereby to deliver liquid fuel peripherally of said ribs and through said slots into said whirling chambers.

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