July 10, 1923. 1,461,545

W. R. PURNELL

MECHANICAL PRESSURE ATOMIZING FUEL BURNER

Filed June 4, 1921

Fig. 1.

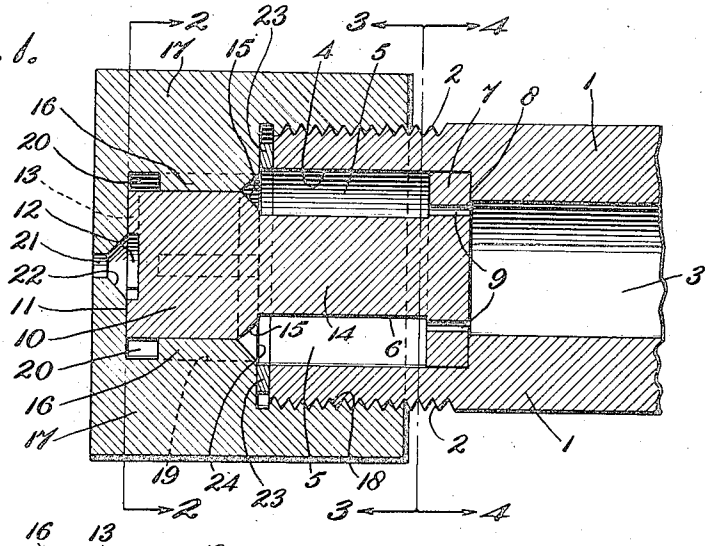


Fig. 2.

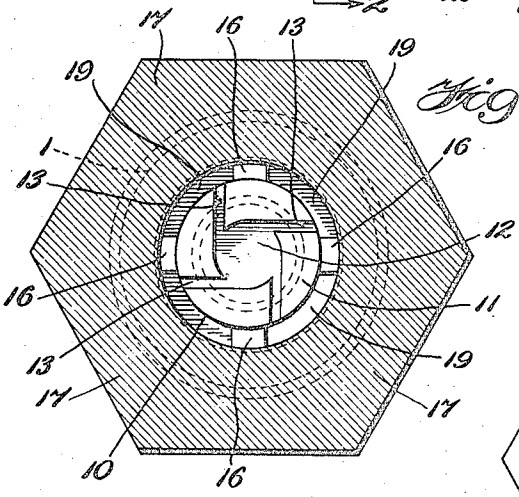


Fig. 3.

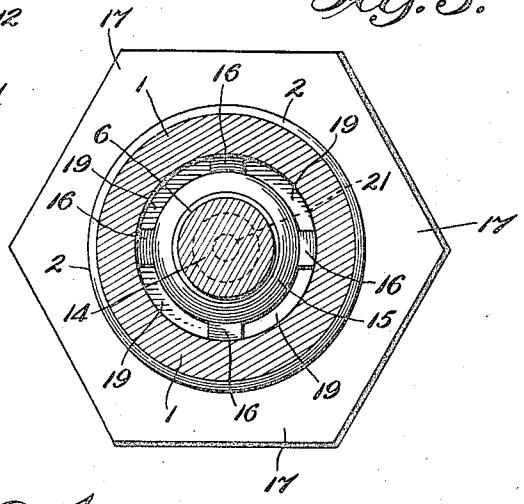
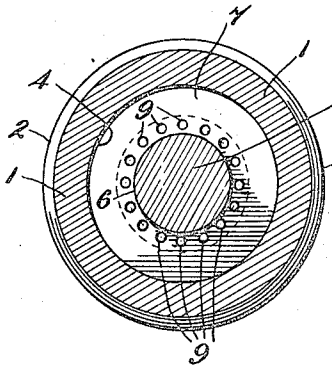


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MECHANICAL PRESSURE ATOMIZING FUEL BURNER.

Application filed June 4, 1921. Serial No. 475,143.

To all whom it may concern:

Be it known that I, WILLIAM R. PURNELL, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Mechanical Pressure Atomizing Fuel Burners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to mechanical pressure atomizing burners and has for its object to produce a device of this character which will be simple in construction, comparatively inexpensive to manufacture, and more efficient in action than those heretofore proposed.

With these and other objects in view, the invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification, in which like numerals designate like parts in all the views:

Figure 1 is a central vertical sectional view through the end of a fluid fuel burner made in accordance with the present invention;

Figure 2 is a cross sectional view taken on the line 2—2 of Figure 1, looking in the direction of the arrows;

Figure 3 is a similar view taken on the line 3—3 of Figure 1, looking in the direction of the arrows; and

Figure 4 is a cross sectional view taken on the line 4—4 of Figure 1, looking in the direction of the arrows.

1 indicates a burner pipe provided with the screw threads 2 and bore 3. The end of the said pipe is counterbored as at 4 to provide an enlarged chamber 5 into which is adapted to fit the plug member 6. The said plug member is provided on one end with a flange 7 adapted to abut against the shoulder 8 provided by the counterbore 4 and said flange is provided with a plurality of relatively small holes 9, extending substantially parallel to the axis of said member. The opposite end 10 of the plug member 6 is also somewhat enlarged as best shown in Figure 1, and its flat face 11 is recessed to provide a circular mixing chamber 12 into which lead a plurality of tangential grooves 13, see Figure 2.

The surface between the enlarged end 10 and the body portion 14 of the plug member 6 is preferably inclined or beveled as indicated at 15 and the said enlarged end is adapted to engage and be held in axial alinement by means of a plurality of lugs 16 carried by the burner tip 17, which latter is provided with the screw threads 18 adapted to engage the threads 2 with which the burner pipe 1 is provided. The said tip 17 is recessed to provide the passages 19 between the said lugs 16 and also to provide a chamber 20 adjacent the end of the enlarged portion 10 of the plug 6, see Figure 1, which chamber communicates through the tangential grooves 13 with the whirling chamber 12, as will be readily apparent. The said burner tip 17 is also provided with an orifice 21 having a beveled portion 22 coacting with the said chamber 12, which orifice discharges into the furnace, not shown.

A washer 23 of copper or other suitable material is preferably interposed between the shoulder 24 with which the burner tip 17 is provided and the end of the burner pipe 1, as will be clear from the drawings, in order to afford a tight joint between the parts.

The operation of the burner will be clear from the foregoing, but may be briefly summarized as follows:

Oil under pressure from any suitable source not shown, is introduced into the bore 3 of the burner pipe 1, passes through the relatively fine passages or holes 9 in the flange 7 of the plug 6, which holes being substantially parallel to the axis of flow while acting as a strainer for the said oil do not materially impede its progress and reduce the pressure. After passing through the said strainer holes 9, the oil enters the annular chamber 5 formed by the body portion 14 of the plug member 6 within the bore 4, and continues through the said chamber in substantially parallel lines until it reaches the inclined surface 15 of the plug member 6. It then continues its flow through the passages 19 between the plug 16 and enters the annular chamber 20 within the burner tip 17 from whence it passes through the tangential grooves 13 into the mixing or whirling chamber 12. Its direction of motion is here changed from a straight line motion to a rotary or whirling

motion in the well known manner, and it passes from the said whirling chamber to the orifice 21 in the burner tip from whence it is discharged into the furnace.

By the construction above described, the fuel oil is strained within the burner upon passing through the strainer holes 9 without its pressure being materially reduced due to the fact that the said holes are substantially parallel to the direction of flow.

Furthermore, a reduction in the pressure is avoided by reason of the relatively large spaces 5, 19 and 20 around the plug, so that substantially the full oil pressure which obtains within the bore 3 of the burner pipe 1 is maintained up to the time the oil enters the tangential grooves 13.

As will be readily apparent, this is due largely to the fact that the oil passes in substantially straight lines there being no bends or curves around which it must pass, which would through frictional resistance tend to decrease the said pressure.

Again, the placing of the whirling chamber in the extreme end of the plug member 6 adjacent the orifice 21 which orifice is provided with the beveled portion 22, which in effect constitutes a portion of the said whirling chamber when the parts are assembled produces a high speed of rotation of the oil, resulting in a finer atomization than is produced by the burners heretofore proposed.

By varying the dimensions of the various passages and chambers, as well as the angles thereof, it is possible to change the degree of atomization as well as the angle of spray which is discharged from the orifice 21 to suit varying operating conditions.

It is obvious that those skilled in the art may vary the details of construction as well as the arrangement of parts without departing from the spirit of the invention, and therefore I do not wish to be limited to the above disclosure except as may be required by the claims.

What I claim is:

1. In a mechanical pressure atomizing fuel burner the combination of a burner pipe provided with a chamber; a tip member provided with a recess having lugs and a passage between said lugs and with an orifice communicating with said recess, secured to said pipe; and a plug member provided with an enlarged end portion having a circular recess constituting a whirling chamber, and a passage tangential to the periphery of said circular recess, communicating with said first mentioned recess, said lugs being adapted to engage said enlarged end portion to position said plug member and said plug member also provided with a plurality of passages disposed parallel to the axis of said pipe and entering said chamber from said pipe, substantially as described.

2. In a mechanical pressure atomizing fuel burner the combination of a burner pipe; a plug member provided with a plurality of straining holes disposed with their axes substantially parallel to the axis of said member; and a tip member provided with passages engaging said plug member and pipe, and adapted to maintain said plug member in position with respect to said pipe, said plug also provided with a circular chamber and tangentially disposed passages leading from said first named passages into said chamber, substantially as described.

3. In a mechanical pressure atomizing fuel burner the combination of a burner pipe having a bore provided with a chamber; a plug member entering said bore and provided with a flange having a plurality of straining holes disposed with their axes substantially parallel to the axis of said bore and connecting with said chamber; a tip member provided with an exit orifice and axially disposed passages secured to said pipe and engaging a portion of said plug member to position and hold the latter in said bore; and said plug member provided with a circular chamber opposite said orifice and tangentially disposed passages between said axially disposed passages and said circular chamber, substantially as described.

4. In a mechanical pressure atomizing fuel burner the combination of a burner pipe having a bore and a counterbore forming a chamber having a shoulder; a plug member provided with a flange adapted to enter said counterbore and engage said shoulder, said flange having a plurality of straining holes entering said chamber and disposed with their axes substantially parallel to the axis of said member; a tip member provided with an exit orifice and with a recess having lugs and straight passages adapted to engage said plug member to position and hold its flange against said shoulder; said plug member having a circular chamber opposite said orifice and tangentially disposed passages leading from said straight passages to said circular chamber, substantially as described.

5. In a mechanical pressure atomizing fuel burner the combination of a burner pipe having a bore and a counterbore forming a chamber and a shoulder; a plug member provided with a flange adapted to enter said counterbore and engage said shoulder, said flange having a plurality of straining holes entering said chamber and disposed with their axes substantially parallel to the axis of said bore, said plug member being also provided with a recess constituting a whirling chamber and with a passage communicating therewith; and a tip member provided with an orifice adapted to co-

act with said chamber, and with a recess having lugs with beveled rear portions and straight passages between said lugs, adapted to engage said plug member to position and hold its flange against said shoulder, substantially as described.

6. In a mechanical pressure atomizing fuel burner the combination of a burner pipe having a bore and a counterbore forming a chamber and a shoulder; a plug member provided with a flange adapted to enter said counterbore and engage said shoulder, said flange having a plurality of straining holes connecting said pipe and chamber and disposed with their axes substantially parallel to the axis of said member, said plug member being also provided with an enlarged end portion having a circular recess constituting a whirling chamber, and with a tangential passage communicating therewith; a tip member provided with an orifice adapted to coact with said whirling chamber, and with a recess having lugs with beveled rear ends, adapted to engage said plug member to position and hold its flange against said shoulder; and a washer member interposed between said tip member and said pipe, substantially as described.

In testimony whereof I affix my signature.

WILLIAM R. PURNELL.