April 14, 1936. R. C. VROOM ET AL 2,037,645

WIDE RANGE MECHANICAL ATOMIZER

Filed Sept. 19, 1933

Fig. 1.

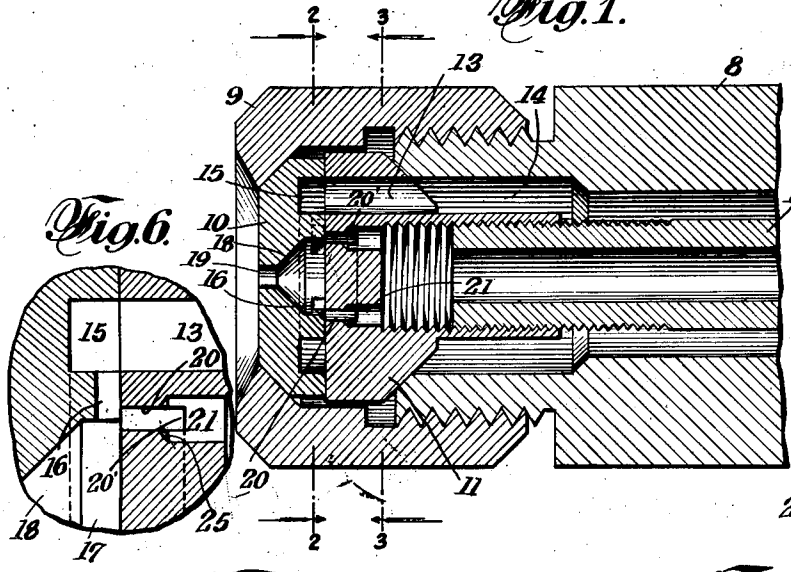


Fig. 6.

Fig. 7.

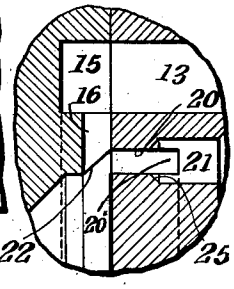


Fig. 2.

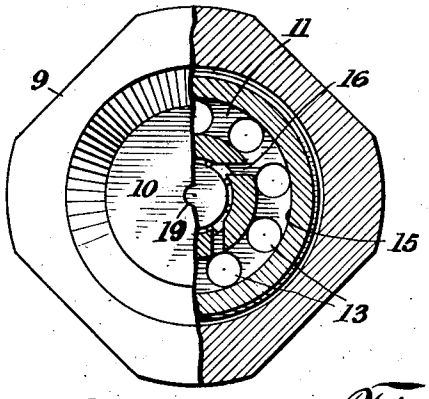


Fig. 3.

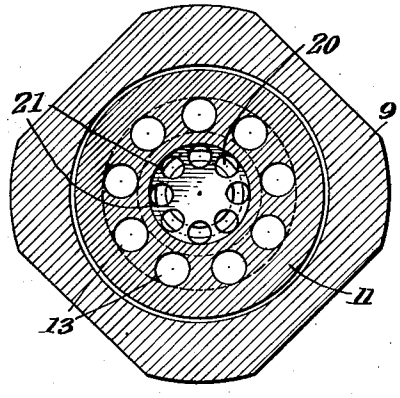


Fig. 4.

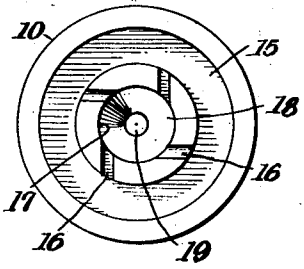
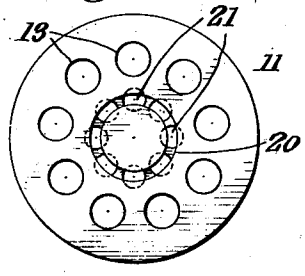


Fig. 5.



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WIDE RANGE MECHANICAL ATOMIZER

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3 Claims. (Cl. 299—120)

This invention relates particularly to burners of the Peabody "wide range" type, in which proper atomization is maintained at the burner tip throughout a wide range of capacity. In burners of this type, the oil is given a rapid rotary motion in a central so-called "whirling chamber" in the burner tip and this rotary motion and hence the atomizing effect at the orifice of the tip due to centrifugal force is kept substantially constant whether the full capacity of oil is to be sprayed or only a portion. This is accomplished by providing an outlet for the oil from the central chamber other than and in addition to the orifice through which the oil is sprayed to the furnace. By releasing such portion of the oil as may not be required for burning, a wide capacity range is secured which is under control of a valve in the return line. As heretofore constructed, the oil thus returned has been released through a series of openings in the back wall of the whirling chamber.

The objects of this invention are to eliminate retarding or turbulent effects in the whirling chamber and to smooth out the action and improve atomization.

Other objects of the invention are set forth or will be apparent in the accompanying specification, claims and drawing. The latter shows by way of illustration certain preferred embodiments of the invention and what is now considered the best mode of applying the underlying principles. Other embodiments of the invention employing the same or equivalent principles may be used and structural changes made as desired by those skilled in the art without departing from the present invention and within the spirit of the appended claims.

Fig. 1 in the drawing is a broken longitudinal sectional view of an atomizer having a form of the invention incorporated therein.

Fig. 2 is an end view of the same partly in section as substantially on the plane of line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional view as on line 3—3 of Fig. 1.

Fig. 4 is an inside view of the burner tip.

Fig. 5 is a face view of the cooperating plug element.

Fig. 6 is an enlarged broken sectional detail of the structure shown in Fig. 1.

Fig. 7 is a similar view of a modified form of the same.

In Fig. 1, the barrel of the atomizer is indicated at 8, having screwed over the end of the same a cap 9, which holds the tip 10, against the plug 11, which is screwed over the end of the oil return tube 12.

The plug member is shown as having supply openings 13, leading from the annular oil flow passage 14, in the barrel to an annular channel 15, in the back of the tip.

Passages or slots 16 substantially tangential to the walls of the central chamber provide for flow of the oil from the annular supply channel 15, into the cylindrical rearward portion 17, of said chamber, which has the forward conical portion 18, leading to the central discharge orifice 19.

At the base or back of the whirling chamber, there is provided, in the present invention, an annular groove 20, for return flow of such oil as is not discharged at the atomizing orifice, this return flow groove being formed in the present disclosure, in the face of the plug member 11, and having drilled into it from the rear an annular series of return passages 21, opening directly to the interior of the plug and thus in communication with the passage in the return pipe 12.

The openings 21 are of greater diameter than the width of the annular return slot and the slot extends well into these openings as particularly shown at 20' in Figs. 6 and 7, providing thereby sufficient capacity to carry off the oil to be returned through the annular slot, 20.

In the form of the invention shown in Figs. 1 to 6, the annular return groove 20 extends only slightly within the cylindrical portion of the whirling chamber. The return groove may, however, be set back as in Fig. 7, so as not to project at all into the whirling chamber. In this modification the entire back wall of the whirling chamber is solid and continuous so that there is no interruption for the body of oil rotating over the face of the same and hence no turbulence imparted thereto by such wall. This uninterrupted back wall may be entirely smooth and flat as shown, or may, if desired, be curved or specially contoured.

When the return slot 20 is set back or outward of the whirling chamber as in Fig. 7, the wall of the chamber may be chamfered or bevelled as indicated at 22, to fully uncover and provide a divergent annular throat leading from the whirling chamber into the annular return groove.

Operation

Oil under pressure is delivered to the annular space between the inner tube 12 and the burner barrel 8 and enters the annular space 14 from which it passes through the ports 13 to the an-

nular channel 15. This channel communicates with the ports 16 which are arranged to deliver the oil tangentially into the central chamber 17 of the tip 10. Thus a rapid rotary motion is set up within the central chamber which creates centrifugal force sufficient to break the body of the liquid up into a fine spray when it is released on passing out through the tip orifice 19. In addition to the orifice 19 supplementary outlets from the central chamber are provided consisting of the annular channel 20 which communicates through cylindrical ports 21 with the return oil connection 12. This pipe connects through certain fittings not shown in the drawing with an oil supply pipe provided with a valve (also not shown). When this valve is closed all the oil entering the central chamber of the tip escapes through orifice 19 and the burner is then operating at full capacity. If however this valve in the return line is partially open some of the oil passes away from the central chamber through the annular channel 20, ports 21 and pipe 12. Thus according as to how much the valve in the return line is open a greater or less amount of oil will be sprayed into the furnace. As the effectiveness of the atomizing action depends upon centrifugal force it is essential that as little opposition to the whirling action of the oil in the central chamber shall be set up as possible and this is secured by the novel construction of the annular outlet channel 20.

The effectiveness of the wide capacity range action of the atomizer is facilitated by having the outlet port from the central chamber removed as far as possible from the axis of rotation of the oil in the central chamber. This is accomplished by the present invention.

The annular return groove may be made quite narrow in width so as to offer minimum interference to the rotating oil body and returning flow of oil and the extension of the larger diameter return openings 21, into the back of the return grooves provides widening passages 25, from the groove into these openings, giving sufficient cross-sectional area to carry off the oil.

What is claimed is:

1. An atomizer having a whirling chamber with a substantially tangential inlet, an atomizing discharge orifice, said whirling chamber having the rear wall back of said atomizing orifice provided with an annular return groove extending outwardly from said whirling chamber and lying partially outside the periphery of said whirling chamber and a return outlet in communication with said annular groove.

2. An atomizer of the character disclosed, comprising in combination a barrel, a return tube therein, a plug on the end of said return tube, said plug being provided with an annular return groove in the outer face of the same and with openings extending from said annular return groove through the back of the plug and open to the return tube and a burner tip engaged over the plug and provided with a whirling chamber in the back of the same in communication with said return groove in the plug, said tip having an atomizing orifice in communication with the whirling chamber and tangential supply passages opening into the whirling chamber and in communication with the interior of the barrel, said annular return groove in the face of said slug lying at least partially outside the periphery of said whirling chamber.

3. An atomizer having a whirling chamber with a rearward substantially cylindrical portion, a forwardly tapering conical portion with a central discharge orifice, supply passages opening tangentially into the cylindrical rearward portion of the chamber, a back wall with an annular return slot therein in rear of said cylindrical portion of the chamber and of greater diameter than said cylindrical rearward portion of the chamber and a divergent annular throat extending radially outward from said cylindrical portion of the chamber to said larger diameter annular return slot.

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