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2,284,264

FUEL BURNER

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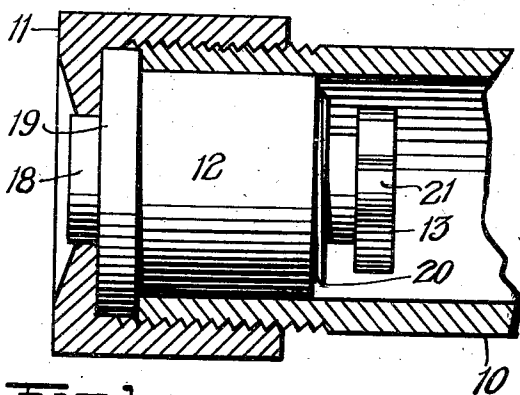


Fig. 1.

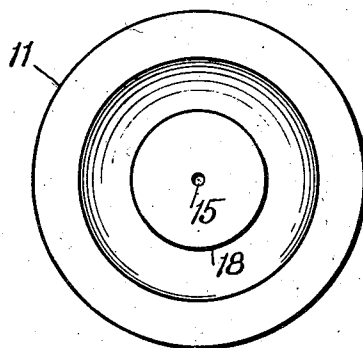


Fig. 2.

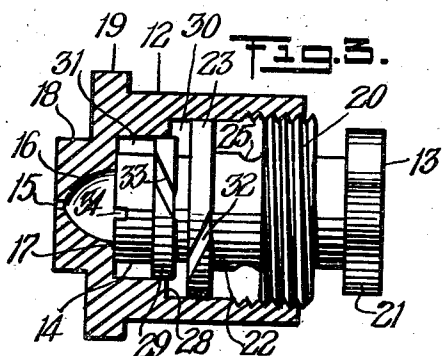


Fig. 3.

Fig. 4.

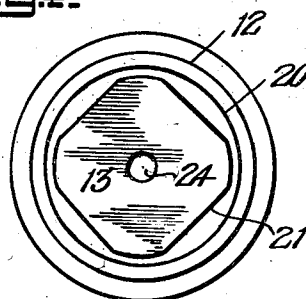
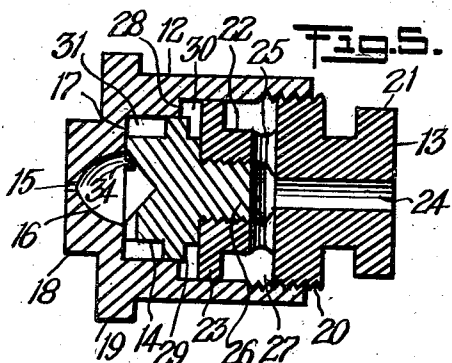


Fig. 5.

Fig. 7.

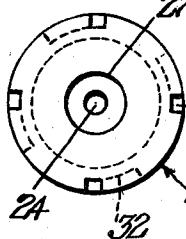


Fig. 6.

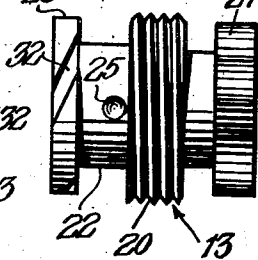
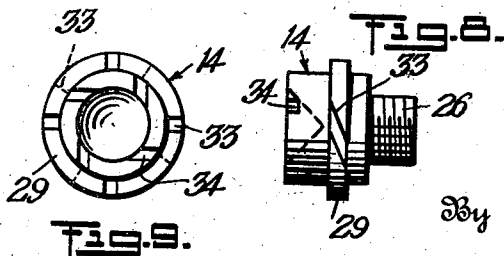


Fig. 8.

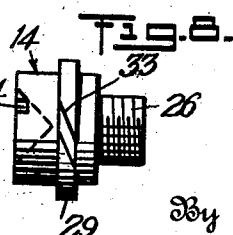


Fig. 9.

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FUEL BURNER

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2 Claims. (Cl. 299-120)

This invention relates to fuel burners, and more particularly to the atomizer thereof.

Primary objects of the invention are the provision of an atomizer for fuel burners having generally improved characteristics, and the accomplishment of better results in use.

More specifically, objects of the invention are the provision of improved means for more thoroughly and effectively atomizing the fuel; to overcome difficulties encountered in fuel burners of the prior art, especially obviating and minimizing those difficulties which have heretofore caused the failure of burners to function efficiently or to require too frequent repair or replacement of atomizers; to give superior performance to the fuel burners embodying the present invention; to thoroughly crack the oil used as fuel; to impel the fuel in adverse directions in its transition through the atomizer; to accomplish a focal ejection of the fuel; to improve and generally simplify and obtain maximum efficiency of the mechanism; and to provide an extremely simple, compact mechanism of this kind which is economical, durable, safe and reliable in operation and economical to manufacture, install and maintain.

The invention accordingly comprises the features of construction, combination of elements, arrangement of parts, and steps in the manufacture and use thereof which will be exemplified in the disclosure hereinafter set forth, wherein further objects and advantages of the invention will be disclosed, and the scope of the invention of which will be indicated in the appended claims.

Referring to the accompanying drawing, in which like numerals of reference indicate similar parts throughout the several views;

Figure 1 is a longitudinal section of the nozzle end of a burner, showing the atomizer therein in elevation;

Figure 2 is a forward end view of the burner;

Figure 3 is a view of the atomizer as shown in Fig. 1, but with the tip in longitudinal section;

Figure 4 is a rear view of the atomizer;

Figure 5 is a longitudinal sectional view through both the tip and plug;

Figure 6 is a side elevation of the rear plug section;

Figure 7 is a forward end view thereof;

Figure 8 is a side elevation of the forward plug section; and

Figure 9 is a forward end view of the same.

In the specific embodiment of the invention illustrated in said drawing, the reference numeral 10 indicates a part of the burner, namely

the feed pipe which in use extends inwardly of the fire box. The end of the pipe is screw threaded and receives thereon a cap 11. The atomizer in which the present invention inheres more particularly is mounted within the end portion of pipe 10 and held by said cap.

The atomizer proper consists of three parts, as shown, namely, a tip 12 which for most of its length substantially fits within the pipe, a rear plug section 13 which screws into the rear end of said tip, and a forward plug section 14 carried at the forward end of the rear plug section 13 within the tip 12. The rear and forward plug sections 13, 14, together constitute the plug.

The tip 12 is formed after the manner, in general of prior art tips, in that it provides a forward end with a central orifice 15 from which the fuel is ejected into the furnace. Within the tip, in communication with said central orifice 15 is a final atomizing whirl chamber 16. More will be said of this chamber later on, but suffice it to say for the moment that it is upon a common axis with the orifice 15, and extends inwardly to a square shoulder 17. It is this shoulder 17 against which the forward end of the forward plug section engages when the atomizer is assembled. The outside of the tip provides a forward central boss 18 which protrudes through a corresponding opening in the cap. Back of the boss, the forward end of the tip provides a peripheral flange 19 which will seat against the forward end of pipe 10 and thus be held in position by the clamping effect of cap 11. Removal of the atomizer from the burner pipe may thus be readily done by merely unscrewing cap 11 and sliding the atomizer from the pipe.

Rear plug section 13 at the mid-portion is of maximum diameter and screw threaded, as at 20. Rearward of this screw threaded mid-portion is a nut or squared end 21 which is exterior of the rear end of the tip and forms a convenient means for manipulating the plug in screwing it home or removing it from the tip. Forwardly of the screw threaded mid-portion 20, is a peripheral groove 22 beyond which is a flange 23 the outer circumference of which makes a close fit with the inner face of the tip forwardly of the threads. There is thus provided, by groove 22 a primary or first stage annular flow chamber. Oil or other fuel may be introduced to this first stage flow chamber 22 from pipe 10 by way of a central bore 24 extending forwardly from the nut 21 to a cross-bore 25 situated diametrically of the plug section and opening at its opposite ends in the said groove or first stage flow chamber.

The forward plug section 14 preferably has a rear face which engages the forward face of the rear plug section, and also has a threaded connection with the rear plug section. As here shown, the forward plug section has a rearwardly directed screw threaded stem 26 which fits into a forward central socket 27 in the rear section. The diameter of the forward section is less than the diameter of the rear section where the faces thereof meet. At a distance forward from the forward face of the rear section, the tip shoulders inward, as at 28, to a smaller diameter, and at about the same position the forward plug section is provided with a peripheral flange 29 which substantially fits the smaller diameter of the tip and thus provides to the rear of said flange but forward of the inner or forward flange of the rear member, a peripheral groove or second stage flow chamber 30. Between the forward side of flange 29 on the forward plug section and the first-described inner square shoulder in the tip is another peripheral or third stage flow chamber 31.

From each flow chamber to the next one forward are provided sloping slots for passing the fuel. The direction of slope of the slots between successive chambers is reversed, so that the fuel is first whirled in one direction and then in the opposite direction. I have found it very advantageous in obtaining better atomization of the fuel, to introduce obstacles to the free or direct flow of the fuel. Thus, the T-shape of the inlet passage to the first flow chamber obtains a degree of benefit. Then the oil, introduced radially has to change its course to circumferentially in the first stage flow chamber 22, then passes diagonally through slots 32 in the first flange 23, then circumferentially again in the second flow chamber 30, thence in a reverse direction through slots 33 in the forward plug section flange 29 to the third flow chamber 31 where it must move circumferentially. The forward end of the plug has slots 34 (sloping reversely with respect to the next preceding slots) which again reverse direction of movement of the fuel, this time directing the same inward and in a manner to cause the fuel to whirl within the final flow chamber 16.

It is now to be called to attention that the forward end of the forward plug section 14 is recessed rearwardly, preferably as a shallow cone the apex of which is directly aligned or upon a common axis with the orifice 15. The base of this conical recess is forward and of the same diameter as the rear end of the chamber 16 on the inside of the tip. That chamber has its wall preferably parabolic so as to focus toward the apex of the cone portion of the chamber. The fuel admitted to this chamber tends to reflect from the parabolic surface toward the conical end, and thus increasing the pressure toward the rear center of the chamber, the fluid forms a central column through the middle of the chamber around the chamber axis and directly out of the orifice. This structure of the final flow chamber consequently performs the additional important function of forming a directed stream of fuel ejecting as a column initiated at the bottom of the chamber and consequently not affected by undue lateral flaring of the stream where leaving the atomizer.

From the foregoing description, it will be now understood that the invention resides in part in the discovery of the need for changing the direction of flow of the fuel to atomize it most effectively, and in part in the mechanism ac-

complishing such change of direction. The invention also includes the construction of final whirl chamber by which a directed stream is secured. Furthermore, the invention provides as a sub-combination feature, the provision of a forward plug section which may be replaced as becomes necessary periodically, although it is to be understood features of the assembly of the plug irrespective of the plug being sectional are considered important subject matter of this invention.

While this one particular construction has been illustrated, it is to be understood other means for obtaining a staggered routing of the fuel under atomizing impetus and other means for accomplishing the several further objects of the invention may be employed within the province of the inventive concept thus exemplified, and the invention therefore is not limited to the details of construction illustrated except as set forth in the following claims when construed in the light of the prior art.

I claim:

1. An atomizer for fuel burners, comprising a tip and plug, said tip having a forward wall with a central orifice and with a forwardly extending central boss, said forward wall having a rear annular flat face substantially entirely behind and reinforced by said boss, said tip also having a rearwardly extending cylindrical side wall open at the rear thereof and threaded thereat on the inside of said cylindrical wall, and said plug having a forward annular flat end in flatwise engagement with and of less diameter than the said flat rear annular face of the forward wall of the tip and located entirely behind said boss of the tip, a peripheral flange on the plug spaced rearwardly from said forward annular end thereof, the outer periphery of said flange having a slidable rotatable fit with said inside cylindrical wall of the tip so as to provide an annular chamber between said tip and plug, and said plug providing a solid depth of metal from the forward annular flat end for a distance lengthwise of the plug beyond the rear of said flange, another and more rearward flange on said plug having peripheral screwthreads interfitted with the screwthreads in said tip for tightly and forcibly seating the forward annular flat end of the plug against the rear annular flat face of said forward wall of the tip where reinforced by said boss and prevent leakage past said plug to said orifice, said plug having fuel passages from the rear thereof to the said annular chamber and from the annular chamber to the said orifice.

2. An atomizer for fuel burners, comprising a tip and plug, said tip having a forward wall with a central orifice and with a forwardly extending central boss, said forward wall having a rear annular flat face substantially entirely behind and reinforced by said boss, said tip also having a rearwardly extending cylindrical side wall open at the rear thereof and threaded thereat on the inside of said cylindrical wall, and said plug having a forward annular flat end in flatwise engagement with and of less diameter than the said flat rear annular face of the forward wall of the tip and located entirely behind said boss of the tip, a peripheral flange on the plug spaced rearwardly from said forward annular end thereof, the outer periphery of said flange having a slidable rotatable fit with said inside cylindrical wall of the tip so as to provide an annular chamber between said tip and plug, and said plug providing a solid depth of metal from the forward

annular flat end for a distance lengthwise of the plug beyond the rear of said flange, another and more rearward flange on said plug having peripheral screwthreads interfitting with the screwthreads in said tip for tightly and forcibly seating the forward annular flat end of the plug against the rear annular flat face of said forward wall of the tip where reinforced by said boss and prevent leakage past said plug to said orifice, said plug having an intermediate flange 10

thereon situated between and spaced from the first-mentioned flange and the threaded flange and also having a sliding rotatable fit with the inner face of the cylindrical wall of the tip, whereby said flanges provide additional annular chambers spaced successively rearward from the first-mentioned annular chamber, said plug having fuel passages from the rear thereof successively to the annular chambers and orifice.

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