Jan. 17, 1956 C. BRAMMING 2,731,299

FILTERING FUEL NOZZLE FOR PRESSURE STOVES AND LANTERNS

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Fig. 1

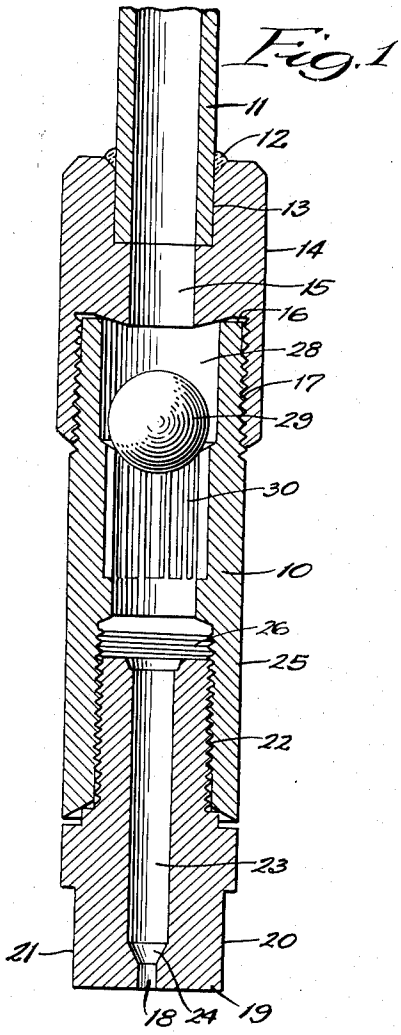


Fig. 2

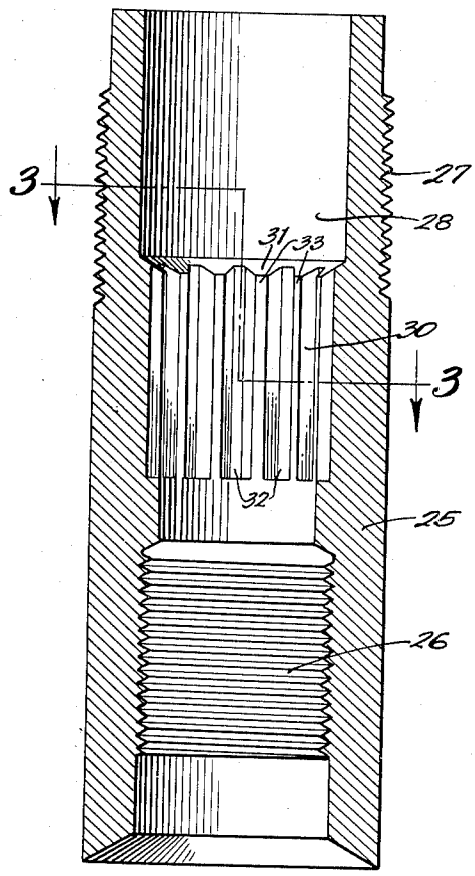
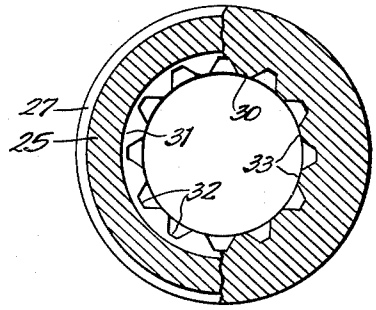


Fig. 3



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FILTERING FUEL NOZZLE FOR PRESSURE STOVES AND LANTERNS

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5 Claims. (Cl. 299—107)

This invention relates to hydrocarbon burners such as stoves and lanterns, and is more particularly related to the provision of a fuel filtering device associated with the fuel discharge nozzle and adapted to filter fuel immediately prior to its passing through the very small orifice in the fuel discharge nozzle.

Hydrocarbon burners must be constructed so as to perform satisfactorily for extended periods of time utilizing commercially available hydrocarbon fuels such as kerosene or gasoline. In pressure type stoves and lanterns, the fuel discharge orifice thereof is of relatively small diameter, being in the order of six to ten one-thousandths of an inch. Orifices of this size clog very readily, and accordingly must be protected in order that they perform efficiently.

Commercially available hydrocarbon fuels contain impurities and insufficiently refined fractions of hydrocarbon bases in quantities sufficient to clog the small fuel discharge orifice in a very short time. Accordingly, a fine mesh screen filtering device is usually provided to protect the orifice from the larger pieces of dirt, rust, scale, and other foreign matters. In spite of the use of these filters, however, these orifices tend to clok too readily for efficient operation.

Additional clogging agents in commercially available hydorcarbons are the heavier fractions of fuel which tend to form carbon deposits at or adjacent the fuel discharge orifice, particularly when they are supported by minute pieces of foreign matter such as dirt or rust. Since the fuel discharge orifice is immediately adjacent the flame, the fuel discharge nozzle becomes extremely hot, which adds to the speed with which the heavier fractions of hydrocarbon fuel build up the carbon deposit.

It is accordingly an object of this invention to provide a filter immediately adjacent the fuel discharge nozzle, the filter being specifically built to remove foreign matters which have an effective diameter of only a fraction of the diameter of the fuel discharge orifice.

A further object is to provide a filter which may be built in a very inexpensive manner and which is easy to assemble.

A still further object is to provide a filter which can be manufactured in the extremely small sizes required in this art.

Further objects and advantages of this invention will be apparent from a consideration of the accompanying drawings in which:

Fig. 1 is a view in section on the center line of a fuel discharge nozzle constructed and arranged in accordance with the invention.

Fig. 2 is a view in section on a larger scale of the sleeve in which the filtering action is accomplished, and

Fig. 3 is a view in section on the line 3—3 of Fig. 2.

It must be appreciated that the devices with which we are here concerned are very small in the usual stove or lantern. For instance, the fuel discharge nozzle illustrated in Fig. 1 is usually made in the order of three-quarters of an inch to an inch in length, and slightly over

one-eighth of an inch in outside diameter. The sleeve shown in Fig. 2 is usually less than half an inch long and its outside diameter barely exceeds one-eighth of an inch. The very small overall size of these parts makes the tolerances of the individual parts very critical and requires careful planning and execution in order to accomplish the desired results.

As shown in Fig. 1, the fuel discharge nozzle **10** is attached to a fuel supply pipe **11** by some means such as the silver solder **12** which holds the pipe **11** in the socket **13** formed in the cap **14**. The fuel supply pipe **11** has an internal diameter in the order of one-sixteenth inch which is continued in the tubular bore **15** of the cap **14**. The cap **14** is completed with a counter-bore **16** which is internally threaded as at **17**.

It will be appreciated that fuel enters the nozzle **10** through the fuel pipe **11** and that it is desired to discharge this fuel through the orifice **18** in the burner tip **19**. The The outside diameter of the tip **19** is approximately one-eighth of in inch, and the flattened portions **20** and **21** provide means for gripping the tip with a wrench. The opposite end of the tip **19** is threaded as at **22** and contains a main bore **23** which is tapered at **24** into the orifice **18**. It is preferred that the orifice **18** be coaxial with the bore **23** and that the orifice **18** be accurately reamed to a size approximating six to seven thousandths of an inch. That diameter is not determinative of the scope of the claims herein excepting insofar as it may be related to the width of the filtering channel.

The burner tip sleeve **25** is formed at its lower end with an internal thread **26** adapted to mate with the external thread **22** on the burner tip **19**. The upper end of the tip **19**, as shown in Fig. 1, need not extend the full length of the thread **26** in the assembled condition. The sleeve **25** is formed at its upper end with an external thread **27** adapted to be received in the internal thread **17** in the cap **14**.

The filtering action takes place in the upper half of the sleeve **25**. There the filter chamber **28** contains the ball **29**. Since tolerances and clearances are critical in the construction of this filtering device, it is suggested that the chamber **28** be reamed to .113 inch for use with a ball **29** which is a commercial tolerance ball seven sixty-fourths of an inch in diameter. The ball exceeds .109 inch. With the ball in position, the total clearance in diameter is less than $\frac{4}{1000}$ of an inch, and when the ball is centered, the clearance on each side of the ball is less than $\frac{2}{1000}$ of an inch.

To provide additional filtering action, and to maintain the ball **29** centered relative to the chamber **28**, the bore **30** is provided at its upper end with a countersunk shoulder **31**. The cylindrical chamber **30** is provided with a number of uniformly distributed grooves **32** separated by a series of lands **33**. Both the lands and the grooves are of a smaller effective diameter than the diameter of the chamber **28**. For instance, the effective diameter between the grooves **32** should be in the order of .110 inch while the effective diameter between the lands **33** is .100 inch. This will operate to center the ball **29** relative to the chamber **28** and to the chamber **30**.

I have chosen to use the ball **29** as constructed from stainless steel with commercial tolerances. In this size, the tolerances are small enough that the ball will perform the filtering operation in cooperation with the particular chambers described. Any impurities or foreign materials which enter the chamber **28** through the fuel pipe **11** are filtered out by the annular filtering area between the ball **29** and the chamber **28**, and between the ball **29** and the lands **33** and the grooves **32**. This annular filtering area is of relatively small radial extent, being between one-half thousandth of an inch and almost two thousandths of an inch, in radial distance, while being of considerable ex-

tent, relatively, in annular distance. Being of the small extent radially, the filtering area will remove all but the finest of impurities, while being of a considerable extent in annular length, there is a large total filtering area, almost all of which must become clogged before the action of the burner is appreciably affected.

The filter and burner tip may be easily disassembled for cleaning. Additionally, with the parts threaded in the particular manner shown and because of the use of the ball **29**, reassembly is simple, and it is impossible to reassemble the parts improperly, if they are all used.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A fuel filtering burner nozzle, comprising body means having a discharge orifice therein of relatively small diameter and an inlet opening therein of relatively large diameter, means in said body means forming a passage interconnecting said discharge orifice and said inlet opening, said passage including a filtering chamber, a ball positioned in said chamber, said chamber and said ball defining filtering passage means therebetween of a size substantially less than the size of said discharge orifice so that particles in the fuel of a size sufficient to clog the orifice cannot pass said ball.

2. A fuel filtering burner nozzle, comprising body means having a discharge orifice therein of relatively small diameter and an inlet opening therein of relatively large diameter, passage means in said body means interconnecting said discharge orifice and said inlet opening, said passage means including a cylindrical chamber, a ball positioned in said chamber, means for retaining said ball in said chamber, said chamber having a diameter exceeding the diameter of said ball by an amount substantially less than the diameter of said discharge orifice so that particles in the fuel of a size sufficient to clog said orifice cannot pass said ball.

3. A fuel filtering burner nozzle, comprising body means having a discharge orifice therein of relatively small diameter and an inlet opening therein of relatively large diameter, means in said body means forming a passage interconnecting said discharge orifice and said inlet opening, said passage including a cylindrical chamber, a ball positioned in said chamber, means for centering said ball in said chamber, said chamber having a radius exceeding the radius of said ball by an amount substantially less than the diameter of said discharge orifice so that particles in the fuel of a size sufficient to clog said orifice cannot pass said ball.

4. A fuel filtering burner nozzle, comprising body means having a discharge orifice therein of relatively small diameter and an inlet opening therein of relatively large diameter, means in said body means defining a passage interconnecting said discharge orifice and said inlet opening, said passage including first and second coaxial interconnected bores, said first bore communicating at its one end with said orifice and opening at its opposite end into said second bore, said second bore having a diameter greater than the diameter of said first bore, means between said bores forming a seat facing toward said inlet opening, a ball in said second bore engageable with said seat, said seat having a plurality of generally longitudinal grooves formed therein to conduct fuel around said ball, said grooves being substantially smaller in dimension than said discharge orifice so that particles in the fuel of a size sufficient to clog said orifice cannot pass through said grooves.

5. A fuel filtering burner nozzle, comprising body means having a discharge orifice and an inlet opening therein, first and second coaxial interconnected bores in said body means, said bores being in direct communication at adjacent ends thereof and having their opposite ends communicating respectively with said orifice and said inlet opening, said second bore having a diameter greater than the diameter of said first bore, means between said bores forming a seat facing toward said inlet opening, a ball in said second bore engageable with said seat, said first bore having a plurality of longitudinal flutes formed therein of a size substantially less than the size of said orifice to conduct fuel through said seat while filtering out particles of a size sufficient to clog said orifice, said bore having a radius exceeding the radius of said ball by an amount less than the diameter of said orifice to filter out particles of a size sufficient to clog said orifice.

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