Oct. 7, 1958 G. W. F. RICHARDS 2,855,030

BURNERS FOR VAPORISED LIQUID FUELS

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Fig. 1.

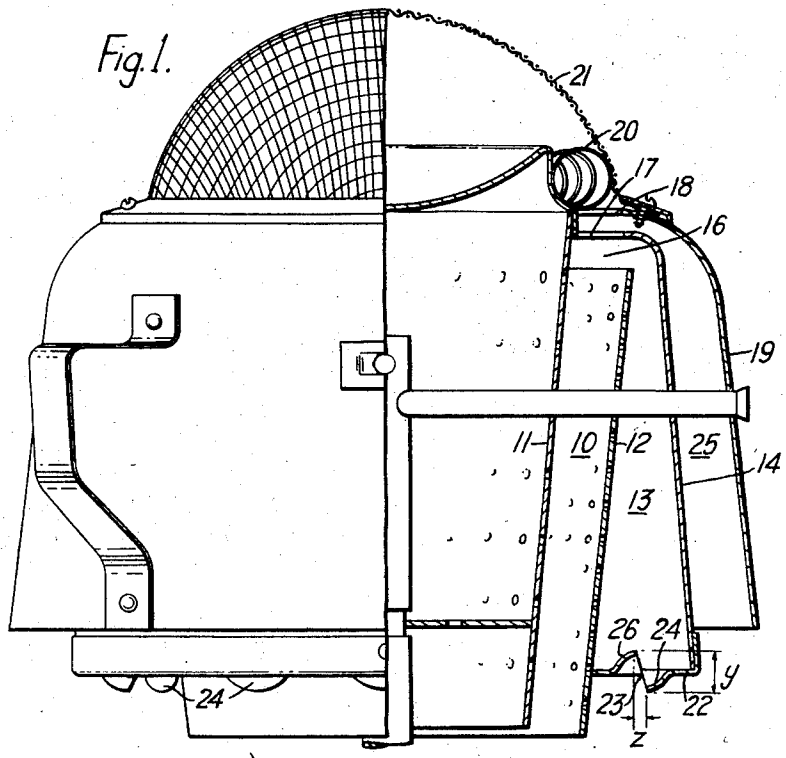



Fig. 2.

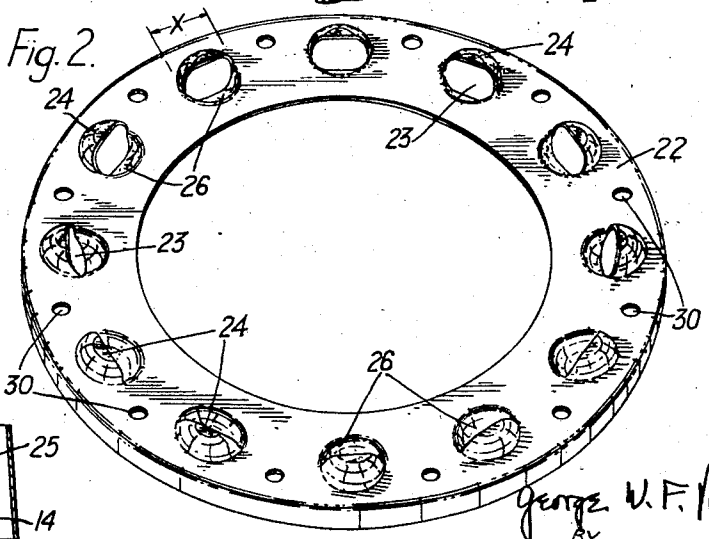
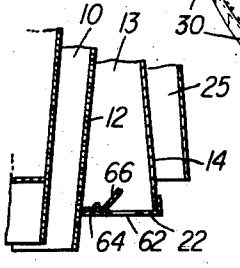



Fig. 3.

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# BURNERS FOR VAPORISED LIQUID FUELS

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4 Claims. (Cl. 158—89)

This invention relates to burners for vaporised liquid fuels.

The type of burner with which the invention is concerned is that in which the combustion chamber is defined by two perforated shells arranged coaxially one within the other and within a shroud which, with the outer shell, defines a space through which combustion air passes to the combustion chamber through the perforations in that shell.

The type of burner can be made to give good service both as to its heat output and its efficiency. It is, however, found to suffer from the disadvantage of being sensitive to draughts. If, for example, a space heater embodying such a burner is placed near a door, the draught caused by opening the door is liable to upset the even flow of vapour through the combustion chamber and to result in "popping" noises which persist for a time which depends on the violence of the draught and on the general design of the burner.

The object of the invention is to make a burner of the type in question less sensitive to draughts.

That object is achieved by restricting the air inlet while, of course, providing an adequate supply of air and forming the inlet so that a gust of air from the outside does not tend to pass directly through the perforations in the outer shell into the combustion chamber.

In the burner in accordance with the invention, the space defined by the shroud and the outer perforated shell is in communication with the combustion space above the top of the outer shell and is closed at the bottom, the supply of air to the space being effected through holes at or near the lower end of the space, which holes are formed or provided with baffles so as to direct the incoming air away from the outer perforated shell.

In the preferred form of the invention, the holes are formed in a plate which closes the lower end of the space between the outer perforated shell and the shroud. In this form, best results have been obtained by the use of holes formed by making slits in the closing plate parallel to the periphery of the shroud and pressing down the material of the plate which lies on the shroud side of each slit and pressing up the material which lies on the opposite side.

In order that the supply of combustion air may be adequate the total area of the holes must be at least as great as that of the perforations in the outer shell but, in order that the burner may be practically insensitive to sudden gusts, the area of the holes should not exceed that of the perforations by more than 5%.

In order that the invention may be clearly understood and more easily carried into effect, an example of a burner in accordance with it will now be described with reference to the accompanying drawings in which:

Figure 1 is an elevation, partly in section of one form of the invention;

Figure 2 is a perspective view of the closing plate shown in Figure 1 as seen from below the burner;



Figure 3 is a fragmentary view of a modified form of a part of the burner shown in Fig. 1.

The burner shown in Fig. 1 has a combustion chamber **10** defined by two perforated shells **11** and **12** which are arranged coaxially one within the other. The two perforated shells are located within a shroud **14** which with the outer perforated shell **12** defines a space **13** through which combustion air passes to the perforations in the shell **12** as will be explained below.

The space **13** is in communication with the combustion chamber **10** above the top of the shell **12**, the major part of the combustion taking place in the space **16** and the combustion products passing through outlets **17** and **18** in the shroud **14** and an outer shroud **19** respectively to a coil **20** and a gauze dome **21** which are thus caused to glow.

The space **13** is closed at the bottom by a closing plate **22** which is provided with a number of holes **23** forming at the lower end of the space **13** an inlet for the supply of the combustion air.

An extra supply of combustion air is led through the space **25** between the two shrouds **14** and **19** to ensure complete combustion of the vapour before the combustion products pass to the atmosphere.

The holes **23** in the closing plate **22** are formed by making slits in the plate parallel to the periphery of the shroud **14**, pressing the material of the plate on each side of the slits in opposite directions so as to form baffles **24** and **26** as shown in Figs. 1 and 2.

In the normal burner, the space **13** between the shroud **14** and the shell **12** being open, a sudden increase in the air supply such as is caused by a gust due to a swinging door or the like, is transmitted immediately and directly to the combustion chamber through the perforations in the outer shell **12**.

In the modified burner, as can be seen from Figs. 1 and 2, the baffles **24** and **26** bounding the air inlet holes **23**, direct the incoming air away from the shell **12**. This, it is found, stops the disagreable "popping" to which the normal burner is prone. While a sudden gust may produce a "pop" or two, the popping does not persist over any appreciable period, normal steady combustion being very rapidly re-established.

Fig. 3 shows a modification of the closing plate **22** of the burner described with reference to Figs. 1 and 2. Here, the lower end of the space **13** is closed by a plate **22** provided with air inlet holes **62** which are baffled by a ring **64** having an inclined flange **66** which partly overlies the holes and serves to direct the incoming air away from the shell in much the same way as do the baffles **26** shown in Figs. 1 and 2.

In all the burners described, the air inlet holes must have a total area adequate to allow sufficient air to be supplied for proper combustion of the fuel. Their total area must be at least equal to that of the perforations in the outer shell **12**. Because of the baffling effect which is produced in accordance with the invention, it is, however, found desirable that the area of air inlet holes be somewhat in excess of that of the perforations. In practice, it is found that an excess of up to about 5% is desirable.

It is not essential that the whole of the air supply be baffled. A minor amount of the air can be supplied through unbaffled holes such as the holes **30** shown in Fig. 2. These holes, as shown, should be near the shroud **14** rather than near the shell **12**. They also serve as a convenient means whereby the manufacturer can adjust the total area of the air inlet holes as required.

The following is a typical example:

With a shroud **14** of 4¾ inches diameter and an outer perforated shell **12** of 3 inches diameter at the bottom, excellent results have been obtained with an arrange-

ment having the proportions shown in Fig. 1, the holes **23** having dimensions X, Y and Z (see Figs. 1 and 2) of ½ inch, 5/16 inch and ⅛ inch respectively.

The greatest benefit is obtained from the invention if it is used in a burner having a combustion chamber the cross-sectional area of which, as shown in the drawings, increases progressively upwards, this being achieved by the use of tapering shells **10** and **12** or the use of one cylindrical and one tapered shell.

What I claim is:

1. A vaporised fuel burner comprising, an inner upwardly flared perforated shell, an outer upwardly flared perforated shell surrounding said inner shell in coaxial relationship therewith to define an annular combustion chamber, a shroud surrounding said outer perforated shell in coaxial relationship therewith to define an annular combustion air space, the upper end of said shroud defining with the upper end of said inner shell a combustion space located above the upper end of said outer perforated shell, at least one wire element arranged above said combustion space and in the path of products of combustion passing from said combustion space to atmosphere, the upper end of said combustion air space being in communication with said combustion space and the lower end of said combustion air space being closed by an apertured plate, the apertures in said plate being provided with baffles whereby at least the major part of the incoming air is directed away from the perforations in said outer perforated shell.

2. An open-topped vaporised fuel burner having a combustion chamber defined by inner and outer perforated shells arranged coaxially one within the other, and a shroud surrounding the outer shell and defining therewith a space through which combustion air passes to and through the perforations in that shell, said shroud extending above the outer shell and provided with an inwardly directed lip cooperating with the inner shell to provide an additional space immediately above the top of the outer shell communicating with the first space, and said first space being bounded at the bottom by an annular plate having therein holes for the supply of air to the first space, the said holes being provided with baffles arranged so as to direct at least the major part of the incoming air away from the outer perforated shell.



3. A burner according to claim 2 in which the holes are formed by making slits in said annular plate parallel to the periphery of the shroud and pressing down the material of the plate which lies on the shroud side of each slit and pressing up the material which lies on the opposite side.

4. A burner according to claim 3 in which the total area of the holes is greater than that of the perforations in the outer shell but does not exceed the area of those perforations by more than 5%.

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