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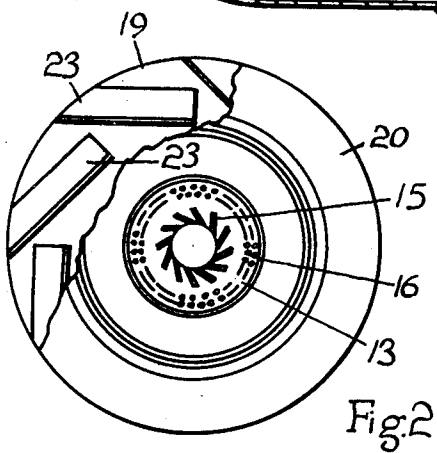
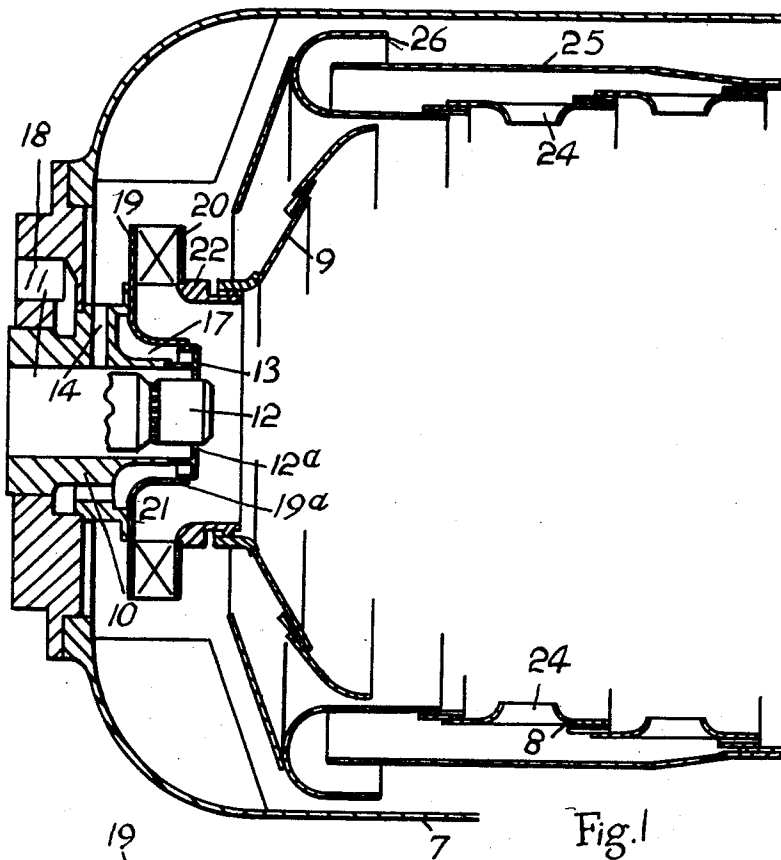
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LIQUID FUEL COMBUSTION APPARATUS

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2 Sheets-Sheet 1



1

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LIQUID FUEL COMEUSTION APPARATUS

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This invention relates to liquid fuel combustion apparatus of the kind comprising in combination a sheet metal combustion chamber, a casing surrounding the combustion chamber in spaced relationship to define therebetween an air jacket, a liquid fuel burner at one end of the combustion chamber, and a swirler surrounding the burner and through which combustion air can be introduced from the air jacket into the combustion chamber.

The object of the invention is to provide such apparatus in a convenient form having provision whereby an alternative and gaseous fuel may be used instead of liquid fuel.

According to the invention in liquid fuel combustion apparatus of the kind specified the burner is mounted within a hollow body part to which are also connected the vanes of the swirler, and there is formed in the body part one or more passages for the introduction of an alternative and gaseous fuel, said passage or passages being in communication with the combustion chamber.

In the accompanying drawings, FIGURE 1 is a sectional side view illustrating one example of the invention, FIGURE 2 is an end view, partly broken away, illustrating the burner and swirler, FIGURE 3 is a view similar to FIGURE 1 illustrating a modification, FIGURE 4 is a fragmentary section on the line 4—4 in FIGURE 3, and FIGURE 5 is a sectional view illustrating a detail of the combustion chamber common to both examples.

Referring first to FIGURES 1 and 2, there is provided a sheet metal combustion chamber 6 of generally cylindrical form which is surrounded in spaced relationship by a sheet metal outer casing 7 so as to define an air jacket therebetween. The casing 7 is of cylindrical form, and the combustion chamber 6 is mounted concentrically therein. However, one part of the casing 7 (FIGURE 5) intermediate the ends of the chamber 6 is of increased diameter and has an air inlet 8 at one side, the cross-section of the casing at this part being almost cylindrical but eccentric with respect to the combustion chamber. Thus at this part the radial depth of the air jacket is at its maximum near the inlet and diminishes from the inlet to a point diametrically opposite thereto.

One end of the combustion chamber is shaped to form a substantially conical flare 9 and at the centre of the flare is mounted a hollow body part 10. Mounted in spaced relationship within a central bore 11 in the body part is a liquid fuel burner 12, the nozzle of which is supported within a nose piece 13 closing the inner end of the bore. Air from the air jacket can enter the annular space within the bore around the burner 12 through one or more angularly spaced passages 14 in the body part 10. In use, such air serves to cool the burner, and is discharged to the combustion chamber through angularly spaced slots 15 in the nose piece 13, thereby serving to minimise formation of carbon on the burner nozzle. Moreover, a proportion of the air enters a cap 12^a surrounding the nozzle.

The slots 15 extend at inclinations to radii of the nose piece 13, and in the latter beyond the outer ends of the slots are formed annularly arranged rows of gas inlet holes 16. The holes 16 do not communicate with the bore 11, but are in communication with passages, or an annular passage 17 in the body part 10 to which a gaseous fuel such, for example, as a natural gas can be ad-

2

mitted through an inlet 18 at the outer end of the body part.

At the inner end of the body part is a swirler which surrounds the nose piece 13 and through which primary combustion air can be admitted from the air jacket to the combustion chamber. The swirler includes a pair of spaced annular discs 19, 20, the disc 19 being welded to a flange 21 in the body part 10 and having an inner portion 19^a bent to cylindrical form and welded at its end to the nose piece 13 to define in part the outer side of the passage 17. The disc 20 is welded or otherwise secured to a separately formed and substantially cylindrical part 22 to which the flare 9 is connected. Secured to the adjacent faces of the pair of discs are a plurality of angularly spaced and tangentially extending vanes 23 which serve both to space and interconnect the discs 19, 20, and also to impart a swirling effect to the air entering the combustion chamber between the discs.

In the periphery of the combustion chamber are formed angularly and axially spaced plunger holes 24 through which secondary combustion air and dilution air can enter the chamber from the air jacket. However, it will be understood that air in the jacket will flow in contra direction to the gases in the chamber, and in order to direct the secondary combustion air into the holes 24 nearer the flare 9 a scoop is provided in the air jacket. This scoop may take the form of an annular sheet metal sleeve 25 secured at its one end to the periphery of the chamber, and extending in spaced relationship relative thereto towards the flare 9 around the holes 24, and a second sheet metal and annular member 26 of substantially U cross section having one limb secured to the chamber at the inner side of the free end of the sleeve 25, and its other limb disposed at the outer side of the free end of the sleeve. The action of this scoop is to cause a proportion of the air flowing the jacket towards the swirler to change direction and to enter the chamber through the holes 24.

The modification of the invention illustrated in FIGURES 3 and 4 is similar to that shown in FIGURES 1 and 2, and like parts have been designated with the same reference numerals. In this example, however, the nose piece 13 is omitted and air flows through the passage or passages 14 to the bore 11 and around the burner 12 to the combustion chamber. Further, each vane 23 has formed therein a bore 27 which communicates with the passage 17 and with three further passages 28. Where gaseous fuel is employed, this fuel flows through the passage 17, the bores 27, the passages 28 and the central hole in the disc 20 to the combustion chamber. Moreover, in this modification passages 29 are provided through which air from the air jacket can enter the combustion chamber.

By constructions as above described the gas inlet can be closed and the apparatus caused to operate on liquid fuel sprayed into the combustion chamber from the burner in the normal manner. However, if desired, where a ready source of gas is available, this gas can be used as the fuel and fed through the gas inlet to the combustion chamber, whilst the supply of liquid fuel is interrupted.

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

1. Liquid fuel combustion apparatus comprising in combination a sheet metal combustion chamber, a casing surrounding said combustion chamber in spaced relationship thereto so as to define therewith an air jacket surrounding said combustion chamber which is provided at one end with a central opening for admitting fuel and primary combustion air to the interior of said combustion chamber, a liquid fuel burner situated at said end of said combustion chamber, and provided with a discharge noz-

3

zle which communicates through said central opening with the interior of said combustion chamber, an air swirler provided with a pair of spaced annular discs which are interconnected by a plurality of spaced vanes, and which surround said liquid fuel burner with the outer and inner peripheral portions of the space between said discs in communication respectively with said air jacket and said central opening in one end of said combustion chamber so that primary combustion air can flow from said air jacket through said air swirler to the interior of said combustion chamber, and a hollow body part to which said air swirler is secured, and in which said liquid fuel burner is mounted in spaced relationship thereto, the space between said liquid fuel burner and said hollow body part being in communication with the interior of said combustion chamber, said hollow body part having formed therein at least one passage which communicates with said central opening in one end of said combustion chamber, and through which an alternative and gaseous fuel can be introduced into said combustion chamber, and said hollow body part also having formed therein at least one other passage through which air from said air jacket can flow around said liquid fuel burner and into said combustion chamber.

4

2. Liquid fuel combustion apparatus according to claim 1, and having a nose piece which surrounds the discharge nozzle of said liquid fuel burner, and which is provided with holes establishing communication between said combustion chamber and the alternative and gaseous fuel passages in said hollow body part.

3. Liquid fuel combustion apparatus according to claim 1, wherein the vanes of said air swirler are formed with passages which establish communication between said combustion chamber and the alternative and gaseous fuel passage in said hollow body part.

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