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(54) Spark ignition gas burner.

(57) The invention relates primarily to a spark ignition gas burner for a cooker wherein the spark electrodes are so located as to avoid problems from contamination by spillage and of danger to the user. The invention makes use of alumina - a material hitherto unknown in such applications.

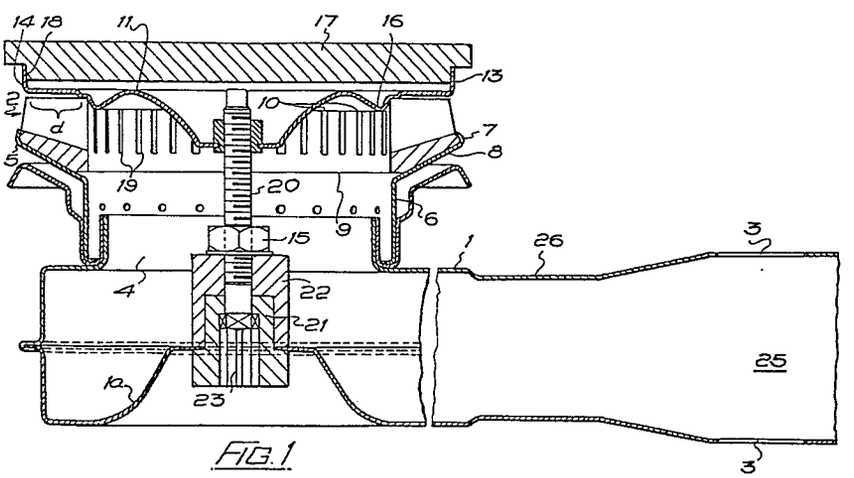

FIG. 1

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Spark Ignition Gas Burner

The invention relates to a gas burner particularly, but not exclusively, for a gas cooker with spark ignition.

Spark ignition by means of an in situ spark unit is a very desirable method of lighting gas burners, but the ratio of gas to air in the primary mixture normally supplied to a gas burner is controlled according to stoichiometric considerations in the interest of efficiency of combustion, and such a mixture is too gas-rich for ready ignition by an electric spark.

It has been proposed to place the spark unit at a position spaced from the burner head in a direction of the issuance of gas-air mixture from a burner port, at which position the primary mixture has become so diluted with the so-called "secondary" air of the atmosphere as to form a more explosive or ignitable mixture. However, when the position has been exterior of the burner head, the spark unit has been susceptible to gross contamination from accidental spillage resulting in the unit not being able to pass a spark. This problem has been mitigated, in the case of a toroidal burner, by placing the spark unit interiorly of the burner and by providing an ignition port in the burner head to produce a jet of primary gas-air mixture, in the direction of the unit. Contamination of the spark unit has not been completely eliminated however and the further problem has not hitherto been solved that under low gas-flow conditions the mixture

in the region of the spark unit may not be sufficiently gas-rich for ignition.

Hitherto, a variety of materials have been used for the manufacture of gas burner bodies including, for spark ignition burners, electrically insulating materials, but the search for new materials for this purpose has concentrated on such as have good resistance to thermal shock because of the high risk of spillage of relatively cold liquids onto a hot burner body, and it was totally unexpected to find a material could be used for a burner body which had poor resistance to thermal shock.

According to one aspect of the invention there is provided a gas burner head comprising a burner body made at least substantially, and preferably of between 75% and 98%, of alumina. Preferably the head also comprises at least one pair of electrodes spaced apart by the body and providing a spark gap therebetween. One of said electrodes may be covered with a cap of ceramic glass so that a user of the burner may be protected from electric shock.

According to a further aspect of the invention there is provided a spark ignition gas burner comprising a burner head body of electrically insulating material formed with a plurality of passageways for the passage of combustible air-gas mixture therethrough and each terminating in a flame port, and first and second electrode means connected or connectible to spark generating means and positioned relative to said body whereby in use of the burner a spark may be produced in the vicinity of one or other of said ports.

The burner head body may comprise a ring of ceramic material such as alumina defining, at least in part, a wall of a chamber connectible to a source of gas and air, said

passageways comprise vertically elongate slots opening at the upper surface of the body and extending radially from the interior of the chamber to said ports.

Preferably the body is supported on the first electrode means and is surmounted by the second electrode means whereby a spark may pass between the electrode means.

The burner may further comprise a feed pipe for feeding air-gas mixture from said source to said chamber and having a restricting throat at which the cross-sectional area is less than, and preferably only between 35% to 45% of, the sum of the cross-sectional areas of the said ports.

Embodiments of the invention will now be described by way of example and with reference to the accompanying drawings of which:-

Fig. 1 is a vertical section of a burner according to the invention.

Fig. 2 is a perspective and exploded view of the assembly of electrodes and burner head body of the embodiment shown in Fig. 1 (but showing a smaller number of slots for simplicity).

In the drawings the burner comprises a feed pipe 1 and a burner head 2, the pipe 1 being adapted for connection to a source of gas at elevated pressure and being provided with air inlets 3 whereby air can be introduced into the pipe to provide a primary mixture of air and gas. The burner head comprises a chamber 4 of which the upper portion is defined in part by lower electrode 5. The electrode comprises a lower cylindrical wall 6, an upper low peripheral rim 7 and an intermediate conical portion 8.

The lower electrode 5 supports a burner head body 9 of annular construction which is provided with a plurality, in this embodiment, forty, slots 10 which extend radially from the inside of the annulus to flame ports 19 at the outer edge thereof and downwardly from the upper surface 11. The radially outer surface 12 of the burner head body and the rim 7 of the lower electrode taper slightly inwardly and upwardly so tht the body may be a captive fit within the rim 7 and the lower surface of the body is angled to correspond with the conical portion 8 so that the body may be supported by the electrode as shown in Fig. 1. Upper electrode 13 is essentially a disc pressed out of sheet material and having a peripheral rim 14. The upper electrode also has an annular depression 16 corresponding in diameter to the inside diameter of the burner head body 9 so that when assembled as shown in Fig. 1 the depression 16 located against the radially inner surface of the body.

The body 9 is made of a material which comprises between 80% and 94% of alumina, though the proportion may range from about 75% to 98%. Although this material is generally known to have poor resistance to thermal shock it is surprisingly found that at least in the construction described it is capable of withstanding very severe shock and it is thought that this may be due to the radial slots allowing for expansion and contraction without excessive build-up of strains within the alumina body.

The assembly is surmounted by a cap 17 of ceramic glass such as CERAN or ALPHASTAE (Trade Marks) or other suitable material to protect the upper electrode from contamination and to provide electrical insulation for the safety of a user of the cooker. The cap is formed with a flange 18 which engages the flange 14 of the upper electrode.

Each of the electrodes is formed of electrically conducting

material such as sheet metal, and the lower electrode 5 is in electrical contact with the burner feed pipe 1 through which it may be connected electrically to the cooker or other appliance with which it is adapted to be used. The upper electrode is threaded on to a stem 20 (not shown in Fig. 2) which is mounted in a block 21 of insulating material which in turn is secured by sleeve 22 and nut 15 in a depression 1a in the lower face of the feed pipe 1. The stem 20 terminates in terminal 23 which is connectible to a spark generating device of any suitable type.

Suitable types of spark generating devices include 1-shot or single-spark, continuous spark, and re-ignition types each of which may be supplied from electrical mains or battery and some of which may be alternatively powered by piezo-electrical means. The spark generator is connected between terminal 23 and the feed pipe 1 of the burner, and thus the electrical potential of the generator exists between the upper electrode 13 and the lower electrode 5.

The closest approach of these electrodes, namely between rim 7 and the foot of flange 14, presents in effect a continuous annular spark gap. In theory, a spark may pass between the electrode at any position around the burner but in practice it has been found that sparks normally pass down the outer face 12 of the body 9 intermediate an adjacent pair of ports 19 where the combination of primary mixture and secondary air provide an optimum ignitable mixture. Successive sparks may be located in the vicinity of the same pair of slots but it is more likely that successive sparks will be found adjacent different pairs. Contamination of surface 12 presents no problem and indeed tends to produce an even better spark, but should distortion of an electrode reduce the chance of a spark adjacent one port there are, in this embodiment, a further

39 ports near which a spark can pass. In other embodiments a fewer or even more slots may be provided around the circumference of the burner head body.

If moisture were to be deposited on the outer face 12 of the burner body, for example by condensation, and if the foot of flange 14 were in contact with the upper edge of face 12, the possibility would arise of a leakage of electricity between the electrodes via the wet face. Therefore, as shown in Fig. 1, a slight gap 24 is provided between the underside of electrode 13 and the upper face of body 9 so that the path length for leakage over a wet surface is increased by the depth d of the gap 24.

Because the slots are open at the top it is a relatively easy matter to clean the slots of any contaminants, and for this purpose the assembly of upper and lower electrodes and the burner head body can be removed readily from the burner. The slots may be cleaned by brushing.

In order to ensure a maximum ignition performance, the supply pipe 1 is provided with a venturi throat 26 of which the internal cross-section is between 35% and 45% and preferably of the total cross-section area of all the flame ports. The throat also ensures optimum conditions for aeration when high primary air is called for such as in the use of liquified petroleum gas.

It is desirable for the sake of optimum ignition performance that the air inlets 3 are non-adjustable and that gas injector 25 is consistently mounted within gas feed pipe 1.

It should be understood that the electrical connections to the electrodes could be reversed so that sparks pass between the electrodes in the opposite direction.

CLAIMS

1. A burner body for a gas burner head, said body being made at least substantially of alumina.

2. A burner body according to Claim 1 comprising between 75% and 98% of alumina.

3. A burner body according to Claim 1 further comprising at least one pair of electrodes spaced apart by the body and providing a spark gap therebetween.

4. A burner body according to Claim 3 wherein one of said at least one pair of electrodes is covered with a cap of ceramic glass.

5. A gas burner with spark ignition comprising a burner head body of electrically insulating material formed with a plurality of passageways for the passage of combustible air-gas mixture therethrough and each terminating in a flame port, and first and second electrode means connectible to spark generating means and positioned relative to said body whereby in use of the burner a spark may be produced in the vicinity of one or other of said ports.

6. A gas burner according to Claim 5 wherein the body comprises a ring of ceramic material such as alumina defining, at least in part, a wall of a chamber connectible to a source of gas and air.

7. A gas burner according to Claim 5 wherein said passageways comprise vertically elongate slots opening at the upper surface of the body and extending radially from the interior of the chamber to said ports.

8. A gas burner according to Claim 5 wherein the body is

supported on the first electrode means and is surmounted by the second electrode means whereby a spark may pass between the electrode means.

9. A gas burner according to Claim 5 and further comprising a feed pipe for feeding air-gas mixture from said source to said chamber and having a restricting throat at which the cross-sectional area is less than the sum of the cross-sectional areas of the said ports.

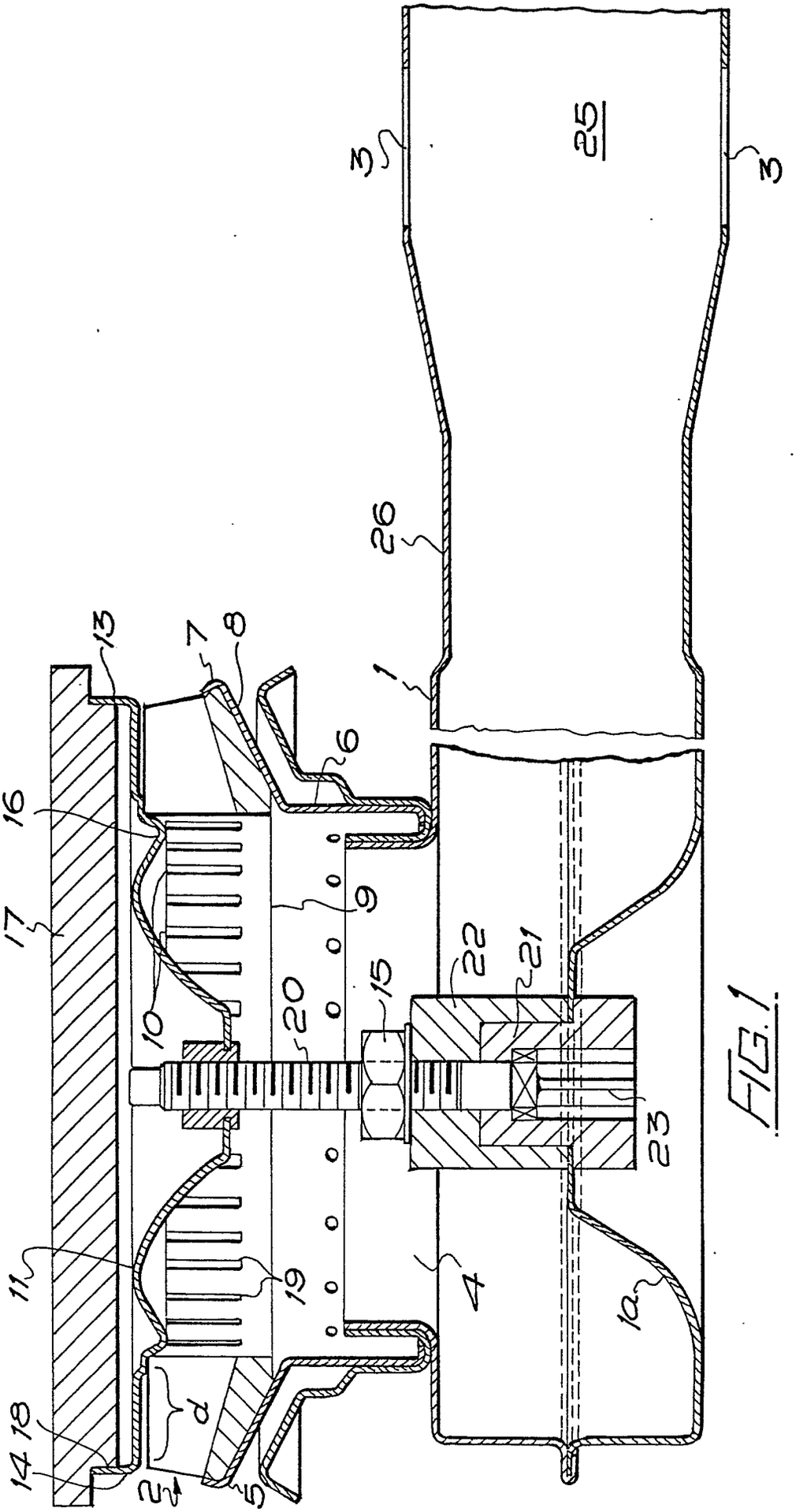

FIG.1

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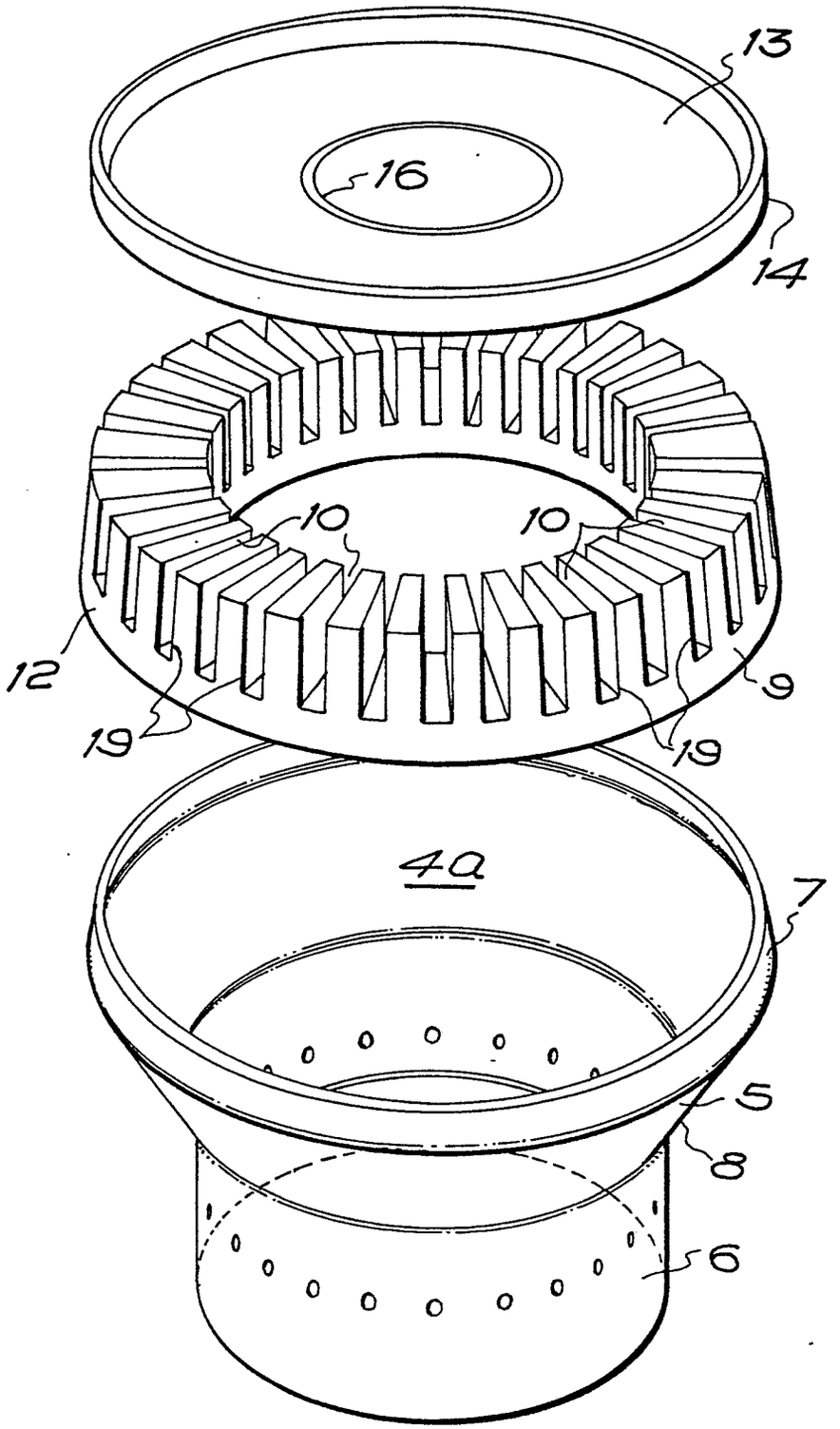

FIG. 2