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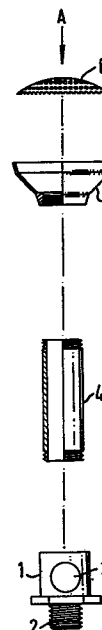
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⑧④ Designated Contracting States: **DE FR IT NL SE**

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⑤④ **Improvements in gas burners.**

⑤⑦ A gas burner comprises a jet (1) with air inlet aperture (3), an air gas mixing tube (4) and burner head 5 with an outwardly tapering conical cup. The upper surface of the cup is closed by a perforated plate (6). The plate (6) is formed from a sheet material with a plurality of adjacent longitudinally extending lines of rectangular shaped perforations, each perforation being formed by a punch which displaces material to extend to one side of the sheet forming an aperture of which the sides are defined by the material displaced by the punch.



TITLE

"Improvements in Gas Burners."

This invention relates to an improved construction of gas burner primarily intended for burning natural gas or propane mixes.

5 Gas burners are known which have a jet through which gas under pressure passes into a mixing tube having one or more air inlet apertures to draw in that proportion of air required for combustion. The gas and air mix then pass into a conical burner head having a perforated
10 plate through which the mixture passes and thereafter burns. With natural gas, mixing with the air is often not satisfactory in view of small flow rates and generally low turbulences. In addition, the perforated plate on the burner head is punched with a series of
15 apertures which is a costly operation and weakens same, requiring a heavier gauge material to be used.

An object of the invention is to provide a simple construction of gas burner which nevertheless is more efficient and provides good properties in the burning
20 flame and efficient air and gas mixing.

A further object is to provide a burner which is simpler to produce and more robust.

According to this invention a gas burner comprises a gas jet, a gas and air mixing portion and a diffusing
25 part comprising a generally outwardly conically tapering

-2-

body with the open mouth thereof provided with a perforated closure, said closure being formed from a sheet material with a plurality of adjacent longitudinally extending lines of rectangular shaped perforations, such perforation being formed by a punch which displaces material to extend to one side of the sheet forming an aperture defined by sides formed from the displaced material.

With such a construction for the burner it has been found that the usual turbulence between gas and air which results from a simple circular clean punched perforation is avoided, and the sheet material according to the aforesaid construction has a venturi-like effect following from the shape of the cross-section which results to the passage of air and gas through the perforated material being smoother. The side of the material to which the punched material is displaced may be towards the outside or inside of the burner.

An embodiment according to the invention is shown by way of example and described with reference to the accompanying drawings.

In the drawings:-

Figure 1 shows an exploded side view of a burner,

Figure 2 shows a plan view of the perforated closure,

-3-

Figure 3 is a plan view of one form of perforated strip material produced in accordance with the invention,

Figure 4 is a section taken on the line II-II of Figure 3,

Figure 5 is a fragmentary view showing the thickness and the shape of a pair of adjacent teeth of the toothed roller,

Figure 6 is a fragmentary end view showing the side faces of said teeth at the end of the roller, and

Figure 7 is an explanatory diagram.

Referring to Figures 1 and 2 of the drawings, the burner assembly as a whole comprises a jet unit 1 for connection to a gas supply by means of a threaded coupling 2 and in which air is drawn in through one or more apertures 2. The air/gas mixture passes then upwardly through a mixing tube 4, the length of this being determined by the mixing effect, and thence into the burner head 5. The burner head comprises a generally outwardly tapering conical cup with the upper surface closed by a perforated burner plate 6 which is retained by spinning over the peripheral rim of the head 5.

The material from which the perforated plate 6 is made comprises a sheet, for example of stainless steel,

-4-

which has been passed between two co-operating rollers
comprises a toothed punch and die which rotate as a
sheet passes therethrough. The effect of this action
is to produce a series of longitudinally extending lines
of perforations, each perforation being of generally
rectangular form, preferably 1.8 mm by 1.5 mm approximately,
with the material which is displaced during the punching
deformed to one side of the sheet into four lips which
define a generally rectangular venturi-type of aperture,
that is an aperture in which the cross-section tapers.

Referring to Figures 3 to 7 of the accompanying
drawings, these illustrate one preferred method of
manufacturing the perforate material for the plate.

The perforated material is formed from a sheet of
ductile metal, and as shown in Figures 3 and 4 the
perforations are in the form of narrow elongated
rectangular perforations or slots 10 and the material
displaced by the cutting forms tapering side lips 20
which are not burred and which define longitudinal ribs
30 which are bridged by transverse rib-like portions 40.
The dimensions here show a slot which is longer than
that of the plate shown in Figures 1 and 2.

The said elongated perforations or slots 1 are
formed by passing the strip or sheet material between
a toothed roller and a roller having aligned circumferential

-5-

recesses or grooves into which the teeth can pass and be accommodated after penetrating the said material.

The perforating roller is formed with teeth having the shape illustrated in Figures 5 and 6, according to which each tooth in longitudinal cross-section, that is from root to tip, comprises side faces 50 which converge to and terminate in a sharp cutting edge 60, and the characteristic feature of each tooth is that the angle B included between said side faces of the tooth in the portion 70 adjacent the cutting edge 60 is greater than the angle A included between the said side faces between the root of the tooth and said portion 70.

As previously explained, the formation of the teeth in the foregoing manner enables the teeth to be made shorter so that they do not pick up the material as they leave the formed perforations. Figure 6 illustrates how gaps 90 are formed between the leading and trailing edges of the teeth by tapering these edges slightly radially.

Although it is preferred to have an angular transition between the parts of the side faces disposed at different angles as explained above, a section similar to that shown in Figure 5 but with a curved transition between said parts of the side faces is also acceptable.

-6-

It has been found that the value of the angle "C" defining that gap 90 between the leading and trailing edges of adjacent teeth is important and should neither be too large nor too small, the value of this angle "C" depending on the diameter of the roller and the penetration of the teeth. If the angle "C" is too small then, as the tooth leaves the material, the root of the tooth and the cutting face lie behind the vertical to the metal strip and the metal is picked up. If this angle is too great the material tears before full penetration is reached.

Ideally the leading edge of each tooth should have a positive angle "D" (Figure 7) to the vertical "V" during the exit phase. If the angle "D" is too large, then the distance between one rib-like portion 40 to the next exceeds the distance from the point of the leading edge and the back of the tooth, and slip occurs and full penetration by the trailing edge is not achieved and the trailing edges of the slots 10 become rounded and ill formed.

For the gas burner of this invention the apertures are preferably more of a square shape with the displaced material forming a generally rectangular venturi tube.

With known construction of burners of a smaller size it has hitherto been necessary to incorporate a

-7-

5 piece of gauze material below the perforated burner plate
in order to effect turbulence and more rapid mixing in
the gas flow prior to same reaching the burner. This
has been necessary because of the relatively short flow
path for the gas which is insufficient to cause good
mixing. By using a perforated plate in accordance with
the present invention with the rough side of the per-
forations facing inwardly, it has been found that this
produces good turbulence in the gas flow and it is
10 possible to omit the gauze which has hitherto been used.
The material appears to effect the slowing down of the
flow, hence creating high turbulence and better mixing.

15 With larger burners, on the other hand, it has been
found that the rough side of the material is preferably
located outwardly thereby providing a plurality of
venturi passages which provide a smooth flow path to
give good burning characteristics to the flame. This
arrangement can be adapted where the burners are
sufficiently large so that mixing occurs satisfactorily
20 prior to reaching the burner plate.

25 It will thus be apparent that the invention
provides considerable advantage in that the same material
for the burner plate may be used whether or not the
construction of small or large burners is contemplated,
and by the simple expedient of reversing the material

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-8-

various characteristics can be imparted to the gas
flow through the burner head.

CLAIMS

1. A gas burner comprising a gas jet (1), a gas
and air mixing portion (4) and a diffusing part (5)
comprising a generally outwardly conically tapering body
with the open mouth thereof provided with a perforated
closure (16), said closure (6) being formed from a sheet
material with a plurality of adjacent longitudinally
extending lines of rectangular shaped perforations (10)
each perforation being formed by a punch which displaces
material to extend to one side of the sheet forming an
aperture defined by sides (20) formed by the displaced
material.

2. A gas burner according to Claim 1, wherein the
displaced material forms lips (20) around the aperture.

3. A gas burner according to Claim 2, wherein the
cross-section defined by the sides of the lips tapers to
form a venturi aperture.

4. A gas burner according to any preceding claim,
wherein the aperture has side dimensions approximately
between 1.8 mm and 1.5 mm.

5. A gas burner according to Claim 4, wherein the
aperture is rectangular with a dimension 1.8 mm by 1.5 mm.

6. A gas burner according to any preceding Claim,
wherein the displaced material extends inwardly of the
burner.

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-10-

7. A gas burner according to any preceding Claim, wherein the displaced material extends outwardly of the burner.

1/2

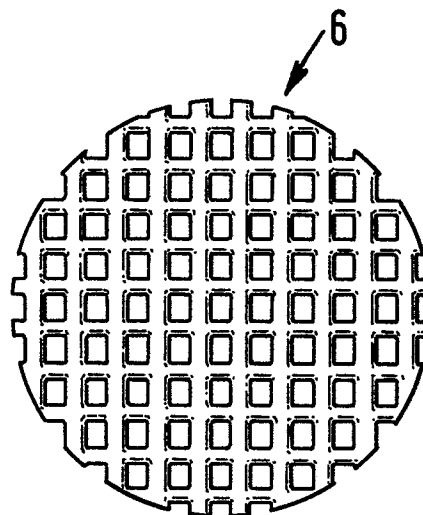
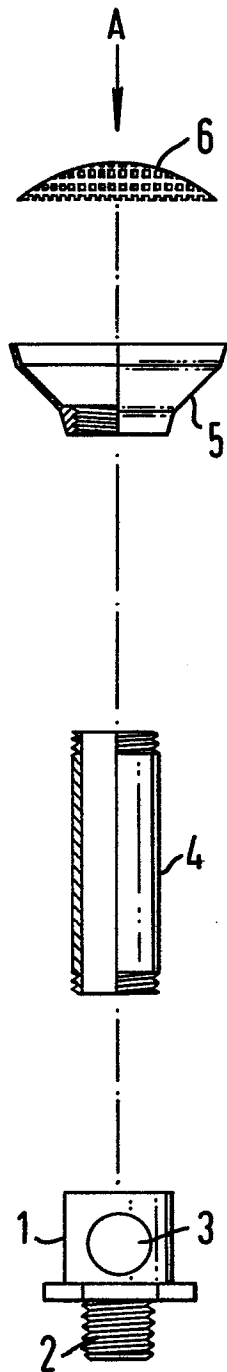


FIG. 2

FIG. 1

2/2

FIG. 3

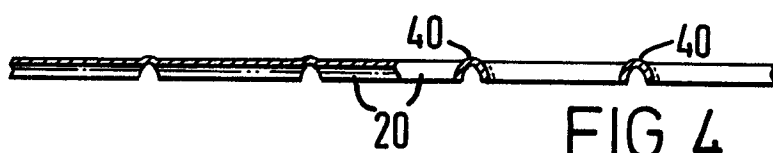
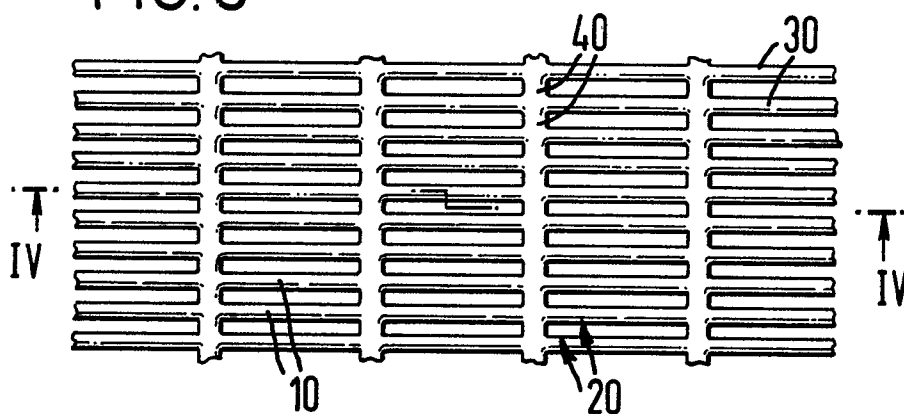


FIG. 4

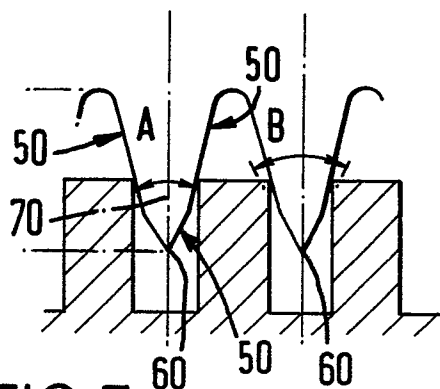


FIG. 5

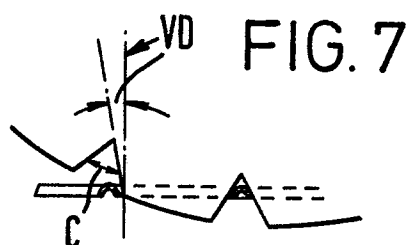


FIG. 7

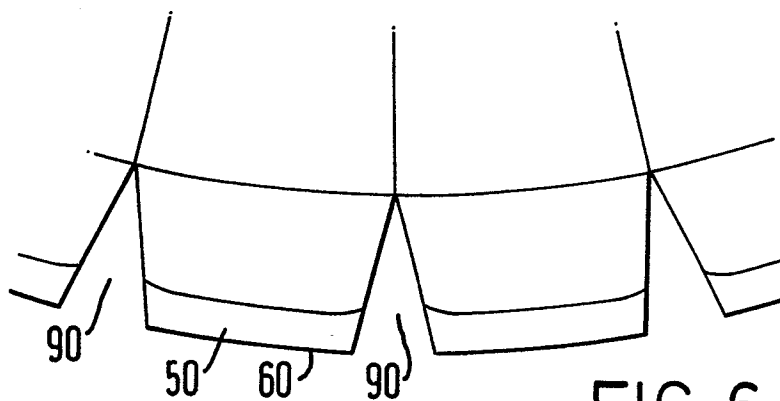


FIG. 6

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EUROPEAN SEARCH REPORT

Application number

EP 81 30 5516

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
E, X	GB-A-2 076 136 (ROBERT BION & CO. LTD) *The whole document*	1-7	F 23 D 13/36 F 23 D 13/10
Y	GB-A- 540 384 (THE GAS LIGHT & COKE CO) *Figures 1-3; page 1, lines 9-16, 46-54, 65-70; page 2, lines 3-16; page 4, lines 40-91; page 5, lines 68-96*	1	
Y	DE-A-1 915 832 (JUNKERS & CO) *Figures 1,2; page 1, lines 1-5; page 2, line 12 - page 3, line 1; page 3, line 14 - page 4, line 6* & GB - A - 1 254 247	1,2,3,7	
A	GB-A-1 473 959 (AEROMATIC CO LTD) *Figures 1,2; page 1, lines 10-74,96 - page 2, line 76; claims 1,8*	1,3,4,7	TECHNICAL FIELDS SEARCHED (Int. Cl. 3) F 23 D
A	DE-B-1 161 522 (JOH. VAILLANT) *Figures 1-3; column 1, lines 1-6; column 2, line 22 - column 3, line 9*	1,2,3,7	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15-07-1982	Examiner DIJKSTRA G.
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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EUROPEAN SEARCH REPORT

Application number

EP 81 30 5516

DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	GB-A-1 188 540 (ROBERTSHAW CONTROLS CO.) *Figures 1-17; page 1, line 83 - page 3, line 15; page 4, lines 3-33* -----	2,6	
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15-07-1982	Examiner DIJKSTRA G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			