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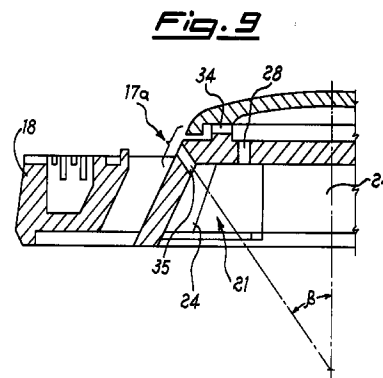
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**(54) Gas burner for kitchen appliances**

(57) A burner (1) for gas cookers, comprising a central flame crown (17; 17a), two concentric circumferential crowns (18, 19), a substantially horizontal Venturi effect chamber (27) and holes or slits (28) for supplying a mixture of air and gas from the Venturi chamber (27) to the central crown (17), located in proximity to the zone of cessation of the Venturi effect and/or downstream of the said zone, with respect to the flow of the gas-mixture.



**EP 0 797 048 A1**

## Description

The present invention relates to a burner for kitchen cooking appliances of a type provided with three flame-crowns.

Gas burners for cooking appliances providing two or three flame-crowns are known in the art. In particular, three flame-crown burners are known which have one central flame-crown and two circumferential crowns, one directed towards the centre of the burner and the other towards the outside.

This type of burner is particularly advantageous since it heats the base of the pot more uniformly.

The British Application No. GB-A-2233444, in the name of Lee, describes a burner comprising a vertical combined gas-supply and support pipe on which is mounted a three-crown head. The central crown is coaxial with the vertical supply pipe and communicates with it; three branching ducts extend from this supply pipe to take the mixture of primary air and gas to a circular flame-separator crown, into which two circumferential flame-crowns are cut. The secondary air is taken from above the hob for all three crowns.

The vertical shape of this embodiment makes it not suitable for use on "built-in" kitchen units where the vertical height of the burners must be reduced as much as possible. Furthermore, the internal circumferential crown has a reduced number of flame jets as a result of interference and combustion problems found with this type of burner.

The EP-A-0534301, in the name of Merloni, describes a burner with a two-crown head. Similar to what is described in German Patent No. 3123751 in the name of the Applicant, in this burner both the primary and secondary air are taken from above the hob and the mixture of primary air and gas is taken to the flame crown by a so-called horizontal Venturi duct. The two crowns are cut externally and internally into a circular flame separator whose interior space is divided by separator elements into a plurality of sectors to which the primary air-gas mixture is supplied by a plurality of arms.

This embodiment has not solved the problem of the earlier art in that, while the horizontal Venturi reduces the height of the burner, there are only two circumferential flame-crowns, of which the internal has a very small number of flame jets.

The aim of the present invention is to overcome the above problems and produce a three-flame burner of reduced height, which is simple and inexpensive to produce and install, which produces a flame that is substantially free of turbulence and interference and which gives easy access to the gas jet to allow replacement.

This aim is achieved by the present invention, which relates to a gas burner for domestic use characterized according to Claim 1.

According to a preferential embodiment of the invention, the chamber which produces the Venturi effect has two or more holes or slits in its upper wall to

allow the primary air-gas mixture to enter the central crown; such holes or slits are located between the beginning of the diverging length of the bottom wall, where the Venturi effect is off or is substantially reduced, and the end of the flat length of the top wall of the chamber.

Preferably, the area of the slits is between 2% and 10% of the area of the upper wall.

According to another preferential embodiment of the invention, the angle between the two surfaces on the lower wall of the chaser is within the range from 5° to 15°.

According to another aspect of the invention, the sidewalls of the Venturi-effect chamber are flared.

According to another aspect of the invention, there is provision for supplying secondary air to the burner from above or below the hob.

According to a further embodiment of the invention, the central flame crown comprises a plurality of pilot flames obtained from cuts connected to the upper cavity of the central body and with a plurality of main flames obtained from holes located on said flared sidewalls of the Venturi chamber. Said holes are preferably inclined with respect to the burner vertical axis with an angle within the range from 20 to 40 degrees, and preferably of about 32 degrees.

The burner according to the invention has numerous advantages over the state of the art. The burner has three flame-crowns distributed substantially uniformly, thus giving effectively uniform heating of the pot. The flames are essentially free of turbulence or interference.

The burner has a low profile and can be installed on "built-in" cooking hobs.

The invention will now be described in more detail with reference to the attached drawings which are by way of example and not limiting, in which:

- Fig.1 is a partial sectioned exploded view of an embodiment according to the invention;
- Figs. 2 and 3 are plan views from below and above respectively of the upper plate of the burner shown in fig.1;
- Fig. 4 is a view from below of an element of the burner shown in fig.1;
- Fig.5 is a view from above of the detail shown in fig.4;
- Fig.6 is a side view of the burner according to the invention mounted on a hob;
- Fig.7 is a sectioned view of the Venturi chamber of the burner according to the invention;
- Fig.8 is a plan view of the base element of the burner according to the invention;
- Figures 9 and 10 are enlarged, partial and sectioned views along planes B-B and C-C (fig.11) of a further embodiment of the invention;
- Fig.11 and fig.12 are plan views from below and above, respectively, of the upper plate of the burner according to figures 9 and 10; and
- Fig.13 is a lateral view of the embodiment accord-

ing to figures 9-12.

As visible in figures 1 (that is a section along plane A-A of fig. 3) and 6, the burner 1 according to the invention comprises a base 2 to which is attached the gas supply pipe 3 and a seat 4 for the jet 5 (fig.6). The base 2 is provided with a plurality of flanges 11 projecting radially to attach it to the hob. The base 2 houses a cylindrical element 6; within this element 6 is an internal conduit 8 integral with or assembled onto the same element 6. In the embodiment shown, the conduit 8 is integral with the element 6 and forms with it and with the base 2 a mixing chamber 9 for the mixing of the gas from supply 3 and of the primary air coming from above the hob 13 (fig. 6) through the openings 14. Such openings 14 are defined by the flange 11, by corresponding flanges 12 on the cylindrical element 6 and by vertical fins 15 on the underside of the flange 12.

Above the cylindrical element 6 is a head 16 in which are cut the three crowns 17, 18 and 19, and which shall be better described with reference to figs. 2 and 3.

The head 16 comprises a central portion 20 on which are provided upper cavity 33 and the grooves of the central flame crown 17. The central portion 20 is connected by the arms 21 to a circular element 22, with a substantially U-shaped section, on which are the circumferential flame crowns 18 and 19. For the sake of drawing simplicity, in fig.3 these flame crowns (comprising a plurality of grooves) are shown only on part of the circular element 22. The arms 21 are hollow and have no lower wall, allowing the primary air/gas mixture to enter the circular element 22; the lower boundary of the arms 21 is comprised by the plates 12 on a peripheral part of which the head 16 rests.

As can be seen from figs. 1 and 2, the lower face of the central portion 20 presents a cavity defined by the wall or flat face 23 and the walls 24 which are flared. This cavity houses the upper part 25 of the cylindrical element 6 which is of such height as to leave the upper face 26 of the said part 25 spaced from the flat face 23 of the head 16, when the burner is assembled, by a distance preferably between 1.5 and 3.5 mm. In this way a substantially horizontal Venturi chamber 27 (fig.7) is created which allows the gas access to the flame crowns 17 - 19. As mentioned above and as can be more easily seen in fig.7, Venturi effect chamber 27 is substantially horizontal and defined by face 23 of the central portion 20 of head 16 and face 26 of cylindrical element 6. Face 23 is effectively the upper wall of chamber 27 and face 26 is its lower wall.

Face 26 is provided with a circular bevel 26a which lies at an angle to the plane of the face 26, such plane is substantially parallel to the above face 23. The angle  $\alpha$  between the two planes is preferably between 5 and 15 degrees.

The Venturi effect ends or is severely reduced near the boundary between the face 26 and the circular bevel 26a.

Walls 24 are flared (see fig.2) to guide and conduct

to arms 21 without turbulence the part of the air/gas mixture flow that strikes said walls on its exit from the Venturi chamber 27.

According to the present invention, the flat wall 23 is provided with two or more slits 28, preferably four slits, one for each wall 24, that connect Venturi chamber 27 with cavity 33 of central portion 20.

The slits 28 are located in proximity to the zone where the Venturi effect ends or is substantially reduced, and/or downstream of that zone with respect to the gas flow. In the embodiment according to the present invention, the holes or slits are therefore located in the face 23 in correspondence to the boundary of face 26 defined by the bevel 26a, preferably downstream thereof with respect to the gas flow, and more preferably (as in the embodiment shown) corresponding to the bevel 26a.

The holes or slits 28 are preferably of such size that their total area is from 2% to 10% of the area of face 23, where the said area is defined as the total area of face 23 including the area of the said hole bounded by the line H in fig.2.

As can be seen in fig.6 embodiment, the burner has two covers 29 and 30 to cover the central portion 20 and the circular element 22 of the head 16, part 20 being raised above the element 22.

Figures 9-13 show a further embodiment of the invention in which the central flame crown is obtained on different levels. The remaining features of the burner, i.e. Venturi chamber, slits etc., are the same as in above embodiment and are referred to with identical reference numbers.

As can be seen in figures 9 and 10, that are sectional views along plane B-B and C-C of fig. 11, central flame ring 17a comprises a first plurality of flames 34 (consisting of grooves or cuts) that are connected to cavity 33 of central portion 20; in other words, flames 34 are obtained on the edge of cavity 33 of central portion 20 by means of grooves that are defined above by a cover 30a. These flames are pilot flames and main flames 35 are obtained from holes provided on flared walls 24 of the Venturi chamber.

Holes or flames 35 are angled to the burner vertical axis with an angle  $\beta$  within the range from 20 to 40 degrees and preferably with an angle  $\beta$  of about 32 degrees.

The cover 30a is centered on the upper edge of central portion 20 by means of projecting portions 36 provided on said edge, and it projects beyond it to cover flames 34.

In all the embodiments of the invention the flame crowns are defined in such a way that the main flames, which are recognizable in the drawings because of the large grooves, are offset with respect to those of the next crown, to avoid interference with them.

Operation is similar in both disclosed embodiments. Primary air arriving through openings 14 is mixed with gas in chamber 9. From here it flows to horizontal Venturi chamber 27 through duct 8.

After passing through the Venturi effect chamber 27, in the embodiment of fig. 1-8 the primary air/gas mixture flows along the wall 24 and the arms 21 of the head 16 et in part flows to the crown 17 through the plurality of through holes, or slits, 28 in face 23 of central portion 20 of head 16.

The same happens in the embodiment of fig. 9-13, with the difference that in this case a part of the mixture flows through the inclined slits or flames 35 which constitute the principal flames of the central crown.

As mentioned above, in the burner according to the present invention the primary and secondary air are taken from above the hob. In a preferred embodiment there is provision for a means of supplying secondary air to the burner also from below the level of the hob. It has been found that the problem of instability in the flame when lighting the burner from cold can be eliminated in this way.

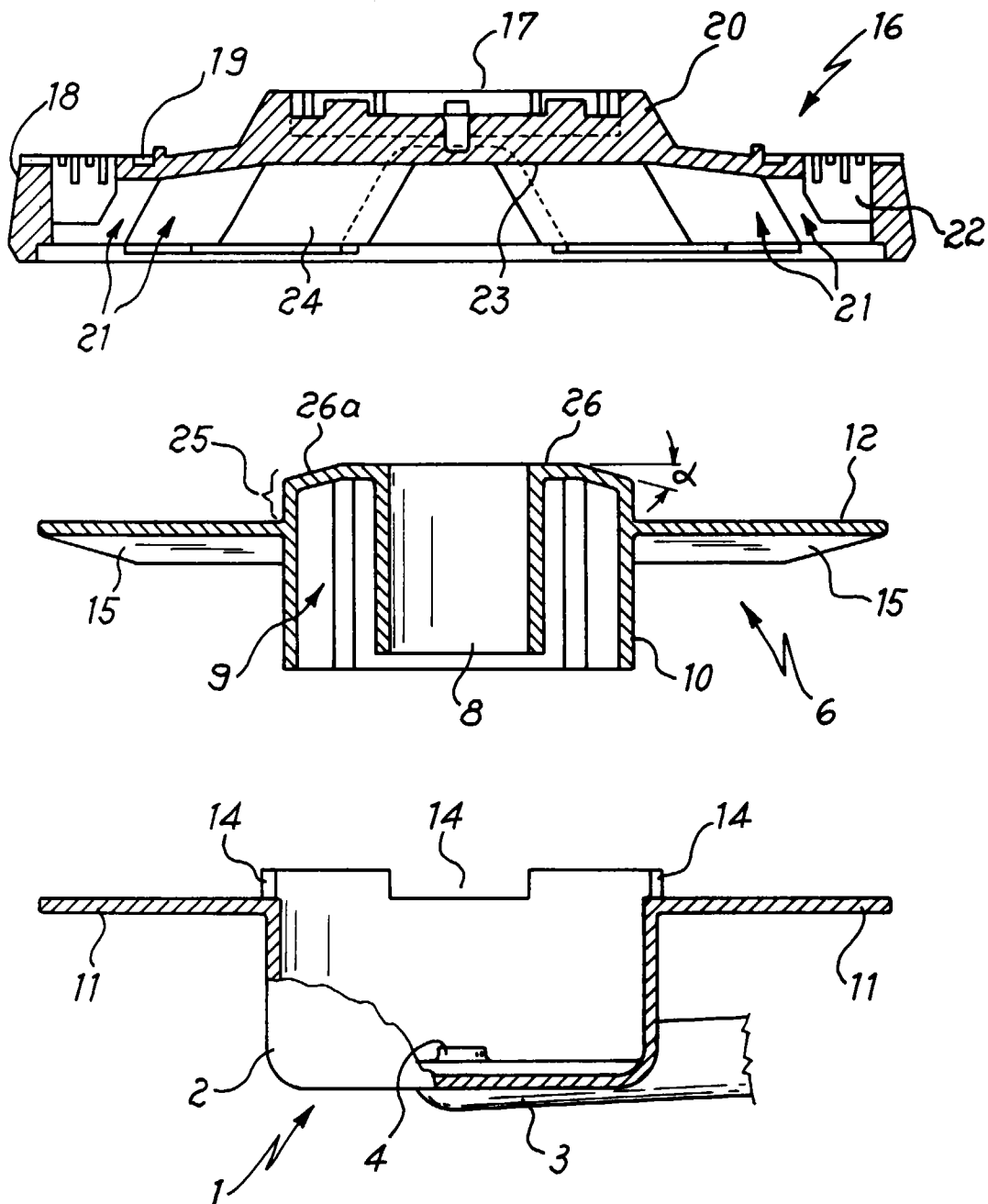
The preferred means of supplying secondary air from below the hob is shown in fig.8. This figure shows a base 2a provided with a conduit 3 to supply gas and a seat 4 for the gas jet. Similar to base 2 shown in fig.1, also base 2a is provided with arms 11a to attach it to the hob 13.

Unlike the embodiment shown in fig.1, however, arms 11a in base 2a are joined to each other to form the flange 32, in which are cut slits 31 for the passage of air from below the hob to above the hob.

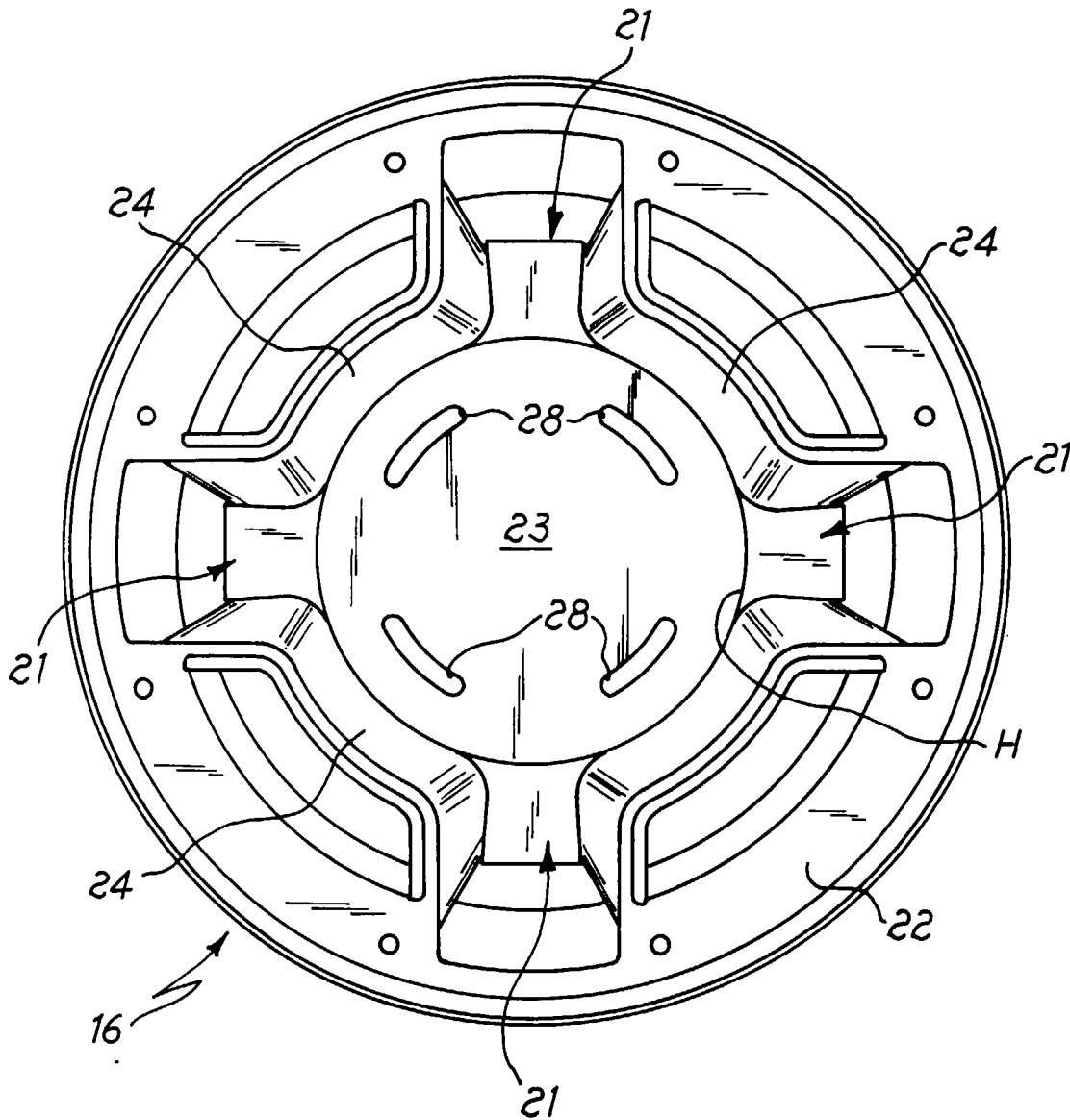
## Claims

1. A burner (1) for kitchen appliances, comprising a central flame crown (17; 17a) and two concentric circumferential flame crowns (18, 19), means (21) of supplying a mixture of air and gas to said circumferential crowns (18,19) and means of supplying said mixture to said central flame crown from a chamber (27) by Venturi effect, characterized in that said chamber (27) is substantially horizontal and the said means of supplying a mixture of air and gas to the said central crown (17, 17a) comprises a plurality of holes or slots (28) provided on the upper wall (23) of said chamber in correspondence to the zone of cessation of the Venturi effect and/or downstream of the said zone, with respect to the flow of the said gas-mixture.
2. A burner according to Claim 1, wherein the area of the said slits is between 2% and 10% of the total area of the said wall (23).
3. A burner according to Claim 1 or 2, comprising a peripheral portion (26a) adjacent to the said Venturi effect chamber (27), which lies in a plane at an angle to the plane (26) of the said chamber.
4. A burner according to any of the preceding Claims, wherein the angle between the two said planes is between 5 and 15 degrees.
5. A burner according to any of the preceding Claims, wherein said angled peripheral portion (26a) is on the lower wall of the chamber (27).
6. A burner according to Claim 5, wherein the said holes or slits (28) are located between the said angle and the end of the upper wall (23) of the said chamber.
7. A burner according to any of the preceding Claims, further comprising flared walls (24) located laterally of the said chamber (27).
8. A burner according to any of the preceding Claims, wherein the pilot flames (34) and the main flames (35) of the said central flame crown (17a) are located on different planes, said main flames being located on the lateral walls (24) of said Venturi chamber.
9. A burner according to Claim 8, wherein said main flames (34) are angled to the vertical axis of said burner by an angle within the range from 20 to 40 degrees.
10. A burner according to Claim 9, wherein said angle is about 32 degrees.
11. A burner according to any previous Claim, wherein said main flames of said central flame crown (17, 17a) are offset from the main flames of said inner circumferential flame crown (19).
12. A burner according to any previous Claim, further comprising a means (31) of taking secondary air for the said flame crowns from below the said hob.

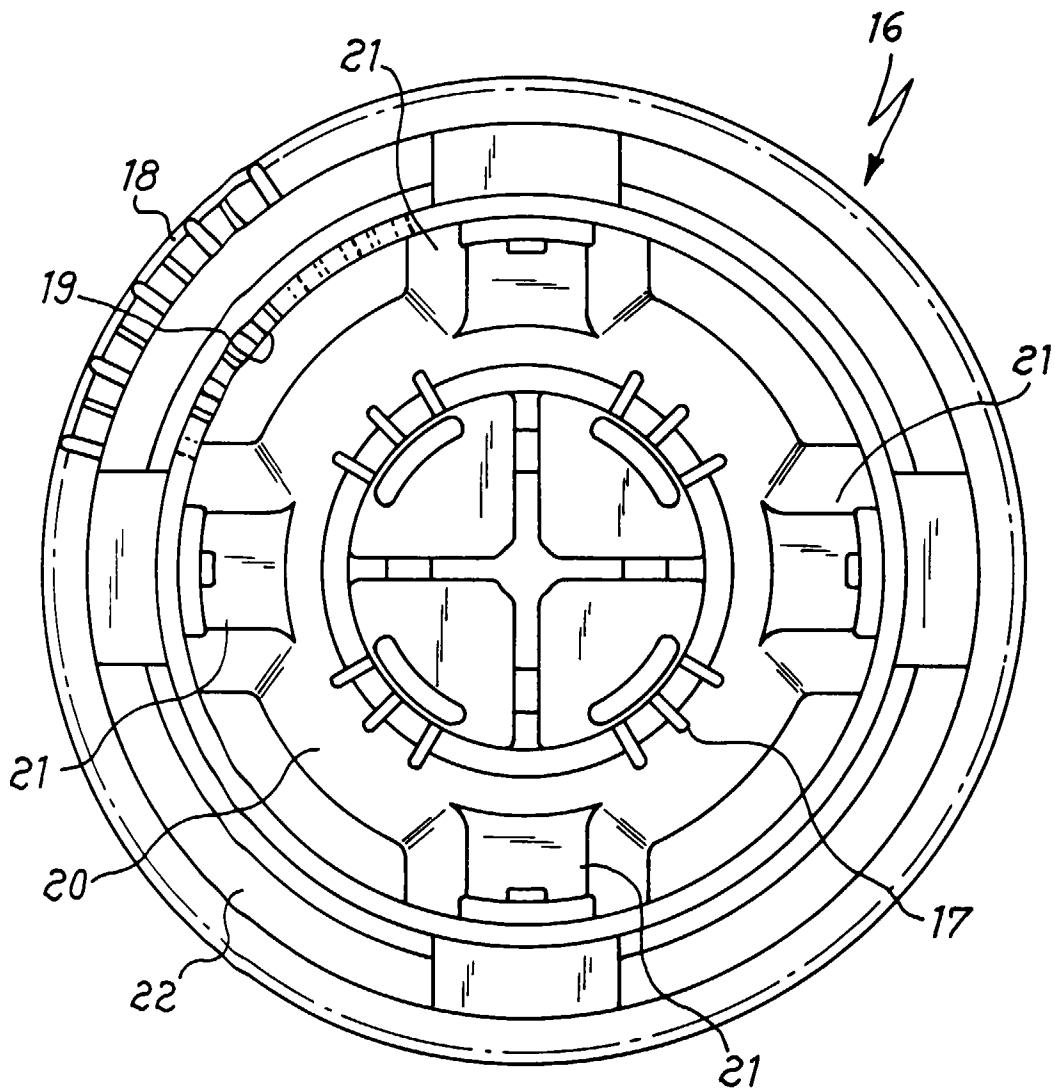
***Fig. 1***



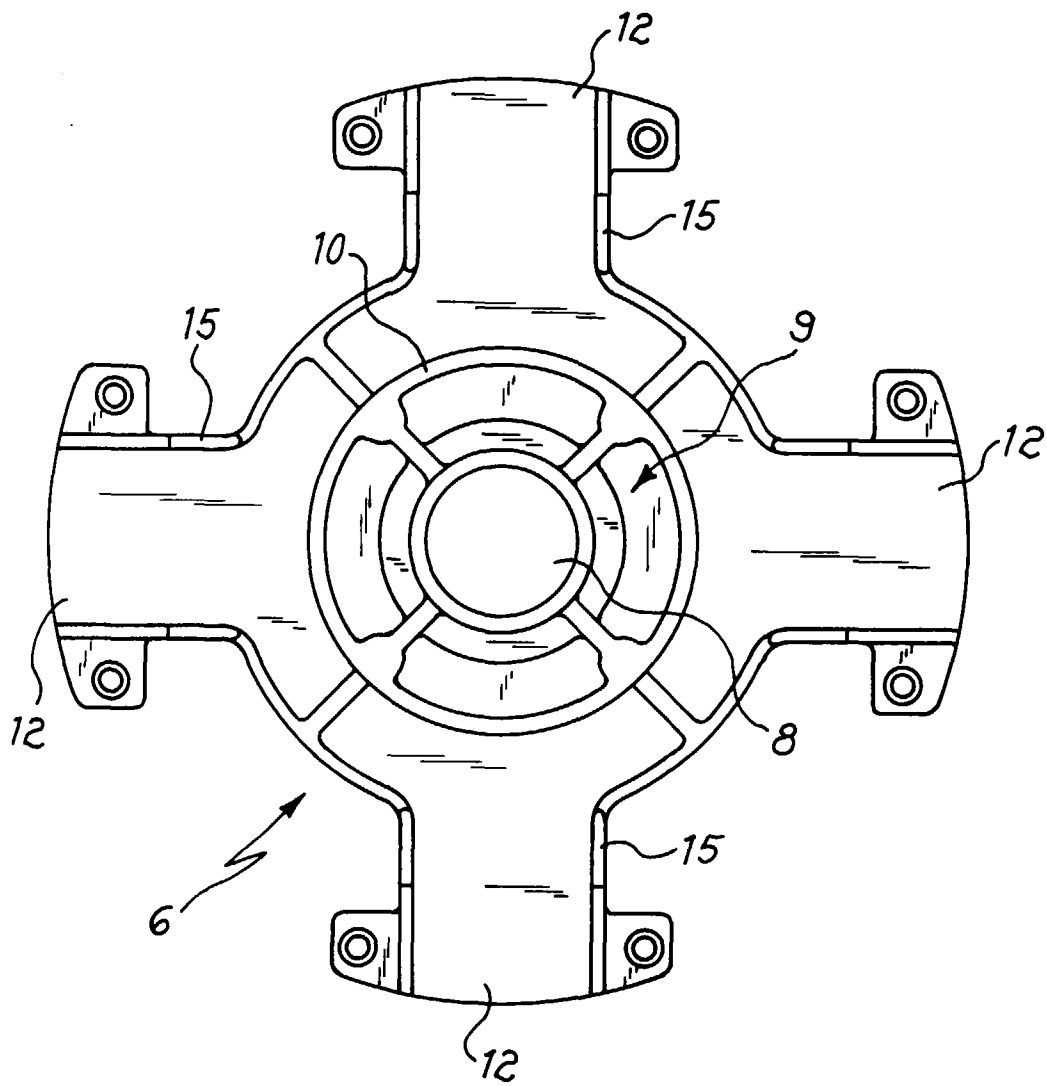
***Fig. 2***



*Fig. 3*



***Fig. 4***





***Fig. 5***

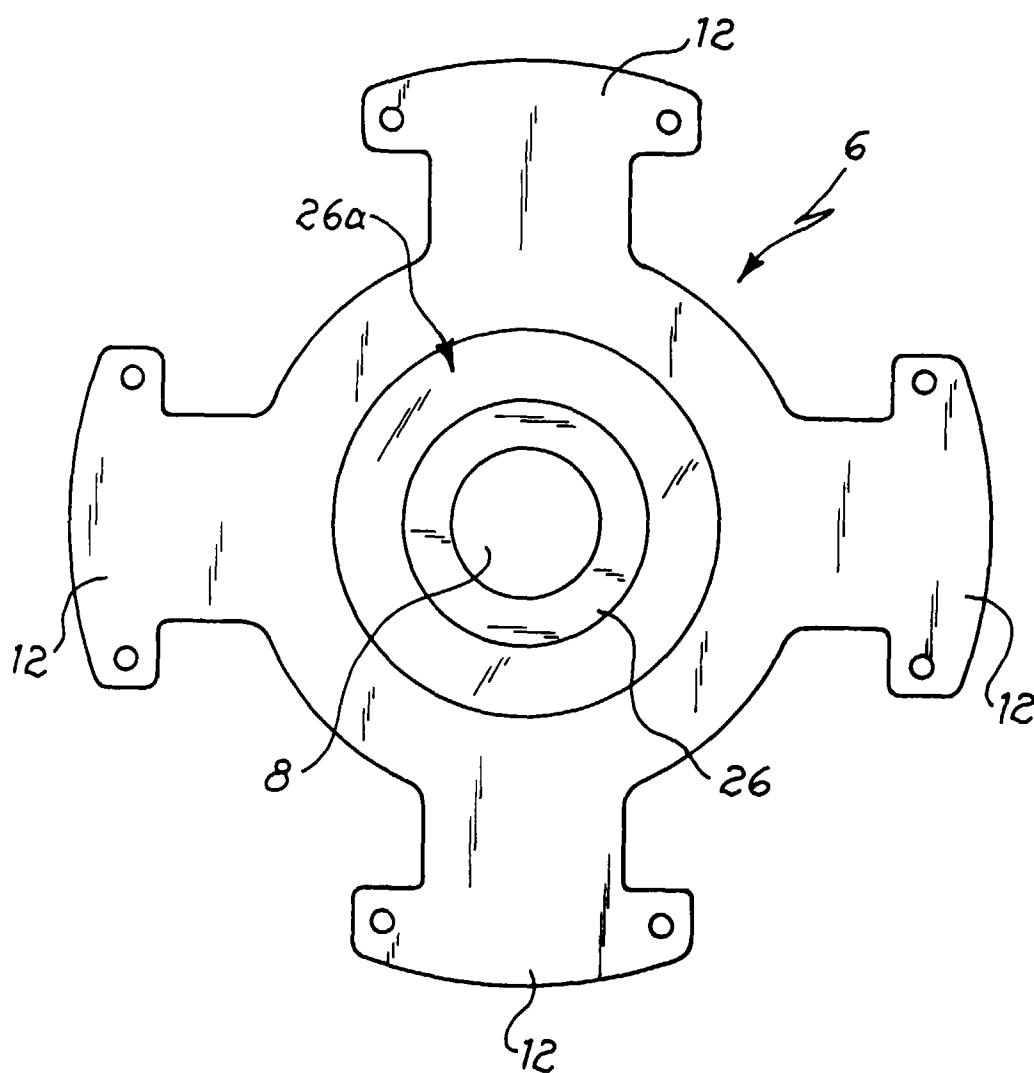
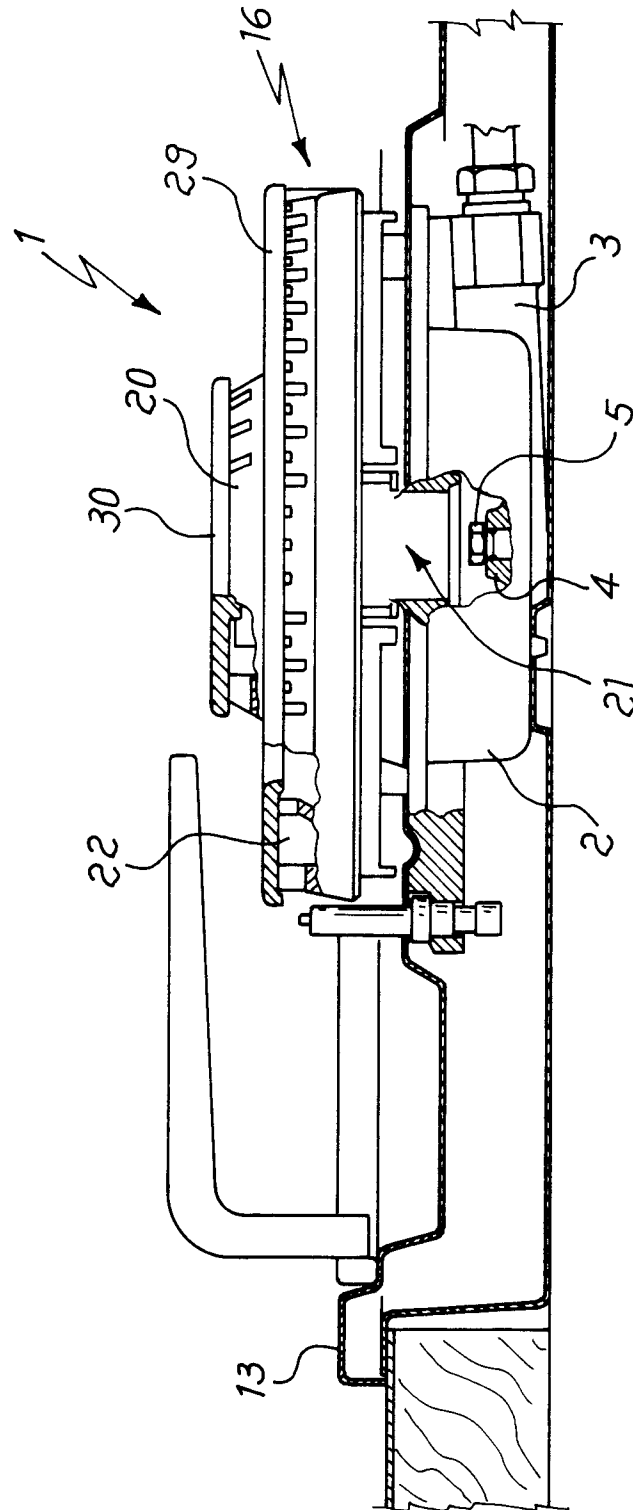
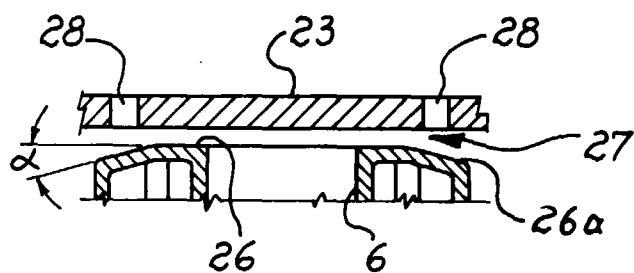


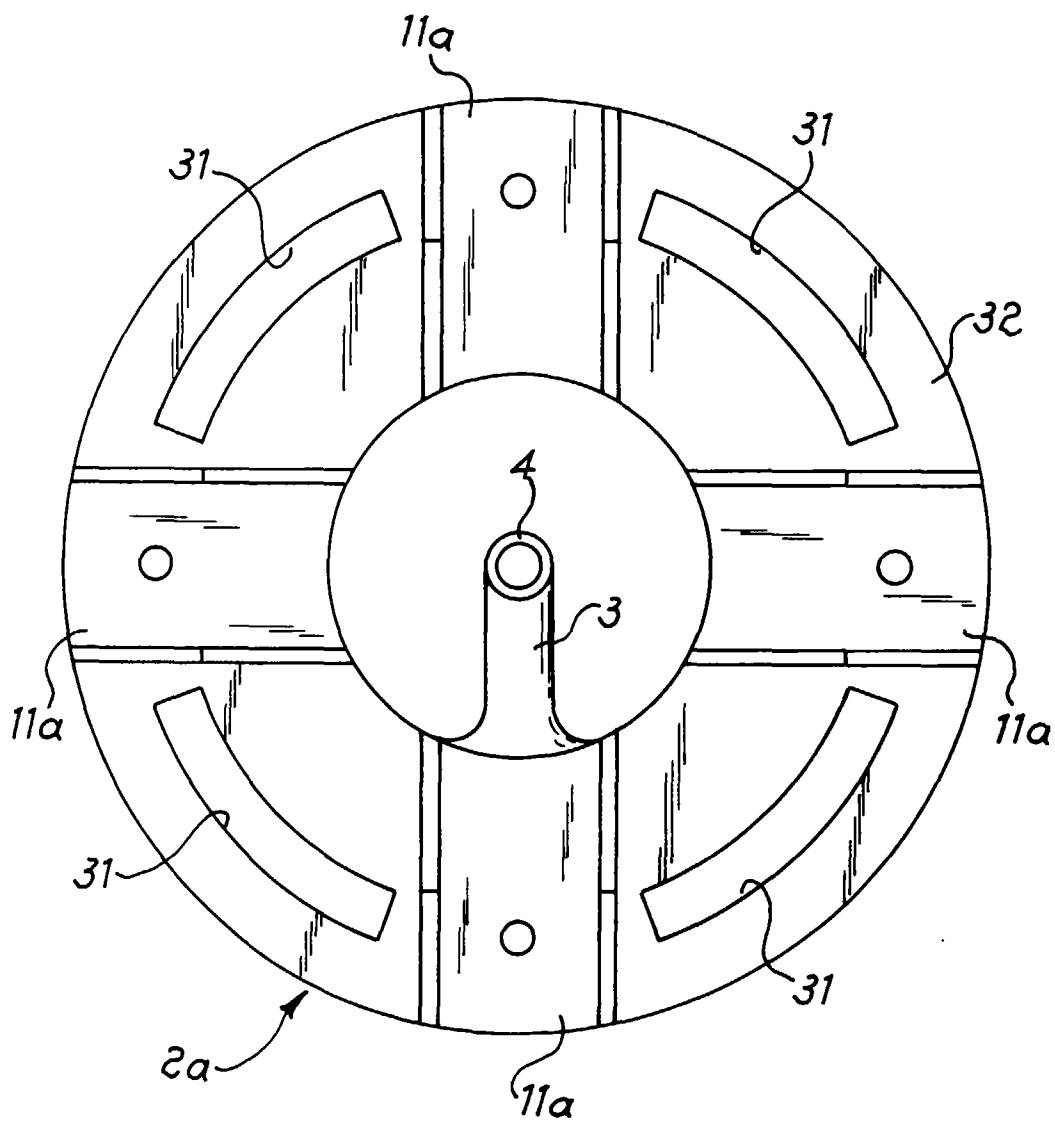
Fig. 6



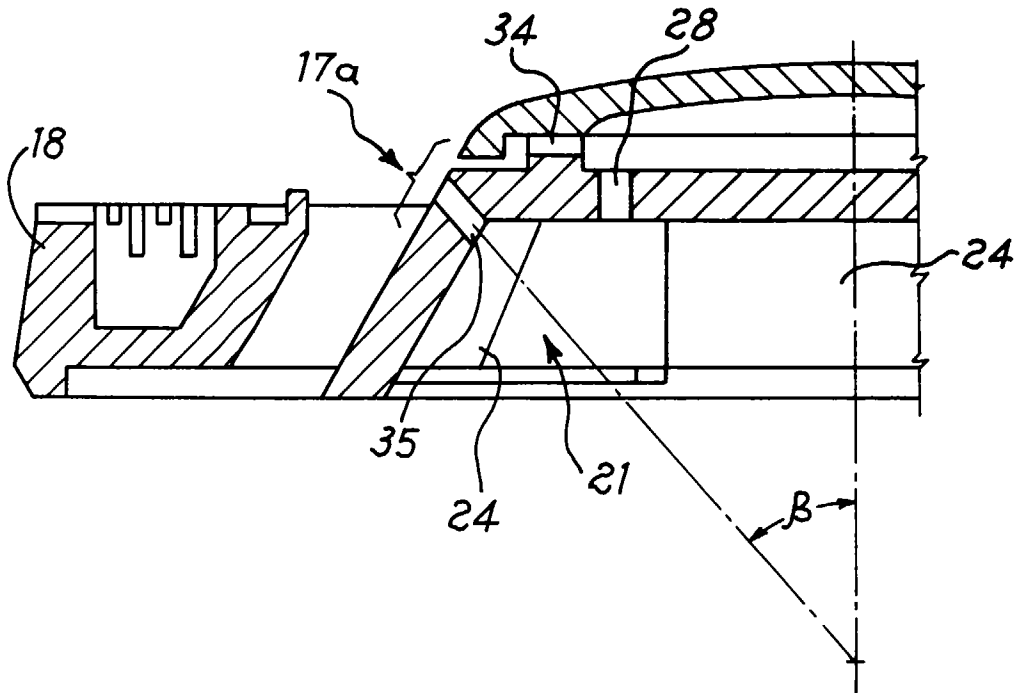
**Fig. 7**



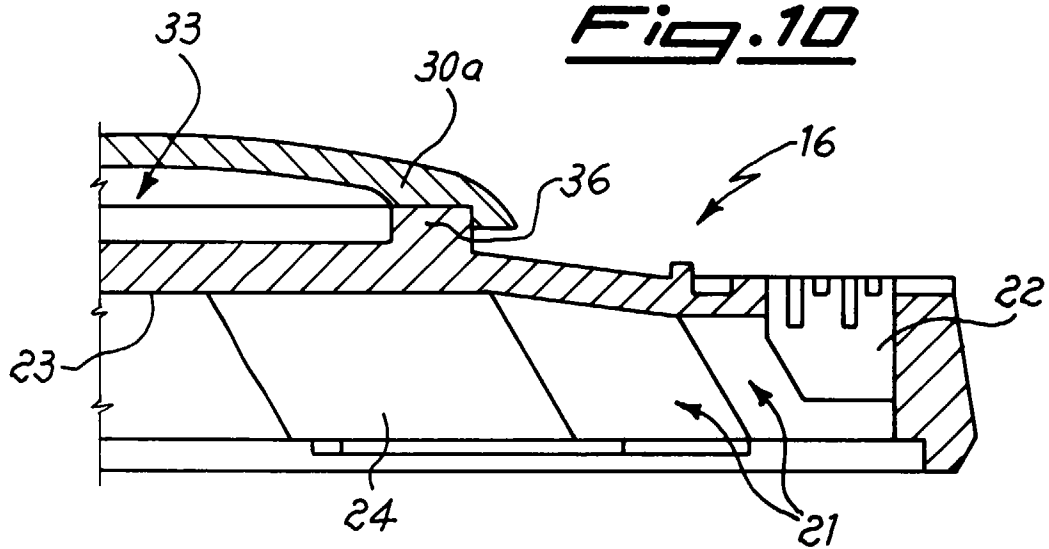
**Fig. 8**



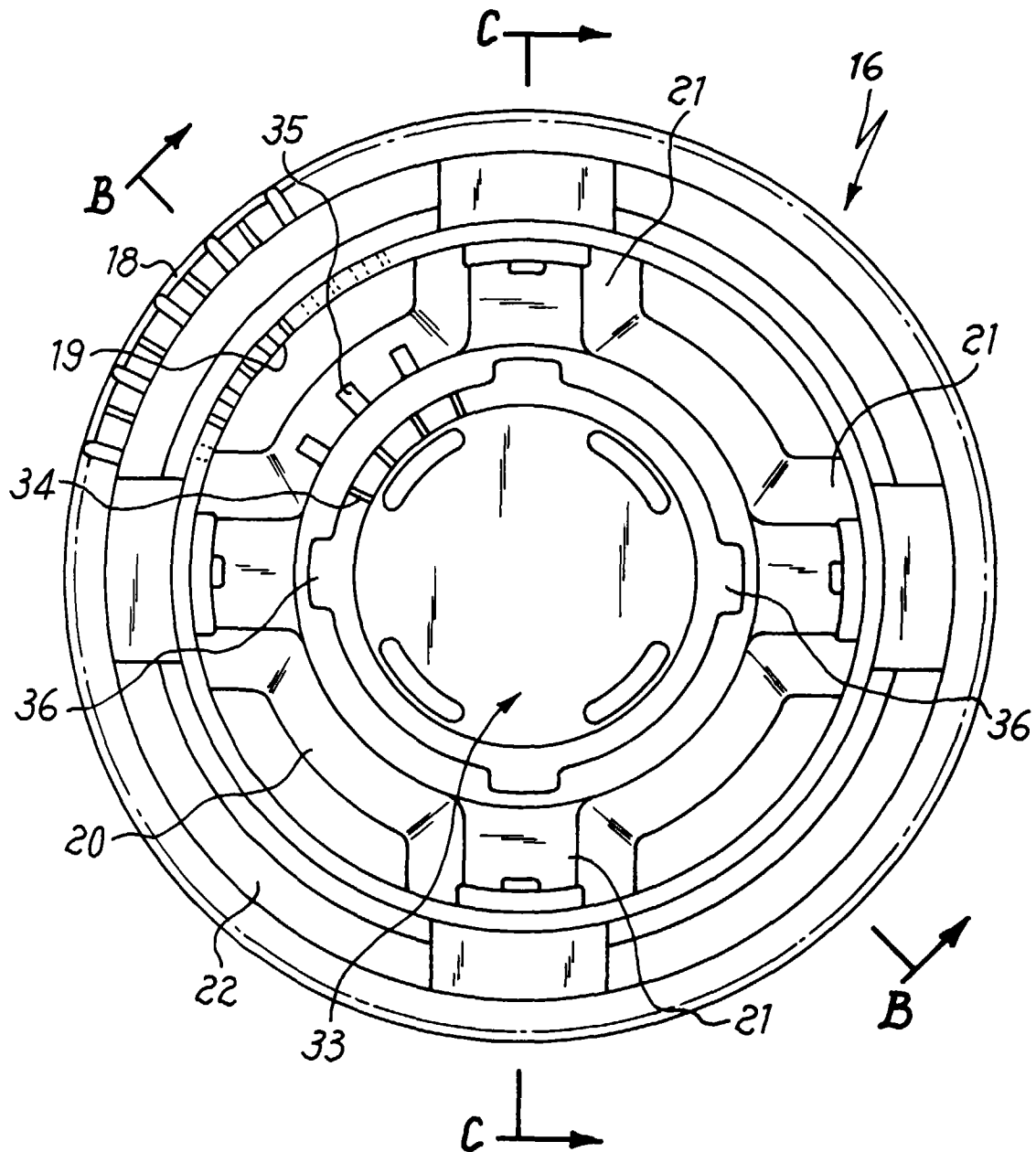
***Fig. 9***



***Fig. 10***



***Fig. 11***



***Fig. 12***

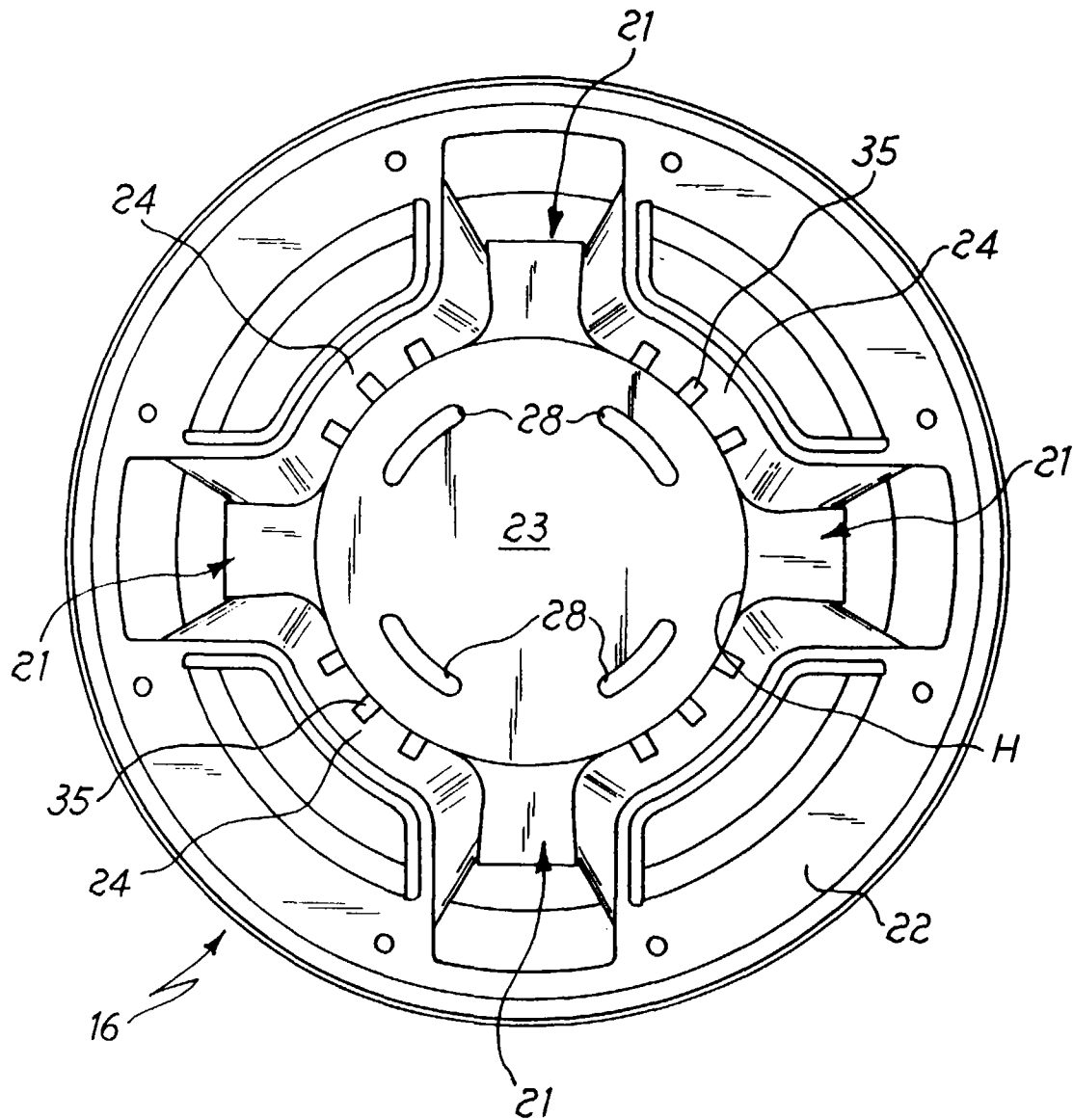
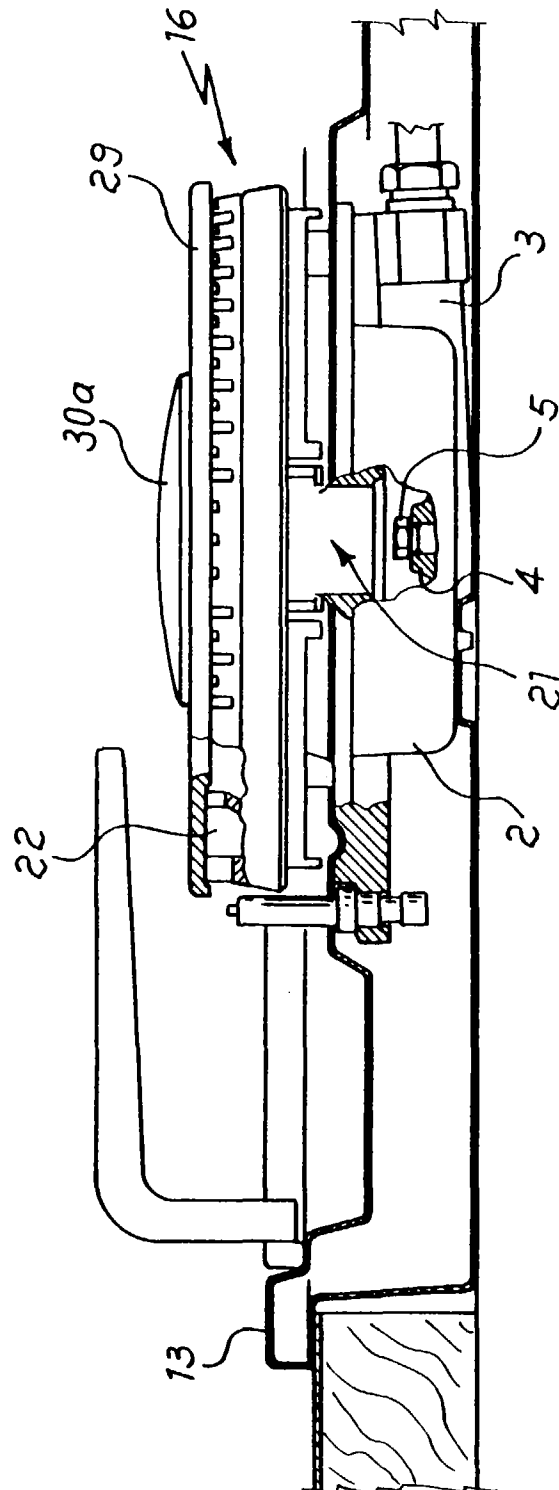


Fig. 13





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# EUROPEAN SEARCH REPORT

Application Number  
EP 96 10 9934

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.6)
A,D	GB 2 233 444 A (LEE CHENG SAN) 9 January 1991 * the whole document *	1	F23D14/00 F23D14/06
A	EP 0 552 135 A (SMEG SPA) 21 July 1993 * the whole document *	1	
A,D	DE 31 23 751 A (SABAF SPA) 30 December 1982 * the whole document *	1	
A,D	EP 0 534 301 A (MERLONI ELETTRODOMESTICI SPA) 31 March 1993 * the whole document *	1	
The present search report has been drawn up for all claims			<b>TECHNICAL FIELDS SEARCHED (Int.Cl.6)</b> F23D
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>16 June 1997</b>	Examiner <b>Coli, E</b>
<b>CATEGORY OF CITED DOCUMENTS</b> 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			

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