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(54) GAS BURNER WITH MULTIPLE FLAME RINGS

GASBRENNER MIT MEHREREN FLAMMENRINGEN

BRÛLEUR À GAZ AUX ANNEAUX DE FLAMME MULTIPLES

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Description

[0001] The present invention relates to a gas burner with multiple flame rings.

[0002] Single control gas burners with multiple concentric flame rings are known, i.e. burners in which the gas feed is controlled by a single tap. These generally comprise an injector holder cup, a flame divider resting on the injector holder cup and formed from two parts joined together to form an inner central portion and an outer annular portion, an annular cover which closes the annular portion of the flame divider, and a discoidal cover which closes the central portion of the flame divider.

[0003] Hence known gas burners with multiple concentric rings are formed from a total of five elements assembled together.

[0004] One of these known burners is described for example in EP-B1-0797048.

[0005] WO200605136 discloses a gas burner system for food cooking is described, comprising a pair of concentric burners, the gas to be supplied to the pair of burners being suitably mixed with air taken above the cooking top on which the burner system is mounted, so as to form an air-gas mixture for the pair of burners.

[0006] US2006121402 discloses a gas burner for cookers, of the type fitted to a cooking hob, comprising a central body having a first ring of flames and at least one external body, fluidly separated from said central body and substantially concentric with it, having at least one second (circumferential) ring of flames, as well as means for separately feeding the mixture of primary air and gas to the central body and to the external body.

[0007] An object of the invention is to provide a gas burner of multiple concentric ring type in which the number of components is reduced.

[0008] Another object of the invention is to provide a gas burner of multiple concentric ring type which is of limited overall height, such as to be able to be mounted on traditional built-in cooking hobs.

[0009] Another object of the invention is to provide a gas burner of multiple concentric ring type in which the primary air is drawn in from above the cooking hob, in order to prevent streaming, i.e. flame disturbance on sudden opening of the oven door or of a furniture item positioned below the cooking hob.

[0010] These and other objects which will be apparent from the ensuing description are attained according to the invention by a gas burner with multiple concentric rings as described in claim 1.

[0011] The present invention is further clarified hereinafter by means of some preferred embodiments thereof described with reference to the accompanying drawings, in which:

Figure 1 is an exploded perspective view of a first embodiment of the burner according to the invention, seen from above,

Figure 2 is an exploded perspective view thereof seen

from below,

Figure 3 is a perspective view thereof in its assembled state, mounted on a cooking hob,

Figure 4 is a perspective view thereof shown in vertical section,

Figure 5 is a second embodiment thereof shown in the same view as Figure 4, and

Figure 6 shows a third embodiment thereof with three injectors.

[0012] As can be seen from the figures, the burner of the invention comprises, in the embodiment shown in Figures 1-4, three basic components consisting of the injector holder 2, the flame divider 4 and the cover 6.

[0013] The injector holder 2 is of essentially elongated extension and is shaped to define two cups 8 connected together by two baffles 10. The two cups are closed lowerly and laterally and are open at their top, where the lateral wall is provided with an outwardly jutting flange 12 for resting against the underside of the sheet metal of a cooking hob 14, to which the burner is fixed by screws.

[0014] The lateral wall of each cup 8 extends upperly beyond the flange 12 to form a rim 16 emerging from the cooking hob 14 and acting as the support element for the flame divider 4.

[0015] The injector holder 2 also comprises a gas feed conduit 18; it extends horizontally below the base of the two cups 8, it is open at one end for gas entry and communicates with two injectors 20 screwed centrally to the base of the cups.

[0016] The flame divider 4 rests on the injector holder 2 such that two of its downwardly jutting profiled projections 22 rest on the upper rims 16 of the two cups 8. These profiled projections 22 do not extend along the entire extension of the corresponding upper rims 16, but only along its two lateral portions and along its inner portion, such as to define between the flame divider 4 and the injector holder 2 two apertures for access of the primary air originating from above the cooking hob 14 into the two cups 8.

[0017] The flame divider 4 is centred about the injector holder 2 by projections 24, which extend downwards from the flame divider 2 and adhere via their outer vertical edge to the inner surface of the lateral wall of the two cups 8.

[0018] The flame divider 4 comprises an outer portion 26 of overall annular shape and an inner portion 28 of overall circular shape.

[0019] More particularly, the outer portion 26 presents an outer rim 30 which extends along a circumference, and an inner rim 32, of which a certain part extends along a circumference concentric with that of the outer rim 30, then it curves inwards to connect to the circular rim 34 of the inner portion 28. In this manner two substantially radial channels 36 are obtained providing fluidic connection between the inner circular portion 28 and the outer annular portion 26 of the flame divider 4. Hence these

two portions are bounded by a single continuous rim, which comprises along its entire extension, with the exception of the parts relative to the two radial channels 26, a plurality of main ports 38 and secondary ports 40, which on the rim 30 form the outer ring of outwardly directed flames, on the rim 32 form the intermediate ring of inwardly directed flames, and on the rim 34 form the inner ring of outwardly directed flames.

[0020] The two rims bounding the radial channels 36 also present secondary apertures 42, the purpose of which is to transmit the flames from the intermediate ring to the inner ring.

[0021] In addition, in the outer portion 26 of the flame divider 4, two channels 43 are positioned provided with two small ports 44 for inter-ignition between the flames of the outer ring and those of the intermediate ring and inner ring.

[0022] The flame divider 4 also comprises two vertical conduits 46 which at their lower end face the two injectors 20 and open upperly at projections 48 which lowerly define two venturi effect chambers bounded upperly by the cover 6, which rests on the flame divider 4 at four centring pegs 50 provided therein.

[0023] When the flame divider 4 rests via its profiled projections 22 on the upper rims 16 of the two cups 8, it is maintained spaced from the sheet metal of the cooking hob 14 by a distance such as to determine passages therewith for the secondary air intended for the inner portion 28 of the flame divider.

[0024] The cover 6 is formed in one piece and comprises an annular outer portion 52, a discoidal inner portion 54 and two profiled radial connection portions 56.

[0025] The burner of this embodiment operates in the following manner:

[0026] The gas entering from the conduit 18 leaves from the injectors 20 and enters the two vertical conduits 46 of the flame divider 4, to entrain the primary air drawn in from above the cooking hob 14 through the apertures defined by the outer part of the profiled projection 22 of each cup 8 and the overlying flame divider, in accordance with the path indicated by the arrows 58 in Figure 4.

[0027] The flow of gas and primary air which begins to mix in each of the vertical conduits 46 completes its mixing in the corresponding radial venturi chamber defined lowerly by the surface of the projection 48 and upperly by the cover 6.

[0028] The mixture obtained in this manner then propagates along the annular portion 26 of the flame divider 4 to feed the two rings of outer and intermediate flames thereof, then further propagates along the two radial conduits 36 to feed the central ring of flames of the inner portion 28.

[0029] From the foregoing it is apparent that the burner of the invention is much more advantageous than traditional multi-flame ring burners, and in particular:

- it is formed from only three pieces, hence as the flame divider is of one-piece die-cast construction

without machining, it is of simple and economical manufacture,

- the cover, even though intended for a three flame ring burner, is also formed in one piece, again making the burner manufacture simple and economical,
- because of the use of radial venturi mixing chambers, it is of small vertical height and easily installed in normal cooking hobs. The fact of having two mixing chambers means that a power can be developed which is much higher than traditional burners with a single radial venturi mixing chamber,
- finally, as the primary air is drawn in from above the cooking hob, it is virtually insensitive to streaming.

[0030] In the embodiment illustrated in Figure 5, the gas/primary air mixture of the burner of the invention generated by the two radial venturi chambers is conveyed into the inner central portion 28 of the flame divider 4 not through radial channels bounded by the flame divider and the cover, as in the preceding embodiment, but by two radial channels 60 bounded by the flame divider 4 and the injector holder 2. For this purpose the injector holder 2 is provided, in the connection portion between the two cups 8, with two radial channels 60 which connect the two radial venturi mixing chambers to the inner portion 28 of the flame divider 4, which is also provided with baffles 62 for upperly closing said channels 60.

[0031] In this embodiment the cover 6, the purpose of which is no longer to upperly bound the radial channels connecting the two mixing chambers to the inner portion 28 of the flame divider 4, can be formed in two separate parts, of which the outer part is of approximately annular shape and the inner part is of discoidal shape.

[0032] The embodiment shown in Figure 6 differs from the preceding embodiments by the addition, to the two cups 8 provided on their base with corresponding injectors, of a third central cup 8' provided on its base with a third injector 20', also communicating with the same gas feed conduit 18.

[0033] In this case the inner portion 28 of the flame divider 4 communicates with the cup 8' via its own vertical conduit 46', through which the gas/primary air mixture is fed.

[0034] The flame divider 4 rests only partly on the underlying injector holder 2, such as to define access apertures for the primary air originating from above the cooking hob.

Claims

1. A gas burner with multiple flame rings, comprising an injector holder piece (2), a flame divider (4) having an outer portion (26) of overall annular shape and an inner portion (28) of overall circular shape, and means (6) for upperly closing said outer and inner portions,

- said injector holder piece (2) carries, applied thereto, at least two injectors (20, 20') of substantially vertical axis positioned in a substantially diametrical plane of the burner,
 - said flame divider (4) comprises at least two substantially vertical conduits (46, 46') facing the two injectors (20, 20') of the injector holder (2) and opening upperly into a horizontal venturi effect chamber, bounded upperly by said closure means (6),
characterized in that
 - the region downstream of said horizontal vertical effect chamber is connected in a fluidic manner to the inner portion (28) of said flame divider (4), via two channels (36, 60).
2. A burner as claimed in claim 1, **characterised in that** applied to the injector holder 2 there are two injectors (20) positioned on the base of two upperly open and laterally closed cups (8) which with their lateral wall surround the vertical conduit (46) facing the corresponding injector (20).
3. A burner as claimed in one or more of the preceding claims, **characterised in that** the lateral wall of each cup (8) extends upperly in the form of a rim (16) beyond the sheet metal of the cooking hob (14) and receives, resting thereon, a corresponding profiled projection (22) jutting lowerly from the flame divider (4) and partially interrupted to form an aperture providing access to the interior of said cup for the primary air drawn in from above said cooking hob.
4. A burner as claimed in claim 3, **characterised in that** the flame divider (4) resting by its profiled projections (22) on the upper rim (16) of each cup (8) maintains said flame divider raised from the sheet metal of the cooking hob (14) by an amount sufficient to determine therebetween two passages for the secondary air feeding the inner portion (28) of said flame divider (4).
5. A burner as claimed in one or more of the preceding claims, **characterised in that** the inner portion (28) of the flame divider (4) is of overall circular shape, the outer portion (26) being of overall annular shape comprising two widenings at which said horizontal venturi effect chambers are provided.
6. A burner as claimed in claim 5, **characterised in that** the outer portion (26) of the flame divider (4) presents an outer rim (30) extending along a circumference, and an inner rim (32) a certain part of which extends along a circumference internally concentric with the preceding circumference while the remaining part forms two re-entrant regions corresponding with the widenings of said outer portion.
7. A burner as claimed in claim 5, **characterised in that** the inner portion (28) of the flame divider (4) is bounded by a rim (34) which is of circular shape with the exception of parts connected to the outer rim (32) of the outer annular portion (26) of said flame divider.
8. A burner as claimed in claim 7, **characterised in that** the connection parts between the rim (34) of the inner portion (28) of the flame divider (4) and the outer rim (32) of its outer portion (26) define radial channels (36) providing fluidic connection between the radial venturi effect chambers and said inner portion (28).
9. A burner as claimed in claim 8, **characterised in that** said closure means (6) consist of a cover comprising an annular outer portion (52) for closing the outer annular portion (26) of the flame divider (4), a circular inner portion (54) for closing its circular inner portion (28), and two radial profiled portions (56) connecting together said outer portion (52) and said inner portion (54) and for upperly closing said radial channels (36).
10. A burner as claimed in one or more of the preceding claims, **characterised by** providing, in that portion of the injector holder (2) which connects the two cups (8) together, two channels (60) connecting each horizontal venturi effect chamber to the base of the inner portion (28) of said flame divider (4).
11. A burner as claimed in one or more of the preceding claims, **characterised by** applying, to the injector holder (2), three injectors (20, 20') positioned on the base of three cups (8, 8') and substantially aligned in the diametrical plane of the burner.
12. A burner as claimed in one or more of the preceding claims, **characterised in that** the cups (8, 8') are provided with access apertures for the primary air drawn in from above the cooking hob.

Patentansprüche

1. Gasbrenner mit mehreren Flammenringen, umfassend ein Einblasdüsen-Halterstück (2), einen Flammerteiler (4) mit einem äußeren Abschnitt (26) mit einer insgesamt ringförmigen Form und einem inneren Abschnitt (28) mit einer insgesamt kreisförmigen Form und Mittel (6) zum Schließen des äußeren und inneren Abschnitts von oben,
- wobei das Einblasdüsen-Halterstück (2) mindestens zwei daran angebrachte Einblasdüsen (20, 20') mit einer im Wesentlichen vertikalen Achse trägt, die in einer im Wesentlichen diametralen Ebene des Brenners angeordnet sind,

- wobei der Flammteiler (4) mindestens zwei im Wesentlichen vertikale Leitungen (46, 46') umfasst, die den zwei Einblasdüsen (20, 20') des Einblasdüsenhalters (2) gegenüberliegen und sich nach oben in eine horizontale Venturieffekt-Kammer öffnen, die oben durch die Schließmittel (6) begrenzt ist,
dadurch gekennzeichnet, dass
 - der Bereich stromabwärts der horizontalen vertikalen Venturieffekt-Kammer fluidisch mit dem inneren Abschnitt (28) des Flammteilers (4) über zwei Kanäle (36, 60) verbunden ist.
2. Brenner nach Anspruch 1, **dadurch gekennzeichnet, dass** an dem Einblasdüsenhalter (2) zwei Einblasdüsen (20) angebracht sind, die an der Basis von zwei nach oben offenen und seitlich geschlossenen Bechern (8) angeordnet sind, die mit ihrer Seitenwand die vertikale Leitung (46) umgeben, die der entsprechenden Einblasdüse (20) gegenüberliegt.
3. Brenner nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sich die Seitenwand jedes Bechers (8) in Form eines Kranzes (16) nach oben über das Blech des Kochfeldes (14) hinaus erstreckt und darauf aufliegend einen entsprechenden profilierten Vorsprung (22) aufnimmt, unterhalb des Flammteilers (4) hervorsticht und teilweise unterbrochen ist, um eine Öffnung zu bilden, die Zugang zu dem Innenraum des Bechers für die Primärluft bereitstellt, die oberhalb des Kochfeldes eingesogen wird.
4. Brenner nach Anspruch 3, **dadurch gekennzeichnet, dass** der Flammteiler (4), der durch seine profilierten Vorsprünge (22) auf dem oberen Kranz (16) jedes Bechers (8) aufliegt, den Flammteiler von dem Blech des Kochfeldes (14) um eine ausreichende Menge angehoben hält, um dazwischen zwei Durchlässe für die Sekundärluft festzulegen, die den inneren Abschnitt (28) des Flammteilers (4) speist.
5. Brenner nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der innere Abschnitt (28) des Flammteilers (4) eine insgesamt kreisförmige Form aufweist, wobei der äußere Abschnitt (26) eine insgesamt ringförmige Form aufweist, die zwei Verbreiterungen umfasst, an denen die horizontalen Venturieffekt-Kammern bereitgestellt sind.
6. Brenner nach Anspruch 5, **dadurch gekennzeichnet, dass** der äußere Abschnitt (26) des Flammteilers (4) einen äußeren Kranz (30), der sich entlang eines Umfangs erstreckt, und einen inneren Kranz (32) aufweist, von dem sich ein bestimmter Teil entlang eines Umfangs erstreckt, der intern konzentrisch mit dem vorherigen Umfang angeordnet ist, während der restliche Teil zwei hinterschnittene Bereiche bildet, die mit den Verbreiterungen des äußeren Abschnitts übereinstimmen.
7. Brenner nach Anspruch 5, **dadurch gekennzeichnet, dass** der innere Abschnitt (28) des Flammteilers (4) durch einen Kranz (34) begrenzt ist, der mit Ausnahme von Teilen, die mit dem äußeren Kranz (32) des äußeren ringförmigen Abschnitts (26) des Flammteilers verbunden sind, eine kreisförmige Form aufweist.
8. Brenner nach Anspruch 7, **dadurch gekennzeichnet, dass** die Verbindungsteile zwischen dem Kranz (34) des inneren Abschnitts (28) des Flammteilers (4) und dem äußeren Kranz (32) seines äußeren Abschnitts (26) radiale Kanäle (36) definieren, die eine Fluidverbindung zwischen den radialen Venturieffekt-Kammern und dem inneren Abschnitt (28) bereitstellen.
9. Brenner nach Anspruch 8, **dadurch gekennzeichnet, dass** die Schließmittel (6) aus einer Abdeckung bestehen, die einen ringförmigen äußeren Abschnitt (52) zum Schließen des äußeren ringförmigen Abschnitts (26) des Flammteilers (4), einen kreisförmigen inneren Abschnitt (54) zum Schließen des kreisförmigen inneren Abschnitts (28) und zwei radiale profilierte Abschnitte (56), die den äußeren Abschnitt (52) und den inneren Abschnitt (54) miteinander verbinden, zum Schließen der radialen Kanäle (36) von oben umfasst.
10. Brenner nach einem oder mehreren der vorhergehenden Ansprüche, **gekennzeichnet durch** das Bereitstellen, in dem Abschnitt des Einblasdüsenhalters (2), der die zwei Becher (8) miteinander verbindet, von zwei Kanälen (60), die jede horizontale Venturieffekt-Kammer mit der Basis des inneren Abschnitts (28) des Flammteilers (4) verbinden.
11. Brenner nach einem oder mehreren der vorhergehenden Ansprüche, **gekennzeichnet durch** das Anbringen von drei Einblasdüsen (20, 20'), die an der Basis von drei Bechern (8, 8') angeordnet und in der diametralen Ebene des Brenners im Wesentlichen ausgerichtet sind, an dem Einblasdüsenhalter (2).
12. Brenner nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Becher (8, 8') mit Zugangsöffnungen für die Primärluft bereitgestellt sind, die oberhalb des Kochfeldes eingesogen wird.

Revendications

1. Brûleur à gaz à multiples anneaux de flamme, comprenant une pièce de support d'injecteur (2), un diviseur de flamme (4) ayant une partie extérieure (26) de forme globalement annulaire et une partie intérieure (28) de forme globalement circulaire ainsi que des moyens (6) pour fermer par en haut lesdites parties extérieure et intérieure;
 - ladite pièce de support d'injecteur (2) supporte au moins deux injecteurs (20, 20') appliqués sur elle et présentant un axe sensiblement vertical positionné dans un plan sensiblement diamétral du brûleur;
 - ledit diviseur de flamme (4) comprenant au moins deux conduits (46, 46') sensiblement verticaux placés en face des deux injecteurs (20, 20') du support d'injecteur (2) et s'ouvrant vers le haut dans une chambre à effet Venturi horizontale, délimités en haut par lesdits moyens de fermeture (6);

caractérisé en ce que:

 - la région placée en aval de ladite chambre à effet verticale horizontale est reliée de manière fluïdique à la partie intérieure (28) dudit diviseur de flamme (4), par l'intermédiaire de deux canaux (36, 60).
2. Brûleur selon la revendication 1, **caractérisé en ce que** deux injecteurs (20) appliqués au support d'injecteur (2) sont positionnés sur la base de deux coupelles (8) ouvertes sur le dessus et fermées sur le côté qui entourent, avec leur paroi latérale, le conduit vertical (46) placé en face de l'injecteur (20) correspondant.
3. Brûleur selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** la paroi latérale de chaque coupelle (8) s'étend vers le haut sous la forme d'une bordure (16) en saillie par rapport à la feuille métallique de la plaque de cuisson (14) et reçoit, reposant sur elle, une partie profilée (22) correspondante du diviseur de flamme saillant vers le bas (4) et en partie interrompue pour former une ouverture donnant accès à l'intérieur de ladite coupelle afin de laisser passer l'air primaire aspiré au-dessus de ladite plaque de cuisson.
4. Brûleur selon la revendication 3, **caractérisé en ce que** le diviseur de flamme (4) reposant sur ses parties profilées saillantes (22) sur la bordure supérieure (16) de chaque coupelle (8) maintient ledit diviseur de flamme en position surélevée par rapport à la feuille métallique de la plaque de cuisson (14) d'une manière suffisante pour définir entre eux deux passages pour l'air secondaire alimentant la partie intérieure (28) dudit diviseur de flamme (4).
5. Brûleur selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** la partie intérieure (28) du diviseur de flamme (4) est de forme globalement circulaire, la partie extérieure (26) de forme globalement annulaire comprenant deux élargissements au niveau desquels des chambres à effet Venturi horizontal sont prévues.
6. Brûleur selon la revendication 5, **caractérisé en ce que** la partie extérieure (26) du diviseur de flamme (4) présente une bordure extérieure (30) s'étendant le long d'une circonférence et une bordure intérieure (32) dont une certaine partie s'étend le long d'une circonférence concentrique intérieure avec la circonférence précédente tandis que la partie restante forme deux régions rentrantes correspondant aux élargissements de ladite partie extérieure.
7. Brûleur selon la revendication 5, **caractérisé en ce que** la partie intérieure (28) du diviseur de flamme (4) est délimitée par une bordure (34) de forme circulaire à l'exception des parties reliées à la bordure extérieure (32) de la partie annulaire extérieure (26) dudit diviseur de flamme.
8. Brûleur selon la revendication 7, **caractérisé en ce que** les parties de connexion situées entre la bordure (34) de la partie intérieure (28) du diviseur de flamme (4) et la bordure extérieure (32) de sa partie extérieure (26) définissent des canaux radiaux (36) assurant une connexion fluïdique entre les chambres à effet Venturi radiales et ladite partie intérieure (28).
9. Brûleur selon la revendication 8, **caractérisé en ce que** lesdits moyens de fermeture (6) consistent en un couvercle comprenant une partie extérieure annulaire (52) fermant la partie annulaire extérieure (26) du diviseur de flamme (4), une partie intérieure circulaire (54) fermant sa partie intérieure circulaire (28) et deux parties profilées radiales (56) reliant ensemble ladite partie extérieure (52) et ladite partie intérieure (54) et fermant par en haut lesdits canaux radiaux (36).
10. Brûleur selon l'une ou plusieurs des revendications précédentes, **caractérisé par** en ce qu'il comprend, dans la partie du support d'injecteur (2) qui relie les deux coupelles (8) ensemble, deux canaux (60) reliant chaque chambre à effet Venturi horizontale à la base de la partie intérieure (28) dudit diviseur de flamme (4).
11. Brûleur selon l'une ou plusieurs des revendications précédentes, **caractérisé par** l'application, sur le support d'injecteur (2), de trois injecteurs (20, 20') positionnés sur la base de trois coupelles (8, 8') et sensiblement alignés dans le plan diamétral du brûleur.

12. Brûleur selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** les coupelles (8, 8') sont munies d'ouvertures d'accès pour l'air primaire aspiré au-dessus de la plaque de cuisson.

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FIG. 1

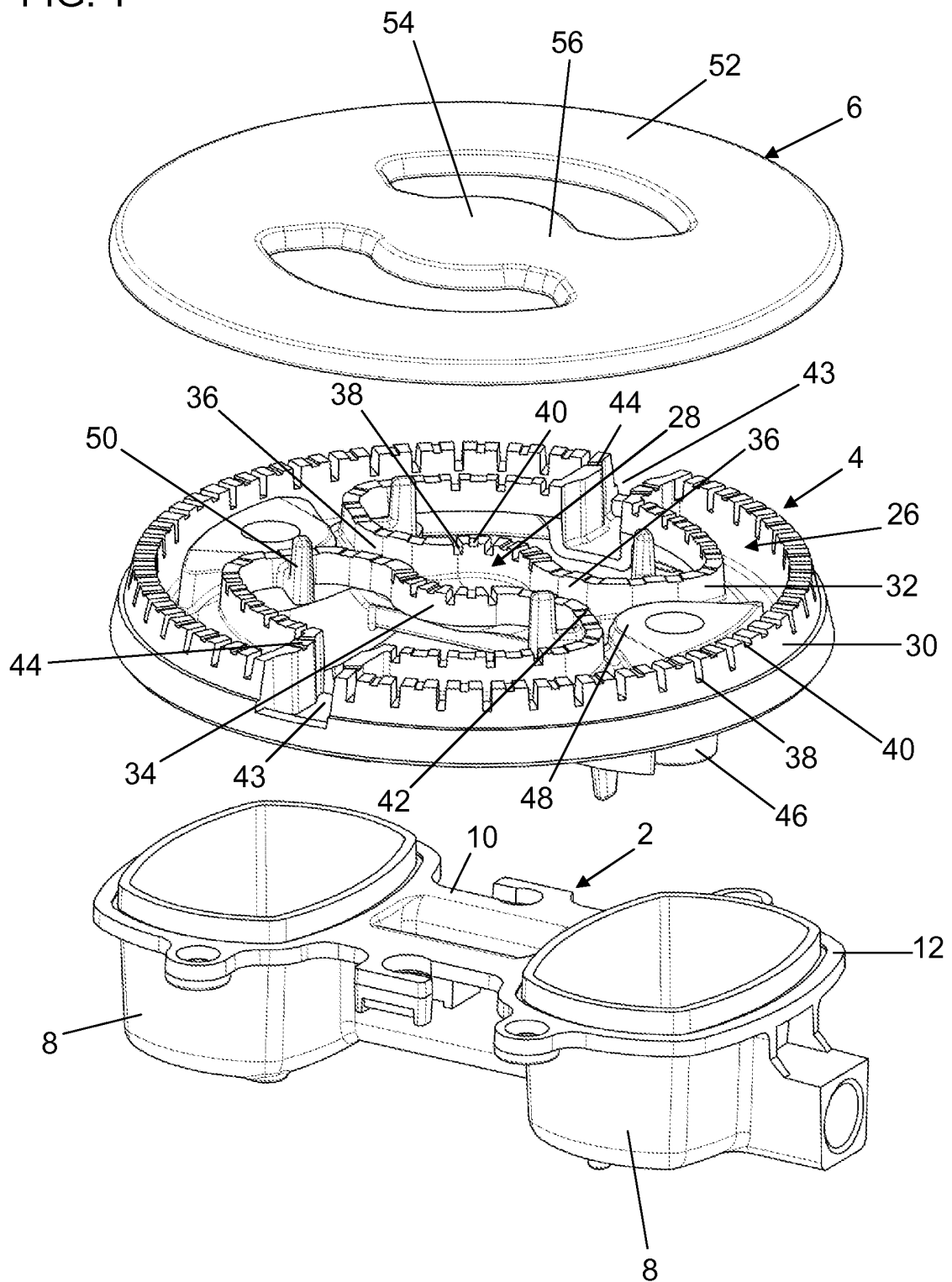


FIG. 2

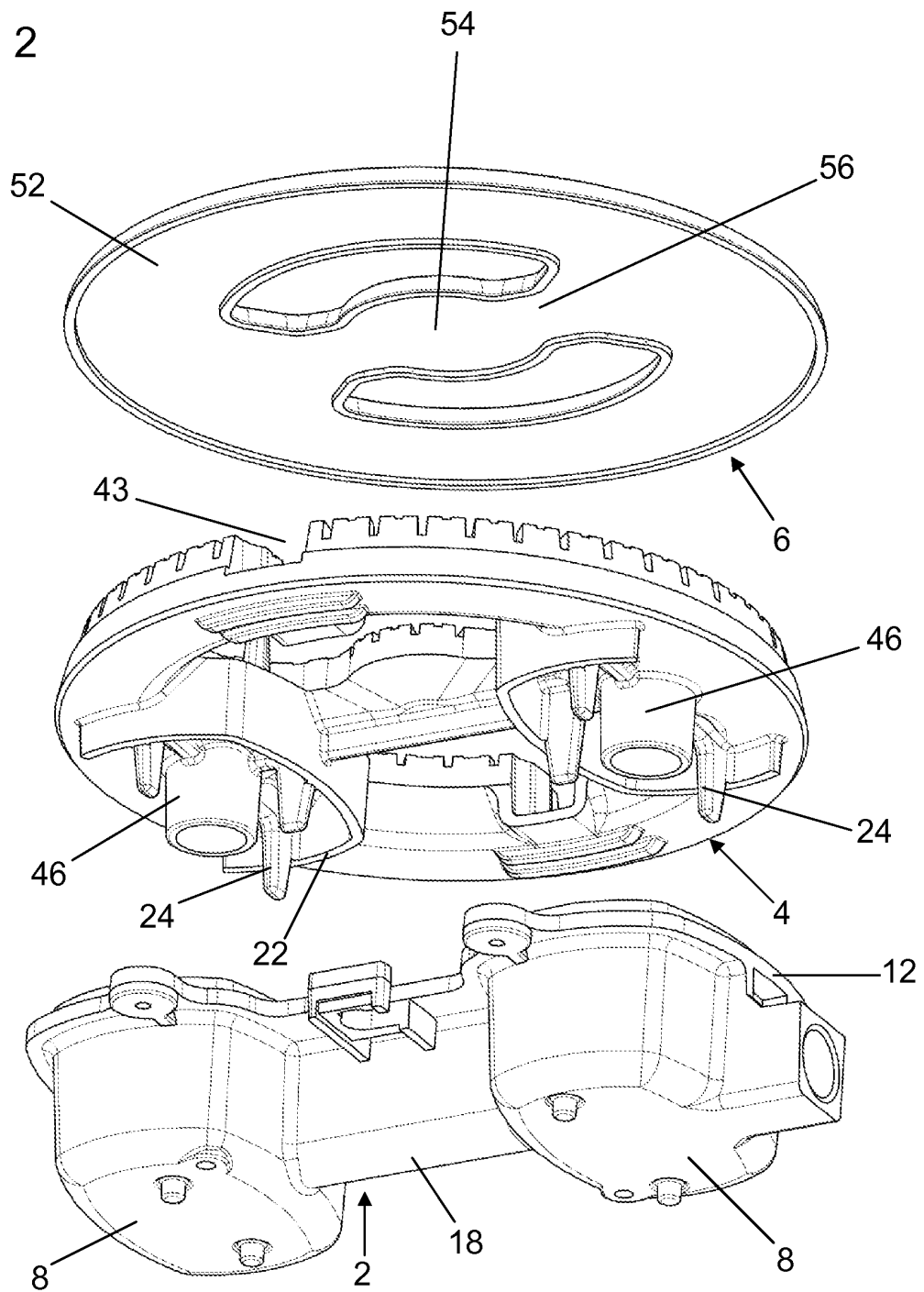


FIG. 3

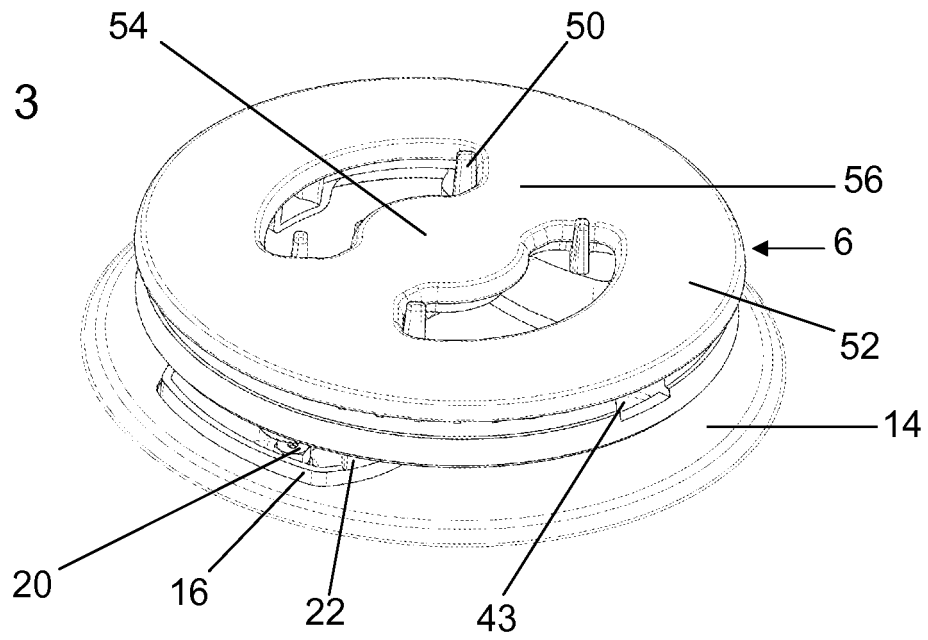


FIG. 4

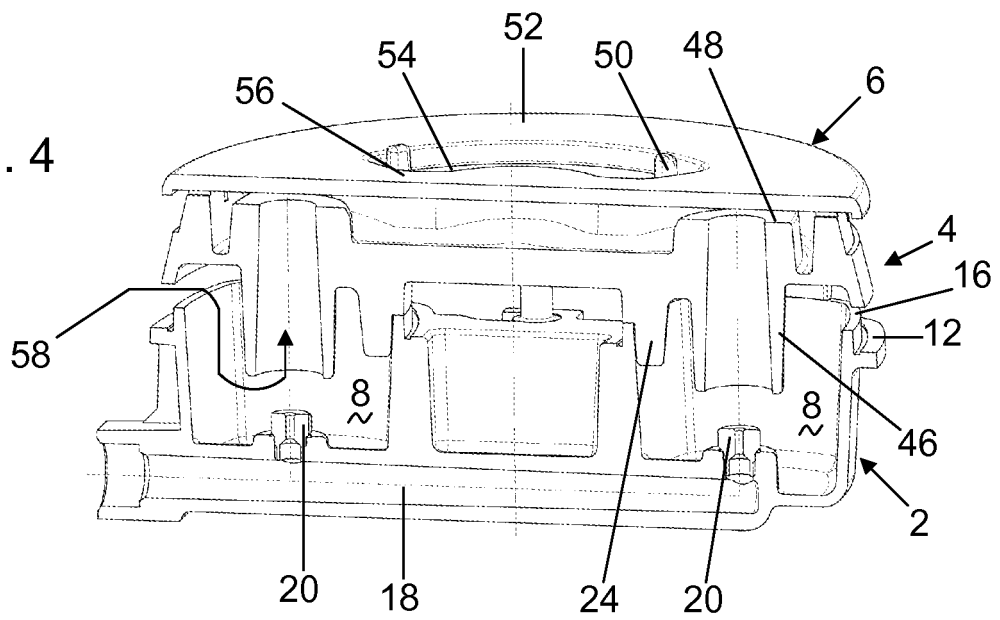


FIG. 5

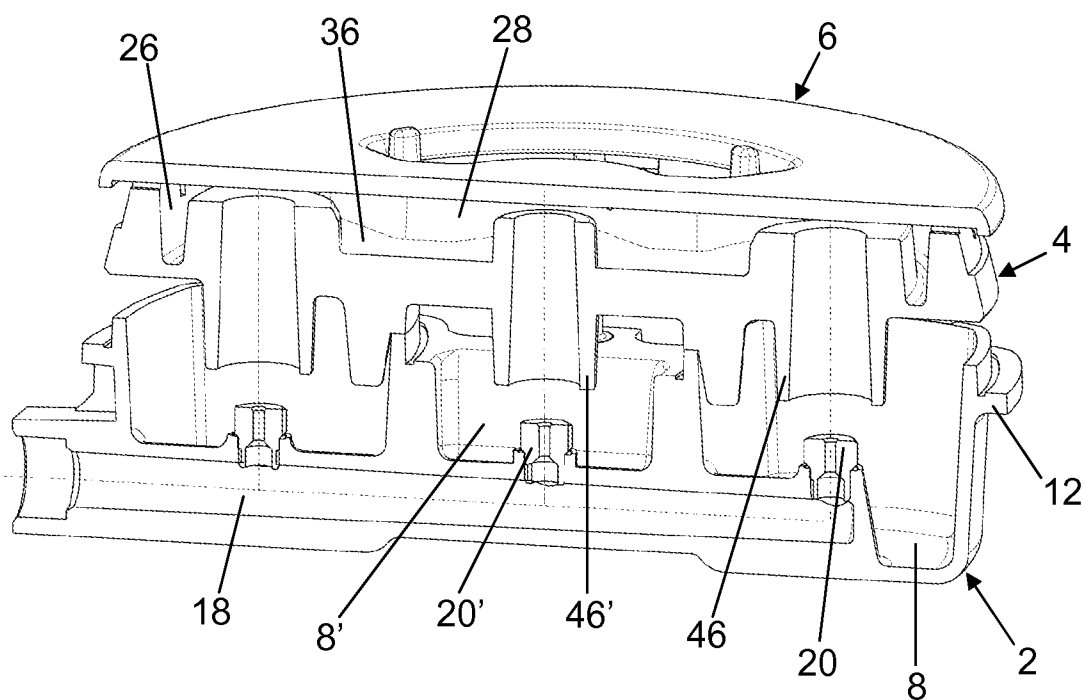
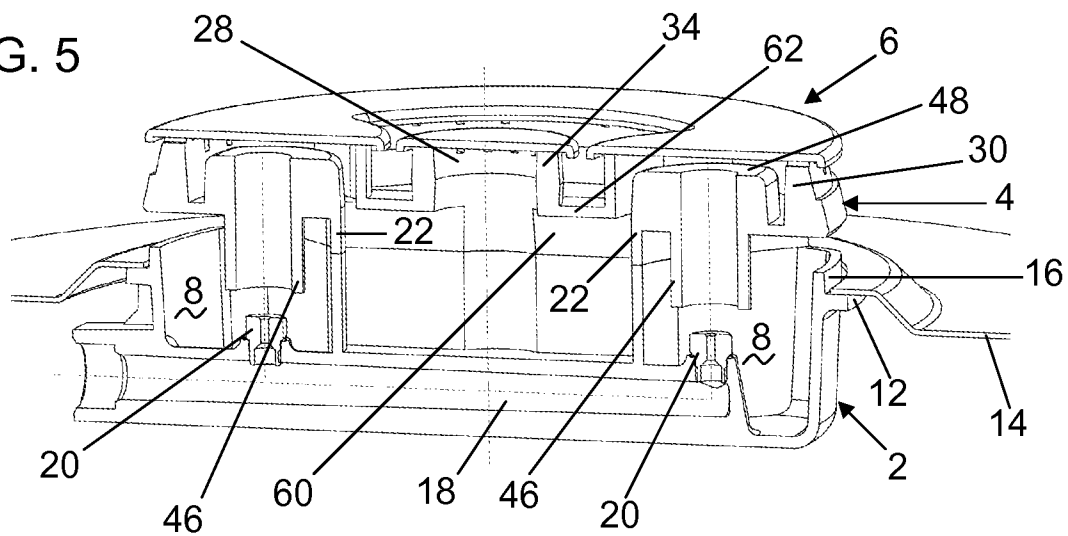


FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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