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(54) **Dish-washing machine**

Geschirrspülmaschine

Machine à laver la vaisselle

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Description

[0001] The invention relates to a dish-washing machine according to the preamble of independent claim 1.

[0002] A dish-washing machine of this kind is known from DE 296 01 313 U1. On this known dish-washing machine, a simple blocking device ensures that the extraction line is only opened when the fan is switched on, and is closed again automatically when the fan is switched off, and is thus controlled without intervention in the control programme. On this known dish-washing machine, the hot vapour-saturated air sucked out of the washing area is only mixed in the fan, located in the engine area, and the exit channel with a stream of dry air. The consequence of this is that the hot vapour-saturated air condenses in the extraction line to the fan. This condensate must then be caught by means of a condensate trough from which it can then evaporate between the washing cycles.

[0003] The object of the invention is, on a dish-washing machine of the type mentioned initially, to prevent the formation of condensation in the extraction line to the fan.

[0004] This object is achieved according to the invention by the dishwashing machine defined in independent claim 1.

[0005] The relative air humidity is considerably reduced before it enters the extraction line and thus the formation of condensation in the extraction line is prevented. The air which is taken in via the additional suction aperture of the blocking device on the roof of the washing area is warm and dry, which has a positive effect on the reduction of the air humidity in the mixed air which is led to the extraction line. Extraction can be carried out with a simple one or two-stage fan. A condensation trough is no longer necessary.

[0006] An advantageous development of the blocking device is characterised in that the extraction line begins in a housing pan which surrounds the extraction opening with a connection piece and forms a valve seat for the valve disc serving as a valve body, in that the additional suction aperture is arranged above the valve disc on the side of the housing pan facing the extraction line.

[0007] Mixing the hot vapour-saturated air from the washing area and the introduced warm dry air of the secondary air stream is postponed until the entrance region of the blocking device by the extraction aperture being covered in the extraction direction in front of the valve disc by means of a spray-guard disc, which forms with the connection piece of the housing pan, on the side with the additional suction aperture, a suction channel for the hot vapour-saturated air.

[0008] A tight seal of the extraction aperture, when the fan is switched off, is achieved in that the valve disc has an annular web which is approximately triangular in cross-section on the lower side facing the valve seat, and this web closes with its conical lower side the valve seat of the housing pan.

[0009] The adjusting movement of the valve disc is made operationally reliable by the valve disc being provided, on its lower side facing the valve seat, with guide webs which guide the valve disc so as to be untiltable when a connection piece of the housing pan is adjusted, and by the valve disc being provided on the upper side away from the valve seat with spacer elements to limit the adjusting movement.

[0010] The mixing ratio is determined by the proportion of the secondary air stream being established by the cross-section of the additional suction aperture.

[0011] In addition, provision is made for the fan to be configured either one or two-stage, there being no suction aperture for secondary air on the one-stage fan, and on the second-stage fan the diameter of this suction aperture can be reduced; then, in addition to the use of an inexpensive fan, it is also possible to reduce the amount of noise during the extraction process.

[0012] The invention is explained in greater detail with the aid of an embodiment, given by way of example and shown in the drawings. These show:

Fig. 1 in a schematic view, a dish-washing machine with a blocking device with an additional suction aperture for warm dry air,

Fig. 2 in section along line A - A of Fig. 1, a cross-section through the blocking device in the closed position, and

Fig. 3 a section corresponding to Fig. 2 through the blocking device in the open position.

[0013] As can be seen from Fig. 1, when the fan 30 is set in motion, a stream of air is formed in the washing area or chamber 40 of the dish-washing machine, which air involves a blocking device 10 arranged in the roof region of the washing area 40 and an extraction conduit or line 16 leading to the fan 30, as well as the fan 30. When the fan 30 is switched on, hot vapour-saturated air FL is sucked out of the washing area 40 via a suction channel 20, whilst, when the fan 30 is switched off, the blocking device 10 automatically closes the extraction line, as is also shown with the aid of Figs. 2 and 3. Thus an electrical control of the blocking device 10 can be dispensed with.

[0014] As can also be recognised from Fig. 1, warm dry air TL is sucked in via an additional suction channel 24 of the blocking device 10, air which has gathered in the roof region outside the washing area 40. The two streams of air FL and TL are mixed with one another before they go into the extraction line 16 in the blocking device 10, with the result that the air humidity is considerably reduced. No condensation can any longer form in the extraction line 16, and thus, in the region of the fan 30, no condensation trough is necessary either. The fan 30 can be configured either one-stage or two-stage, it not being necessary to mix in any secondary air NL

with a one-stage fan 30. On a two-stage fan 30, the suction cross-section for the secondary air NL can be chosen to be small, which leads to a reduction in noise during the extraction process.

[0015] As Figs. 2 and 3 show, the extraction line 16 begins in a housing pan 11 which is arranged in the roof region of the washing area 40 and is open towards the washing area 40 with a connection piece 18, and forms an inlet aperture 15, through which hot, vapour-saturated air is extracted from the washing chamber. At the transition from the housing wall of the housing pan 11 to the connection piece 18, a valve seat 19 is formed on which a valve disc 13 sits tightly as a valve body, when the fan 30 is switched off, on the basis of its own weight. To improve the blocking effect, the valve disc 13 carries an essentially triangular annular web 23 on its lower side facing the valve seat 19. Fig. 2 shows the closed position of the blocking device 10, guide webs 12 arranged on the lower side of the valve disc 13 being introduced into the connection piece 13. On the opposite upper side of the valve disc 13, spacer elements 17 are provided which limit the lifting stroke of the valve disc 13, as Fig. 3 shows. This ensures that, when the valve disc 13 is raised as the fan 30 is switched on, the valve disc 13 is guided without tilting and does not jam. The guide webs 12 project partially into the connection piece 18 of the housing pan 11, with the result that the valve disc 13 can also not be pulled into the extraction line 16. On the side away from the extraction line 16, the housing pan 11 has an additional suction aperture 24 for warm dry air TL from the region below the roof of the washing area 40. When the fan 30 is switched on and the valve disc 13 raised from the valve seat 19, the extraction aperture 15 is opened and connects with the additional suction aperture 24. As the arrows in Fig. 3 show, the extraction aperture 15 is covered towards the washing area 40 by means of a splash-guard disc 21 which forms a suction channel 20 on the side of the housing pan 11 with the additional suction aperture 24, with the result that, immediately in the entrance region, the air streams TL and FL are mixed with one another and reach the extraction line 16 already mixed.

[0016] The connection piece 18 of the housing pan 11 is fixed on to the washing container 41 by means of a nut 22, a sealing ring 14 taking care of the sealing. The splash-guard disc 21 can be screwed on to the nut 22. This splash-guard disc 21 prevents water jets, occurring during the cleaning and clear rinsing cycles, from lifting the valve disc 13 from the valve seat 19, and thus the extraction line 16 from being released when this is not desired.

[0017] The blocking device 10 works without electrical control. The valve disc 13 is only controlled by the suction air stream generated by the fan 30. The washing process runs without loss of heat and with very little energy, humidity, smell and noise. The mixed air which reaches the extraction line 16 only has a little humidity and can no longer condense. A condensation collecting

trough in the region of the fan 30 is no longer necessary.

Claims

1. Dish-washing machine, comprising a washing chamber (40) which accommodates the dishes and into which an extraction conduit (16) is located, via which conduit a hot, vapour-saturated air stream (FL) is sucked out of the washing chamber by means of a fan (30), wherein a shut-off or blocking device (10) is provided at the extraction conduits inlet, the device comprising an inlet aperture (15), said device being disposed in the top region of the washing chamber and having a valve disc (13) acting as a blocking element, wherein, when the fan is switched-on, the valve disc exposes the inlet aperture, and wherein, when the fan is switched-off, the valve disc returns to its initial position due to its own weight and closes the inlet aperture,
characterised in that,
the shut-off or blocking device (10) is provided with an additional suction channel (24) which, when the fan (30) is switched-on and when the valve disc (13) is raised and unblocks the inlet aperture (15), communicates with the inlet aperture (15), a warm dry air stream (TL) present above the top of the washing area (40) being drawn-in by suction through said suction channel (24) and added to the hot, vapour-saturated air stream (FL), drawn-in from the washing chamber (40), the two streams (FL, TL) being mixed prior to entering the extraction conduit (16).
2. Dish-washing machine according to claim 1,
characterised in that,
the extraction conduit (16) begins in a housing pan (11), which surrounds the inlet aperture (15), the pan comprising a connection piece (18) which forms a valve seat (19) for the valve disc (13), serving as a valve body, and **in that** the additional suction channel (24) is arranged above the valve disc (13).
3. Dish-washing machine according to claim 2,
characterised in that,
the hot, vapour-saturated air stream extraction inlet (15) is covered in the extraction direction in front of the valve disc (13) by means of a splash-guard disc (21) which, with the connection piece (18) of the housing pan (11) on the side with the additional suction aperture (24) forms a suction channel (20) for the hot, vapour-saturated air stream (FL).
4. Dish-washing machine according to one of claims 2 and 3,
characterised in that,
the valve disc (13), on its lower side facing the valve seat (19), has an annular web (23) which is approx-

imately triangular in cross-section, and which closes with its conical lower side the valve seat (19) of the housing pan (11).

5. Dish-washing machine according to one of claims 2 to 4,
characterised in that,
the valve disc (13) is provided, on its lower side facing the valve seat (19), with guide webs (12) which guide the valve disc (13) so as to be untiltable when the connection piece (18) of the housing pan (11) is adjusted, and **in that** the valve disc (13) is provided, on its upper side away from the valve seat (19), with spacer elements (17) to limit the adjusting movement.
6. Dish-washing machine according to one of claims 1 to 5,
characterised in that,
the proportion of the warm dry air stream (TL) is determined by the cross-section of the additional suction channel (24).
7. Dish-washing machine according to one of claims 1 to 6,
characterised in that,
the fan (30) is configured as a one or a two-stage fan, there being no suction aperture for secondary air (NL) on the one-stage fan (30), the two-stage fan comprising a small aperture enabling secondary air (NL) to be drawn into this two-stage fan (30).

Patentansprüche

1. Geschirrspülmaschine mit einer Waschkammer (40), die an das Geschirr angepasst ist und in der ein Ansaugkanal (16) angeordnet ist, über den ein heißdampfgesättigter Luftstrom (FL) mittels eines Ventilators (30) aus der Waschkammer angesaugt wird, wobei eine Sperrvorrichtung (10) vorgesehen ist, die am Eingang des Ansaugkanals im Dachbereich der Waschkammer angeordnet und mit einer Eingangsöffnung (15) sowie einer als Sperrelement wirkenden Ventilscheibe (13) versehen ist, und wobei die Ventilscheibe (13) bei eingeschaltetem Ventilator (30) die Eingangsöffnung (15) freigibt und bei ausgeschaltetem Ventilator (30) in die Anfangsposition aufgrund ihres Eigengewichts zurückkehrt und die Eingangsöffnung (15) schließt,
dadurch gekennzeichnet,
dass die Sperrvorrichtung (10) mit einem zusätzlichen Ansaugkanal (24) versehen ist, der bei eingeschaltetem Ventilator (30) und bei abgehobener, die Eingangsöffnung (15) nicht sperrender Ventilscheibe (13) mit der Eingangsöffnung (15) in Verbindung steht, wobei ein am Dach der Waschkammer (40) vorhandener, warmer, trockener Luftstrom in den

zusätzlichen Ansaugkanal (24) eingesogen und dem aus der Waschkammer (40) angesaugten, heißdampfgesättigten Luftstrom (FL) zugefügt wird und wobei die beiden Luftströme (FL, TL) vor dem Eintritt in den Ansaugkanal (16) gemischt werden.

2. nach Anspruch 1,
dadurch gekennzeichnet,
dass der Ansaugkanal (16) in einer Gehäusemulde (11) beginnt, die die Eingangsöffnung (15) umgibt und die ein Verbindungsstück (18) aufweist, das einen Ventilsitz (19) für die als Ventilkörper dienende Ventilscheibe (13) bildet, und dass der zusätzliche Ansaugkanal (24) über der Ventilscheibe (13) angeordnet ist.
3. Geschirrspülmaschine nach Anspruch 2,
dadurch gekennzeichnet,
dass die den heißdampfgesättigten Luftstrom durchlassende Eingangsöffnung (15) in Ansaugrichtung am Vorderende der Ventilscheibe (13) mittels einer Spritzschutzscheibe (21) abgedeckt ist, die zusammen mit dem Verbindungsstück (18) der Gehäusemulde (11) auf der Seite mit der zusätzlichen Ansaugöffnung (24) einen Ansaugkanal (20) für den heißdampfgesättigten Luftstrom (FL) bildet.
4. Geschirrspülmaschine nach einem der Ansprüche 2 und 3,
dadurch gekennzeichnet,
dass die Ventilscheibe (13) auf ihrer dem Ventilsitz (19) zugewandten Unterseite einen Ringsteg (23) aufweist, der im Querschnitt annähernd dreieckförmig ist und mit seiner konischen Unterseite den Ventilsitz (19) der Gehäusemulde (11) schließt.
5. Geschirrspülmaschine nach einem der Ansprüche 2 bis 4,
dadurch gekennzeichnet,
dass die Ventilscheibe (13) auf ihrer dem Ventilsitz (19) zugewandten Unterseite Führungsstege (12) aufweist, die die Ventilscheibe (13) derart führen, dass sie nicht schräggestellt werden kann, wenn das Verbindungsstück (18) der Gehäusemulde (11) eingestellt wird, und dass die Ventilscheibe (13) auf ihrer dem Ventilsitz (19) abgewandten Oberseite mit Abstandselementen (17) zur Begrenzung der Einstellbewegung versehen ist.
6. Geschirrspülmaschine nach einem der Ansprüche 1 bis 5,
dadurch gekennzeichnet,
dass die Größe des warmen, trockenen Luftstroms (TL) durch den Querschnitt des zusätzlichen Ansaugkanals (24) festgelegt ist.
7. Geschirrspülmaschine nach einem der Ansprüche 1 bis 6,

dadurch gekennzeichnet,

dass der Ventilator (30) einstufig oder zweistufig ausgebildet ist, wobei bei der einstufigen Ausbildung keine Ansaugöffnung für die Sekundärluft (NL) vorhanden ist und bei der zweistufigen Ausbildung eine kleine Öffnung vorgesehen ist, durch die die Sekundärluft (NL) in den zweistufigen Ventilator (30) eingesogen werden kann.

Revendications

1. Machine lave-vaisselle, comprenant une chambre de lavage (40) qui reçoit la vaisselle et dans laquelle est situé un conduit d'extraction (16) via lequel de l'air chaud et saturé de vapeur (FL) est aspiré hors de la chambre de lavage au moyen d'un ventilateur (30), un dispositif de coupure ou de blocage (10) étant prévu à l'entrée du conduit d'extraction, ledit dispositif comprenant une ouverture d'entrée (15), et ledit dispositif étant disposé dans la région supérieure de la chambre de lavage et comportant un disque de valve (13) faisant office d'élément de blocage, dans laquelle, quand le ventilateur est mis en marche, le disque de valve expose l'ouverture d'entrée, et lorsque le ventilateur est arrêté, le disque de valve retourne à sa position initiale sous son propre poids et ferme l'ouverture d'entrée,

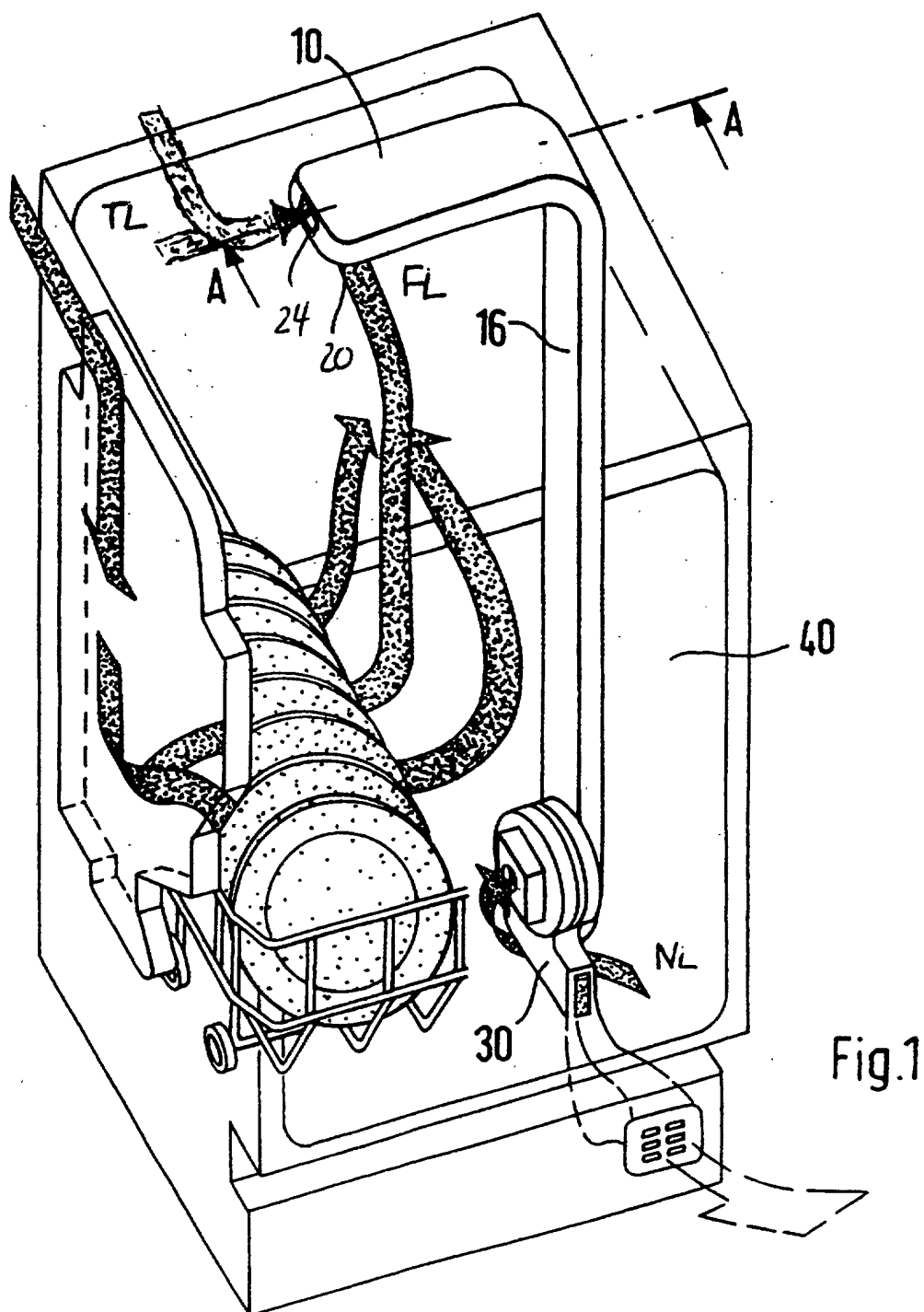
caractérisée en ce que

le dispositif de coupure ou de blocage (10) est pourvu d'un canal de succion additionnel (24) qui, lorsque le ventilateur (30) est mis en marche et que le disque de valve (13) est soulevé et débloquent l'ouverture d'entrée (15), communique avec l'ouverture d'entrée (15), et un courant d'air chaud et sec (TL) présent au-dessus du sommet de la zone de lavage (40) qui est aspiré par succion via ledit canal de succion (24) est ajouté au courant d'air chaud saturé de vapeur (FL), aspiré depuis la chambre de lavage (40), les deux courants (FL, TL) étant mélangés avant d'entrer dans le conduit d'extraction (16).

2. Machine lave-vaisselle selon la revendication 1, **caractérisée en ce que** le conduit d'extraction (16) commence dans une cuve de boîtier (11), qui entoure l'ouverture d'entrée (15), la cuve comprenant une pièce de connexion (18) qui forme un siège de valve (19) pour le disque de valve (13), servant de corps de valve, et **en ce que** le canal de succion additionnel (24) est agencé au-dessus du disque de valve (13).
3. Machine lave-vaisselle selon la revendication 2, **caractérisée en ce que** l'ouverture d'entrée (15) pour l'extraction du courant d'air chaud saturé de vapeur est couverte dans la direction d'extraction en face du disque de valve (13) au moyen d'un disque anti-

éclaboussures (21) qui forme, avec la pièce de connexion (18) de la cuve de boîtier (11) sur le côté pourvu de l'ouverture de succion additionnelle (24), un canal de succion (20) pour le courant d'air chaud saturé de vapeur (FL).

4. Machine lave-vaisselle selon l'une ou l'autre des revendications 2 et 3, **caractérisée en ce que** le disque de valve (13) comporte, sur son côté inférieur tourné vers le siège de valve (19), un voile annulaire (23) qui a une section transversale approximativement triangulaire, et qui ferme avec son côté inférieur conique le siège de valve (19) de la cuve de boîtier (11).
5. Machine lave-vaisselle selon l'une des revendications 2 à 4, **caractérisée en ce que**, sur son côté inférieur tourné vers le siège de valve (19), le disque de valve (13) est pourvu de voiles de guidage (12) qui guident le disque de valve (13) de manière à l'empêcher de basculer quand la pièce de connexion (18) de la cuve de boîtier (11) est ajustée, et **en ce que**, sur son côté supérieur détourné du siège de valve (19), le disque de valve (13) est pourvu d'éléments d'espacement (17) pour limiter le mouvement d'ajustement.
6. Machine lave-vaisselle selon l'une des revendications 1 à 5, **caractérisée en ce que** la proportion du courant d'air chaud et sec (TL) est déterminée par la section transversale du canal de succion additionnel (24).
7. Machine lave-vaisselle selon l'une des revendications 1 à 6, **caractérisée en ce que** le ventilateur (30) est configuré sous la forme d'un ventilateur à un étage ou à deux étages, aucune ouverture de succion n'étant prévue pour l'air secondaire (NL) dans le cas d'un ventilateur à un étage (30), tandis que le ventilateur à deux étages comprend une petite ouverture permettant à l'air secondaire (NL) d'être aspiré dans ce ventilateur à deux étages (30).



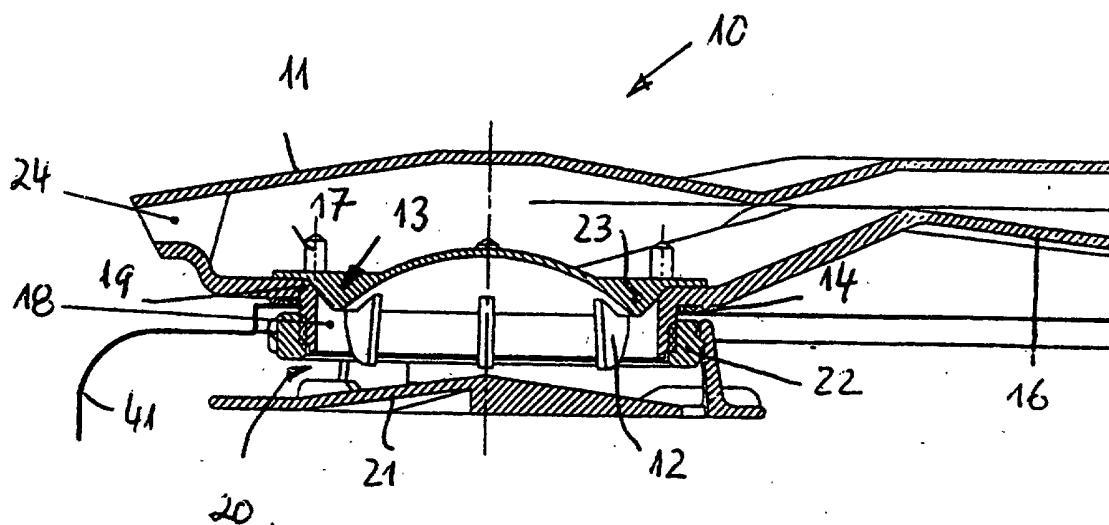


Fig. 2.

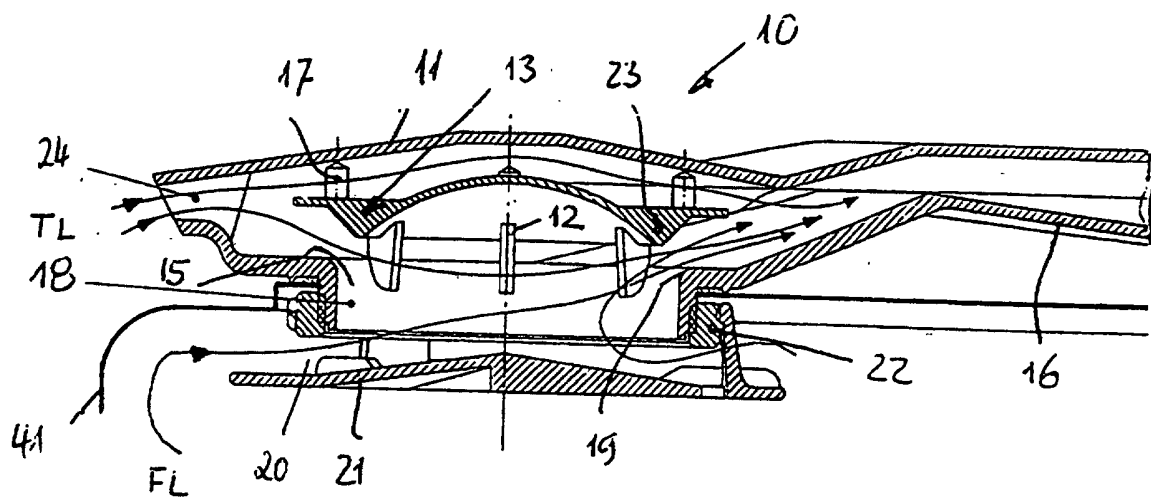


Fig. 3