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(54) **Filter assembly for industrial dishwasher**

Filteranordnung für industrielle Geschirrspüler

Ensemble filtrant pour lave-vaisselle industriel

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Description

[0001] The present invention relates to industrial dishwashers, and in particular to an improved filter assembly to be used in said machines.

[0002] It is known that industrial dishwashers used in professional fields (restaurants, bars, etc.) are capable of washing dishes within extremely reduced times, thanks to some constructional features that make them different from domestic dishwashers in various respects. In particular, thanks to the presence of two distinct wash and rinse circuits each having its own sprinklers, the wash water is sprayed onto the dishes by a wash pump and during the rinse a portion of this water is replaced by rinse water pre-heated in a heater and fed to the rinse circuit by a suitable rinse pump.

[0003] However, most often the same manufacturers of those machines advise the users to rinse the dishes prior to washing them, with a clear waste of water and time, because if the dishes are introduced into the machine as they are removed from the table (apart from disposing of the largest residues) the wash results are often poor. In fact, these machines are provided with filter devices substantially intended only to prevent damages to the wash and drain circuits of the machine, because in case some residues such as nutshells, toothpicks, mollusc shells or the like end up in the pumps they can block them and/or clog the water ejection nozzles. .

[0004] Prior art filters, therefore, rather than cooperating in keeping as clean as possible the wash water, which is not changed between a cycle and the following one but for the partial restoring with clean water during the rinse phase, retain almost completely the dirt that by building up cycle after cycle pollutes the wash water ever more.

[0005] It is clear that in order to achieve a good wash effectiveness it is necessary that the filter assembly succeeds in retaining the potentially harmful dirt particles without clogging. For this reason, it is essential to manufacture a filter assembly having a correct balance between the requirements of filtering and not being clogged, i.e. capable of letting through for evacuation by the drain pump all those residues that by building up increase the water dirtiness in addition to progressively clogging the filters, typically rice grains, bits of meat or vegetables, bread crumbs and the like.

[0006] Prior art filter devices have the drawback of not striking this balance of requirements, whereby they do not allow to achieve a desirable high wash effectiveness. Such prior art filters are known for example from EP-A-0 855 965.

[0007] Therefore the object of the present invention is to provide an improved filter assembly which overcomes said drawback.

[0008] This object is achieved by means of a filter assembly having the features cited in claim 1. Other advantageous features are disclosed in the dependent claims.

[0009] The main advantage of the filter assembly ac-

ording to the present invention is that of achieving a high filtering without clogging problems; since it is capable of retaining all those residues that could actually cause damage to the machine while letting through all those residues that could cause the clogging, so as to validly contribute to a good wash effectiveness of the dishwasher.

[0010] Another advantage of the present filter assembly is that of being made up of few simple parts, which positively affects its cost and the ease in assembling and disassembling it.

[0011] These and other advantages and characteristics of the filter assembly according to the present invention will be clear to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the annexed drawings wherein:

Fig. 1 is a perspective exploded view showing the tank bottom of a dishwasher provided with the present filter assembly;

Fig. 2 is a vertical sectional view of said filter assembly;

Fig. 3 is a vertical sectional view of said tank bottom region with the filter assembly in the assembled state; and

Fig. 4 is a perspective enlarged view of a first filtering element of the filter assembly.

[0012] With reference to figures 1 to 3, there is seen that the filter assembly according to the present invention includes a first filtering element 1 introduced from above into a second filtering element 2, which is in turn located into the central opening of a concave-shaped flat filter 3 that acts as a lid of the collecting sump CS formed in the tank bottom TB of a dishwasher.

[0013] The flat filter 3 consists of a perforated stainless steel sheet, with holes having a diameter indicatively between 1,5 and 2,2 mm, which has the function of letting through most (about 75-85%) of the flow rate of the wash pump, and of receiving in its central opening the second filtering element 2 that is made up of three concentric cylinders 2a, 2b and 2c of different diameter joined through a concave circular ring 2d provided with openings.

[0014] More specifically, the inner cylinder 2a extends above ring 2d and is closed but for openings on the top side; the outer cylinder 2b also extends above ring 2d and has a top peripheral rim 4 for fitting into the flat filter 3, as well as a side wall with slots in the range of 0,8-1,2 mm in width; and finally the intermediate cylinder 2c extends below ring 2d and is open at the bottom but closed on the side except for at least one, but preferably two or more, slots 5 of width W and height H, where W is in the range 0,5-2 mm and H is in the range 15-35 mm.

[0015] The first filtering element 1 consists of two concentric cylinders 1a, 1b joined at their bases through connecting ribs that leave a circular passage 6 whose width C ranges from 4 to 6 mm, preferably 5 mm.

[0016] More specifically, the inner cylinder 1a is closed but for openings on the top side and is sized to fit on the inner cylinder 2a of the second filtering element 2; the outer cylinder 1b has a top peripheral rim 7 for fitting into the outer cylinder 2b of the second filtering element 2, as well as a side wall with holes having a diameter indicatively between 1 and 1,5 mm.

[0017] As shown in Fig.4, where said perforated side wall is omitted for the sake of clarity of the drawing, the circular passage 6 is also preferably limited by vertical radial ribs 8 formed with a pitch P in the range from 10 to 16 mm, more preferably between 12 and 14 mm.

[0018] Thanks to these features, all the residues that pass through the filter assembly can smoothly be evacuated by the drain pump, as indicated by arrow DP, that removes them from the collection area CA located under the filter assembly, whereas the other residues that could cause troubles are retained (Fig.3).

[0019] It should be noted that slots 5 have a particular function since during the operation of the wash pump, as indicated by arrow WP, thanks to the proximity of slots 5 to the suction duct of the wash pump there is generated a water stream that coming down from the top portion of the filter assembly tends to bring along therewith the dirt residues that get through, collecting them in the collection area CA. A contribution to said downward stream is also given, with varying amounts depending on the manufacturing tolerances, by the radial and axial play between the bottom edge of the intermediate cylinder 2c and the circular seat S of sump CS in which it fits.

Claims

1. Filter assembly for industrial dishwasher including a first filtering element (1) introduced into a second filtering element (2) which is in turn received in an opening of a concave-shaped flat filter (3) suitable to act as a lid for the collecting sump (CS) formed in the tank bottom (TB) of a dishwasher, **characterized in that** said first filtering element (1) consists of two concentric cylinders (1a, 1b) joined at their bases through connecting ribs that leave a circular passage (6) whose width (C) ranges from 4 to 6 mm, preferably 5 mm.
2. Filter assembly according to claim 1, **characterized in that** the circular passage (6) is also limited by vertical radial ribs (8) formed with a pitch (P) in the range from 10 to 16 mm, preferably between 12 and 14 mm.
3. Filter assembly according to claim 1 or 2, **characterized in that** the first filtering element (1) includes an inner cylinder (1a) closed but with openings on the top side and an outer cylinder (1b) having a side wall with holes having a diameter indicatively between 1 and 1,5 mm.

4. Filter assembly according to one of the preceding claims, **characterized in that** the second filtering element (2) is made up of three concentric cylinders (2a, 2b, 2c) joined through a concave circular ring (2d), all the parts (2a, 2b, 2c, 2d) of said second filtering element (2) being provided with openings.
5. Filter assembly according to claim 4, **characterized in that** the second filtering element (2) includes an inner cylinder (2a) that extends above the circular ring (2d) and is closed but for openings on the top side, an outer cylinder (2b) that extends above the circular ring (2d) and has a top peripheral rim (4) for fitting into the flat filter (3) and a side wall with slots in the range of 0,8-1,2 mm in width, and an intermediate cylinder (2c) that extends below the circular ring (2d) and is open at the bottom but closed on the side except for at least one, preferably two or more, slots (5) of width W and height H, where W is in the range 0,5-2 mm and H is in the range 15-35 mm.
6. Filter assembly according to claim 4 or 5, **characterized in that** the inner cylinder (1a) of the first filtering element (1) is sized to fit on the inner cylinder (2a) of the second filtering element (2) and the outer cylinder (1b) of the first filtering element (1) has a top peripheral rim (7) for fitting into the outer cylinder (2b) of the second filtering element (2).
7. Filter assembly according to one of the preceding claims, **characterized in that** the flat filter (3) consists of a perforated stainless steel sheet with holes having a diameter between 1,5 and 2,2 mm.

Patentansprüche

1. Filtergruppe für eine gewerbliche Geschirrspülmaschine, umfassend ein erstes Filterelement (1), welches in ein zweites Filterelement (2) eingesetzt ist, das seinerseits in einer Öffnung eines konkaven Planfilters (3) aufgenommen wird, der als Deckel für einen im Tankboden (TB) einer Geschirrspülmaschine ausgebildeten Sammelsumpf (CS) dienen kann, **dadurch gekennzeichnet, dass** das besagte erste Filterelement (1) aus zwei konzentrischen Zylindern (1a, 1b) besteht, die an ihren Basen mittels Verbindungsstegen verbunden sind, welche einen kreisförmigen Durchgang (6) lassen, dessen Breite (C) im Bereich von 4 bis 6 mm liegt und vorzugsweise 5 mm beträgt.
2. Filtergruppe gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der kreisförmige Durchgang (6) ebenfalls durch vertikale radiale Stege (8) begrenzt ist, welche mit einem Abstand (P) im Bereich von 10 bis 16 mm, vorzugsweise von 12 bis 14 mm geformt sind.

3. Filtergruppe gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das erste Filterelement (1) einen geschlossenen, aber mit Öffnungen auf der Oberseite versehenen inneren Zylinder (1a) und einen äußeren Zylinder (1b), dessen Seitenwand Löcher mit einem Durchmesser von etwa 1 bis 1,5 mm aufweist, umfasst.
4. Filtergruppe gemäß einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** das zweite Filterelement (2) aus drei konzentrischen Zylindern (2a, 2b, 2c) besteht, die durch einen konkaven kreisförmigen Ring (2d) miteinander verbunden sind, wobei alle Teile (2a, 2b, 2c, 2d) des besagten zweiten Filterelements (2) mit Öffnungen versehen sind.
5. Filtergruppe gemäß Anspruch 4, **dadurch gekennzeichnet, dass** das zweite Filterelement (2) einen inneren Zylinder (2a), der sich oberhalb des kreisförmigen Rings (2d) erstreckt und mit Ausnahme der auf der Oberseite angeordneten Öffnungen geschlossen ist, einen äußeren Zylinder (2b), der sich oberhalb des kreisförmigen Rings (2d) erstreckt und einen oberen, am Umfang verlaufenden Rand (4) zum Einpassen in den Planfilter (3) und eine Seitenwand mit Schlitzern mit einer Weite im Bereich von 0,8 bis 1,2 mm hat, sowie einen mittleren Zylinder (2c) umfasst, der sich unterhalb des kreisförmigen Rings (2d) erstreckt und am Boden offen, aber an der Seite mit Ausnahme von mindestens einem, vorzugsweise zwei oder mehr Schlitzern (5) mit einer Weite W und einer Höhe H geschlossen ist, wobei W im Bereich von 0,5 bis 2 mm und H im Bereich von 15 bis 35 mm liegt.
6. Filtergruppe gemäß Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** der innere Zylinder (1a) des ersten Filterelements (1) in seiner Größe so ausgelegt ist, dass er auf den inneren Zylinder (2a) des zweiten Filterelements (2) passt, und der äußere Zylinder (1b) des ersten Filterelements (1) einen oberen, am Umfang verlaufenden Rand (7) zum Einpassen in den äußeren Zylinder (2b) des zweiten Filterelements (2) aufweist.
7. Filtergruppe gemäß einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** der Planfilter (3) aus einem perforierten Edelstahlblech mit Löchern mit einem Durchmesser von 1,5 bis 2,2 mm besteht.
- son tour reçu dans une ouverture d'un filtre plat de forme concave (3) approprié pour servir de couvercle pour le bac de collecte (CS) formé dans le fond de la cuve (TB) d'un lave-vaisselle, **caractérisé en ce que** ledit premier élément de filtration (1) se compose de deux cylindres concentriques (1a, 1b) assemblés à leurs bases par des nervures de raccordement qui laissent un passage circulaire (6) dont la largeur (C) est de l'ordre de 4 à 6 mm, de préférence 5 mm.
2. Ensemble de filtre selon la revendication 1, **caractérisé en ce que** le passage circulaire (6) est également limité par des nervures radiales verticales (8) formées avec un écartement (P) de l'ordre de 10 à 16 mm, de préférence compris entre 12 et 14 mm.
3. Ensemble de filtre selon la revendication 1 ou 2, **caractérisé en ce que** le premier élément de filtration (1) comprend un cylindre interne (1a) fermé mais avec des ouvertures sur le côté supérieur et un cylindre externe (1 b) ayant une paroi latérale avec des trous ayant un diamètre indicativement compris entre 1 et 1,5 mm.
4. Ensemble de filtre selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le second élément de filtration (2) est composé de trois cylindres concentriques (2a, 2b, 2c) assemblés par une bague circulaire concave (2d), toutes les parties (2a, 2b, 2c, 2d) dudit second élément de filtration (2) étant prévues avec des ouvertures.
5. Ensemble de filtre selon la revendication 4, **caractérisé en ce que** le second élément de filtration (2) comprend un cylindre interne (2a) qui s'étend au-dessus de la bague circulaire (2d) et est fermé excepté pour les ouvertures sur le côté supérieur, un cylindre externe (2b) qui s'étend au-dessus de la bague circulaire (2d) et un bord périphérique supérieur (4) pour le montage dans le filtre plat (3) et une paroi latérale avec des fentes de l'ordre de 0,8 - 1,2 mm de largeur, et un cylindre intermédiaire (2c) qui s'étend au-dessous de la bague circulaire (2d) et est ouvert au niveau de la partie inférieure mais fermé sur le côté excepté pour au moins une, de préférence deux fentes (5) ou plus de largeur W et de hauteur H, où W est de l'ordre de 0,5 - 2 mm et H est de l'ordre de 15 - 35 mm.
6. Ensemble de filtre selon la revendication 4 ou 5, **caractérisé en ce que** le cylindre interne (1a) du premier élément de filtration (1) est dimensionné pour se monter sur le cylindre interne (2a) du second élément de filtration (2) et le cylindre externe (1 b) du premier élément de filtration (1) a un bord périphérique supérieur (7) pour se monter dans le cylindre externe (2b) du second élément de filtration (2).

Revendications

1. Ensemble de filtre pour lave-vaisselle industriel comprenant un premier élément de filtration (1) introduit dans un second élément de filtration (2) qui est à

7. Ensemble de filtre selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le filtre plat (3) se compose d'une tôle en acier inoxydable perforée avec des trous ayant un diamètre compris entre 1,5 et 2,2 mm.

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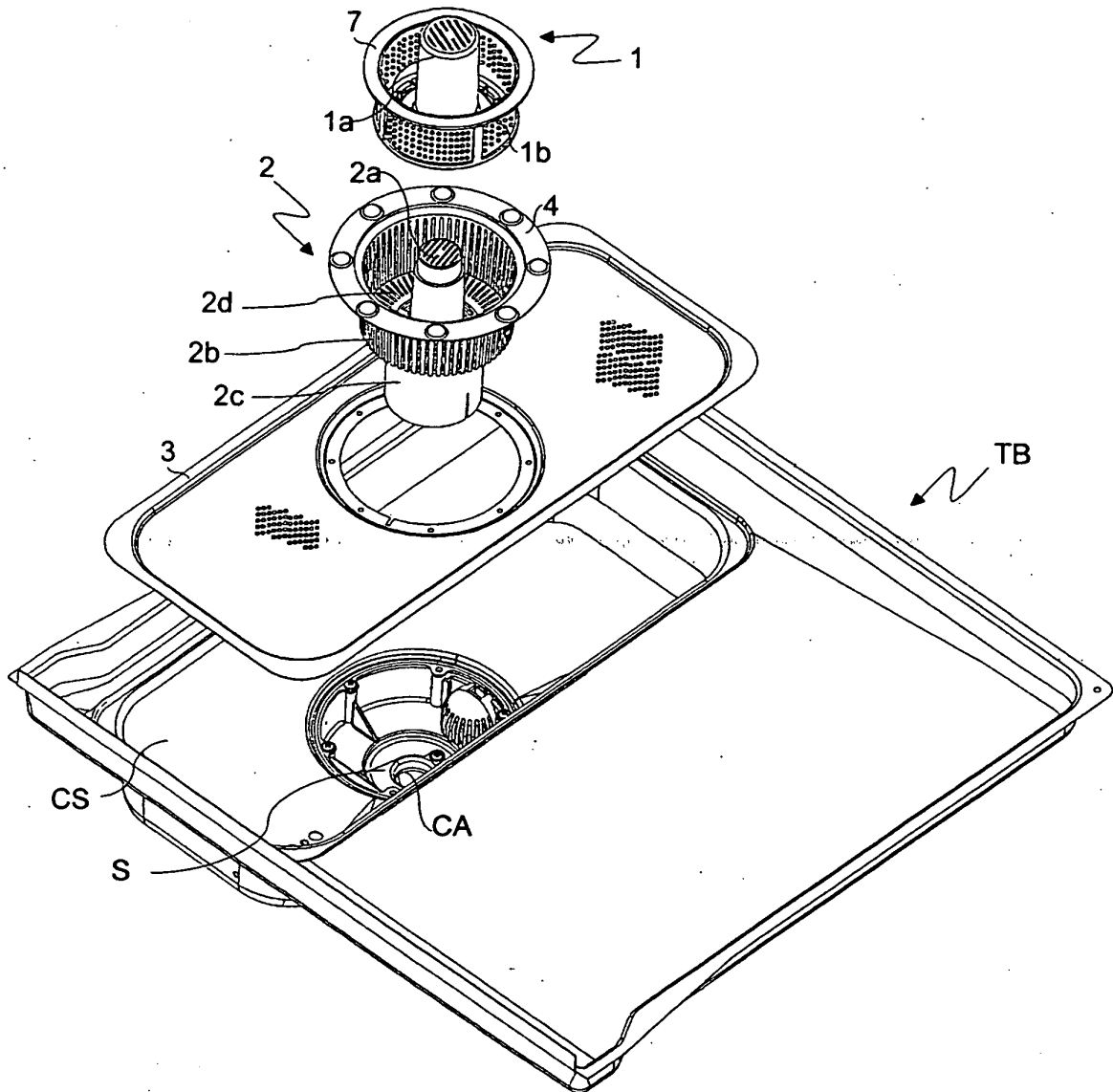


Fig.1

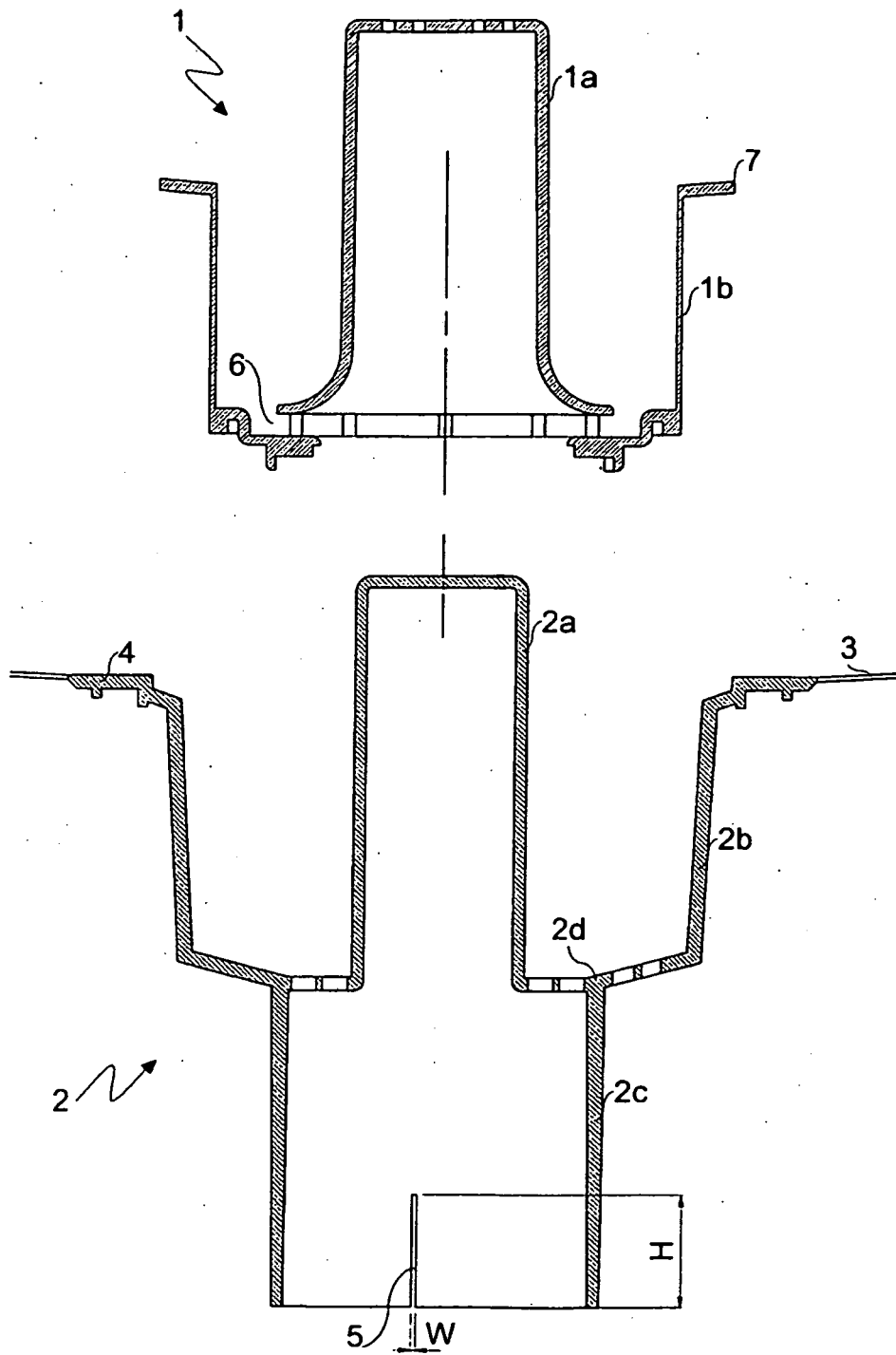


Fig.2

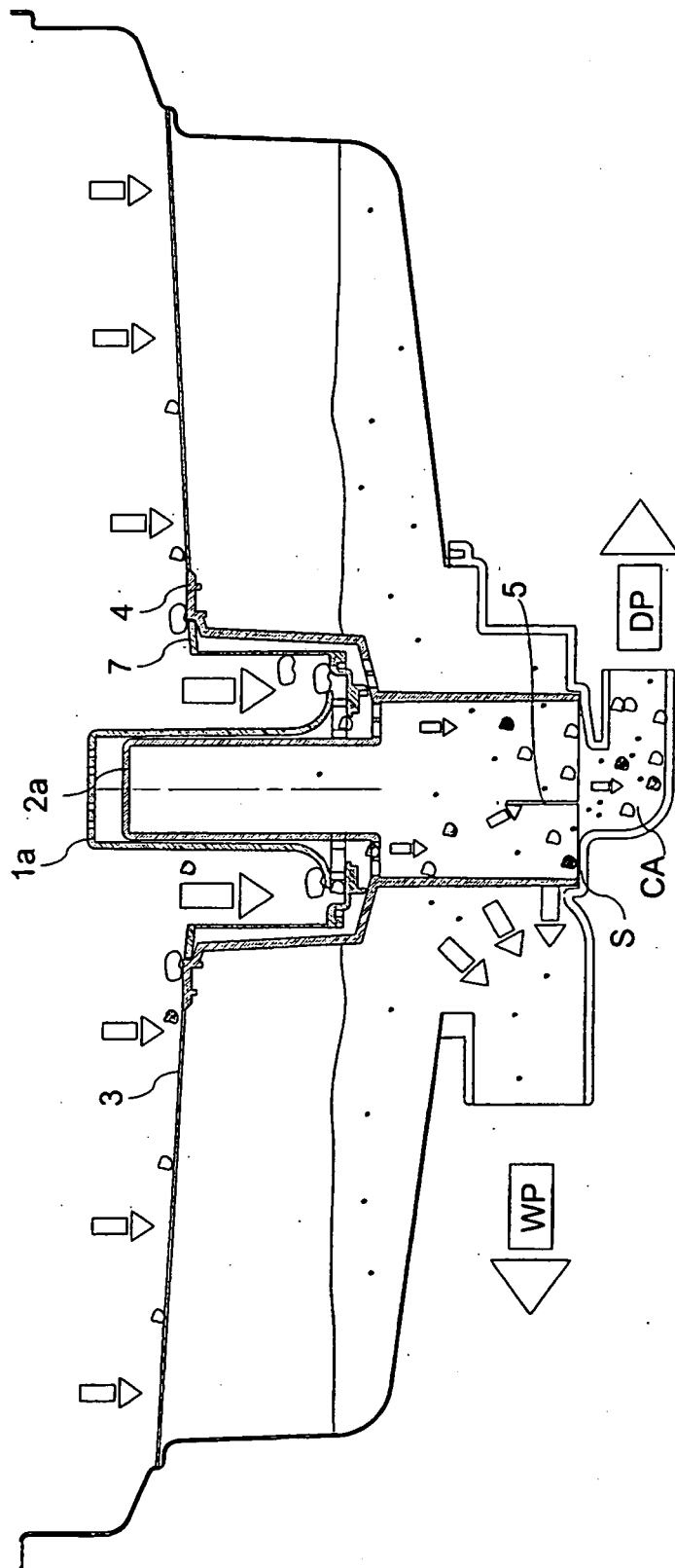


Fig.3

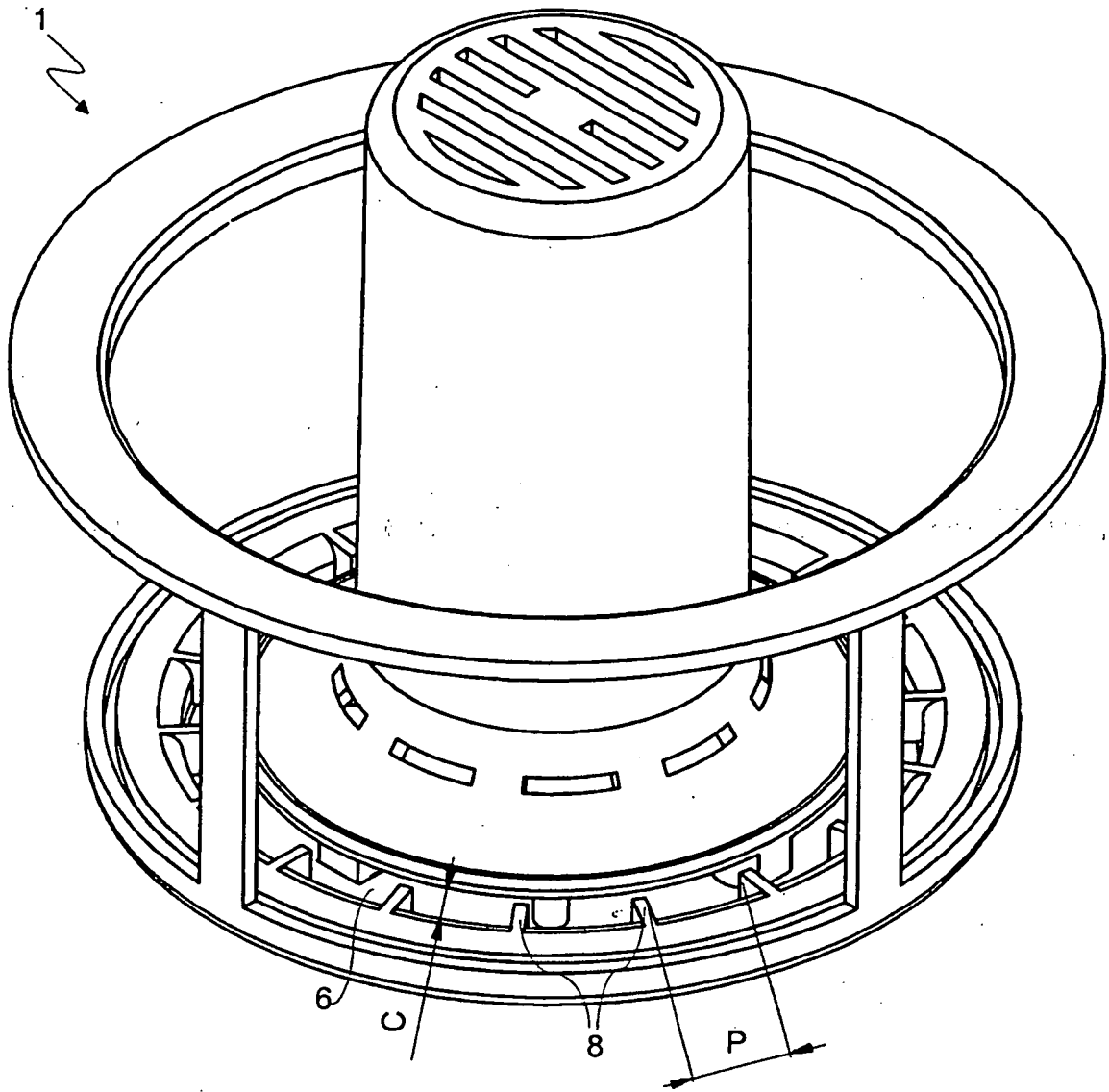


Fig.4

REFERENCES CITED IN THE DESCRIPTION

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