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(54) **Device for controlling the flow of washing liquid for feeding the spraying rotors of a dishwasher machine**

Waschwasserzufuhrkontrolle für Sprüharme einer Geschirrspülmaschine

Dispositif pour le dosage contrôlé de liquide de lavage pour les bras d'arrosage d'une machine à laver la vaisselle

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Description

[0001] The present invention relates to a device for controlling the flow of washing liquid for feeding the spraying rotors of a dishwasher machine.

[0002] Known dishwasher machines comprise a washing tub in which two horizontal shelves are slidingly housed to hold the dishes to be washed, situated at the bottom (lower shelf) and mid-height (upper shelf) respectively of the washing tub. Two spraying rotors, lower and upper respectively, are associated to said shelves and fed with the washing liquid (mixture of water and detergent) by a motor pump connected to a sump located below the bottom of the washing tub and wherein the washing liquid diffused by the spraying rotors is collected.

[0003] In most dishwashers the two rotors are fed simultaneously, assuming that both the shelves have been loaded with dishes to be washed. The quantity of water which has to be fed into the tub of the dishwasher has to be such that the pump does not go into cavitation and that the pressure of the water emitted by the rotors is not too low.

[0004] Nevertheless the growing interest in dishwashers which require smaller volumes of water, with a consequent saving in detergent and electrical energy for heating the washing liquid, is known. For this purpose devices for controlling the flow of liquid sent by the pump to the rotors have been introduced and which allow one rotor to be fed at a time alternately. In this way the volume of water required by the dishwasher is smaller because the two rotors never operate simultaneously and the quantity of liquid in circulation is smaller. These are substantially devices for diverting the flow of washing liquid and are placed between the pump and the pipes for feeding liquid to the rotors, inside of which a cut-off part moves alternatively between two working positions, in each of which one of the pipes is closed while the other is open. The movement of the cut-off part is achieved either by means of an actuator or under the thrust of the liquid itself, the two working positions in this case being positions of instable equilibrium.

[0005] Nevertheless these devices too, due to the fact that the washing liquid is any case fed to both rotors, assume that both shelves are loaded with dishes to be washed. This can be inconvenient in some dishwashers which have differentiated programmes for washing twelve or six table settings. In this second case in fact it would be more useful to load all the dishes on the upper shelf alone (both for reasons of convenience for the user and better washing results, given that the temperature in the washing tub is higher at the top than at the bottom), and to feed only the upper rotor.

[0006] EP-A-0 585 905 discloses a device according to the preamble of claim 1.

[0007] In view of the state of the art described here, the object of the present invention is that of providing a device for controlling the flow of washing liquid for feeding the spraying rotors which overcomes the aforementioned disadvantages.

[0008] In accordance with the present invention, this object is achieved thanks to a device for controlling the flow of washing liquid for feeding a first spraying rotor and a second spraying rotor of a dishwasher as set forth in claim 1.

[0009] The control device according to the present invention enables continuous or discontinuous feeding of one of the two spraying rotors, while the other one can be independently fed or not. The rotor associated to the outlet conduit controlled by said cut-off means is preferably the lower one so that, should the dishwasher be programmed for washing six table settings, the dishes can be loaded on only the upper shelf, and the flow rate and pressure of the pump fully exploited to feed the washing liquid to the upper rotor alone.

[0010] These and other features of the present invention will be made clearer by the following detailed description of some of its embodiments, illustrated by way of a non-limiting example in the accompanying drawings, in which:

Figure 1 is a section along a vertical plane of a dishwasher equipped with a control device according to a first embodiment of the present invention;
Figure 2 is a section along line II-II of Figure 1;
Figure 3 is a section along line III-III of Figure 1;
Figure 4 is a section along a vertical plane of a dishwasher equipped with said control device, during washing of a complete load of dishes;
Figure 5 is similar to Figure 1, but referred to the case of washing a partial load of dishes;
Figure 6 is a similar section to that in Figure 1, showing a control device according to a second embodiment of the present invention;
Figure 7 is a section along line VII-VII of Figure 6.

[0011] Figure 1 shows a washing tub 1 of a dishwasher, below which washing tub 1 a sump 2, wherein the washing liquid is collected, is mounted. Connected to the sump 2 is a motor pump 3 which, taking the liquid from the sump 2, sends it to a lower spraying rotor 4 extending from the bottom of the tub 1 inside the latter and related to a lower loading shelf 100 and to an upper spraying rotor 4', positioned approximately at mid-height inside the tub 1 and related to an upper loading shelf 101 (Figs. 4 and 5).

[0012] Connected to the outlet conduit 5 of the coil 6 of the pump 3 is a device 7 for cutting off the flow of washing liquid, consisting of a chamber 8 wherein a diaphragm 9, moving between two working conditions (shown as an unbroken line and dotted and dashed line respectively in Figure 1), is hinged. Above the chamber 8 a substantially cylindrical outlet conduit 10 is connected, divided internally into two semicylindrical conduits 11 and 12 by a baffle 13 (Fig. 2). Connected to the outlet conduit 10 is a flow diverter 14, also substantially cylin-

drical, and wherein a baffle 15, having a substantially vertical lower section 18, is also provided and which divides internally the flow diverter 14 into two semicylindrical conduits 16 and 17, and an upper elbow section 19 which joins the semicylindrical conduit 17 to a horizontal cylindrical conduit 20 for feeding the upper spraying rotor 4'. The flow diverter 14 is inserted in a special hole 21 of the tub 1, and is attached by means of a ring nut 22. The lower spraying rotor 4 is mounted, freely rotatably, above the flow diverter 14.

[0013] The diaphragm 9 has dimensions which correspond substantially to those of the chamber 8, and is attached at one end to a pin 24. Outside of the chamber 8 the pin 24 is connected to an actuator 25 which causes displacement of the diaphragm 9 into the two working positions. The diaphragm 9 has a semicircular opening 23 which, when the diaphragm 9 is in the closure position shown by a dashed and dotted line in Figure 1, is positioned below the mouth of the semicylindrical conduit 12.

[0014] When the diaphragm 9 is in the opening position (shown by an unbroken line in Figure 1), both the semicylindrical conduits 11 and 12 are open, and the water coming from the outlet conduit 5 of the pump 3 is distributed among the semicylindrical conduits 11, 16 and 12, 17, thus feeding simultaneously both the lower rotor 4 and the upper rotor 4' (Fig. 4). When the diaphragm 9 is in the closure position, the mouth of the semicylindrical conduit 11 is closed, while the mouth of the semicylindrical conduit 12 is open: thus feeding of the lower rotor 4 is interrupted, while the upper rotor 4' continues to be fed (Fig. 5).

[0015] Figures 6 and 7 show a second embodiment of the device according to the invention. In this second embodiment, the control device forms a single body with the pump 3. Directly connected to the outlet 5 of the pump 3 is the conduit 20, always open, for feeding the upper rotor 4'. Said outlet conduit 5 comprises a substantially horizontal cylindrical end section 26 flowing into a chamber 27 which extends above to form a cylindrical appendage 28 whereon a conduit 29 is fitted and sealed for supporting and feeding the lower rotor 4. This conduit 29 is mounted on the tub 1 in a similar manner to the flow diverter 14 of the previous embodiment. Associated to the chamber 27 is a device for cutting off the fluid comprising a plug 30 controlled by an actuator 31 to move from a first working position, wherein the outlet of the end section 26 of the conduit 5 is open and leads into the chamber 27, to a second working position, wherein the plug 30 closes the outlet of the end section 26 of the conduit 5 (position shown by the dotted and dashed line in Figure 7).

[0016] When the plug 30 is in the opening position the water coming from the pump 3 is distributed between the conduit 20, always open, for feeding the upper rotor 4' and the conduit 29 for feeding the lower rotor 4. When however the plug 30 is in the closure position, the water cannot pass from the end section 26 of the outlet conduit 5 of the pump 3 into the chamber 27, and therefore the lower rotor 4 is not fed.

[0017] In Figure 7 a conduit 32 can also be seen, small in size and also connected to the outlet conduit 5 of the pump 3. This conduit can be used for feeding pressurised liquid in other points of the water supply circuit of the dishwasher. For example this pressurised liquid can be used for cleaning the microfilter normally installed in the sump 2 to filter the liquid coming from the washing tub 1. In dishwashers which allow recovery of the washing liquid used during the final phase of rinsing of a washing cycle, the conduit 32 can also be used for transferring the liquid contained in the washing tub 1 at the end of the final phase of rinsing to a recovery tank, wherein the liquid is stored until the subsequent washing cycle. Thus the pump 3 performs a double function.

Claims

1. Device for controlling the flow of washing liquid for feeding a first spraying rotor (4) and a second spraying rotor (4') of a dishwasher, comprising an inlet conduit (5) connected to means for pumping the washing liquid, at least a first outlet conduit (11; 27,28) and a second outlet conduit (12;20) connected respectively to said first and second spraying rotors (4,4'), and means (9;30) for controlling the flow of liquid from said inlet conduit (5) to said outlet conduits (11;27,28;12;20), wherein said means (9;30) comprises first means (9;30) associated to said first outlet conduit (11;27;28) for controlling the opening and closure thereof and therefore selectively cutting off the flow of liquid from the inlet conduit (5) to the first outlet conduit (11;27,28), **characterized in that** the second outlet conduit (12;20;39) is left constantly open so that the second spraying rotor (4') is always fed, during the washing cycle.

2. Control device according to claim 1, **characterised in that** said first outlet conduit and second outlet conduit are respectively a first semicylindrical portion (11) and a second semicylindrical portion (12) of a cylindrical conduit (10) defined by a baffle (13) inside said cylindrical conduit (10), said first cut-off means comprising a diaphragm (9) which can be rotated between an opening position and a closure position of said first semicylindrical portion (11) of the cylindrical conduit (10).

3. Control device according to claim 1, **characterised in that** said first cut-off means comprise a plug (30) sliding between an opening position and a closure position of said first outlet conduit (27,28).

4. Control device according to any one of the previous claims, **characterised in that** said first spraying rotor (4) is associated to a lower loading shelf (100),

and said second spraying rotor (4') is related to an upper Loading shelf (101).

5. Control device according to claim 4, **characterised in that** said first and second outlet conduits are two semicylindrical portions (38,39) of a cylindrical conduit (34), said first and second cut-off means comprising respectively a first and a second plug (42,43) sliding independently between a position of opening and position of closure of a respective semicylindrical portion (38,39).

6. Control device according to any one of the previous claims, **characterised in that** said first spraying rotor (4) is associated to a lower loading shelf (100), and said second spraying rotor (4') is related to an upper loading shelf (101).

Patentansprüche

1. Vorrichtung zum Steuern des Flusses einer Waschflüssigkeit zum Versorgen eines ersten Sprührotors (4) und eines zweiten Sprührotors (4') einer Geschirrspülmaschine, mit einer Einlaßdurchführung (5), die mit einer Einrichtung zum Pumpen der Waschflüssigkeit verbunden ist, wenigstens einer ersten Auslaßdurchführung (11; 27, 28) und einer zweiten Auslaßdurchführung (12; 20), die jeweils mit dem ersten und dem zweiten Sprührotor (4, 4') verbunden sind, und einer Einrichtung (9; 30) zum Steuern des Flusses von Flüssigkeit von der Einlaßdurchführung (5) zu den Auslaßdurchführungen (11; 27, 28; 12; 20), wobei die Einrichtung (9; 30) eine der ersten Auslaßdurchführung (11; 27, 28) zugeordnete erste Einrichtung (9; 30) zum Steuern ihres Öffnens und Schließens und daher zum selektiven Sperren des Flusses von Flüssigkeit von der Einlaßdurchführung (5) zur ersten Auslaßdurchführung (11; 27, 28) aufweist, **dadurch gekennzeichnet, daß** die zweite Auslaßdurchführung (12; 20; 39) konstant offen gelassen wird, so daß der zweite Sprührotor (4') während des Waschzyklus immer versorgt wird.

2. Steuervorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die erste Auslaßdurchführung und die zweite Auslaßdurchführung jeweils ein erster semizylindrischer Teil (11) und ein zweiter semizylindrischer Teil (12) einer zylindrischen Durchführung (10) sind, die durch eine Einbauplatte (13) innerhalb der zylindrischen Durchführung (10) definiert sind, wobei die erste Sperreinrichtung eine Membran (9) aufweist, die zwischen einer Öffnungsposition und einer Schließposition des ersten semizylindrischen Teils (11) der zylindrischen Durchführung (10) gedreht werden kann.

3. Steuervorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die erste Sperreinrichtung einen Stöpsel (30) aufweist, der zwischen einer Öffnungsposition und einer Schließposition der ersten Auslaßdurchführung (27, 28) gleitet.

4. Steuervorrichtung nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, daß** der erste Sprührotor (4) zu einem unteren Beladeabteil (100) gehört und der zweite Sprührotor (4') zu einem oberen Beladeabteil (101) gehört.

5. Steuervorrichtung nach Anspruch 4, **dadurch gekennzeichnet, daß** die erste und die zweite Auslaßdurchführung zwei semizylindrische Teile (38, 39) einer zylindrischen Durchführung (34) sind, wobei die erste und die zweite Sperreinrichtung jeweils einen ersten und einen zweiten Stöpsel (42, 43) aufweisen, die unabhängig zwischen einer Öffnungsposition und einer Schließposition eines jeweiligen semizylindrischen Teils (38, 39) gleiten.

6. Steuervorrichtung nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, daß** der erste Sprührotor (4) zu einem unteren Beladeabteil (100) gehört und der zweite Sprührotor (4') zu einem oberen Beladeabteil (101) gehört.

Revendications

1. Dispositif pour la commande de l'écoulement de liquide de lavage pour l'alimentation d'un premier rotor de pulvérisation (4) et d'un deuxième rotor de pulvérisation (4') d'un lave-vaisselle, comportant une conduite d'entrée (5) reliée à des moyens de pompage du liquide de lavage, au moins une première conduite de sortie (11; 27, 28) et une deuxième conduite de sortie (12; 20) reliées respectivement aux dits premier et deuxième rotors de pulvérisation (4, 4'), et des moyens (9; 30) destinés à commander l'écoulement de liquide depuis ladite conduite d'entrée (5) vers lesdites conduites de sortie (11; 27, 28; 12; 20), dans lequel lesdits moyens (9; 30) comportent des premiers moyens (9; 30) associés à ladite première conduite de sortie (11; 27, 28) afin de commander l'ouverture et la fermeture de celle-ci et par conséquent couper de manière sélective l'écoulement de liquide de la conduite d'entrée (5) vers la première conduite de sortie (11; 27, 28), **caractérisé en ce que** la deuxième conduite de sortie (12; 20; 39) est laissée constamment ouverte de sorte que le deuxième rotor de pulvérisation (4') est toujours alimenté, pendant le cycle de lavage.

2. Dispositif de commande selon la revendication 1, **caractérisé en ce que** ladite première conduite de

sortie et ladite deuxième conduite de sortie sont respectivement une première partie semi-cylindrique (11) et une deuxième partie semi-cylindrique (12) d'une conduite cylindrique (10) définie par une chicane (13) à l'intérieur de ladite conduite cylindrique (10), lesdits premiers moyens de coupure comportant un diaphragme (9) qui peut être entraîné en rotation entre une position d'ouverture et une position de fermeture de ladite première partie semi-cylindrique (11) de la conduite cylindrique (10).

3. Dispositif de commande selon la revendication 1, **caractérisé en ce que** lesdits premiers moyens de coupure comportent un bouchon (30) pouvant coulisser entre une position d'ouverture et une position de fermeture de ladite première conduite de sortie (27, 28).

4. Dispositif de commande selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit premier rotor de pulvérisation (4) est associé à un plateau de chargement inférieur (100), et ledit deuxième rotor de pulvérisation (4') est lié à un plateau de chargement supérieur (101).

5. Dispositif de commande selon la revendication 4, **caractérisé en ce que** lesdites première et deuxième conduites de sortie sont deux parties semi-cylindriques (38, 39) d'une conduite cylindrique (34), lesdits premier et deuxième moyens de coupure comportant respectivement un premier et un deuxième bouchon (42, 43) pouvant coulisser indépendamment entre une position d'ouverture et une position de fermeture d'une partie semi-cylindrique (38, 39) respective.

6. Dispositif de commande selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit premier rotor de pulvérisation (4) est associé à un plateau de chargement inférieur (100), et ledit deuxième rotor de pulvérisation (4') est lié à un plateau de chargement supérieur (101).

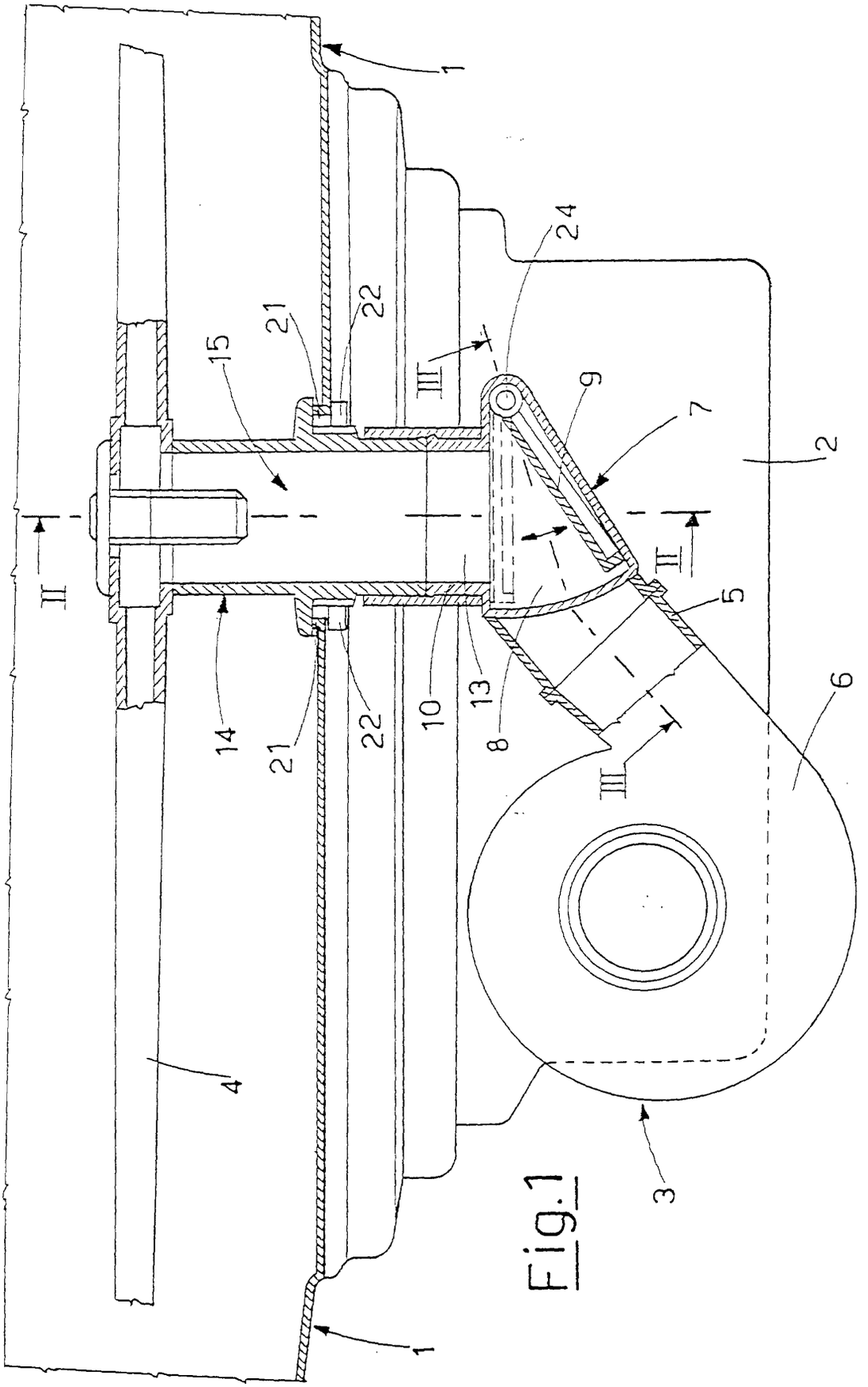

Fig.1

Fig.3

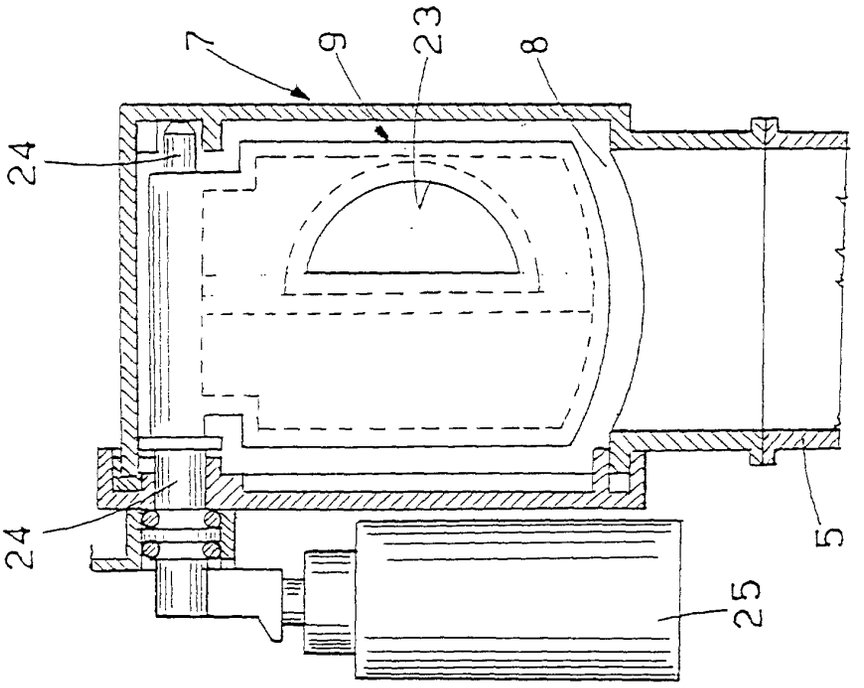
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Fig.2

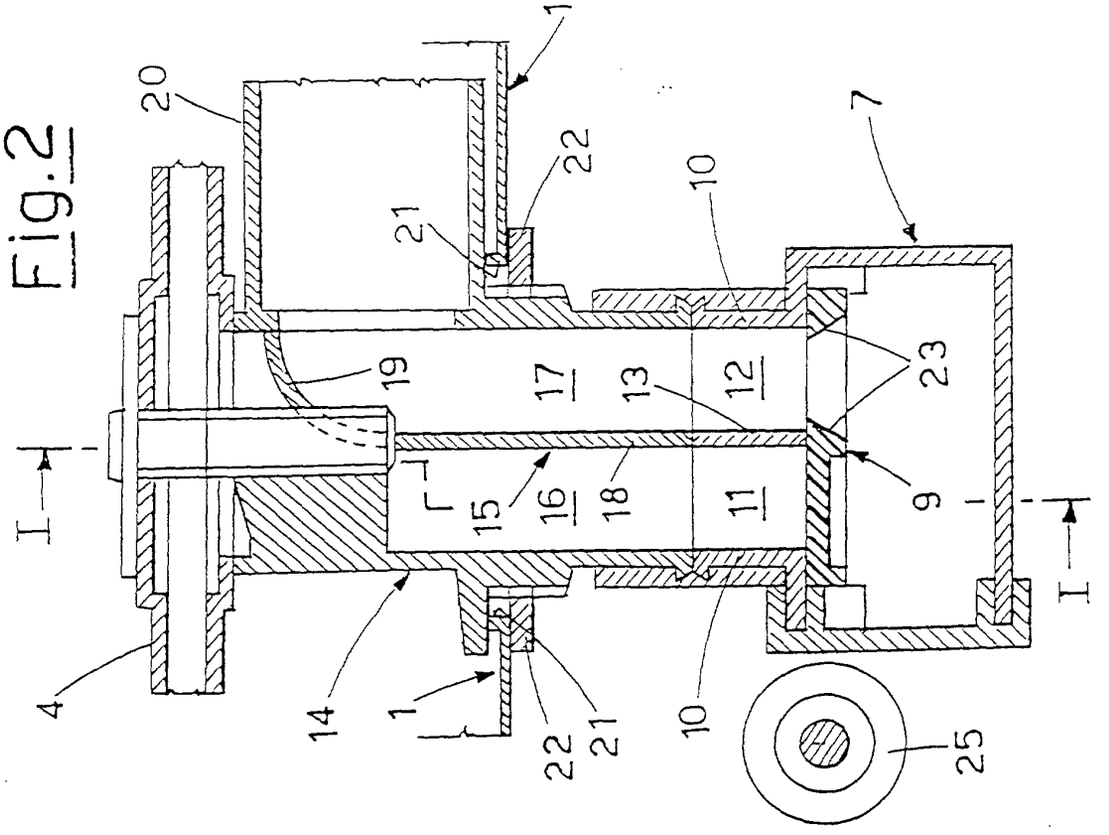
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Fig.5

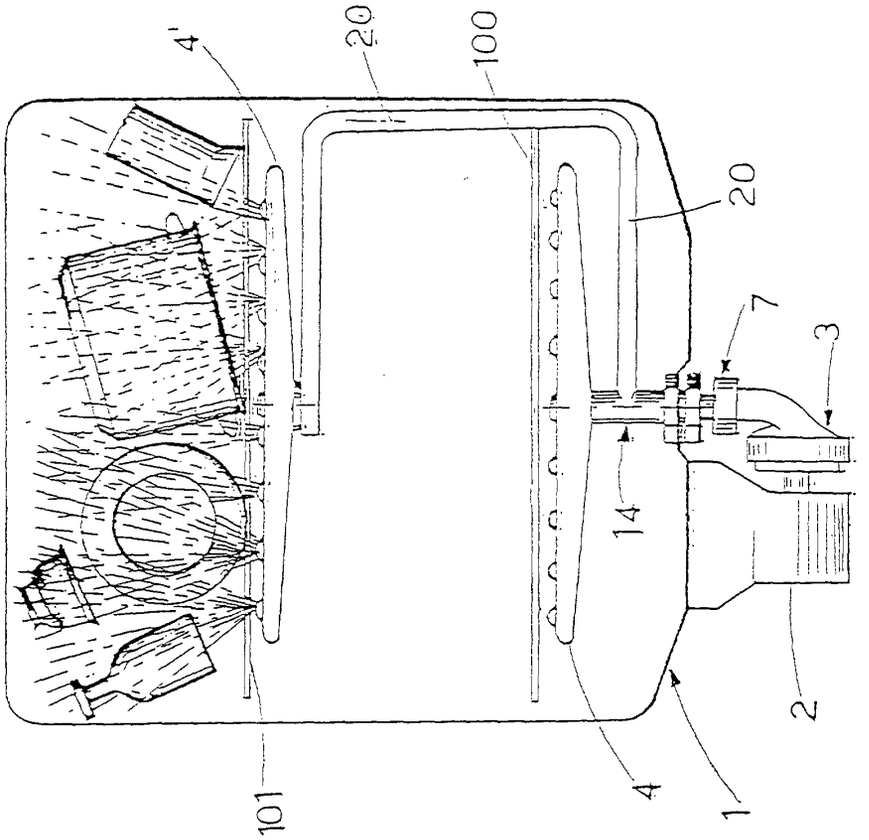

Fig.4

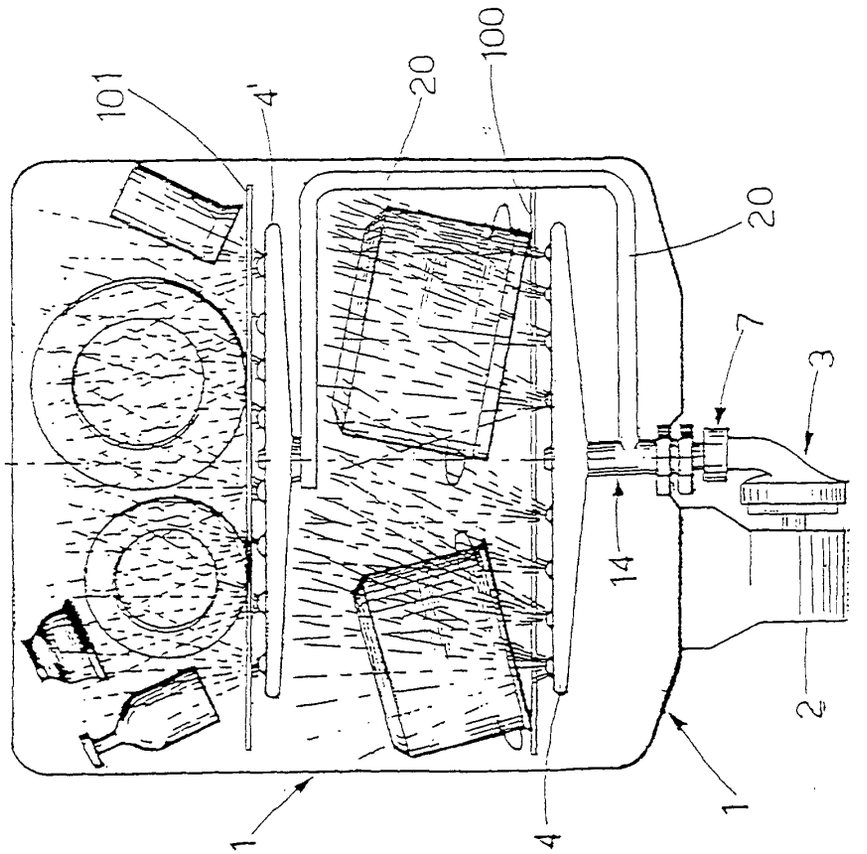

Fig.6

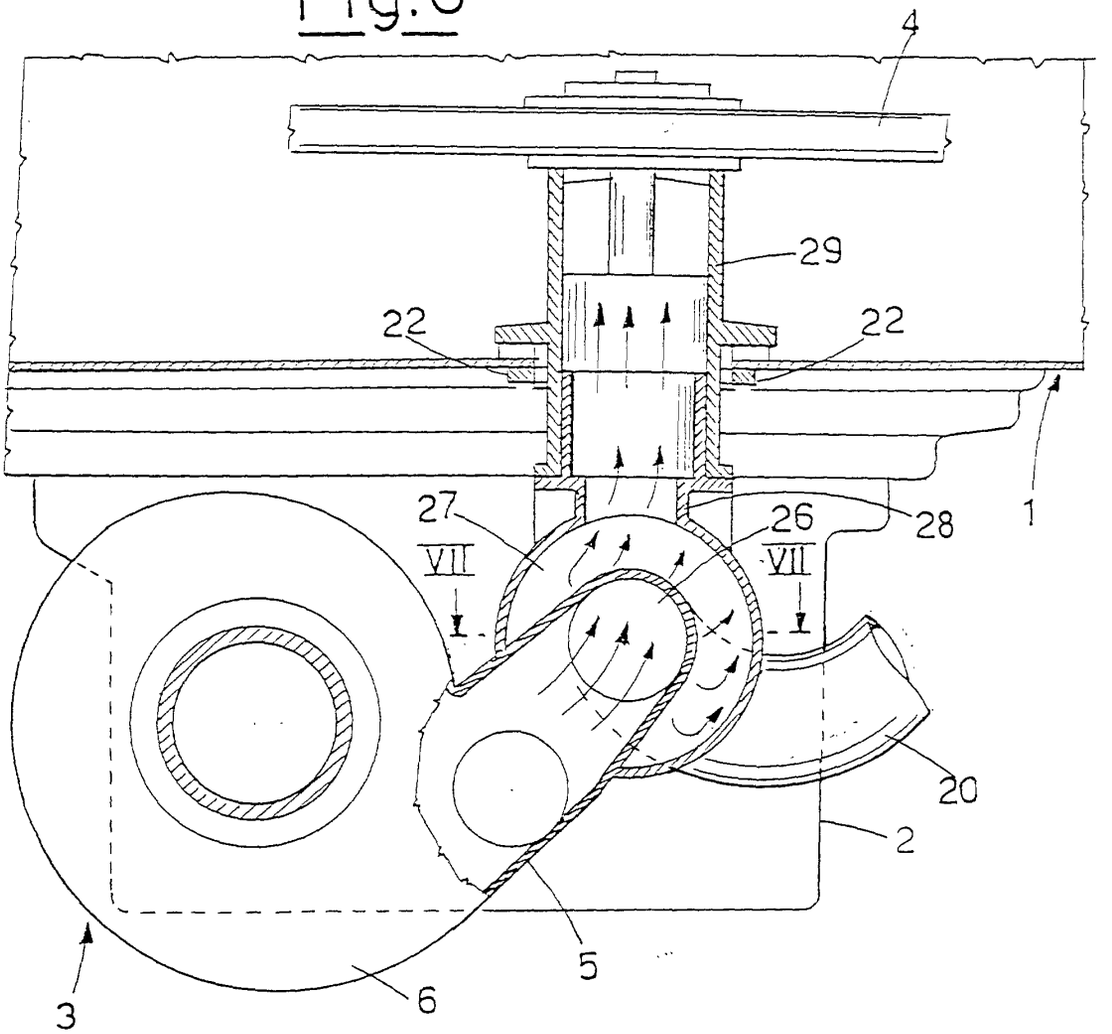

Fig.7