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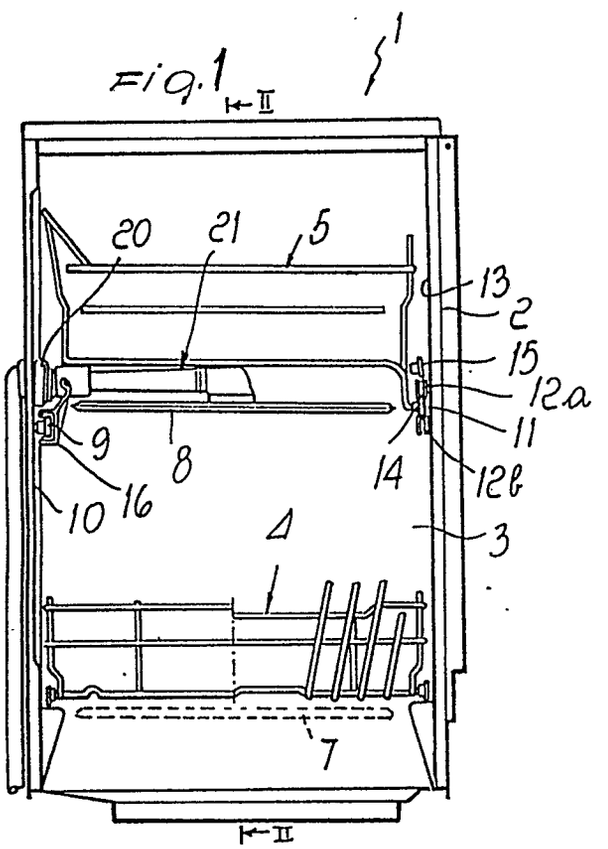
## (54) Dishwashing machine having variable load possibility.

(57) The present invention refers to a dishwashing machine (1) having variable load possibility, comprising a box-type structure defining internally a washing chamber (3) where a lower (4) and an upper (5) load basket are located. The load baskets can slide along an extracting direction substantially perpendicular to the opening face of the washing chamber and underneath each load basket there is a revolving sprayer (7, 8) for a washing liquid. The dishwashing machine comprises means (9, 11, 12a, 12b, 14, 15, 16, 17, 18) to position the upper load basket in different ways in order to realize at least two positions with different tilt in respect of the ideal lying plane of the lower basket, in order to obtain a variation of the loading capacity of the baskets.

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# "DISHWASHING MACHINE HAVING VARIABLE LOAD POSSIBILITY"

The present invention refers to a dishwashing machine having variable load possibility.

As known, diswashing machines usually comprise a box-type structure defining a washing chamber wherein a lower and an upper load basket are located, in order to hold the pottery to be washed. Each load basket can be independently moved along an extracting direction perpendicular to a face of the box-type structure, which is suitably provided with a door in order to allow the loading and unloading of the pottery into and out of the baskets.

Underneath each load basket there is located an arm spraying a washing liquid, revolving around a substantially vertical axis, hitting with liquid jets the pottery loaded in above lying basket. Usually, the cumbersome pottery is located in the lower basket, because the clearance from it to the upper spraying arm is greater than the clearance from the upper basket to the ceiling of the washing chamber.

Moreover, in many types of dishwashers, the upper spraying arm is held by the bottom of the upper basket and is fed through a vertical tubular element located substantially in the centre of the upper basket and which receives the washing liquid from a supplying orifice supported by the ceiling of the washing chamber.

In other types of dishwashers the two spraying arms are supported underneath the load baskets by arms fixed to a wall of the washing chamber.

In the use of dishwashing machines there is very often the need to change the destination of the available space, defined by the position of the two load baskets.

Particularly, very often there is the need of a greater vertical clearance, for instance to locate very cumbersome pottery in the lower basket, or in the case that the available room in the lower basket is not sufficient to locate large pots, pans, etc.

In some types of dishwashers it is possible to change the vertical position of the upper basket, because on the opposite walls of the washing chamber there are provided two couples of sliding guides located at different levels, where the side rollers of the upper basket can be engaged. This possibility often is not satisfying, in relation to the loading necessities, because obviously increasing the available room above one of the baskets, the room available to the other basket could not be sufficient, even in the case that only a part of the basket is occupied by a high pot.

Moreover the possibility to locate also in the upper basket large pots gives rise to problems as the washing efficiency is concerned, as such pottery usually shows dirt and incrustations which are difficult to clean.

Such a problem is more serious in the machines with the upper spraying arm working together with the upper basket, because, owing to the fact that the supply to said arm happens through an air gap, there are great pressure drops, which notably reduce the washing power of the upper arm.

Also in the machines where the upper arm is held by a bracket connected to a wall of the washing chamber, there are problems due to the possibility to change the position of the upper load basket, and, particularly, there are in any case heavy pressure drops, because a device is required to raise and lower the spraying arm together with the upper basket, which also gives rise to mechanical difficulties.

The object of the present invention is to solve the above said problems, realizing a dishwashing machine where there is possible to change the loading capacity of the baskets, so as to satisfy in full very different loading needs.

In order to achieve the above said object, it is an aim of the present invention to realize a dishwashing machine which, together with the possibility to change the loading possibility of the baskets, shows an high washing power for the spraying arm acting on the upper load basket.

Another aim of the present invention is to realize a dishwashing machine having a variable loading capacity for both the baskets, which can be obtained in a simple and effective way.

This object and the said and other aims which could be better understood later, are obtained by a dishwashing machine having variable load possibility, comprising a box-type structure defining internally a washing chamber where a lower and an upper load basket are located, which can slide along an extracting direction substantially perpendicular to the opening face of the washing chamber, where underneath each load basket there is a revolving sprayer for a washing liquid, characterized in that the dishwashing machine comprises means to position the upper load basket in different ways in order to realize at least two positions with different tilt with respect to the ideal lying plane of the lower basket, in order to obtain a variation of the loading capacity of said load baskets.

Further characteristics and advantages of the invention will appear better from the description of a preferred, not exclusive, embodiment of the dishwashing machine according to the invention, shown as an indicative and not limitative example in the accompanying drawings, where:

- figure 1 shows schematically a dishwashing machine according to the invention in a frontal view, with the upper load basket in a first position;

- figure 2 is a schematic section of figure 1 along the II-II axis with the upper load basket extracted from the washing chamber;

- figure 3 is a schematic section of figure 1 like that of figure 2 but with the upper load basket located inside the washing chamber;

- figure 4 shows schematically the dishwashing machine in a frontal view with the upper load basket tilted in respect of the lower load basket;

- figure 5 is a perspective schematic view showing the upper spraying arm;

- figure 6 shows an enlarged view, taken from the top, of a feeding tubular element for the upper spraying arm, showing the different positions which said element can take during the insertion of the upper load basket in the washing chamber;

- figure 7 shows an enlarged frontal view of a part of the holding means of the upper load basket, near to the connection of the tubular element;

- fugure 8 shows a vertical section of the connection of the tubular element which feeds the upper spraying arm;

- figure 9 shows a perspective view of a support means of the upper load basket;

- figure 10 is a schematic view, taken from the top, of the interior of the dishwashing machine, showing the upper load basket and the related fittings; and

- figure 11 shows a vertical section of an advantageous embodiment of the connection of the tubular element which feeds the upper spraying arm.

Referring to the said figures, the dishwashing machine according to the invention, indicated as a whole with the reference number 1, comprises a box-type structure 2 defining internally a washing chamber 3 where a lower load basket 4 and an upper load basket 5 are located.

Load baskets 4 and 5 can slide along extracting directions substantially perpendicular to the front face of structure 2, which is suitably provided with a door 6, which can be open in order to allow to extract the baskets 4 and 5 during pottery loading and unloading operations.

Underneath each load basket there is a spraying arm, e.g. a lower rotating arm 7, which is only schematically indicated and is fed in a 'per se' known way, and an upper rotating arm 8 whose feeding will be explained later on.

According to the invention there are provided means to position the upper basket 5 inside the washing chamber 3 in different ways, at least according to two differently tilted positions in respect of the ideal lying plane, usually horizontal, of the lower basket 4, in order to allow a variation of the loading capacity of both the baskets 4 and 5.

More particularly, according to the shown embodiment, the upper basket 5 can either be located in a first position, where it is substantially parallel to the lying plane of the lower basket 4, or in a second position, where it is tilted in respect of the lying plane of the lower basket 4.

Advantageously, the means for a diversified positioning according to the invention comprise a first slide, formed by an horizontal row of rollers 9, located on a lateral wall 10 defining the washing chamber 3, and a second horizontal sliding guide 11, which is held between two guides 12a and l2b, fixed to the lateral wall 13 opposite to wall 10. The side of the upper basket which faces lateral wall 13 is provided with two rows of horizontal rollers 14 and 15, which according to choice can engage guide 11, and the upper basket can be tilted around an axis parallel to the extracting direction (sliding direction) so as to allow a positioning in two different planes forming an angle as said.

Suitably, on the side of the upper basket facing lateral wall 10, there is provided a supporting means 16, which is coupled in a sliding way with rollers 9, with the intervention of an elongated element 17, and which holds the side of the upper basket by means of hinges 18 which have an axis substantially parallel to the sliding direction of the basket so allowing the tilting around said axis.

Hinges 18 may be constituted simply by cylindrical open recesses, obtained by plastic material moulding, which engage the small lateral bars forming the frame of the basket and which usually show a round cross section.

Owing to the elongated element 17 and to the guide 11 it is possible to fully extract, in a known way, the basket from the washing chamber.

Advantageously, the upper rotating arm 8 is rotatably supported in a plane substantially parallel to the lying plane of load basket 5 by the upper basket 5 itself and there are provided hydraulic connection means intervening between arm 8 and a supply circuit located laterally to the box-type structure.

More particularly, on lateral wall 10 there is held a feeding outlet 20 of the hydraulic supply circuit. Such an outlet shows a head 20a, which is substantially formed in a spherical section, and to which can possibly be connected a suitably conformed end of a tubular element 21, which constitutes the said hydraulic connection means and is connected, at its other end, to rotating arm 8.

Suitably, the tubular element 21 shows a variable lenght so as to allow to engage or disengage with the head of the supply outlet 20.

In fact tubular element 21 is constituted by a first portion 21a which is coupled to the bottom of the upper basket 5 in a way that it can oscillate

around an axis perpendicular to the lying plane of the basket and which holds the arm 8 so that it can rotate around its axis, and by a second portion 21b which is intended for engaging the head 20a and which can slide externally to the the end of portion 21a opposite in respect of the connecting side of arm 8. Second portion 21b is guided in its sliding by bayonet joints 22 which also define the maximum lenght of the tubular element. Between first portion 21a and second portion 21b there are provided first intervening elastic means, e.g. an helical spring 23, which acts on the second portion promoting the lenghtening of tubular element 21. Said elastic means, after the tubular element has been inserted in the supply outlet 20, improve the hydraulic sealing between head 20a and tubular element 21.

Advantageously, in order to easy the insertion of tubular element 21 on the head 20a, there are provided preferential positioning means to hold, during the extraction of the upper basket 5 from the washing chamber, the tubular element 21 in a predetermined position. Said preferential positioning means are constituted by a spring 25 which pulls the tubular element 21 against a firm stop 26 defined in the bottom of the upper basket 5. Tubular element 21 is separated from the firm stop 26 as a consequence of the contact with the supply outlet 20 during the insertion of the basket in the washing chamber and is pressed again by the spring 25 against the firm stop when, as a consequence of the extraction of the upper basket, tubular element 21 leaves the supply outlet 20.

The shape of the coupling of the supply outlet 20 with the tubular element 21 assures the sealing of the connection when the upper load basket 5 is in any of the different positions which it can assume, also because the oscillation axis 27 of the basket is very near, as shown in figure 7, to the curvature centre 31 of the head 20a of the supply outlet 20.

The use of the dishwashing machine according to the invention is the following.

In normal load conditions, the upper basket 5 is positioned in a plane parallel to the ideal lying plane of the lower basket 4, with rollers 14 which engage the guide 11. When it is necessary to increase the available space above the upper basket 5, it is sufficient to extract the upper basket 5 and disengage rollers 14 from guide 11 and engage the guide with rollers 15. In this way, upper basket 5 is tilted toward the bottom and above it, in the area near to wall 13, it is possible to fit pots larger than in the preceding condition.

Now the upper basket 5 can be reinserted in the washing chamber 3. During the extraction of the upper basket 5, the tubular element 21 leaves the supply outlet 20, oscillating around an axis which coincides with the axis of the upper revolving arm 8, while during reinsertion it engages again, as shown in particular in figure 6, with the supply outlet 20.

Figure 11 shows the vertical section of an advantageous embodiment of the connection between the tubular element 21 and the supply outlet 20.

In this embodiment the outlet 20 is always tilted towards the bottom of the washing chamber; in this way when the upper basket is tilted, in order to accept cumbersome pottery, the tubular element 21 is in line with the outlet 20, so that full hydraulic power is available for a stronger washing action; when, on the contrary, the upper basket is in an horizontal position (normal load of small dishes or saucers), the hydraulic power is somewhat reduced.

In this embodiment the assembling of the first portion of the tubular element 21a on the second portion 21b is realized by release means (28,29) formed by small flexible tongues 28 which engage appendixes 29.

It has been practically ascertained that the dishwashing machine according to the invention fulfills very well the extablished aim because the oscillation of the upper load basket allows a more rational exploitation of the space available to the two baskets. Another advantage is that, tilting the upper basket, the loading capacity related to both the baskets is changed substantially only for a portion of the baskets sufficient to face unusual room needs, without affecting the remaining parts.

The dishwashing machine so conceived can easily be modified in many ways, without departing from the inventive idea; for instance, it is possible to foresee devices to vary the vertical positioning of guides 12a and 12b so obtaining a practically continous adjustment of the slope of the upper basket, according to the loading needs.

Moreover technical equivalent elements can be substituted for all details.

Employed materials and sizes can be of any type, according to technical art and needs.

Several variants can be realized by the man of the art on the shown dishwashing machine without departing from the inventive idea, such as:

- the possibility to realize the support means 16 in a dual way in respect of the figure 9, so that the basket 5 is not supported by the said support means from a lower position, but it is sustained by said support means from a higher position (premising that the oscillation axis remain the same);
- the possibility to realize the coupling of the first portion of the tubular element 21a with the second portion of the tubular element 21b providing said two portions with means such as two small tongues

obtained on the portion 21a which engage a pin obtained on the portion 2lb, in order to avoid the mutual rotation of said two portions;
- the possibility to realize a pushing elements connected with the tubular element 21 which grants the moving backwards of said tubular element and its correct positioning on the head 20a, when the load basket 5 is inserted in the washing chamber; - in order to permit a correct positioning of the tubular element 21 on the head 20a, the end of said tubular element 21 turned towards the head 20a can have a craw shape, which avoids the overcoming of the correct working position during a violent insertion of the load basket 5; - the possibility to foresee a blocking element on the sliding means comprising the rollers 9 and the elongated element 17, which avoids, if not disarmed, the complete withdraw of the upper load basket 5; in this way it is possible the positioning of said basket 5 on different height levels in the washing chamber witout the need to disengage completely the support means of said load basket.

## Claims

1. Dishwashing machine having variable load possibility, comprising a box-type structure defining internally a washing chamber (3) where a lower (4) and an upper (5) load basket are located, which can slide along an extracting direction substantially perpendicular to the opening face of the washing chamber, where underneath each load basket there is a revolving sprayer (7,8) for a washing liquid, characterized in that the dishwashing machine (1) comprises means (9,11,12a,l2b,14,15,16,17,18) to position the upper load basket (5) in different ways in order to realize at least two positions with different tilt with respect to the ideal lying plane of the lower basket (4), in order to obtain a variation of the loading capacity of said load baskets.

2. Dishwashing machine according to claim 1, characterized in that said at least two positions with different tilt comprise at least a first position substantially parallel to the ideal lying plane of the lower load basket (4) and a second position which is tilted in respect of said ideal lying plane of the lower load basket (4).

3. Dishwashing machine according to claim 1, characterized in that said upper load basket (5) holds the related rotating spraying arm (8) in a plane substantially parallel to the lying plane of said upper load basket (5), and that there are provided hydraulic connection means (21) intervening between said upper spraying arm (8) and a supply circuit in said box-type structure and activable when said upper load basket (5) is inserted into said washing chamber (3).

4. Dishwashing machine according to one or more of the preceding claims, characterized in that said hydraulic connection means comprise an oscillating tubular element (21), supported, near one (21a) of its ends, by said upper load basket (5) around the rotation axis of said upper rotating spraying arm (8) and which can, at its other end (2lb), watertightly engage, at the insertion of said upper load basket (5) into said washing chamber (3), with a supply outlet (20) protruding from a lateral wall (10) of said washing chamber (3).

5. Dishwashing machine according to one or more of the preceding claims, characterized in that said tubular element (21) shows a variable lenght either against or promoted by first elastic means (23).

6. Dishwashing machine according to one or more of the preceding claims, characterized in that said supply outlet (20) shows an head (20a) substantially formed in a spherical section, which can be pressed to engage said other end (21b) of said tubular element (21), which is provided with a suitably conformed opening.

7. Dishwashing machine according to one or more of the preceding claims, characterized in that said supply outlet (20) is tilted in respect of the said lateral wall (10) so that when said upper load basket (5) is also tilted, said tubular element (21) is in line with the outlet and full hydraulic power is available to said upper spraying arm (8).

8. Dishwashing machine according to one or more of the preceding claims, characterized in that it comprises preferential positioning means (25,26) for said tubular element (21) in order to hold said tubular element (21) in a correct position to engage with said supply outlet (20) when said upper load basket (5) is extracted from said washing chamber (3).

9. Dishwashing machine according to claim 8, characterised in that said preferential positioning means comprise a pushing means, which is connected to the said tubular element (21) in order to obtain its moving backwards and its correct positioning on the said supply outlet (20), during the insertion of said upper load basket (5) in said washing chamber (3).

10. Dishwashing machine according to claim 8, characterised in that said preferential positioning means comprise an element obtained on the end of the said tubular element (21) tourned towards the said supply outlet (20), which prevents the overcoming of the correct working position during the insertion of the said upper load basket (5) in the said washing chamber (3).

11. Dishwashing machine according to claim 8, characterised in that said preferential positioning means comprise fastening means obtained on the both portions (21a,21b) of said tubular element

(21), in order to avoid their mutual rotation.

12. Dishwashing machine according to one or more of the preceding claims, characterized in that said means to position the upper load basket in different ways (9,11,12a,l2b,14,15,16,17,18) comprise sliding guides which are defined onto opposite lateral walls (10,13) of said washing chamber (3), extend along a direction parallel to the extraction direction, and comprise a first sliding guide which is defined onto one (10) of said lateral walls and can engage with a first side of said upper load basket (5) and a second sliding guide which is defined onto the other lateral wall (13) and can according to choice engage with two engagement elements (14,15) which are defined onto a second side of said upper load basket (5), said two engagement elements (14,15) being located at different height levels.

13. Dishwashing machine according to claim 12, characterised in that for the positioning of said upper load basket (5) on different height levels in the washing chamber (3) said first sliding guide has a blocking means which avoids the complete withdraw of the said upper load basket (5) when is realized the choice of one of the two engagements (14,15) defined onto the second side of said basket (5).

14. Dishwashing machine according to one or more of the preceding claims, characterized in that said first sliding guide is defined onto the lateral wall (10) of said washing chamber (3) where said supply outlet (20) is located.

15. Dishwashing machine according to one or more of the preceding claims, characterized in that it comprises a support means (16,17,18) which engage slidingly with said first sliding guide and which holds in an oscillating way said first side of said upper load basket (5) with an oscillation axis substantially parallel to said extraction direction and near to the curvature centre of said supply outlet head (20a).

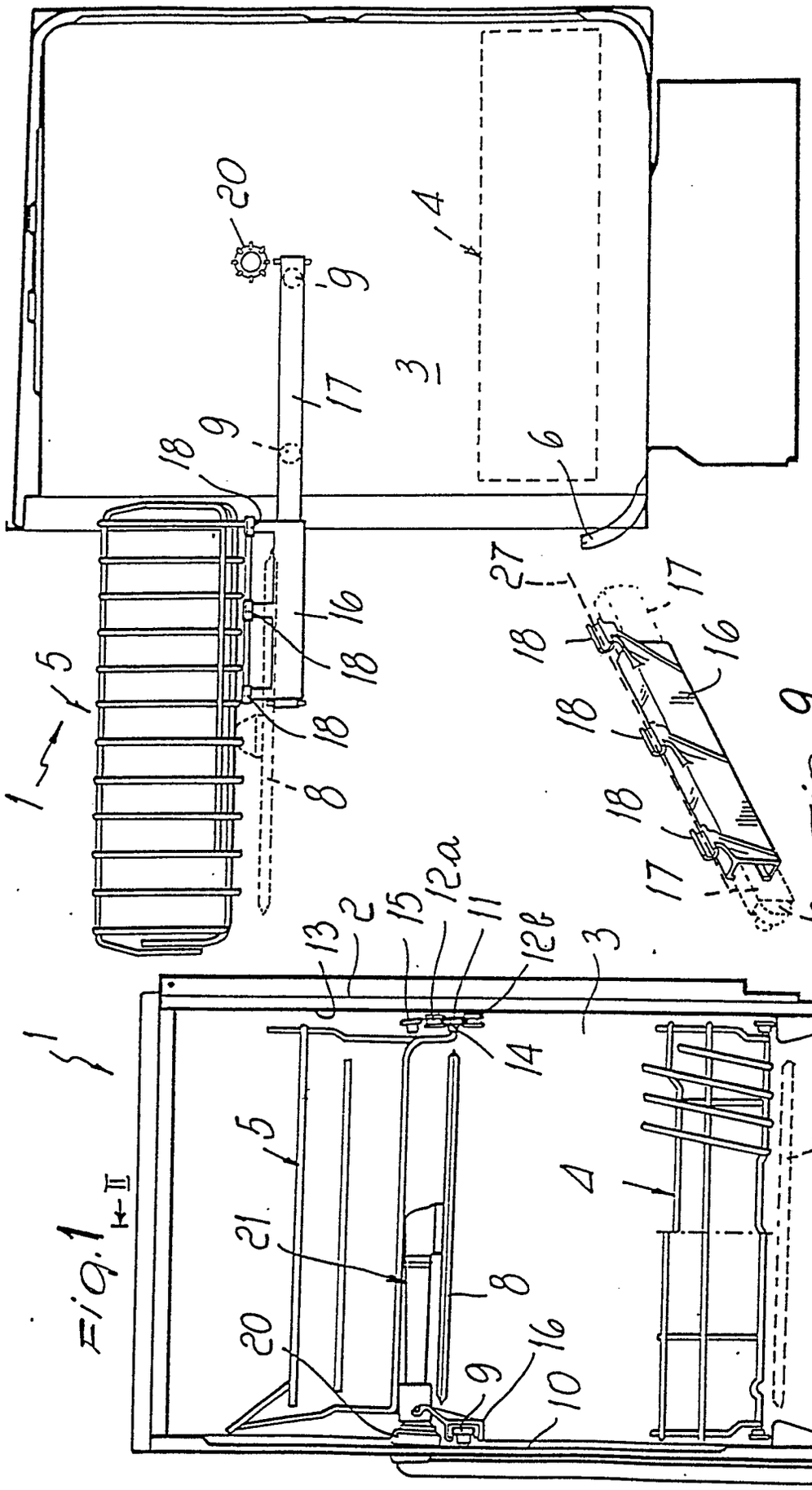


Fig. 2

Fig. 9

Fig. 1

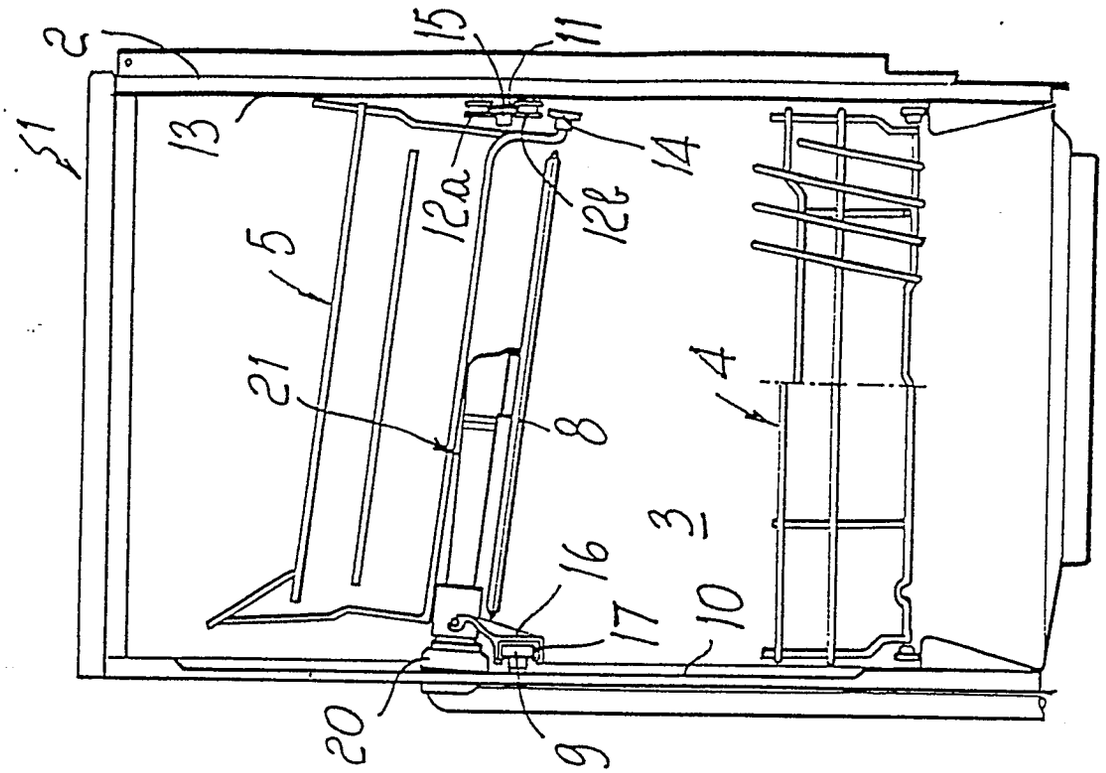


Fig. 4

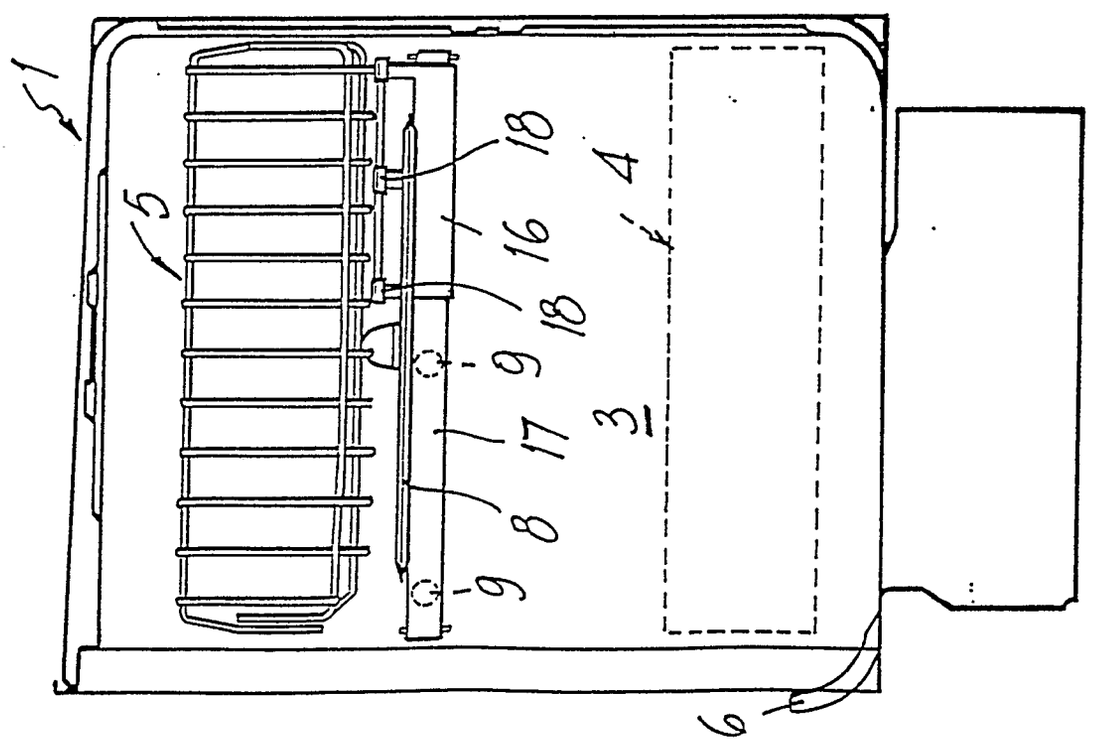


Fig. 3

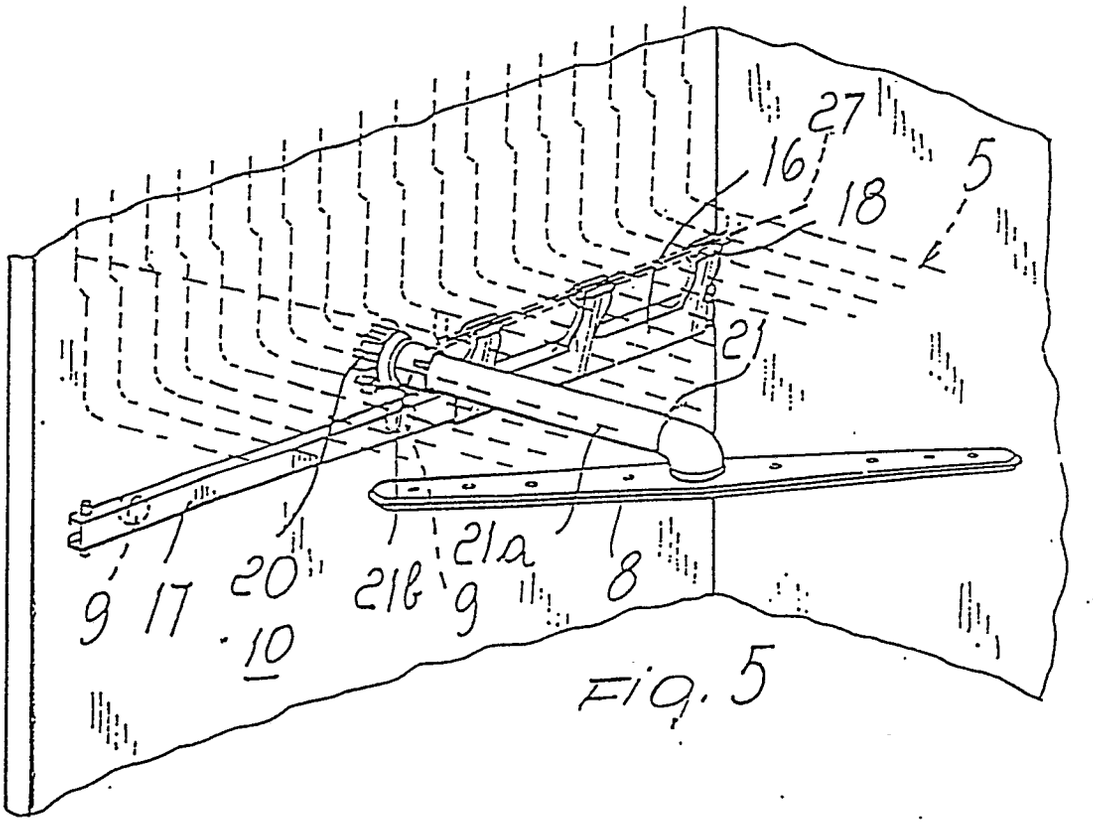


Fig. 5

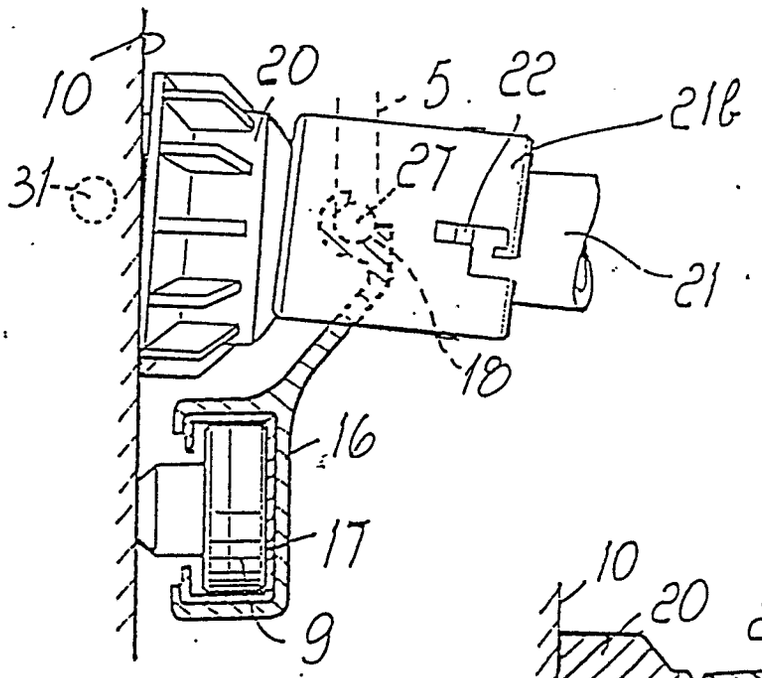


Fig. 7

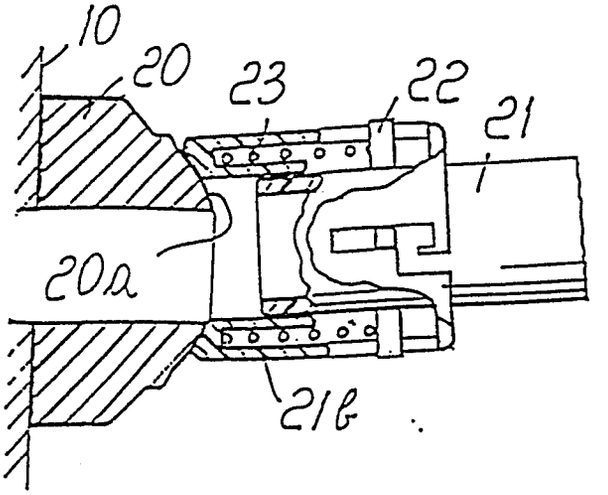


Fig. 8

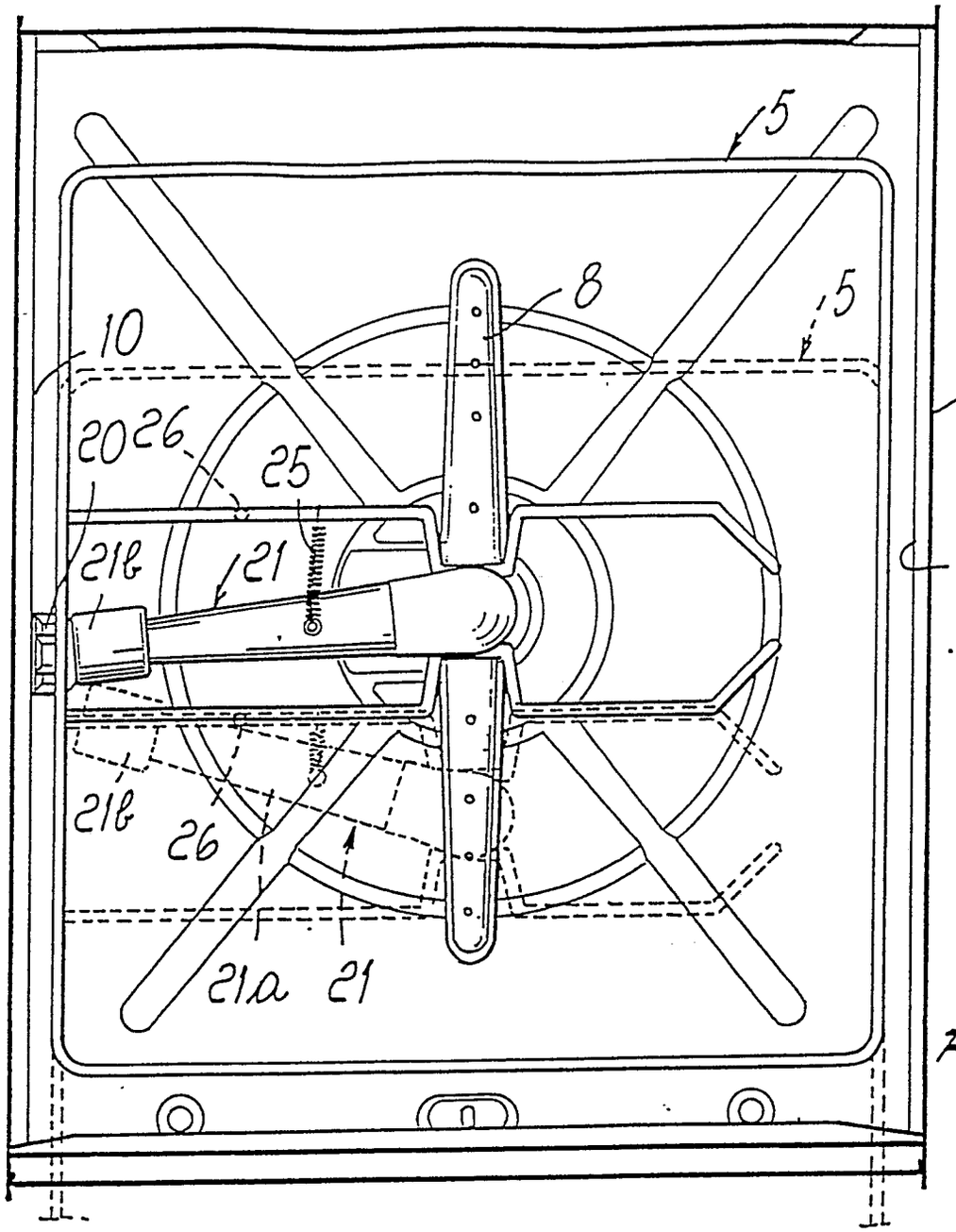


Fig. 10

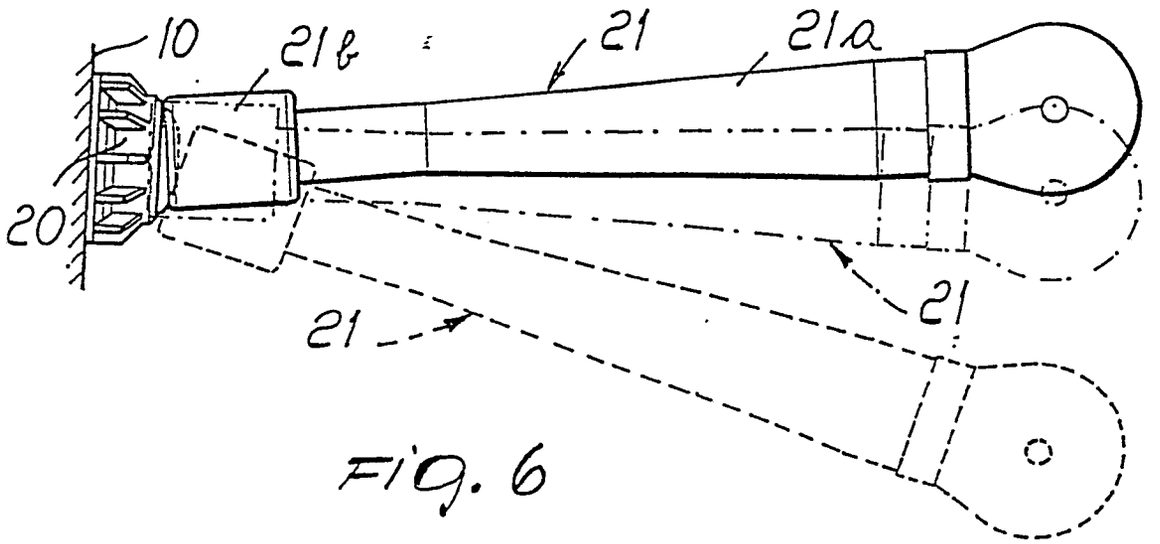


Fig. 6

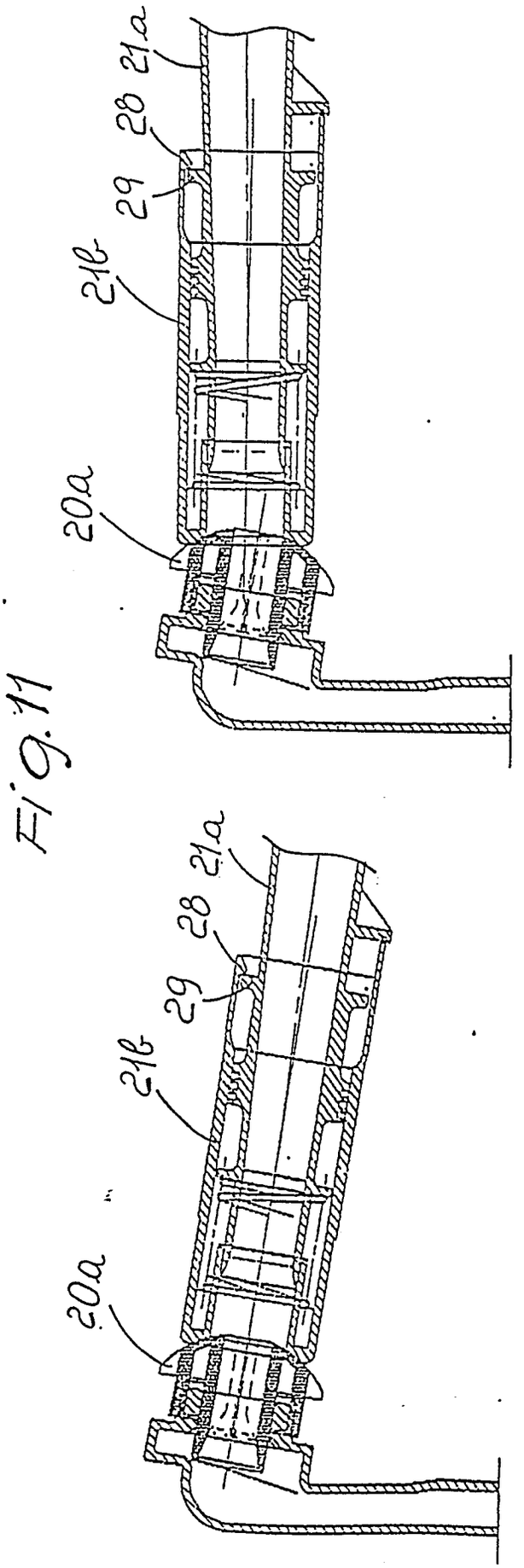


Fig. 11

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# EUROPEAN SEARCH REPORT

Application Number

EP 89 12 1829

## 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.5) |
|---|---|---|---|
| X | DE-A-3 110 299 (BOSCH-SIEMENS HAUSGERAETE GMBH)<br>* claim; figures 1-4 * | 1-3 | A 47 L 15/50<br>A 47 L 15/23 |
| A | --- | 4 | |
| A | WO-A-8 301 892 (AB ELECTROLUX)<br>* figure 1 * | 1,4 | |
| A | --- | | |
| A | DE-A-2 733 090 (HOBART CORP.)<br>* claim 1; figures 1,12 * | 1,4 | |
| A | --- | | |
| A | DE-A-2 732 540 (BOSCH-SIEMENS HAUSGERAETE GMBH)<br>* claim 1; figures 1-3 * | 1,4 | |
| A | --- | | |
| A | DE-A-2 732 665 (BOSCH-SIEMENS HAUSGERAETE GMBH)<br>* claim 1; figures 1,3 * | 1,4 | |
| A | --- | | |
| A | US-A-3 126 098 (R.C. GEIGER et al.)<br>* column 5, lines 1-22; figures 2,4,5 * | 1,12 | |
| | ----- | | |

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A 47 L

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| BERLIN | 19-02-1990 | KANAL P K |

CATEGORY OF CITED DOCUMENTS

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