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(54) **Improved dishwashing machine**

(57) A dishwashing machine comprising a cabinet (2), wherein a wash tub (4) is housed closed on the front by a door (3), said door (3) comprising an inner door (7) depressed to the outside with respect to the wash tub (4) for maximizing the inner space of said wash tub (4) used for the loading of the crockery to be washed. According to the invention, said inner door (7) is depressed along its perimeter, whereas an inner frame of said inner door perimeter is not depressed.

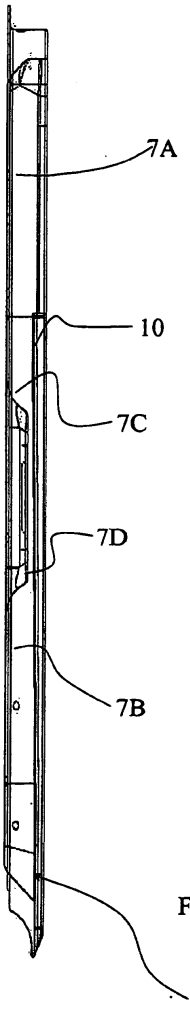

Fig. 2

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Description

[0001] The present invention relates to a dishwashing machine having an improved construction, in particular for household applications.

[0002] Such machines usually consist of a cabinet open on one side, generally on the front, by means of a tilting door hinged on its lower side, through which access to the wash tub is obtained. Besides the wash tub, the above cabinet houses all those elements and devices, which are known for containing the crockery to be washed and apt for implementing the washing cycles. These include the washing agents dispensers, the programmer device of the dishwasher and at times also a ventilation device, which are usually built in inside the door of the dishwashing machine.

[0003] Obviously, a certain total thickness of the door, such as provided in its upper portion, eliminates some useful volume for loading the crockery in the wash tub. As a result, the upper basket of the two baskets usually provided, has overall dimensions surely smaller than the bottom basket. Practically, the upper basket has a smaller length and height extension compared to the dimensions that may be obtained should the upper volumes of the tub be fully utilized.

[0004] In these dishwashing machines the door shell, usually called inner door, is made with a depression to the outside of the tub and has appropriate guides for the bottom basket to slide on them and extracting it from the wash tub when the door is completely open, i.e. tilted to the outside. According to experience, it has been highlighted that above all these guides have a rather restricted height for ensuring a good sliding of the bottom basket during its extraction. Actually, the rollers guiding the bottom basket are often sliding out of the guides, which event occurs quite frequently when the basket is loaded with many pieces of crockery to be washed; this event is rather unpleasant for the user of the dishwashing machine. Moreover, there is also the risk that the crockery contained in it may become broken during a basket derailment from the guides.

[0005] It should also be noticed that in the instance of the above common dishwashers, the profile width of the inner door carrying the sealing gasket is restricted by the upper bulging of the inner door itself, which is provided for housing the programmer device and sometimes the washing agents dispenser. This bulging also reduces the space both vertically and in depth. Therefore, this width is not always big enough to avoid possible deformations and warping when utilizing an extruded gasket, which occur particularly in case of a profile with curving radiuses. An extruded gasket has in fact a substantially consistent section, which cannot be changed in particularly difficult places, such as the curves in line with the inner door angles.

[0006] It should also be noticed that the dispensers usually built in inside the inner doors of the dishwashing machines have the opening of the compartment for the powder or solid washing agents generally assembled flush with the surface of the inner door facing inside the wash tub. As a result, dispensing of the washing agents occurs with at least a portion of the latter left behind right on the inner door surface, which will then be dissolved by the water being sprayed there by the spraying elements.

[0007] Therefore, both the equipment of the inner door and usual arrangement of the dispenser does not ensure an effective use of the whole quantity of washing agents.

[0008] It is further known that originally - i.e. towards the end of the sixties - dishwashing machines had no dispensing means at all of any type on their inner door, with an inner door profile completely and solely depressed to the outside. An example of this execution is disclosed by the document FR-A-2.004.067.

[0009] This type of dishwasher has no longer any relationship with modern dishwashers, whereas the technical solutions provided in them cannot be transferred any more to to-day machines.

[0010] It is the object of the present invention to solve the above drawbacks and provide a dishwashing machine, in particular for household applications, having improved features.

[0011] In this frame, it is the main object of the present invention to provide a dishwashing machine fitted with an inner door depressed in optimal manner, in particular comprising at least a dispenser located favourably in the inner door for distribution of the washing agents.

[0012] It is an object of the present invention to provide a dishwashing machine, which ensures full utilization of the upper space of the wash tub for loading the crockery to be washed. At the same time, the dishwasher door ensures a cost effective and efficient manufacture.

[0013] It is an object of the present invention to provide a dishwashing machine having an upper basket with a plan extension substantially equal to the bottom basket and an increased height compared to common productions.

[0014] Another object is to ensure a good guide of the bottom basket when being extracted from the tub, finally removing any derailment risk for the basket from its guides and possible damages to the crockery loaded on it.

[0015] Another object is to provide a sealing gasket for the dishwashing machine door, which is obtained effectively through a low-cost manufacturing process.

[0016] In order to reach these aims, it is the object of the present invention to provide a dishwashing machine incorporating the features of the annexed claims, which form an integral part of the description herein.

[0017] Further objects, features and advantages of the present invention will become apparent from the following detailed description and annexed drawings, which are supplied by way of non limiting example, wherein:

- Fig.1 shows a schematic side view of a dishwashing machine according to the present invention;

- Fig 2 shows a side view of the door of the dishwashing machine of Figure 1;
- Fig. 3 shows a view from inside the door of Figure 2.

[0018] Figure 1 is representing a dishwashing machine according to the present invention, indicated globally with 1, which has substantially all and only those structural details being apt for understanding the invention as such. All further common structural and technical details known at the present state of the art for a good effective operation of a modern dishwashing machine have been omitted in the description herein and are not described for simplicity's sake.

[0019] Therefore, the dishwasher 1 consists of a closed cabinet 2 having access on the front through a door 3, which is hinged on the bottom and can be completely tilted outside, being shown in its closed position in this representation. The door 3 closes a wash tub 4 on the front, which is contained inside the cabinet 2. The wash tub 4 is commonly housing a first basket 5 on the top and a second basket 6 on the bottom. As it can be noticed, the front edges of the first basket 5 and second basket 6 are flush with a first area 7A and second area 7B, of an inner door 7 inside the door 3 of the dishwasher 1, respectively.

[0020] These baskets 5, 6 have substantially an equal plan development, the same depth and a comparable height. Moreover, it can be noticed how the upper basket 5 has the top edge very near to the wash tub top 4, so as to fully utilize both the height space and depth space for housing the crockery to be washed.

[0021] Figure 2 is representing a schematic side view of the door 3 of the dishwasher 1, whereas Figure 3 shows from the inside a view of the detail of the inner door 7 related to the door 3. Above all in the latter, the particular form of the inner door 7 can be noticed, which is commonly assembled to the door 3 and nearly completely depressed to the outside. Here both the above first area 7A and second area 7B can be identified, which have their utmost depression to the outside with respect to the tub 4 and are centrally separated by a third area 7C. The detail of these areas 7A, 7B, 7C can be appreciated, in particular in Fig. 3.

[0022] The third area 7C has a relief 7D in the middle, protruding from the profile of the inner door 7 and relevant depressed areas 7A and 7C, acting as an outline of a rectangular hole 8, wherein a dispensing device indicated with 9 and schematically represented in Figure 1 will engage. By virtue of the uplifted arrangement with respect to the surface of the inner door 7, the dispenser 9 will dispense the washing agents by gravity directly into the second bottom basket 6, getting very close to the second area 7B of the inner door 7.

[0023] Thus, the quantity of washing agents loaded in the dispenser is directly and completely utilized in the wash tub 4, reducing the risk of leaving a portion of it unused.

[0024] Obviously, once the washing agent is completely dispensed into the wash tub it will be circulated by the recycle system to both the sprayers.

[0025] In this embodiment, the timer - not shown - is a very small electronic timer; therefore, it can be housed even in the reduced space of the first area 7A.

[0026] The inner door 7 has a raised edge 7E following the side and upper profile of the inner door 7, which has a regular shape, with two different thickness. In particular, inside the side border two grooved guides 10 are obtained starting from the lower section. These guides extend well over half the whole length of the inner door 7 itself, they have a slight downwards slope for facilitating the bottom basket 6 sliding when the door 3 is tilted in its open position, and may even exceed even 12 mm height on their highest length. These guides 10 engage conveniently the common rollers of the second bottom basket 6, not shown for simplicity's sake.

[0027] Fig. 3 is clearly representing the trend of the edge 7E; as it can be noticed, this edge 7E maintains a regular trend and consistent width also when is curved approaching the edges of the inner door 7. Said feature ensures application on it of a particularly effective low-cost water sealing gasket for the wash tub 4, not illustrated in the figures for simplicity's sake. Such a gasket is obtained through extrusion of the material used for this common gasket. The width of the edge 7E, e.g. 20 mm compared to the usual 12 mm width of common inner doors, ensures an efficient sealing of the gasket also in the curving radiuses, i.e. in the corners of the inner door 7, where warping may occur.

[0028] This technical progress is obtained by the bulging portion no longer existing inside the inner door, which would have otherwise detracted space for the edge 7E. Actually, the edge 7E is conveniently widened to the inside portion where there is the depressed area 7A .

[0029] According to the inventive concept of the dishwashing machine 1 according to the present invention, the dispensing device 9 is located inside the door 3 of the dishwasher 1 in an area of the inner door 7 not involved by the dimensions of the baskets 5 and 6, in particular in a central position, ensuring a maximum depression of said inner door 7 in the areas 7A and 7B in line with the baskets 5 and 6, so as to maximize the utilization of the inner spaces of the wash tub 4 and improve dispensing of the washing agents contained in the dispenser 9 at the same time.

[0030] Conveniently, the inner door 7 has a depressed configuration along its perimeter, whereas an inner frame of said inner door perimeter is not depressed, i.e. in particular, the inner door 7 is formed to have two areas 7A and 7B particularly depressed to the outside with respect to the tub for the baskets 5 and 6 to reach an equal maximum depth extension. Moreover, due to the extended depression of the area 7A, the first basket 5 has an increased height compared to common upper baskets, substantially similar to the height of the second basket 6 for an improved loading of the crockery to be washed.

[0031] Advantageously, according to the present in-

vention the dispenser device 9 can be arranged with the opening of the washing agents compartment in line with the main relief 7D of the inner door 7, thus contributing to a complete utilization of the dose being dispensed.

[0032] Advantageously, then, the depression of the inner door 7 in the upper area 7A provides an edge 7E of an increased width with respect to usual solutions, in particular in the curving radiuses, warranting optimal sealing of the gasket on said edge 7E. Particularly advantageous is also the use of an extruded gasket of increased width compared to common art being applied to said edge 7E.

[0033] A further advantage is to warrant a safe easy extraction of the second basket 6 from the wash tub 4 of the dishwasher 1, being guided by the guides 10 with a regular configuration and increased height compared to the common solution used for the present state of the art.

[0034] It is obvious that many changes are possible for the man skilled in the art to the improved dishwashing machine previously described, without departing from the novelty principles of the inventive idea as described in the claims; and it is clear that in practical actuation of the invention as claimed the components may often differ in form, size, proportions and materials employed, from the ones described by way of example, and be replaced with technical equivalent elements.

[0035] In particular, the position of the hole 8 in the inner door 7 of the door 3 of the dishwashing machine 1 may differ from its central location, as well as the form and relief 7D surrounding the hole 8 itself.

[0036] Other devices besides the dispenser may be housed in this hole 8.

Claims

1. A dishwashing machine comprising a cabinet (2), wherein a wash tub (4) is housed closed on the front by a door (3), said door (3) comprising an inner door (7) depressed to the outside with respect to the wash tub (4) for maximizing the inner space of said wash tub (4) used for the loading of the crockery to be washed,
   characterized in that
   said inner door (7) is depressed along its perimeter, whereas an inner frame of said inner door perimeter is not depressed.

2. A dishwashing machine according to claim 1, **characterized in that** said inner frame without depression houses dispensing means (9) of washing agents and/or control means.

3. A dishwashing machine according to claim 2, **characterized in that**,

   - at least a first area (7A) and a second area (7B) are identified on said inner door (7), which are depressed in line with the dimensions of a first basket (5) and a second basket (6) for holding crockery in said wash tub (4), respectively when the door (3) is in its closed position;
   - said dispensing means (9) are associated to said inner door (7) in line with a further area (7C) of said inner door (7) differing from said at least first area (7A) and second area (7B).

4. A dishwashing machine according to claim 3, **characterized in that** said further area (7C) of said inner door (7) of said dishwashing machine (1) is comprised between said first area (7A) and second area (7B) of said inner door (7).

5. A dishwashing machine according to claim 2, **characterized in that** said dispensing means (9) of said dishwashing machine (1) are built in inside said inner door (7).

6. A dishwashing machine according to claim 3, **characterized in that** said crockery holding baskets (5, 6) of said dishwashing machine (1) have substantially equal plan overall dimensions, in order to maximize the volume of the crockery to be loaded into said crockery holding baskets (5, 6).

7. A dishwashing machine according to claim 3, **characterized in that** said crockery holding baskets (5, 6) of said dishwashing machine (1) have substantially equal heights for improved loading of the crockery to be washed.

8. A dishwashing machine according to claim 3, **characterized in that** in line with said further area (7C), said inner door (7) of said dishwashing machine (1) has a profile (7D) protruding more inside said tub (4) than the profiles of said at least first (7A) and second area (7B), for a more effective dispensing of the washing agents into said tub (4).

9. A dishwashing machine according to one or more of the previous claims, **characterized in that** said inner door (7) of said dishwashing machine (1) comprises an edge (7E) having a regular trend and enough width for applying on it a water sealing gasket for the wash tub (4), which is produced extruding the material from which said gasket is made.

10. A dishwashing machine according to the previous claim, **characterized in that** said edge (7E) has two grooved guides (10) obtained inside it.

11. A dishwashing machine according to the previous claim, **characterized in that** said grooved guides (10) have a high height extension, in particular over 12 mm, in order to favour the extraction of said second basket (6) from said wash tub (4) of said dishwashing machine (1) when said door (3) is in its open position.

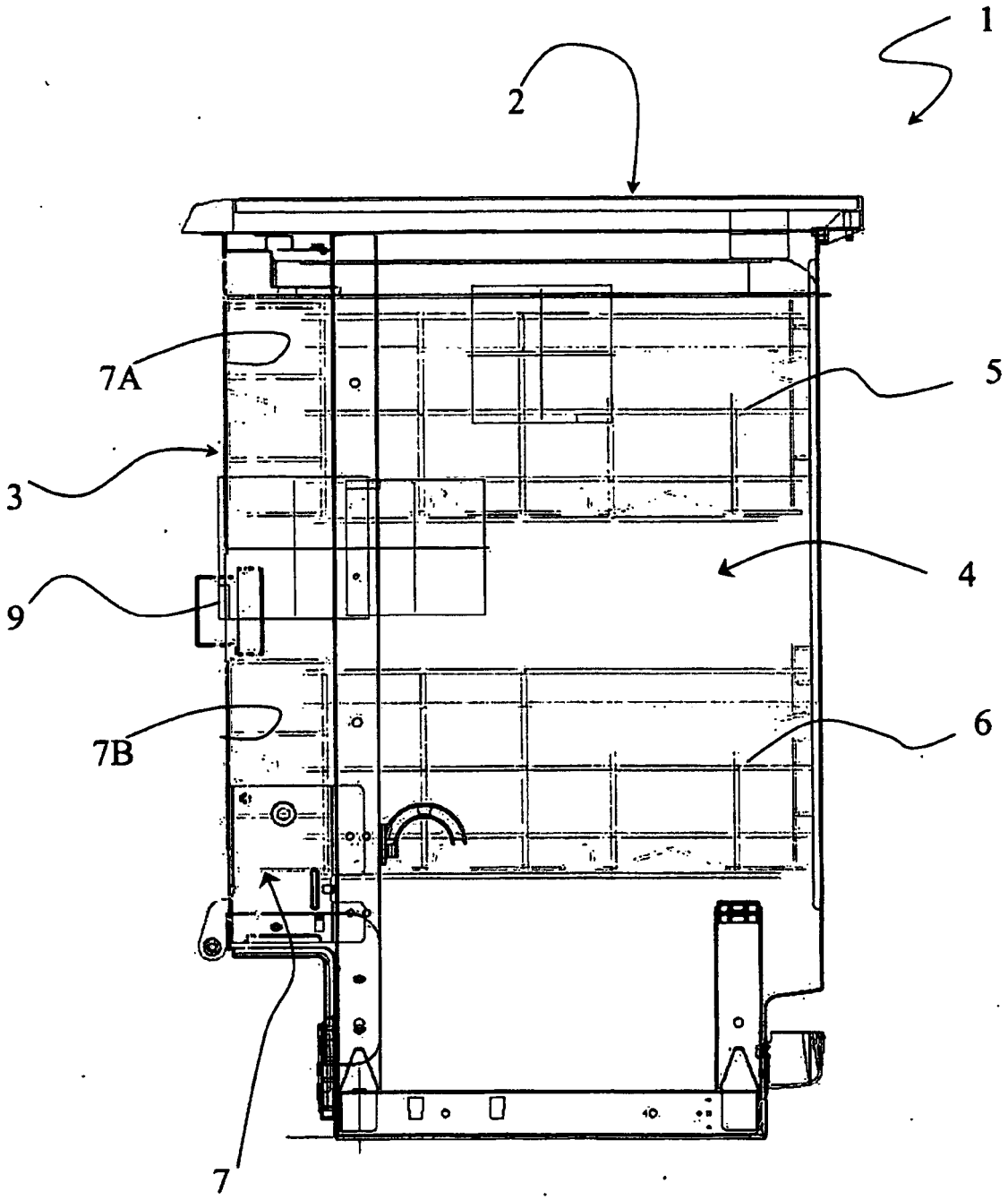

Fig. 1

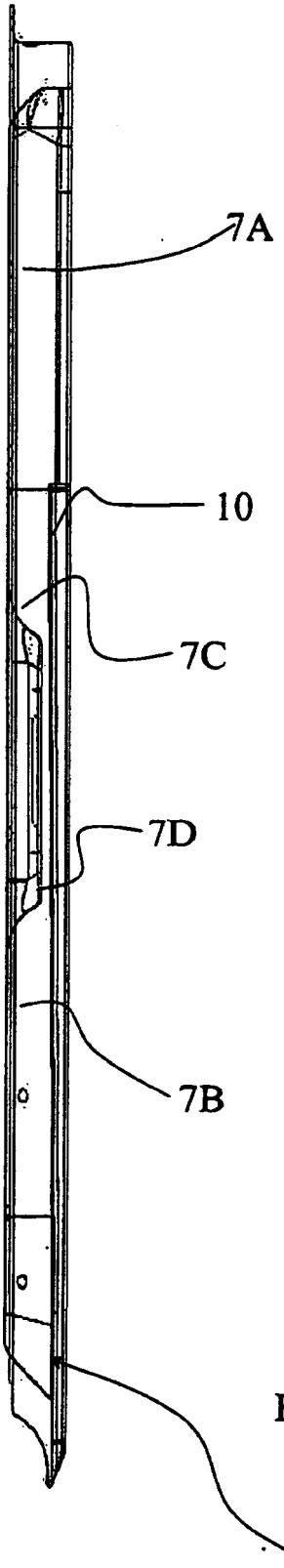

Fig. 2

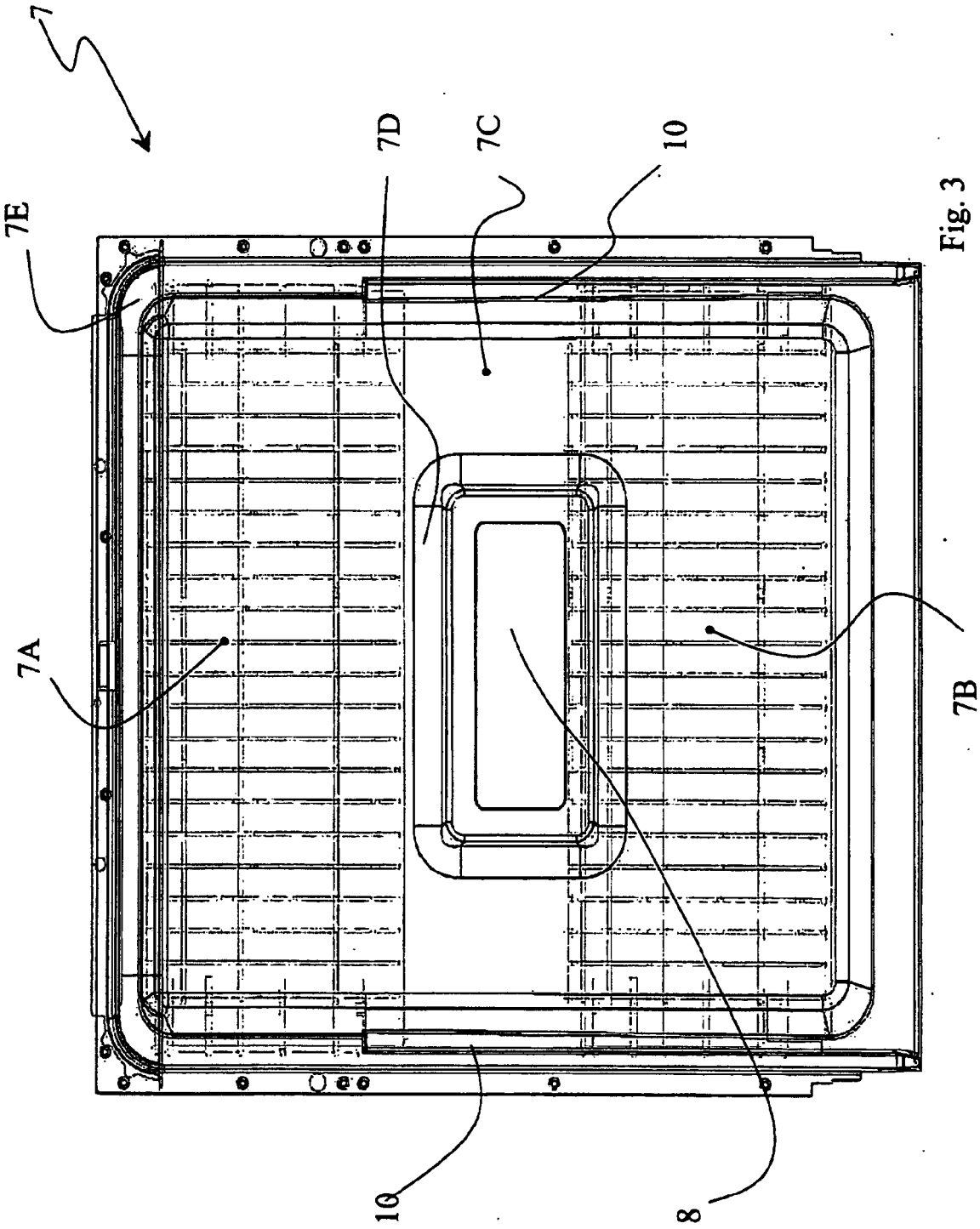

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 09 18 0119

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 671 143 A (ZANUSSI ELETTRODOMESTICI [IT]) 13 September 1995 (1995-09-13) * claim 1; figure 1 *	1	INV. A47L15/42 A47L15/44 A47L15/50
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A	US 4 834 125 A (INSALACO ET AL) 30 May 1989 (1989-05-30) * figures 1,2,5 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 January 2010	Courrier, Gilles

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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