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(54) A dishwasher rack with shelf for supporting objects

(57) The invention relates to a dishwasher rack (1), wherein tip-up shelves (10) are mounted by a support (20, 20', 20") applied to the side wall (5, 6) of the structure, along which the shelf can be positioned at different heights from the bottom (4) of the rack.

Shelves are equipped with appendices that allow their angle with respect to the walls (5, 6), upon which they are mounted, to be modified.

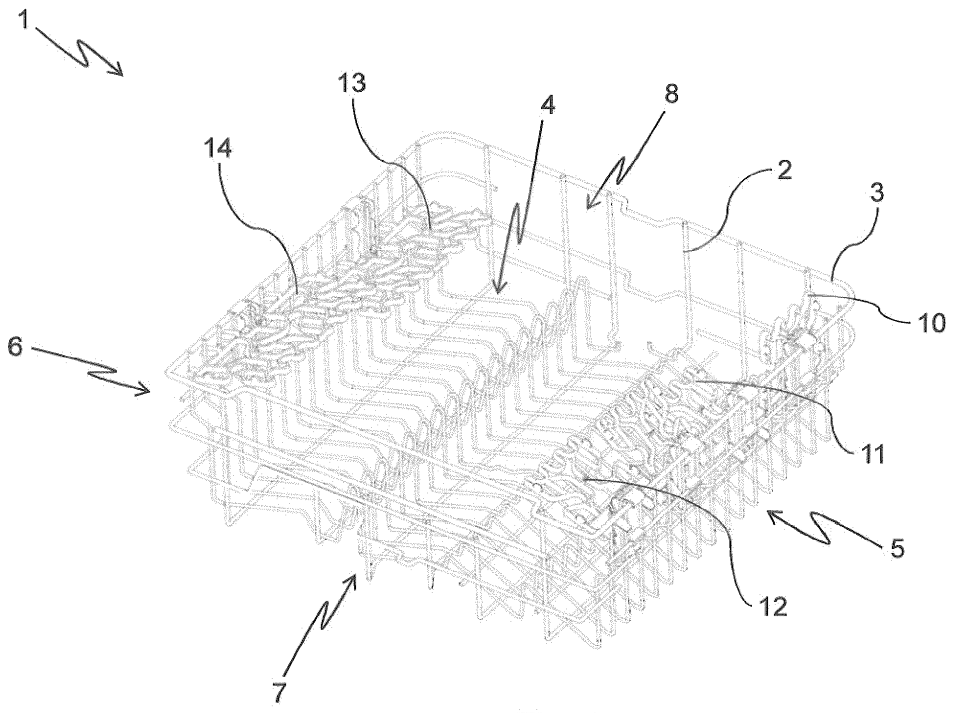

Fig. 1

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Description

[0001] The present invention relates to a dishwasher rack, comprising tip-up shelves for supporting glasses, cups and other objects in general.

[0002] The invention further comprises a tip-up shelf, with the relevant support for being applied to the dishwasher rack, according to what will be better disclosed below.

[0003] As it is known, for supporting glasses, cups, cutlery and other objects that usually are arranged in the upper racks of dishwashing machines, there are provided tip-up shelves, commonly called also as tilting shelves or briefly as flaps; they are essentially composed of flat grid-like frames or however having a perforated configuration, such to allow washing water to freely run through them.

[0004] These tip-up shelves are mainly free to take two positions, that is a raised one where they lean against the rack wall, and a lowered one where they are substantially arranged at 90° with respect to said wall; in the second position objects can be put on the shelf for being washed.

[0005] A drawback occurring quite often is the space under the tip-up shelf with the latter in the lowered position; under the shelf it is necessary to introduce objects having small dimensions or anyway compatible with the distance between it and the rack bottom.

[0006] However, this is not always possible and therefore it would be suitable to have the possibility of height-adjusting the position of the shelf, such to increase the available space under it.

[0007] A first example of height-adjustable tip-up shelf is described in the Italian patent application RN2008A000010, the owner being the same applicant of the present application.

[0008] This document describes a dishwasher rack wherein tip-up shelves have the usual hooks for the connection to the rack structure, allowing them to rotate with respect to the horizontal metal wires constituting it; according to this prior art, tip-up shelves can be positioned with different angles by suitable strikers, one at about 90° with respect to the rack wall and the other one with an angle of about 60° with respect to such wall.

[0009] This allows a greater space to be available under the tip-up shelf when it takes the position with the angle of 60°; in practice this latter is intermediate between the lowered condition of the tip-up shelf at 90° with respect to the rack wall, and the completely raised condition where it leans against the wall itself.

[0010] Although the solution known in the above mentioned Italian patent application is a first and interesting attempt for adjusting the position of the tip-up shelves in order to increase the space available under them, it is not completely satisfactory since anyway the shelf is mounted always at the same distance from the bottom of the rack.

[0011] In order to improve this condition, the already mentioned Italian patent application teaches how to couple the shelf at different heights from the side wall of the rack, along which wires are provided which are horizontally arranged at different heights.

[0012] This solution has the drawback of requiring the complete removal of the tip-up shelves from the rack wall, such to position them with a different height at a different metal wire; this leads to the subsequent need of contemporaneously engaging all the hooks hinging the shelf in the metal wire, which does not always result to be easy particularly in case of quite long tip-up shelves.

[0013] The present invention therefore aims at overcoming such drawback; that is to say, the problem at the base of the present invention is to arrange a dishwasher rack equipped with tip-up shelves for supporting glasses, cups and other objects in general, with such structural and functional characteristics to allow them to be height-adjusted, without the need of removing the whole shelf in order to obtain a wider space between it and the bottom of the rack.

[0014] Such problem is solved by providing a rack whose characteristics are set forth in the following claims; the invention further comprises a system for mounting the shelves on the rack, whose characteristics are also set forth in the annexed claims.

[0015] The characteristics of the invention, the effects deriving therefrom and the advantages obtained, will be more clear from the description of a preferred and non-exclusive embodiment of the invention, shown in the annexed drawings wherein:

figure 1 shows a perspective view of a dishwasher rack according to the invention;
figures 2, 3, 4 and 5 show respective details of the rack of fig. 1;
figure 6 shows a plan view of a tip-up shelf of the rack of fig. 1;
figures 7 and 8 show a front and a side views respectively of a support for tip-up shelves of the rack of the previous figures;
figures 9 and 10 show both perspective views of a second embodiment;
figure 11 is a perspective view of a further embodiment having a size greater than that of figures 9 and 10;
figure 12 shows a perspective view of a fourth embodiment with respect to that of figures 9 and 10.

[0016] With reference to the figures listed above, a dishwasher rack according to the invention is generally designated with 1 (with a shape suitable for being housed in the upper part of the washing tank of a dishwashing machine), which comprises the usual structure 2 made in a manner known per se of metal wires 3 that firstly are bent or shaped in different manners and then welded together to form the assembly, in order to support objects.

[0017] The rack 1 has a substantially parallelepiped shape with a bottom 4 with walls extending along the

edges thereof, a pair of side walls 5 and 6, a front wall 7 and a rear wall 8 opposing each other respectively; then at the top the rack is opened such to allow it to be loaded from the top as usual.

[0018] Along the side walls 5 and 6 of the rack there are provided tip-up shelves 10, 11, 12, 13, and 14 according to the invention; such shelves have different dimensions one with respect to the other but they can be advantageously all mounted according to the same system and therefore reference will be made below only to one of them: however what is described applies also to the other ones.

[0019] Therefore, with reference to the shelf 10 some details of it being shown in figures 2-6, it is advantageously made of plastic material and it comprises a mainly opened structure such to facilitate the water flow, it having a base 15 for being mounted to the wall of the rack from which a wide-mesh reticular frame 16 extends. Such frame advantageously comprises a central mesh for supporting objects such as cups and a plurality ofperimetral housings for supporting objects such as stem glasses.

[0020] On the base 15, at the part opposite than that of the frame 16, two pairs of appendices 18 and 19 extend symmetrically with respect to a central axis of the shelf, arranged vertically with reference to figure 6.

[0021] Moreover, centrally with respect to the appendices there is a "T" shaped engaging spigot 17, whose functions and those of appendices 18 and 19 as well will be better described below.

[0022] The shelves 10, 11, 12, 13 and 14 are mounted on the side walls 5 and 6 of the rack by means of respective supports 20.

[0023] The latter, also made preferably of plastic material, are all equal to one another, and are fastened to the rack walls by means of rear snap-on projections 21, 22, which are configured such to be engaged with the horizontal wires 51, 52 of the side wall 5 of the rack 1. The supports 20 are removable with respect to the rack 1, such that the user can remove them if he/she does not desire to use the shelves or if he/she desires to clean the supports 20; but once they are fastened to the rack 1 and in operation, they substantially remain still with respect to the rack 1, since the width of the projections 21, 22 is slightly lower than the distance between two vertical consecutive wires 53 in the side wall 5 or 6. In the front the supports 20 have a central groove 24 interposed between two walls 25 having an irregular saw-tooth profile.

[0024] The walls 25 act for supporting a pair of supporting pins 28 for the shelf 10, arranged at the sides of the spigot 17.

[0025] The shelf 10 comprises, preferably as one piece, a retaining pin 77 applied on the surface thereof faced towards the relevant support 20, and suitable for allowing the shelf 10 to be firmly vertically positioned.

[0026] Such retaining pin 77 co-operates to this end with the guiding groove 24 or with another suitable locking element integral with the support 20.

[0027] From the above, it is possible to understand the functional aspects of the rack 1 and of the tip-up shelves 10 it is equipped with.

[0028] The tip-up shelves 10 can be positioned with different angles with respect to the corresponding side wall 5, 6 of the rack 1 and, contemporaneously, even at different heights from the bottom thereof.

[0029] To this end, the spigot 17 of each shelf 10 is slidably guided in the guiding groove 24 of the relevant support 20, with respect thereto it can be positioned at different heights due to the saw-tooth profile of the walls 25.

[0030] By engaging the supporting pins 28 of a shelf 10 with the teeth of the walls 25 as shown in figure 3, the shelf can rotate with respect to these teeth that therefore act as a seat for the rotation of the pins.

[0031] Depending on the selected height, it is possible to change even the angle of the shelf positioned in this manner; this is possible by the engagement of the pairs of appendices 18,19 of the shelf, which abut against the vertical and horizontal wires respectively of the same wall in a selective manner and depending on the angle given to the shelf 10. These appendices 18,19 serve for making the support of the objects on the shelf 10 more firm at any heights and/or angle thereof, since the weight of these objects is thus mainly unloaded from the shelf 10 to the rack 1 by means of strikers just obtained by said appendices 18,19.

[0032] With reference to the former, the ends 18a of the appendices 18 are shaped in a concave manner combined with the vertical metal wires of the side walls 5,6 of the rack, as it is better shown in figures 3 and 5; the distance between the appendices 18 is preferably equal to or a multiple of the distance between vertical wires 53, such to guarantee appendices 18 to engage therewith, with the supports 20 in any positions.

[0033] In this condition the shelf 10 is angled at about 60° with respect to the corresponding wall 5,6 of the rack.

[0034] By positioning the shelf at a different height with respect to the walls 25 having the saw-tooth profile, at a horizontal metal wire of the rack wall, the appendices 19 abut against this horizontal wire.

[0035] In this case, the shaped end 19a of the appendices acts as a surface for the abutment against the rack wire and since the appendices 19 are longer than those 18, the latter do not interfere with the positioning of the shelf, which therefore takes an angle different than the previous case (about 45°).

[0036] In this context, it has to be noted that any other angles of the shelves can be obtained in racks such as that shown in the figures, wherein the side walls 5,6 have a step-like arrangement, that is with parallel flat portions, allowing the supports 20 to be positioned at different distances from the wires of the structure.

[0037] In practice, by moving the supports from a portion to another one of the wall of the rack 1, a higher amount of possibilities for adjusting the shelves is obtained.

[0038] Obviously, the shelves 10 can also be com-

pletely tilted such to lean against the side walls 5,6 of the rack. To this end, the shelf 10 comprises, at the central area of the frame 16, a hook (seen in Fig. 2) protruding from the upper face of the frame 16, such that, when the shelf is in the vertical position, this hook engages the central groove 24 of the support 20. To this end, the hook has an appropriate elasticity allowing it to be inserted in the groove 24 and to remain locked therein, thus forcing the shelf 10 to remain in the vertical position. For example the hook can comprise a head composed of two elastic tabs symmetric one another.

[0039] Therefore, it is possible to understand how the rack according to the invention overcomes the technical problems at the base of the invention.

[0040] The tip-up shelves 10 are adjustable not only with reference to the angle with respect to the corresponding side wall of the rack 1 upon which they are mounted, but also their position can be height-adjusted with respect to the bottom of the rack 1, without the need of removing them from the wall.

[0041] This allows the arrangement of the shelves to be easily modified when loading the dishwasher, by a simple gesture of the hand by a person which is asked only to pull the shelf and to slide it along the groove 24 of the support 20, in order to position it on the desired pair of teeth of the walls 25.

[0042] Thus it is not more necessary to remove the shelf from the wall and to hook it again subsequently as it occurs in the prior art mentioned hereinbefore, by operations that involve the use of both the hands and that are not always easy to be performed.

[0043] The combined adjustment of the angle of the shelves and of their height position from the bottom of the rack, synergistically increases the possibilities for loading the dishwasher rack.

[0044] Obviously several variants of the example of the tip-up shelf described up to now are possible.

[0045] A first variant is shown in figures 9 and 10; for the sake of brevity the following disclosure highlights only the parts of this variant different than the main embodiment described above; for the same reason, when possible, the same reference numerals will be used with one or more prime symbols for denoting structurally and functionally equivalent elements.

[0046] In short it is possible to say that in this variant the appendices 19' abut against the support 20' instead of the horizontal wires 51,52 of the wall of the rack 1.

[0047] In this variant, a tip-up shelf 10' is connectable with the support 20' by means of the same means already described in the previous embodiment; this shelf 10' is provided with a base 15', which in turn comprises at least two snap-on projections 18' compatible with the vertical wires 53 of the rack 1. The distance between the snap-on projections 18' is equal to an integer multiple of the distance between the vertical wires 53. Moreover, said shelf 10' comprises one or more appendices 19' having a polygonal, preferably triangular, and more preferably isosceles triangle cross-section, with the height parallel to the axis of symmetry of the shelf 10'.

[0048] The appendices 19' are compatible with the saw-tooth profiles of the walls 25, and are advantageously strengthened for unloading on the support 20' a part of the weight resting on the shelf 10', thus avoiding a part of the weight to be unloaded from the inside to the outside of the rack 1 acting on the horizontal wire 51,52. Thus it is possible to increase the flexibility of use of the shelf 10', making it possible to arrange it with a higher number of positions inside the rack 1. The isosceles triangle cross-section of the appendices 19', by interfering with the saw-tooth profiles of the walls 25, allows the shelf 10' to reach stable angles equivalent to those of the main embodiment described above. In order to make the coupling between the shelf 10' and the support 20' more stable, there are provided one or more cam constraint walls 19a', each of which penetrating into an appendix 19'; these walls 19a' interfere with the walls 25 when to the shelf 10' a rotary movement about its axis of symmetry is given, thus constraining the travel thereof and in addition avoiding the possibility of breaking the engagement spigot 17.

[0049] A second variant is the one shown in fig. 11, which is different than the first variant described above for the provision of a shelf 10" with dimensions about twice those of the variant described above; this shelf 10" comprises a base 15", that in turn comprises at least four snap-on projections 18" joined in pairs by a crossbar 18b". The base 15' has a length about twice that of the first variant.

[0050] This variant comprises appendices 19" structurally and functionally equivalent to the appendices 19' of the first variant; such appendices abut against a support 20". Moreover, this variant advantageously makes it possible to wash bigger dishes in a position raised with respect to the bottom 4 of the rack 1, such as conservation containers or the like.

[0051] A third variant is shown in fig.12. This variant is different than the first one described above, since it provides at least one retaining hook 23"' positioned on the top of a support 20"' and at the top end of a longitudinal groove 24"'. These two last elements are structurally and functionally equivalent with respect to the longitudinal groove 24 of the main embodiment and to one of the supports 20,20',20" described above respectively. The retaining hook 23"' comprises a pair of elastic tabs 23a"', parallel each other and vertically oriented; these tabs 23a"' give the retaining hook 23 a double function, that is the retaining and the guiding one.

[0052] The retaining function is exerted by the hook 23"' when a frame 16"', structurally and functionally equivalent to the frame 16, is coupled to the support 20"' by the longitudinal groove 24"'; when a force from the bottom to the top with a modulus less than a certain threshold is exerted, the tabs 23a"' put up resistance to a spigot 17"' structurally and functionally equivalent to the spigot 17 of the main embodiment while, when the modulus of said force is higher than said threshold value,

the tabs 23a"' open, letting the spigot 17"' to be separated from the longitudinal groove 24"'.

[0053] The guiding function is exerted by the hook 23"' when a frame 16"', structurally and functionally equivalent to the frame 16 of the main embodiment, is separated from the support 20"'; in this situation the tabs 23a"' guide the spigot 17"' into the groove 24"', and they open without a particular resistance.

[0054] The tabs 23a"' generate a striker facilitating the positioning of the tip-up shelf in the raised position.

[0055] In the third variant of figure 12, the locking of the frame 16"' in the vertical position, is guaranteed by the engagement between the retaining pin 77"' and the pair of elastic tabs 23a"', the head of said retaining pin occupying the housing therebetween once the elasticity of the tabs 23a"' is overcome.

[0056] A further variant (not shown in the figures) is given by a shelf similar to shelves 10, 10', 10" just described, wherein said shelf is supported by more than one support 20, 20', 20", 20"', such to allow a higher load to be positioned on said shelf with respect to the variants described above.

[0057] Finally, several combinations of the different variants are possible, such to make it possible for the person skilled in the art to satisfy the design specifications.

Claims

1. A dishwasher rack comprising a structure (2) with a bottom (4) from which a plurality of walls (5, 6, 7, 8) extend, at least one shelf (10, 10', 10") associated with one of said walls for supporting objects in general, **characterized in that**
   it comprises at least one support (20, 20', 20",20"') applied to the wall (5, 6, 7, 8), along which the shelf can be positioned at different heights from the bottom (4).

2. A rack according to claim 1, wherein the shelf (10, 10', 10") can be mounted onto the support at different angles relative to the corresponding wall (5, 6, 7, 8).

3. A rack according to claim 1 or 2, wherein the shelf (10) comprises appendices (18, 18', 18", 19) abutting against the wall (5, 6, 7, 8) to hold the shelf at a predetermined angle relative to the wall.

4. A rack according to any one of the preceding claims, wherein the support (20, 20', 20", 20"') comprises a longitudinal groove (24, 24"') for guiding the shelf (10, 10', 10"), and walls (25) that co-operate with support elements (28) of the shelf to allow the latter to be positioned at different heights relative to the bottom (4) of the rack.

5. A rack according to any one of the preceding claims, whose structure (2) is at least partly made out of metal wires (3) or the like, against which the appendices (18, 18', 18", 19) of the shelf (10) abut to determine the different angles relative to the wall (5, 6, 7, 8) whereon it is mounted.

6. A rack according to claim 5, wherein the ends (18a, 19a) of the appendices (18, 19) are so shaped as to include concave, beveled or similar surfaces, so as to improve the contact with the wires (3) of the rack structure.

7. A rack according to any one of the preceding claims, wherein said at least one support (20, 20', 20", 20"') is removably secured to one wall (5, 6, 7, 8).

8. A shelf for a rack according to any one of the preceding claims, **characterized in that** it comprises a mounting base (15) from which a plurality of appendices (18, 18', 18", 19, 19', 19") extend transversally and a substantially reticular frame (16, 16"') on the opposite side.

9. A shelf according to claim 8, wherein the appendices (18, 18', 18", 19, 19', 19") are arranged symmetrically in pairs with respect to a longitudinal axis of the shelf, where there is a mounting spigot (17, 17"').

10. A shelf according to claim 8 or 9, wherein the ends of the appendices (18, 19) are so shaped as to include concave, beveled or similar surfaces.

11. A shelf according to one of claims 8, 9 or 10, wherein the appendices (19', 19") abut against the support (20, 20', 20", 20"').

12. A shelf support for a rack according to any one of claims 1 to 7, **characterized in that** it comprises a central groove (24, 24"') and two walls (25) having a saw-tooth profile on opposite sides of the groove.

13. A shelf support according to claim 12, comprising tabs (23a"') acting as strikers to facilitate the positioning of a shelf in an upper position.

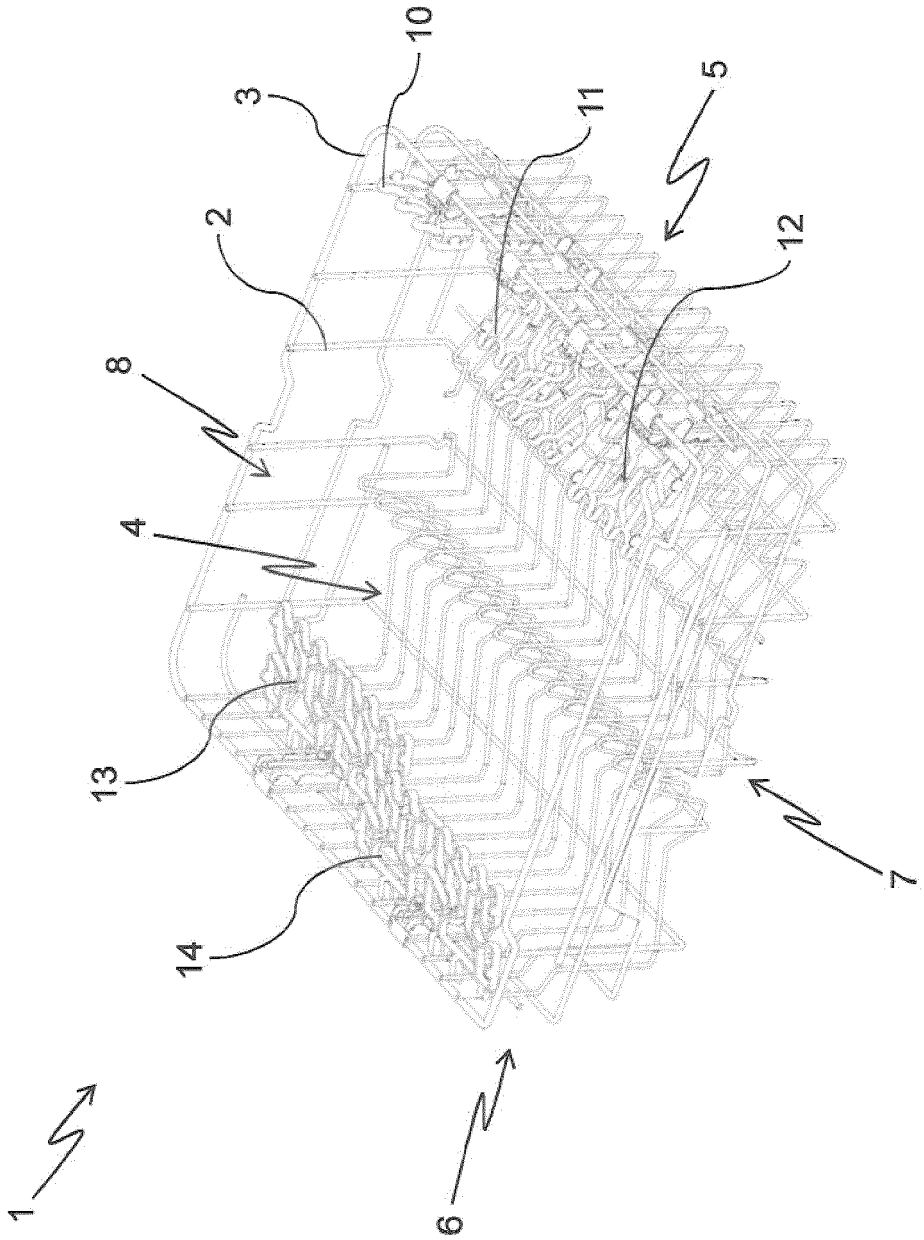


Fig. 1

Fig. 2

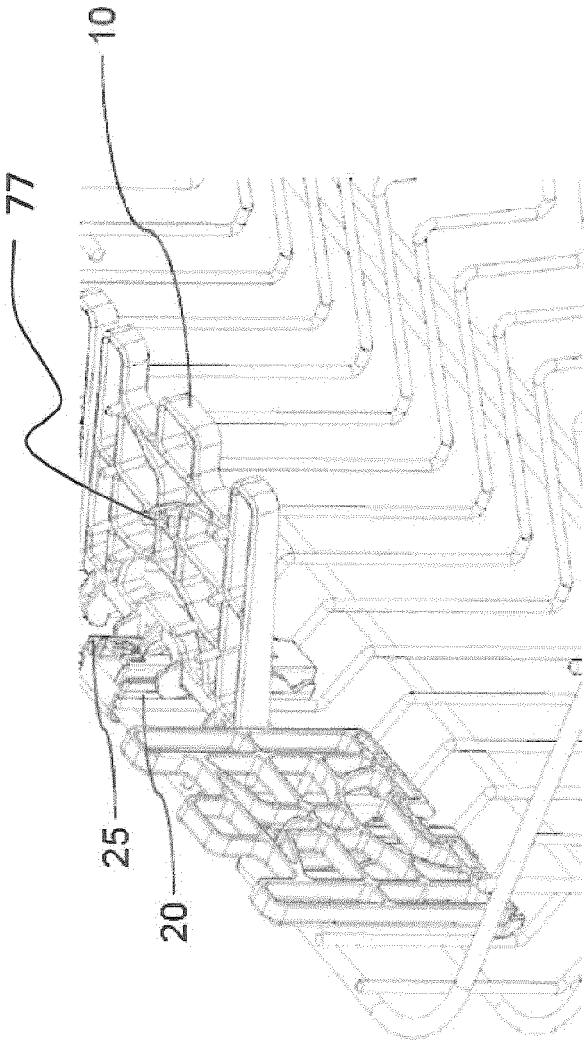
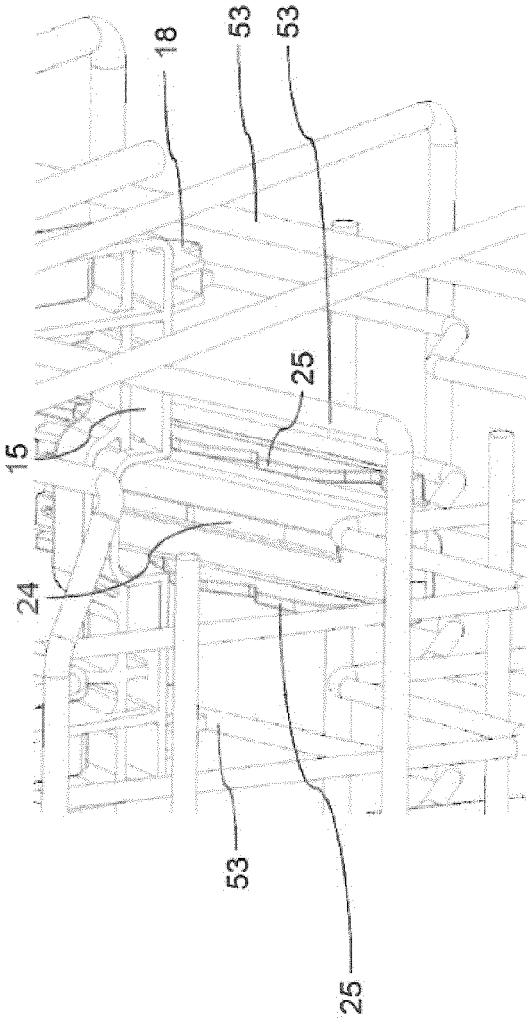


Fig. 3



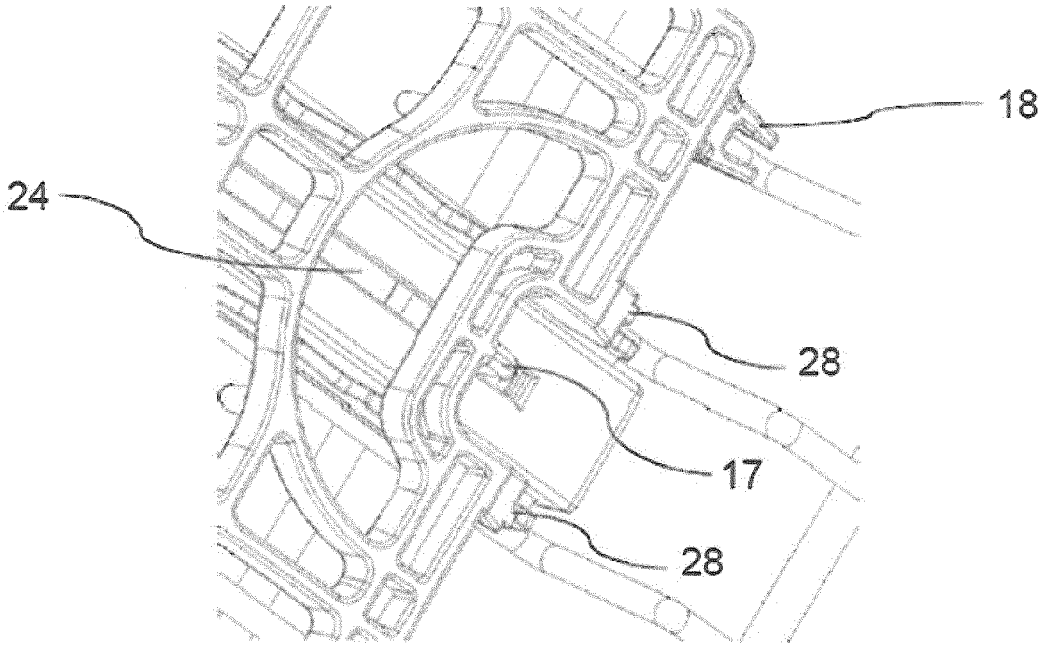


Fig. 4

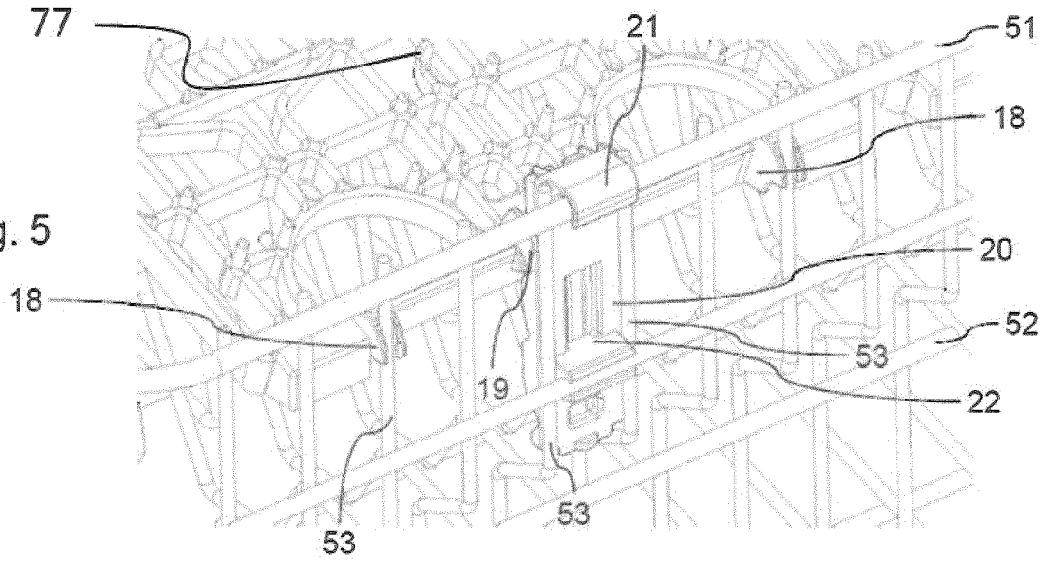


Fig. 5

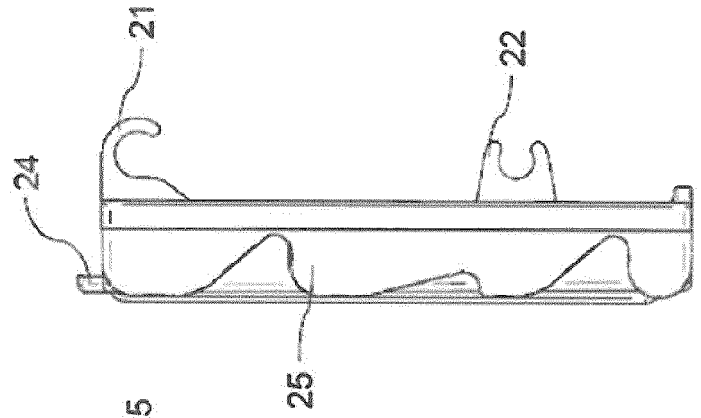


Fig. 8

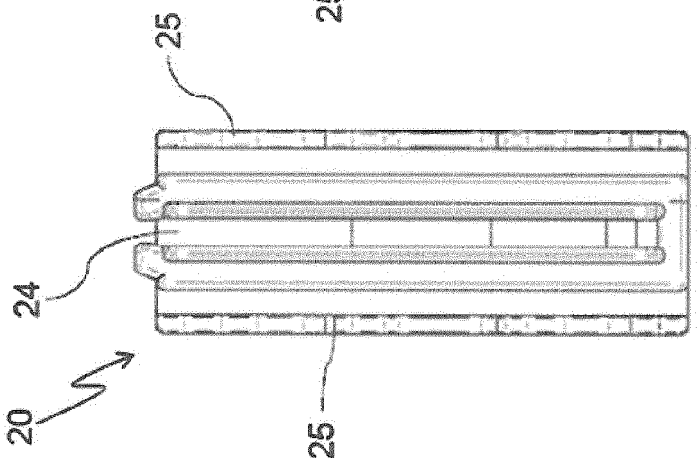


Fig. 7

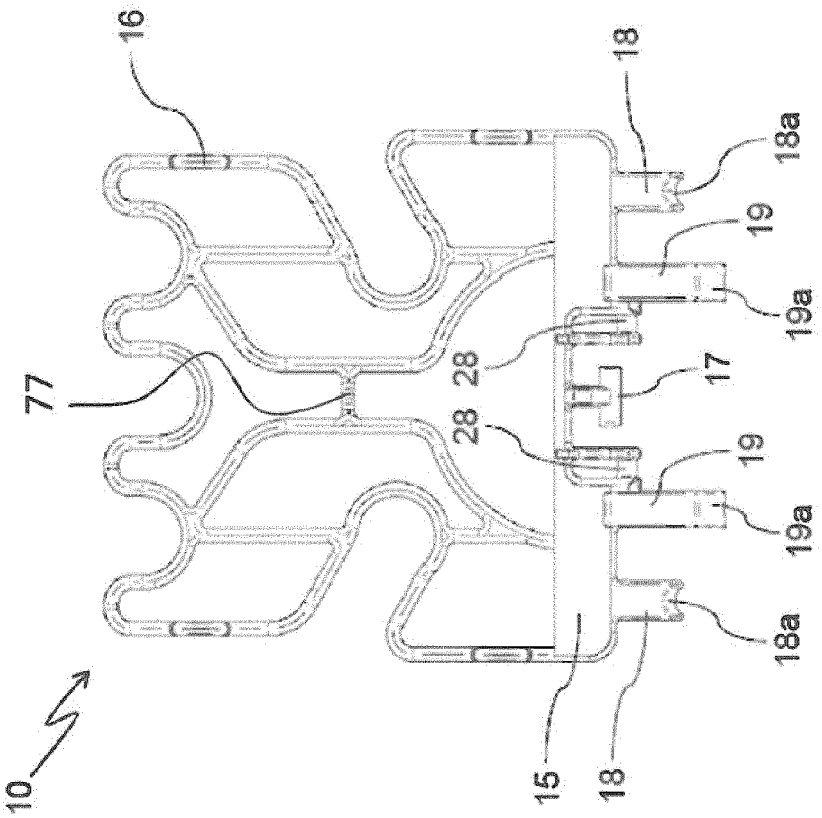


Fig. 6

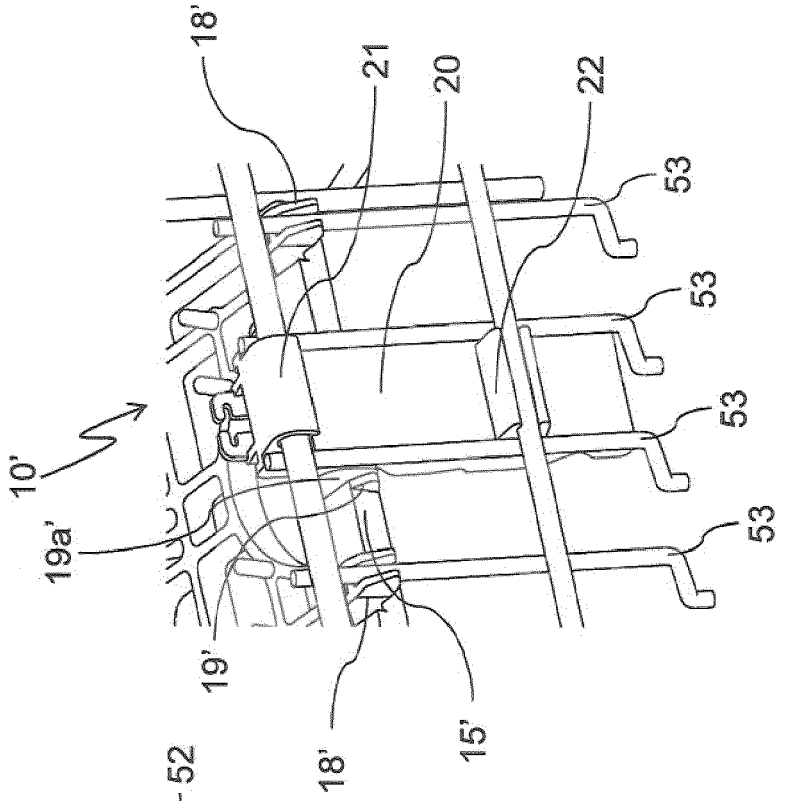


Fig. 10

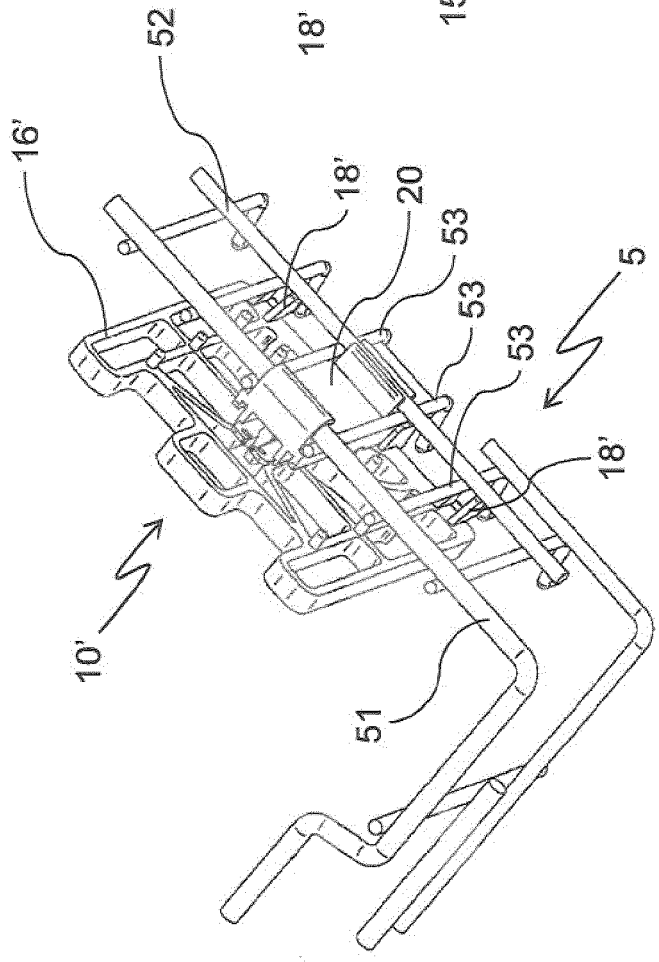


Fig. 9

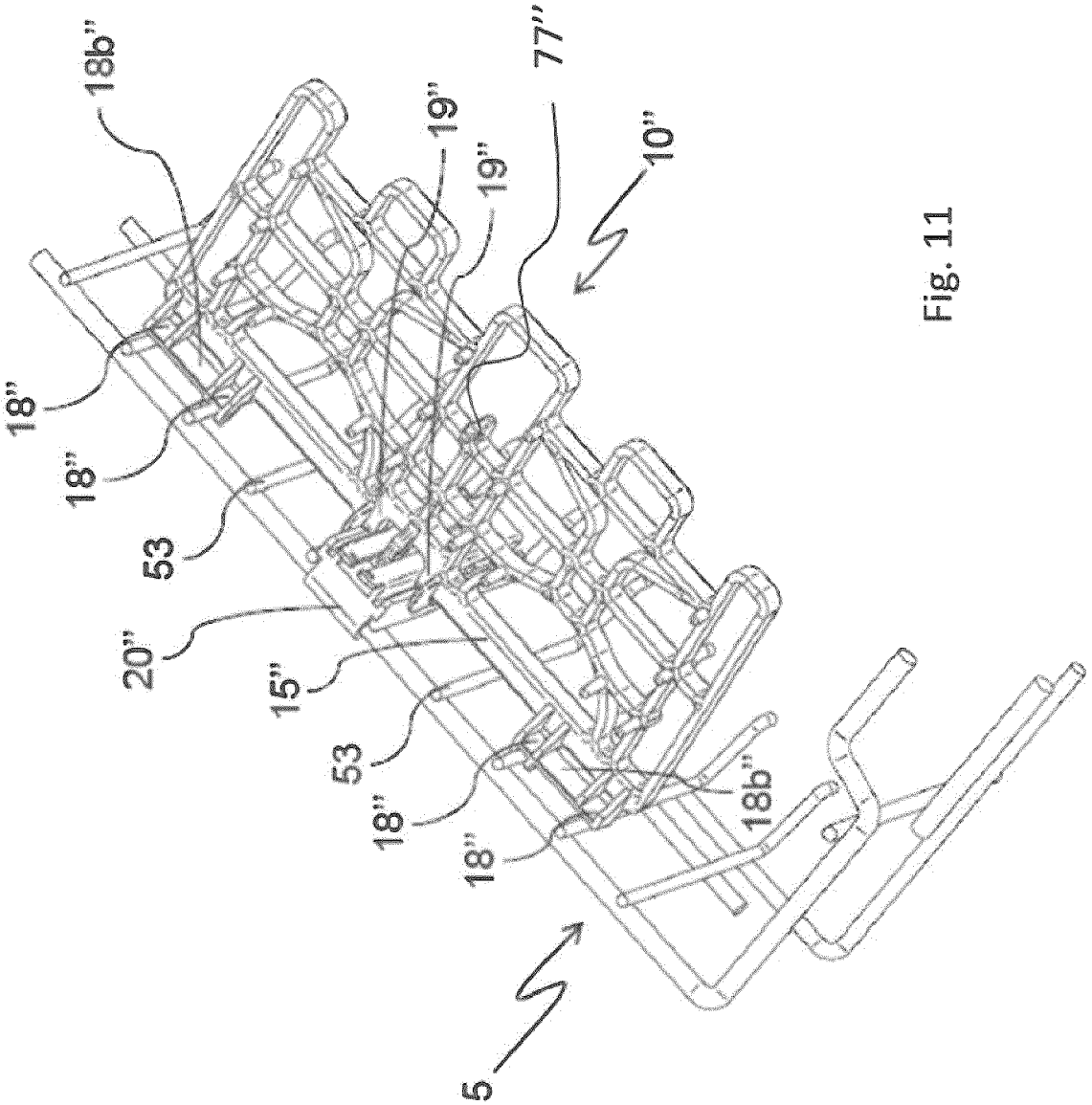


Fig. 11

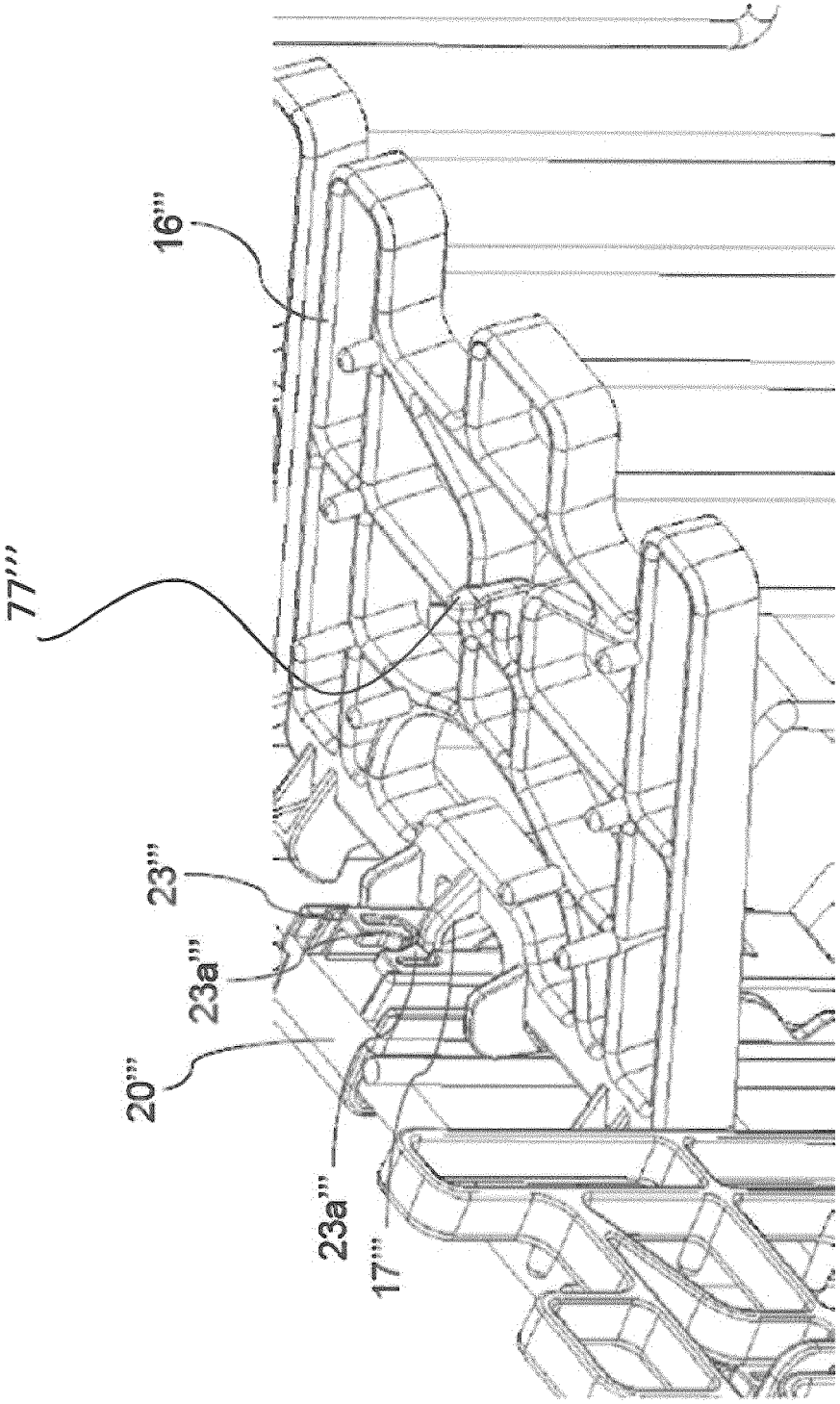


Fig. 12

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EUROPEAN SEARCH REPORT

Application Number
EP 12 17 9131

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 2007/039904 A1 (PURUSHOTHAMAN BALAJI [US]) 22 February 2007 (2007-02-22) * paragraphs [0011] - [0033] *	1,2,4,7, 12,13 3,5,6	INV. A47L15/50
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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
Munich	24 October 2012	Martin Gonzalez, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 17 9131

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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24-10-2012

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