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(54) Rack for dishwashing machines

(57) Only the members (7-9) of the rack that come into contact with the washload items are made in the form of a metal wire framework (1), whereas the remaining part of the rack is formed by a single complementary

body (2) of plastics that comprises integrally a plurality of structural and/or functional members (3, 4, 5; 10, 11). The metal wire framework and the plastic body (2) are snap-fitted to each other.

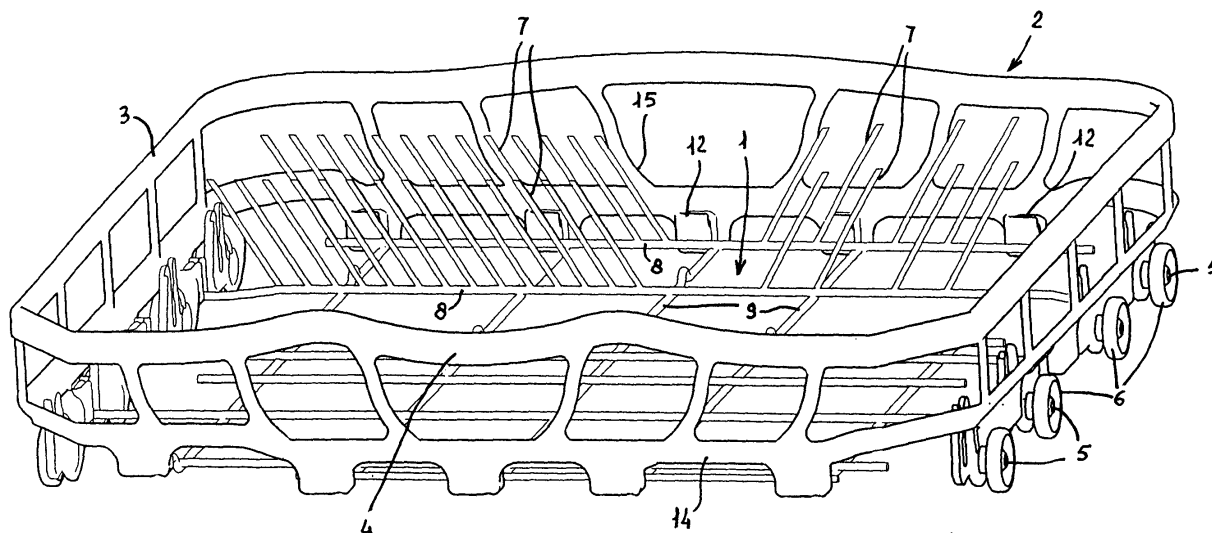


Fig. 1

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Description

[0001] The present invention refers to a composite rack adapted to hold and support the washload items to be handled in a dishwashing machine, in particular of the kind intended for use in households.

[0002] Racks intended for use in dishwashing machines are largely known to be made in the majority of the cases with a grid-like structure formed by metal-wire rods that are so shaped and welded to each other as to define at least a substantially horizontal resting surface, or bottom wall, and substantially vertical side walls. The metal wire rods used to form the rack are additionally coated, after a surface cleaning pre-treatment process, with a protective polymeric material.

[0003] Metal-wire racks have a number of drawbacks. In particular, their architecture is undesirably rigid, i.e. limited by problems and requirements connected with the mechanical processing of the metal-wire, which must in fact be suitably bent and, possibly, deep-drawn in order to give the rack a suitable conformation in view of the basic needs that it is called to meet. It therefore proves practically impossible for a metal-wire rack of this kind to be made with a structure that is capable of duly complying with the modern ergonomic and aesthetical requirements that are becoming increasingly important for the users and consumers in general.

[0004] In all cases, the manufacture of metal-wire racks for dishwashing machines usually calls for some extent of manual work to be provided for positioning and welding special members or items consisting of wire with a different cross-section area, as for instance this may be the case of the prongs of the side combs that are usually provided to support cups or similar items. The resulting impossibility for the rack manufacture on an industrial scale to be completely automated obviously increases the related costs.

[0005] In theory, the above mentioned drawbacks could be overcome by making the racks completely of plastic material, i.e. as an all-plastic construction. However, this would bring unacceptable problems of a technical nature with it. In particular, in order to ensure a sufficient extent of strength and rigidity as required in view of a capability of adequately supporting the washload items even at the usual drying temperatures in a dishwashing machine (i.e. approx. 70°C), the racks should be made with a basic plastic framework of an appropriately large thickness, which therefore would feature substantially small apertures for the wash water jets sprayed onto the washload items to adequately pass therethrough, under a resulting reduction of the washing performance and effectiveness of the machine.

[0006] Furthermore, it is a generally known fact that plastic, unlike metal, does not favour the evaporation of residual water, so that the use of a dish rack of plastics would generally entail an inferior dish-drying effect.

[0007] Composite racks for dishwashing machines have also been proposed, which comprise a metal-wire

framework on which there may be added, e.g. by snap-fitting, individual component parts of plastic material that may be shaped to relatively complex forms owing to technical, ergonomic and/or aesthetical reasons. Solutions of this kind are described for instance in GB-A-2 287 874 and EP-A-0 855 166.

[0008] Also known in the art, for instance from the disclosure in GB-A-2 359 248, are composite racks comprising a metal-wire framework on which there are then added, by an over-injection moulding process, individual component parts of plastic material such as for instance a peripheral frame forming an upper edge of the rack.

[0009] Anyway, even in the above cited composite racks the architecture is undesirably limited by the need arising for the various plastic component parts to be capable to compliantly adapt to the basic form of the metal-wire framework, which, as already pointed out earlier in this description, is scarcely versatile. Furthermore, the fabrication of a composite rack of the above cited kind is undesirably labour-demanding and cost-intensive on an industrial scale owing to the need for each one of the individual plastic component parts to be assembled on to the metal-wire framework.

[0010] It therefore is a main purpose of the present invention to provide a composite rack for dishwashing machines, which is adapted to be manufactured quickly and at a low cost, while featuring a versatile structure and/or appearance and, at the same time, complying with the technical requirements of strength and convenience in use.

[0011] According to the present invention, this and other aims are reached in a composite rack for dishwashing machines incorporating the characteristics as recited and defined in the appended claims.

[0012] Anyway, features and advantages of the present invention may be more readily understood from the description that is given below by way of nonlimiting example with reference to the accompanying drawings, in which

- Figure 1 is a schematic view of a first embodiment of the composite rack according to the present invention, in an assembled state thereof;
- Figure 2 is a schematic view of a second embodiment of the composite rack according to the present invention, in an assembled state thereof; and
- Figure 3 is a partially cross-sectional view of a detail of the rack illustrated in Figure 1.

[0013] The rack according to the present invention has a composite structure that is made partly of metal wire and partly of plastics and comprises support members intended to come into substantial contact with the washload items, such as dishes, pans, glasses and the like.

[0014] In the example illustrated in Figure 1, which refers to a dish rack that is prevalently adapted to be slidably positioned in a lower position in the washing vessel of a dishwashing machine, such support and contact members comprise substantially vertical prongs 7, or the like, shooting out from cross-members 8 and/or longitudinal members 9 that form a base surface.

[0015] Furthermore, the composite structure of the rack comprises a plurality of structural and/or functional parts, such as a frame 3 delimiting the rack all along the periphery thereof, an appropriately shaped gripping handle 4, pins 5 for supporting castors 6 or the like, by means of which the rack is capable of sliding with respect to side runners provided in the dishwashing machine in a generally known (and not shown) manner.

[0016] Said structural and/or functional parts provided in the rack may also comprise hinging and guiding means (not shown) adapted to enable the prongs 7 to be folded or thrown down, such as this is described for instance in GB-A—2 287 874.

[0017] The above mentioned support and contact members 7-9 are made in the form of a metal-wire framework 1. The metal wire used to such a purpose is particularly fit to ensure a sufficient extent of strength and rigidity in view of adequately sustaining the wash-load items, while on the other hand featuring just a small diameter, so that the entire framework 1 advantageously represents a substantially negligible impediment as far as the jets of washing and rinsing water are concerned, which in a generally known (and not shown) manner hit the rack when the dishwashing machine is in operation.

[0018] Furthermore, the metal wire of which said support and contact members 7-9 are made, favours the evaporation of the hot water, i.e. an effect that is normally used in dishwashing machines for drying the dishes after washing. As a result, unlike what happens in the case of plastic racks, the dishes can be dried in an optimum manner, in particular without any substantial scale formation at the contact points with the members 7-9.

[0019] However, according to an aspect of the present invention, it is only the support and contact members 7-9 that are provided in the form of a metal-wire framework 1, whereas the remaining part of the rack is formed by a single complementary body 2 of plastic material comprising the afore cited structural and/or functional parts integrally therewith. In addition, the metal-wire framework and said single-piece plastic body 2 are mechanically coupled with each other in the manner that shall be described in greater detail further on.

[0020] The result is that the framework 1 turns practically out to be solely formed by members 7-9 of metal wire having a relatively small size and elementary shapes all the way, so that, unlikely what normally happens in traditional racks made fully or partially of metal, these members are perfectly capable of being welded together, i.e. to each other, in a fully automated manner. The resulting advantages in a production on an industrial scale are fully manifest.

trial scale are fully manifest.

[0021] The single-piece complementary plastic body 2 can in turn be easily manufactured by a moulding technique, separately from the framework 1, in such a manner as to incorporate the associated structural and/or functional parts, as this has already been said earlier in this description, with a maximum extent of freedom as far as ergonomic conformation, aesthetical appearance and/or colour is concerned.

[0022] In the example illustrated in Figure 1, these integrally provided parts will comprise the peripheral frame 3 and, preferably, also the pins 5 for the wheels 6, as well as one or more possible grips 4. In the case that the rack also includes hinging and guiding means for folding or pulling down the prongs 7, as already mentioned earlier in this description, even such means can be provided integrally with said plastic body 2.

[0023] In conclusion, the composite rack for dishwashing machines according to the present invention can be advantageously manufactured on an industrial scale by fabricating the framework 1 on an automatic line that is adapted to most quickly complete the necessary welding and, possibly, drawing, "rilsanization" and plastic-coating steps, to which the metal parts 7-9 must be subjected, so as to obtain one or more substantially standardized structures.

[0024] Separately, and even simultaneously, the single-piece complementary body 2 can be manufactured by a plastic moulding technique (using for instance such a plastic material as syndiotactic polystyrene, polyoxymethylene copolymer or polymethylpentene) to any conformation and/or colour as actually desired.

[0025] In an assembly station, each standard structure of the metal-wire framework 1 can be quickly coupled mechanically, preferably by snap-fitting, to a corresponding single-piece plastic body 2, thereby most conveniently and quickly obtaining a complete rack having with an extreme overall versatility in terms of shape, appearance and/or colour according to the selected ones among the possible combinations of the various complementary parts 1 and 2. It can be readily appreciated that such a versatility would turn out as being unpractically expensive to obtain in the case of composite racks of a traditional design, in which the various plastic parts are manufactured, i.e. moulded as individual pieces that are then applied individually on to a metal-wire base framework.

[0026] The same considerations apply substantially also to the example illustrated in Figure 2, which refers to a rack that is prevalently adapted to be slidably positioned in an upper position in the washing vessel of a dishwashing machine.

[0027] In a per se known manner, for instance as described in EP-A-0 901 770, such an upper rack comprises cross-members 7 and longitudinal members 9 that are bent and shaped in a different manner, and may be adapted to be mounted in the dishwashing machine with the aid of height-adjustable side support means as

schematically indicated at 10 in Figure 2. In this case, the complementary plastic body 2 integrally comprises at least part of said height-adjustable side support means 10.

[0028] Furthermore, in the above considered case of an upper rack, the complementary plastic body 2 preferably comprises in an integral manner also a part 11 of a water connection conduit that is usually provided in the dishwashing machine to supply water to the (generally known and not shown) water spray means that are associated to the same rack.

[0029] It shall of course be appreciated that the composite rack for dishwashing machines that has been described above by mere way of example may be the subject of a number of modifications without departing from the scope of the present invention.

[0030] In any case, the metal framework 1 and the complementary plastic body 2 are preferably coupled with each other in a loosenable manner, so as to ensure the selective interchangeability thereof at any time, even in the field, with the aid of a plurality of quick-release coupling means distributed all along at least two opposite sides of the rack.

[0031] With reference also to Figure 3, each one of such coupling means comprises an appropriately shaped receptacle 12 that is provided integrally in the plastic body 2 and is adapted to accommodate, in a substantially vertical direction, a correspondingly shaped respective head portion 13 of a corresponding metal wire of the framework 1 extending transversally with respect to the above mentioned opposite sides of the rack, which preferably form a front side 14 and a rear side 15 of the rack, respectively.

[0032] The head portion 13 of the metal wire is substantially formed in the shape of a reverse U lying on a plane that is substantially parallel to the opposite sides 14 and 15 of the rack, wherein an extremity 16 of said U is free, while the other extremity 17 thereof extends into the metal wire itself, which preferably forms a longitudinal member 9.

[0033] Such a solution requires the metal wire to just undergo an elementary bending operation and, at the same time, enables an effective quick-release coupling system to be provided, which, as this has also been found and demonstrated experimentally, confers considerable strength and rigidity, especially in the longitudinal direction, to the entire composite rack. All this thanks to the fact that the above described structure is effective in even geometrically compensating the normal distribution of mechanical stress forces acting in the dish rack.

[0034] Among the advantages deriving therefrom, the possibilities for the dishes or, for the matter, the washload items in the rack to overturn or fall off are reduced to a minimum, even in the case that the rack is being handled in an abrupt manner as this occurs for instance when it is slidably pulled out/pushed in rapidly from/in the dishwashing machine.

Claims

1. Rack for dishwashing machines having a composite structure that is made partly of metal wire and partly of plastic material, said rack comprising members designed to support the washload items by coming into contact therewith, as well as a plurality of structural and/or functional component parts, **characterized in that** a washing vessel (1), a bottom portion (2) of which is firmly joined to a sliding loading door (3), the latter being extractable from a retracted position, in which said door closes the washing vessel frontally, to a pulled-out position, in which said door is open and said bottom portion (2) of the washing vessel is correspondingly pulled out and disjoined from the remaining portion of the washing vessel (1), said washing vessel accommodating upper washload support means (4) and lower washload support means (6), as well as partition means (8) separating the washing vessel, which are provided underneath said upper washload support means (4) so as to collect the water dripping therefrom and convey it towards said bottom portion (2) of the washing vessel, **characterized in that** only said support and contact members (7-9) are made in the form of a metal-wire framework (1), whereas the remaining part of the rack is formed by a single complementary body (2) of plastic material that comprises said structural and/or functional parts (3, 4, 5; 10, 11) integrally, in which said metal-wire framework and said single-piece plastic body are coupled to each other mechanically.
2. Rack for dishwashing machines according to claim 1, **characterized in that** said metal-wire framework (1) and said single-piece plastic body (2) are snap-fitted to each other.
3. Rack for dishwashing machines according to claim 1, **characterized in that** said plastic body (2) comprises a frame (3) delimiting said rack peripherally.
4. Rack for dishwashing machines according to claim 3, **characterized in that** said plastic body (2) integrally comprises at least a handle (4) for gripping said rack.
5. Rack for dishwashing machines according to claim 3, in which the rack is provided with castors or similar parts that make it adapted to slide with respect to side runners provided in the dishwashing machine, **characterized in that** said plastic body (2) integrally comprises pins (5) adapted to support said castors or wheels (6).
6. Rack for dishwashing machines according to claim 3, in which the rack is adapted to be mounted in the dishwashing machine with the aid of height-adjust-

able side support means, **characterized in that** said plastic body (2) integrally comprises at least a part of said height-adjustable side support means (10).

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7. Rack for dishwashing machines according to claim 3, in which the rack is adapted to be mounted in the dishwashing machine in association with water spray means capable of being supplied with water via water connection means, **characterized in that** said plastic body (2) integrally comprises part of said water connection means (11). 10
8. Rack for dishwashing machines according to claim 3, comprising hinging and guide means for some of said support and contact members, **characterized in that** said plastic body (2) integrally comprises said hinging and guide means. 15
9. Rack for dishwashing machines according to claim 2, **characterized in that** said metal-wire framework (1) and said single-piece plastic body (2) are coupled with each other with the aid of a plurality of quick-release coupling means distributed all along at least two opposite sides (14, 15) of the rack, in which each one of such coupling means comprises a correspondingly shaped receptacle (12) that is provided integrally in the plastic body and is adapted to accommodate, in a substantially vertical direction, a correspondingly shaped respective head portion (13) of a corresponding metal wire (9) of the framework extending transversally with respect to said opposite sides of the rack. 20 25 30
10. Rack for dishwashing machines according to claim 9, **characterized in that** said head portion (13) of the metal wire (9) is substantially formed in the shape of a reverse U lying on a plane that is substantially parallel to said opposite sides (14, 15) of the rack, in which an extremity (16) of said U is free, while the other extremity (17) thereof extends into the metal wire itself. i 35 40
11. Rack for dishwashing machines according to any of the preceding claims, **characterized in that** said opposite sides, along which said quick-release coupling means (12, 13) are distributed, form a front side (14) and a rear side (15) of the rack, respectively. 45 50
12. Rack for dishwashing machines according to claim 2, **characterized in that** said metal-wire framework (1) and said single-piece plastic body (2) are snap-fitted each other in a loosenable manner. 55

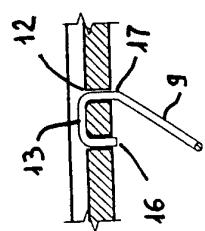


Fig. 3

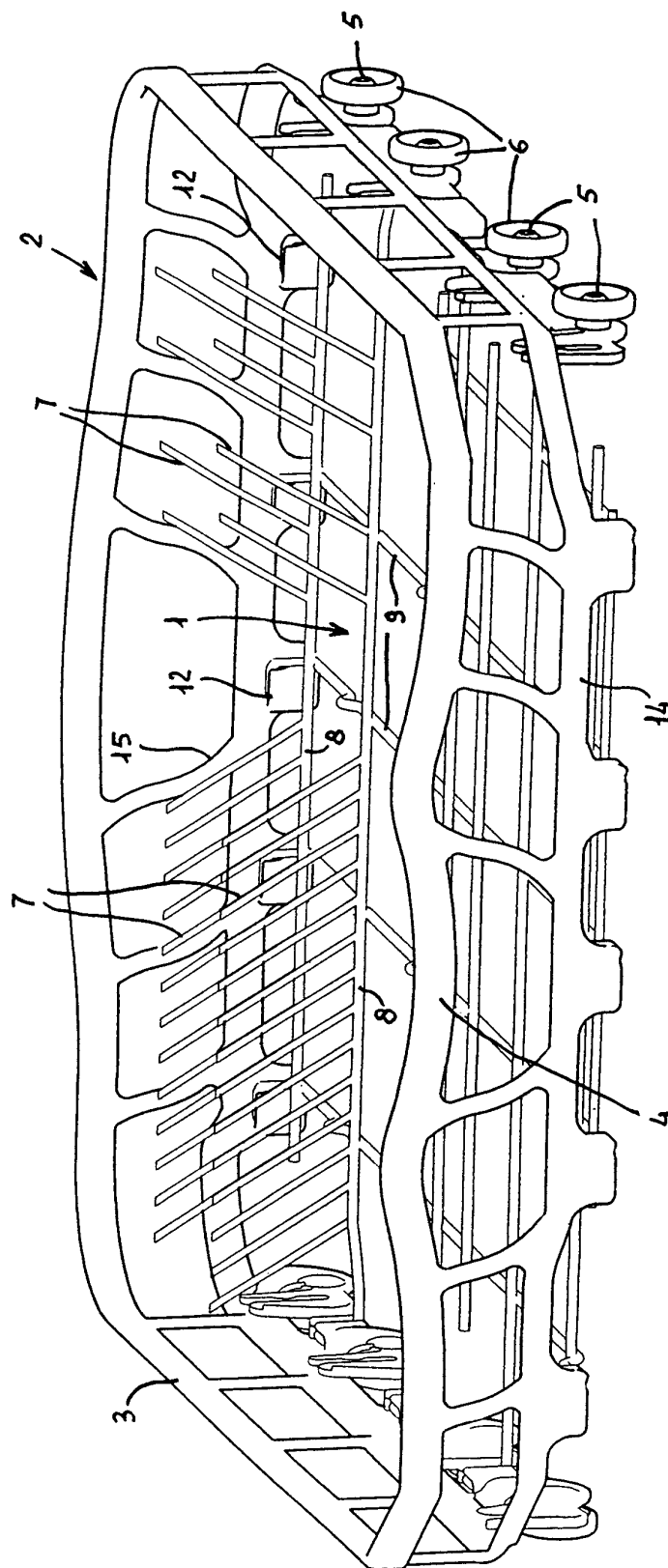


Fig. 1

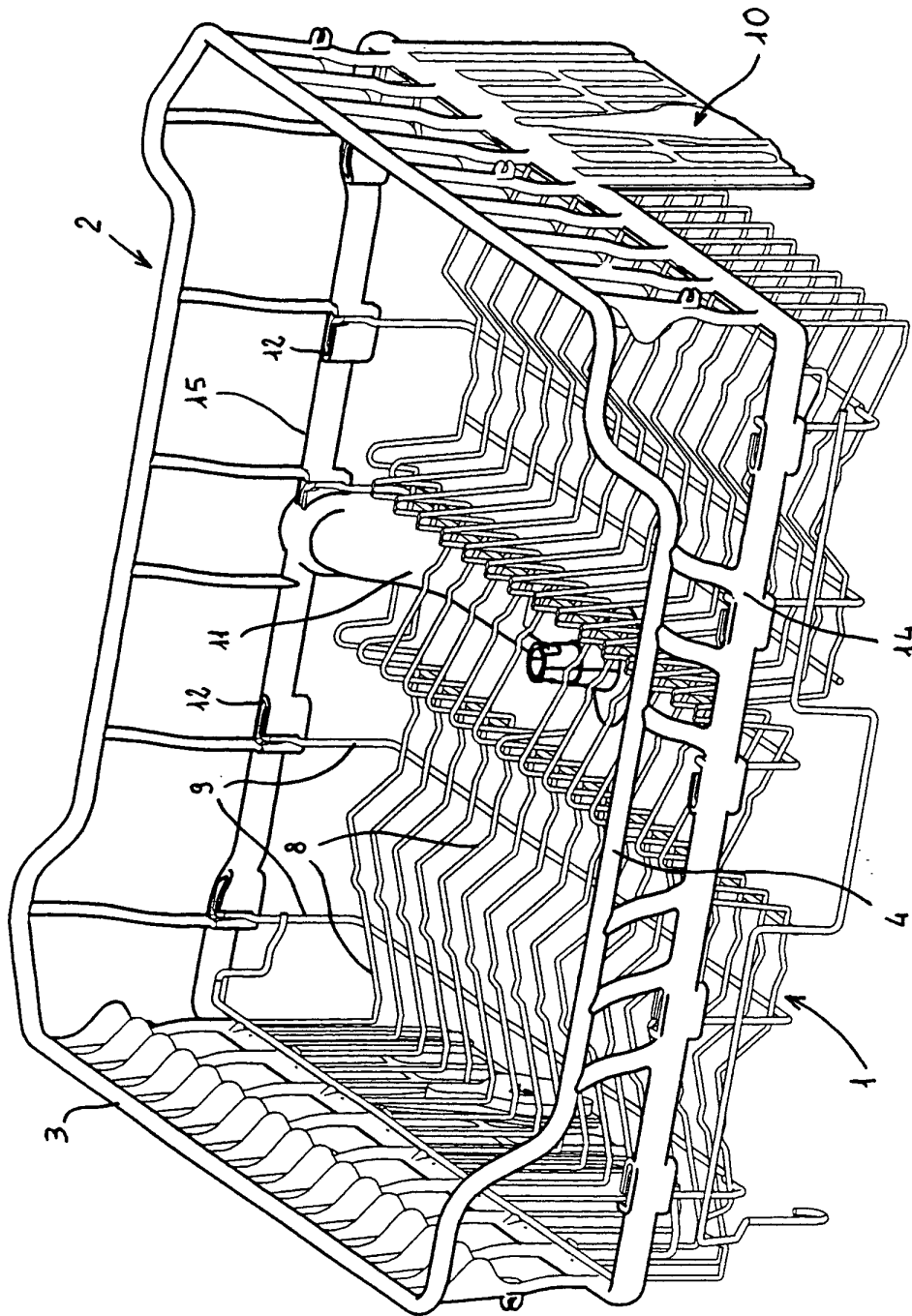


Fig. 2



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 02 01 9604

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Place of search		Date of completion of the search	Examiner
THE HAGUE		10 March 2003	Norman, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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