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(71) Applicant: **Bonferraro S.p.A.**
37060 Bonferraro (VR) (IT)

(72) Inventors:
- **Milani, Boris**
  46039 Villimpenta MN (IT)
- **Ambrosi, Andrea**
  37052 Casaleone VR (IT)
- **Tosi, Mauro**
  37051 Bovolone VR (IT)

(74) Representative: **Concone, Emanuele et al**
Società Italiana Brevetti S.p.A.
Via Carducci 8
20123 Milano (IT)

(54) Removable glass-holding insert for dishwasher rack

(57) A removable glass-holding insert (1) for dishwasher rack comprises an upper supporting crossbar (2) and a lower supporting crossbar (3) which are substantially wavy and arranged in planes mutually oriented at 90°±20°, as well as means (4, 6) for the reversible coupling of the insert (1) to the rack. Such an insert gives a greater flexibility of use to the dishwasher since it can be placed in different positions, also centrally, both in the lower and in the upper rack thus allowing to exploit the available space in the wash tank to the best and to properly place goblets at an optimal angle for their effective washing and drying.

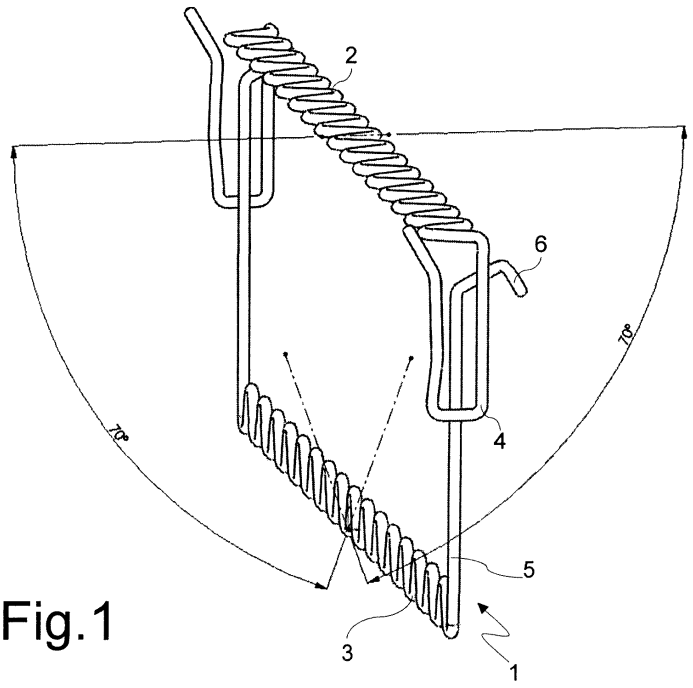

Fig.1

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Description

[0001] The present invention relates to dishwashing machines, and in particular to a removable glass-holding insert that may be hooked up to any of the dishwasher racks.

[0002] It is known that dishwasher racks are usually made from metal wires coated with plastic and welded together so as to form a supporting structure for the dishes. In order to make the use of said racks more flexible, mobile or removable supports are often provided which allow to change the exploitation of the rack according to the need of the moment.

[0003] An example of such a flexibility of use is found in the upper rack which is usually intended to receive the smaller dishes such as cups, glasses and the like. In order to fully exploit its height there is usually provided a cup-supporting shelf, extending along one or both sides of the rack, located at such a level as to allow the positioning of the glasses under the shelf. Said shelf may also be used to place thereon large-size cutlery such as kitchen knives, kitchen spoons and the like, or as a support for goblet stems if the shelf is properly shaped, e.g. with a wavy edge, or it is formed by a series of parallel sticks between which the stems can be introduced.

[0004] However the presence of the shelf is an obstacle if the upper rack needs to be exploited for larger dishes, whereby in order to allow such a possibility of exploitation the shelf can be made removable, as a separate insert, or as a tip-up shelf but in any case its position inside the rack can not be changed. Furthermore, given that the shelf is designed also for other functions, as indicated above, and in supporting the goblets it operates in cooperation with the shaped bottom of the rack, also designed to perform other functions such as mainly the support of dishes and cookware, it is difficult to obtain a stable positioning of the goblets at an optimum angle for effective washing.

[0005] For a still better exploitation of the available space inside the wash tank it is also known to use a substantially flat third rack, positioned in the upper part of the dishwasher above the upper rack, with the function of cutlery tray. The presence of such a third rack, however, implies a significant reduction of the available vertical space in the upper rack making it difficult to place goblets therein.

[0006] Therefore the object of the present invention is to provide a removable glass-holding insert for dishwasher rack which overcomes the above-mentioned drawbacks.

[0007] This object is achieved by means of a removable glass-holding insert comprising at least an upper supporting crossbar and a lower supporting crossbar, said crossbars being provided with a plurality of seats, preferably equally spaced, and with at least one pair of means for the reversible coupling of the insert to the rack, said means being preferably arranged at the ends of the upper crossbar.

[0008] The fundamental advantage of the present removable glass-holding insert is to confer greater flexibility of use to the dishwasher since it can be placed in different positions, also centrally, both in the lower and upper rack thus allowing to exploit the available space in the wash tank to the best and to properly place the goblets even in the presence of the third rack.

[0009] Another advantage of such a removable glass-holding insert is implicit in the fact of being specially designed to support glasses, goblets typically, and thus being able to provide them with a stable positioning at an optimum angle for effective washing and drying.

[0010] A further advantage of this removable glass-holding insert stems from its structural simplicity, which results in a reduced cost, a high reliability and a great ease of use for the user.

[0011] Further advantages and features of the removable glass-holding insert according to the present invention will become apparent to those skilled in the art from the following detailed description of two embodiments thereof with reference to the attached drawings in which:

Fig.1 is a top perspective view of a first embodiment of the insert;
Fig.2 is a front view of the insert of Fig.1;
Fig.3 is an enlarged partial perspective view similar to Fig.1;
Figs. 4 and 5 are views similar to the previous one showing the insert coupled to a rack;
Fig.6 is a side view showing various positions in which the insert can be placed inside the rack;
Fig.7 is a top perspective view of the insert coupled to a rack and loaded with a plurality of different goblets;
Figs. 8 and 9 are enlarged partial views, respectively from above and from the front, showing the geometric parameters of the wavy profiles of the crossbars;
Fug.10 is a top perspective view of a second embodiment of the insert; and
Fig.11 is a side view of the insert of Fig.10.

[0012] Referring to figures 1 to 3, there is seen that a removable glass-holding insert according to a first embodiment of the present invention, generally indicated by reference numeral 1, comprises an upper supporting crossbar 2 and a lower supporting crossbar 3 that are substantially wavy and arranged in planes perpendicular to each other. The upper crossbar 2 is provided with substantially U-shaped terminals 4 which extend towards the lower crossbar 3 in a plane perpendicular to said planes of the crossbars, whereas the lower crossbar 3 is provided with end uprights 5 which extend in its same plane up to the vicinity of the upper crossbar 2 and end with hooks 6 facing outwards and downwards.

[0013] More specifically, the U-shaped terminals 4 have a straight proximal section 4a and intermediate section 4b, whereas the distal section 4c is shaped to protrude outwards in the lower portion and then return par-

tially inwards in the upper portion, so as to form a "knee" and to remain protruding with respect to the plane containing the straight sections 4a and 4b, as better illustrated in the detail of Fig.9. The connection between the two crossbars 2, 3 is achieved by welding at one or both contact points between said elements, namely a first contact point 7a between hook 6 and the top of the proximal section 4a and a second contact point 7b between upright 5 and the center of the intermediate section 4b (Fig.3).

[0014] As previously mentioned, the planes containing the wavy profiles of crossbars 2, 3 could also be oriented non-orthogonally provided that they remain within a range of ± 20° (Fig.1) with respect to the orthogonal arrangement shown in the figures. This could be achieved by varying the angle between the upper crossbar 2 and terminals 4 and/or the angle between the lower crossbar 3 and uprights 5.

[0015] Furthermore, although the present insert 1 is preferably made as a traditional rack with plastic-coated metal wires which are welded together, for reasons of cost and robustness, nothing prevents from making it with other materials and construction methods. For example, insert 1 could be made of plastic by injection molding either in one piece or more preferably in multiple pieces connected by snap fit or interference, or by ultrasonic welding. In that case, of course, the profile of crossbars 2, 3 and the type of attachment means to the rack (terminals 4, hooks 6) could be different from those illustrated in the figures which are advantageous for a structure of metal wires.

[0016] Referring now also to figures 4 to 7, the simple and effective operation of the above-described removable glass-holding insert is readily understood.

[0017] To introduce insert 1 in a dishwasher rack R it is sufficient to flatten at least a part of the mobile dish-holding supports of the rack so that the lower crossbar 3 rests on the bottom of the rack and hooks 6 rest on the upper peripheral wire P. In order to provide greater stability to insert 1, the protruding "knees" of the distal sections 4c of terminals 4 elastically snap engage said peripheral wire P latching under it, so as to ensure that hooks 6 remain engaged and do not slip along the peripheral wire P.

[0018] It is therefore evident that the user can couple insert 1 to rack R with two simple operations, and also the restoration of the standard configuration of rack R is just as easy since the release of insert 1 only requires to push inwards the ends of the distal sections 4c to disengage them from the peripheral wire P. In this way, insert 1 can be extracted from rack R and the mobile dish-holding supports can be returned to their operative position.

[0019] It should be noted that the operative angle taken by insert 1 when it is coupled to rack R depends on the combination of two geometric parameters, namely the distance between the peripheral wire P and the bottom of the rack, which can also vary depending on the position of insertion in rack R, as well as the distance between hooks 6 and the lower crossbar 3. This angle is typically 30° but it may vary within a range of ±10° for a given insert 1, in function of the rack R in which it is inserted and of the specific location of placement. Furthermore, although the figures show a disposition of insert 1 in the transverse direction relative to the direction of removal of the rack, it is clear that also a disposition aligned to said direction would be possible with the same procedures and could influence the operative angle of insert 1.

[0020] As shown in Fig.7, the present insert 1 thus allows to load in any rack R a plurality of goblets G also of different shapes and sizes, holding them at an optimal inclination for their washing and drying. To achieve that result, the wavy profiles of crossbars 2 and 3 have been designed with special dimensional ranges defined by the geometric parameters illustrated in figures 8 and 9.

[0021] More specifically, the upper crossbar 2 has a sinusoidal shape with a "frequency", i.e. the distance F between two adjacent crests, equal to 30±5 mm and an "amplitude", i.e. the depth A of a valley, equal to 20±3 mm. Similarly, the lower crossbar 3 has a sinusoidal shape but "straightened" in the bottom portion to provide a greater bearing surface to the edge of the glass, with a "frequency" F' equal to 30±5 mm and an "amplitude" A' equal to 18±3 mm. The wavy profiles of crossbars 2 and 3 are preferably in phase, i.e. the "frequencies" F and F' are equal and the crests are aligned.

[0022] Obviously in the case of an insert made with a different material and/or constructive method the shapes used to obtain the equally spaced seats on the two crossbars may be correspondingly different. For example in the above-mentioned case of a plastic molded insert the profiles could take the form of a triangular, square or sawtooth wave or the like and also be different between the upper crossbar and the lower crossbar.

[0023] Furthermore, while maintaining the traditional structure of metal wires coated in plastic and welded together, it is possible to obtain the equally spaced seats on the two crossbars also with other types of profiles as shown in the second embodiment of figures 10 and 11. In this case, in fact, the upper crossbar 2' and the lower crossbar 3' have an helical shape while the rest of the structure remains unchanged from the first embodiment.

[0024] In the illustrated example the upper crossbar 2' consists of a helix having a pitch and a diameter slightly higher than the helix of the lower crossbar 3', which is therefore not in phase with it. However it is clear that the two helical profiles could be identical and that each of them could be combined with a wavy profile of the first embodiment so as to derive further embodiments with mixed profiles, namely wavy above and helical below or vice versa.

[0025] It is therefore clear that the above-described and illustrated embodiment of the removable glass-holding insert according to the invention is just an example susceptible of various modifications. In particular, crossbars 2, 3 may be shaped in a different way to obtain seats, possibly also not equally spaced, suitable to receive other types of glasses, and the engagement means can be

constituted by other elements mechanically equivalent to hooks 6 and terminals 4, possibly by integrating the functions of coupling and locking into a single element (e.g. an elastic clip). In addition, the coupling means could be arranged not at the ends of the upper crossbar 3 as explained above but at another position, whereby the coupling to rack R could be realized not at the upper peripheral wire P but at another element of the rack.

[0026] Finally, in another embodiment not shown in the figures, insert 1 could be provided with one or more additional crossbars (even straight) arranged between uprights 5 at such a distance from the lower crossbar 3 as not to interfere with the placement of goblets G yet to allow also the placement of glasses of a height shorter than the distance between crossbars 2 and 3.

Claims

1. Removable glass-holding insert (1) for dishwasher rack (R), **characterized by** comprising at least an upper supporting crossbar (2; 2 ') and a lower supporting crossbar (3; 3'), said crossbars (2; 2', 3; 3') being shaped to obtain a plurality of seats that are preferably equally spaced, and at least one pair of means for the reversible coupling of said insert (1) to said rack (R).

2. Glass-holding insert (1) according to claim 1, **characterized in that** the coupling means are arranged at the ends of the upper crossbar (3; 3') and are able to realize the coupling of the insert (1) to the rack (R) at the upper peripheral wire (P) of the latter.

3. Glass-holding insert (1) according to claim 1 or 2, **characterized in that** the coupling means comprise hooks (6) facing outwards and downwards and elastic means for locking said hooks (6) against the rack (R).

4. Glass-holding insert (1) according to any of the preceding claims, **characterized in that** the lower crossbar (3; 3') is provided with end uprights (5) which extend up to the vicinity of the upper crossbar (2; 2').

5. Glass-holding insert (1) according to claims 3 and 4, **characterized in that** the hooks (6) are formed at the distal ends of the uprights (5).

6. Glass-holding insert (1) according to any of the preceding claims, **characterized in that** the upper crossbar (2; 2') is provided with substantially U-shaped terminals (4) which extend towards the lower crossbar (3; 3') in a plane perpendicular to the longitudinal axes of said crossbars (2; 2', 3; 3'), said U-shaped terminals (4) having straight proximal sections (4a) and intermediate sections (4b), as well as distal sections (4c) shaped to protrude outwards in the lower portion and then return partially inwards in the upper portion, so as to form a knee and to remain protruding with respect to the plane containing said straight sections (4a, 4b).

7. Glass-holding insert (1) according to claims 5 and 6, **characterized in that** the connection between the two crossbars (2; 2', 3; 3') is made by joining them at a first contact point (7a) between the hook (6) and the top of the proximal section (4a) of the U-shaped terminal (4) and/or at a second contact point (7b) between the upright (5) and the center of the intermediate section (4b) of the U-shaped terminal (4).

8. Glass-holding insert (1) according to any of the preceding claims, **characterized in that** it is made from metal wires coated with plastic and welded together.

9. Glass-holding insert (1) according to any of the preceding claims, **characterized in that** the distance between the lower crossbar (3; 3') and the means for the reversible coupling of said insert (1) to the rack (R) is such that the operating angle taken by the insert (1) when it is coupled to the rack (R) is $30° \pm 10°$.

10. Glass-holding insert (1) according to any of the preceding claims, **characterized in that** the two crossbars (2, 3) have substantially wavy profiles, preferably in phase with each other, arranged in planes mutually oriented at $90° \pm 20°$, said profiles preferably having a sinusoidal shape.

11. Glass-holding insert (1) according to claim 10, **characterized in that** the lower crossbar (3) has a sinusoidal shape but straightened in the lower portion.

12. Glass-holding insert (1) according to claim 10 or 11, **characterized in that** in the upper crossbar (2) the distance (F) between two adjacent crests is equal to 30 ± 5 mm and the depth (A) of a valley is equal to 20 ± 3 mm.

13. Glass-holding insert (1) according to any of claims 10 to 12, **characterized in that** in the lower crossbar (3) the distance (F') between two adjacent crests is equal to 30 ± 5 mm and the depth (A') of a valley is equal to 18 ± 3 mm.

14. Glass-holding insert (1) according to any of claims 1 to 9, **characterized in that** the upper crossbar (2') and/or the lower crossbar (3') have a helical shape.

15. Glass-holding insert (1) according to any of the preceding claims, **characterized in that** it further comprises one or more additional crossbars arranged between the upper crossbar (2; 2') and the lower

crossbar (3; 3'), said additional crossbars being preferably straight.

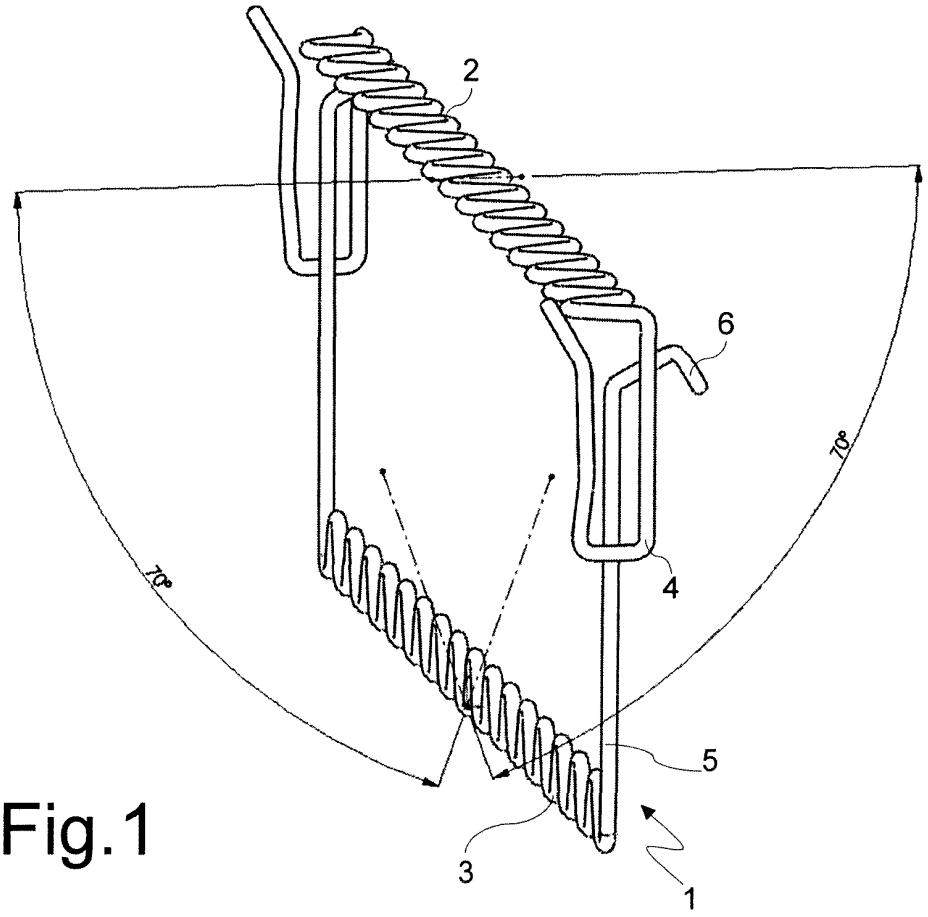


Fig.1

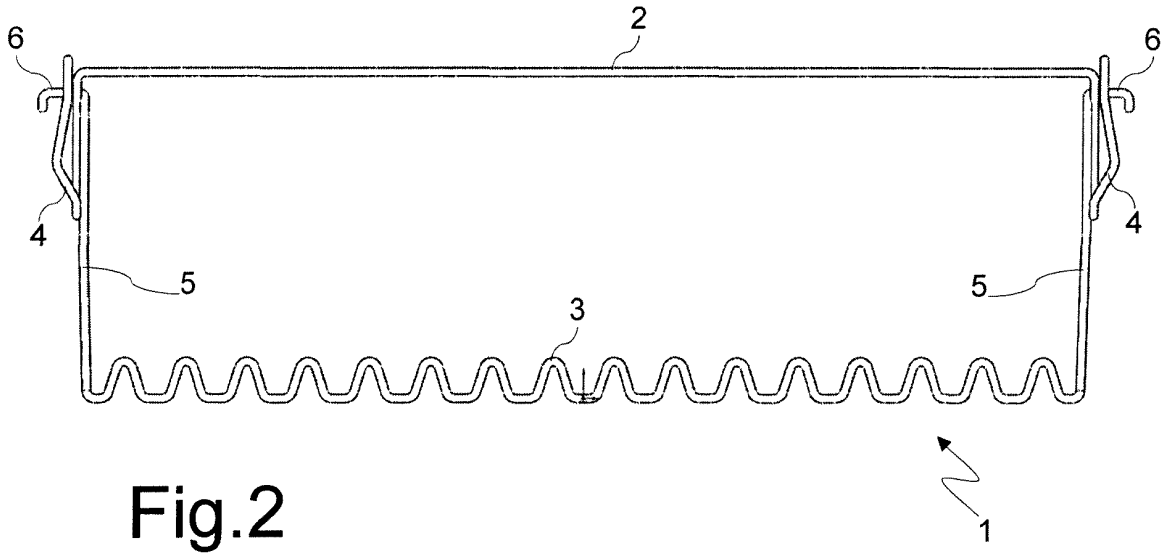


Fig.2

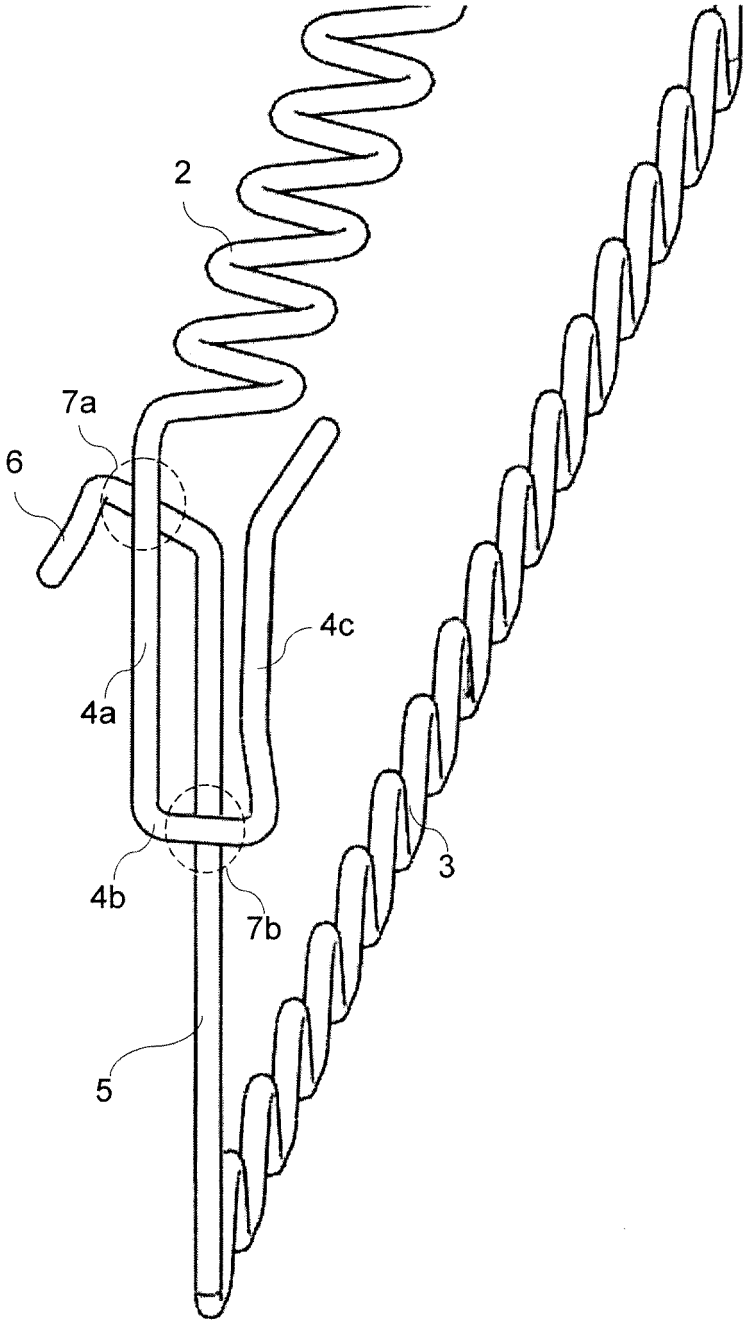


Fig.3

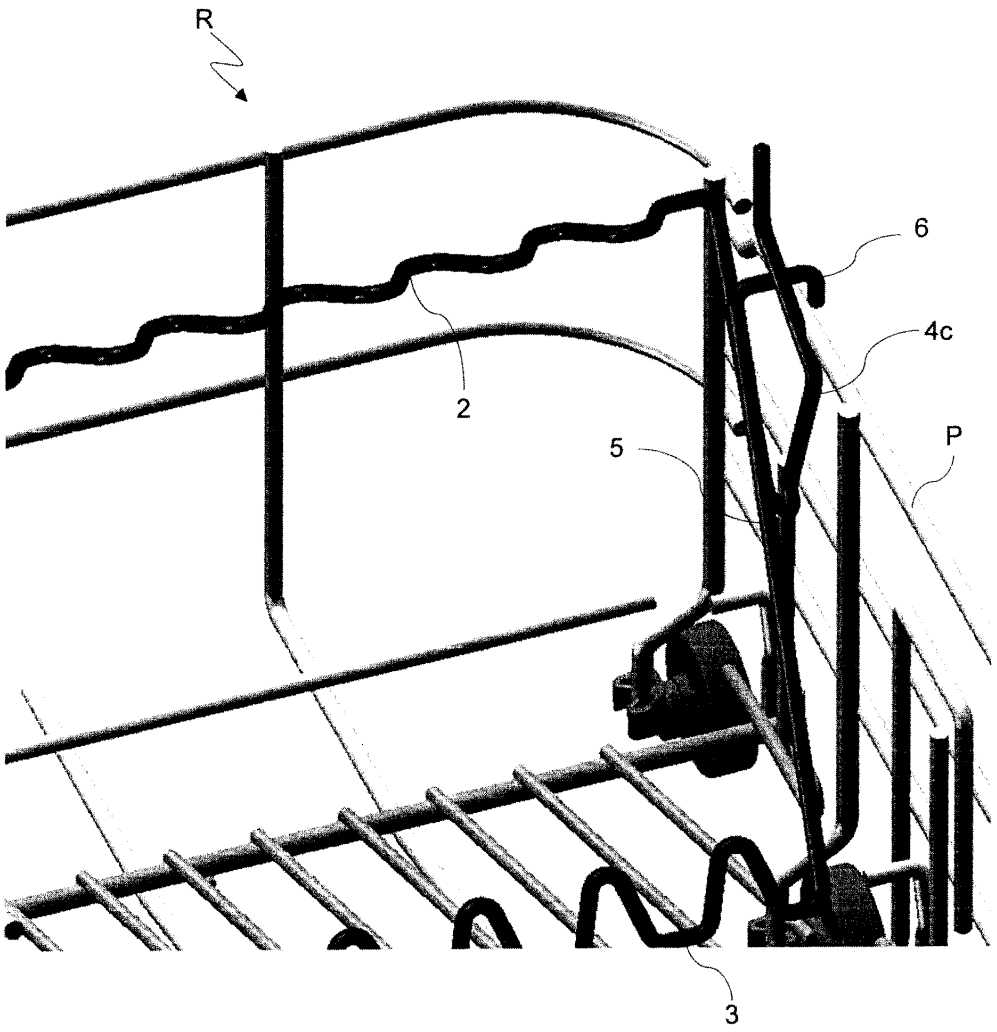


Fig.4

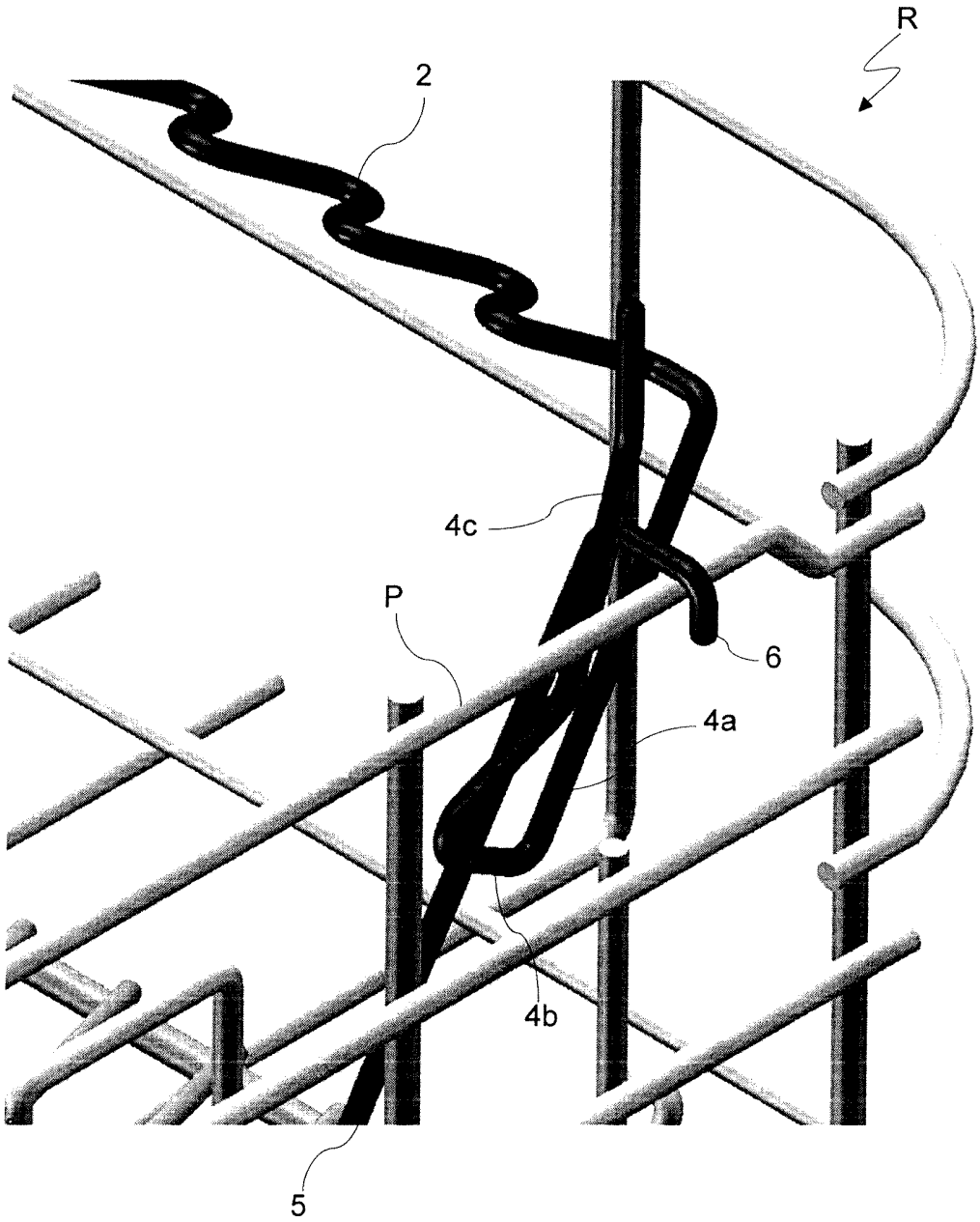
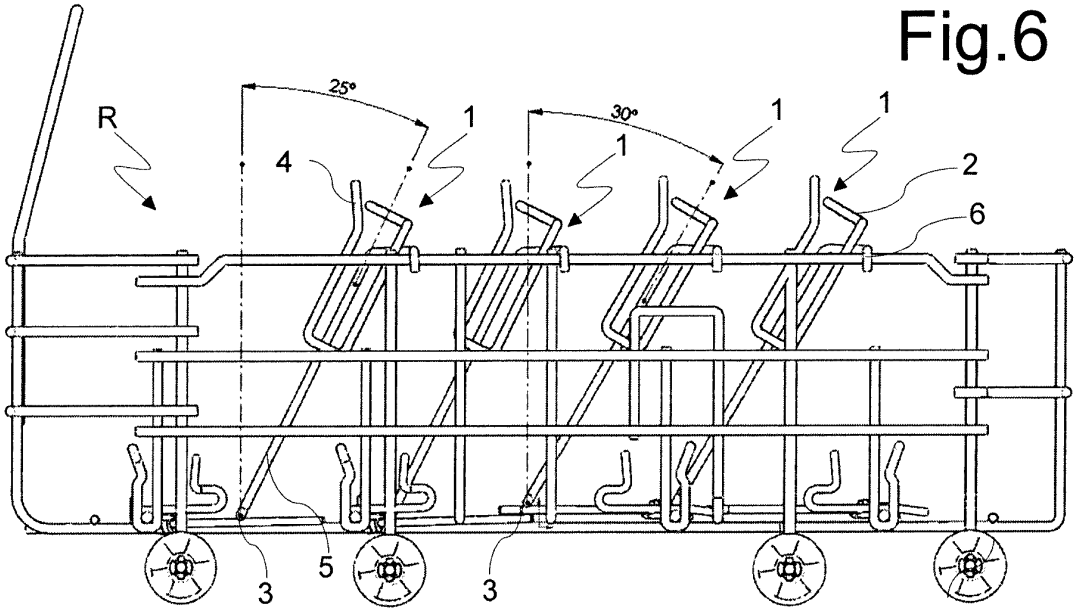


Fig.5

Fig.6



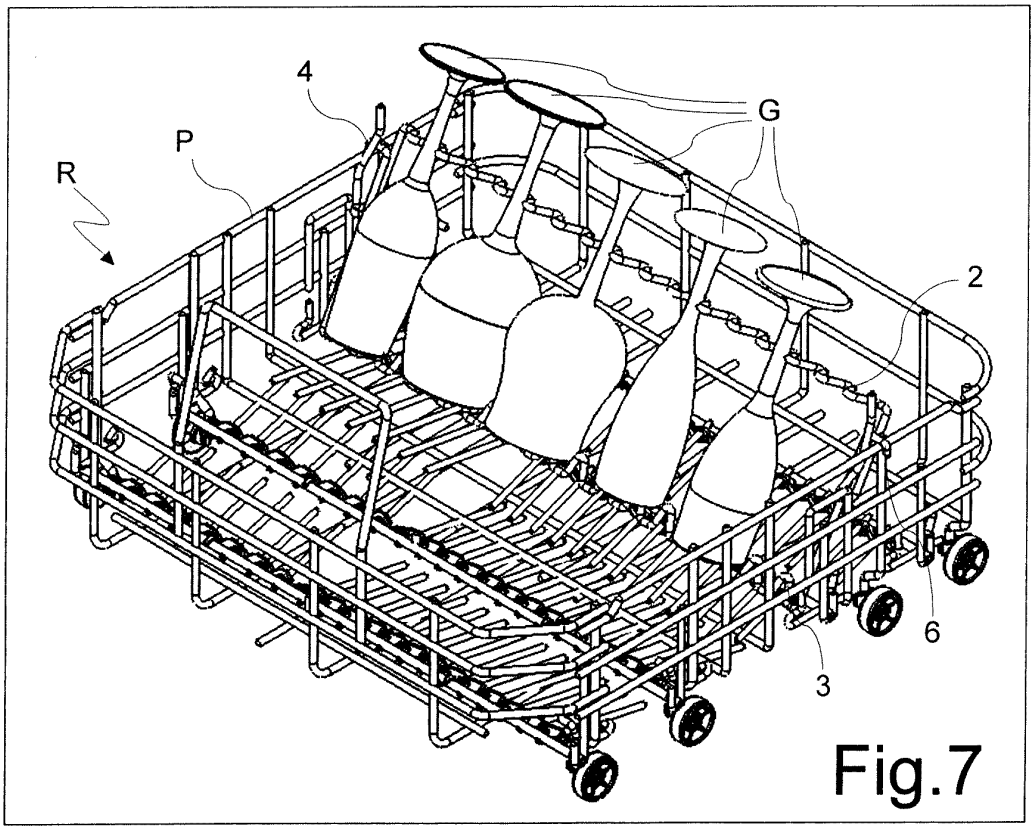


Fig.7

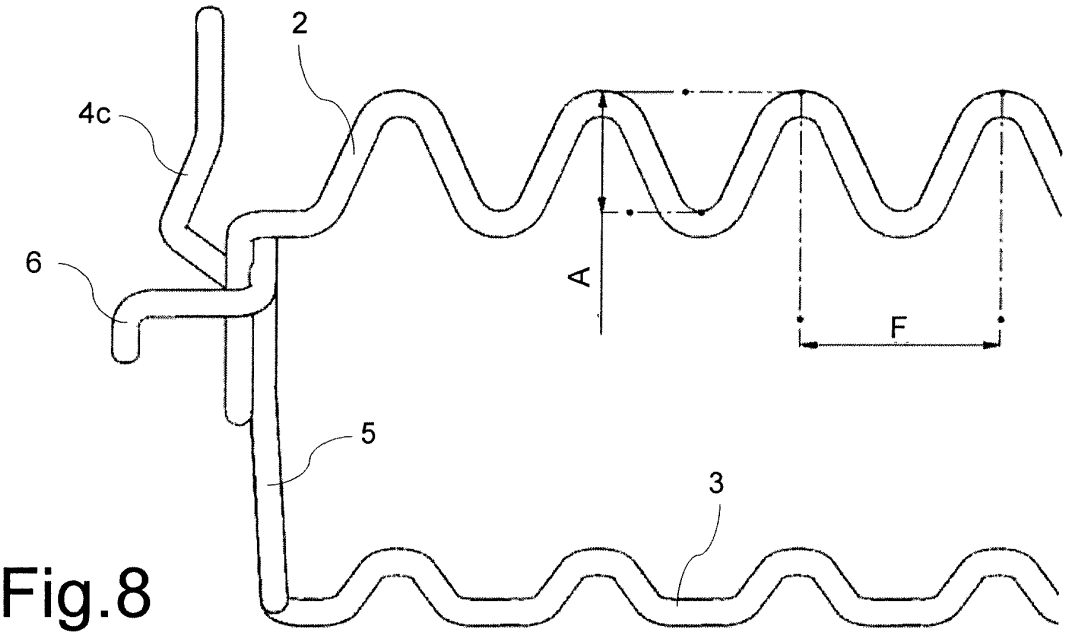


Fig.8

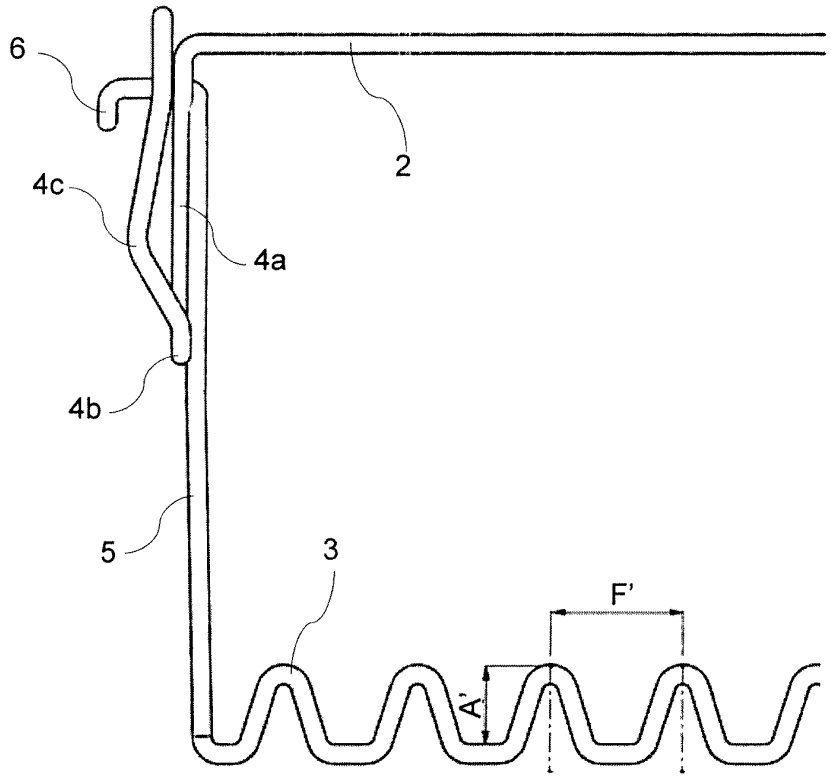


Fig.9

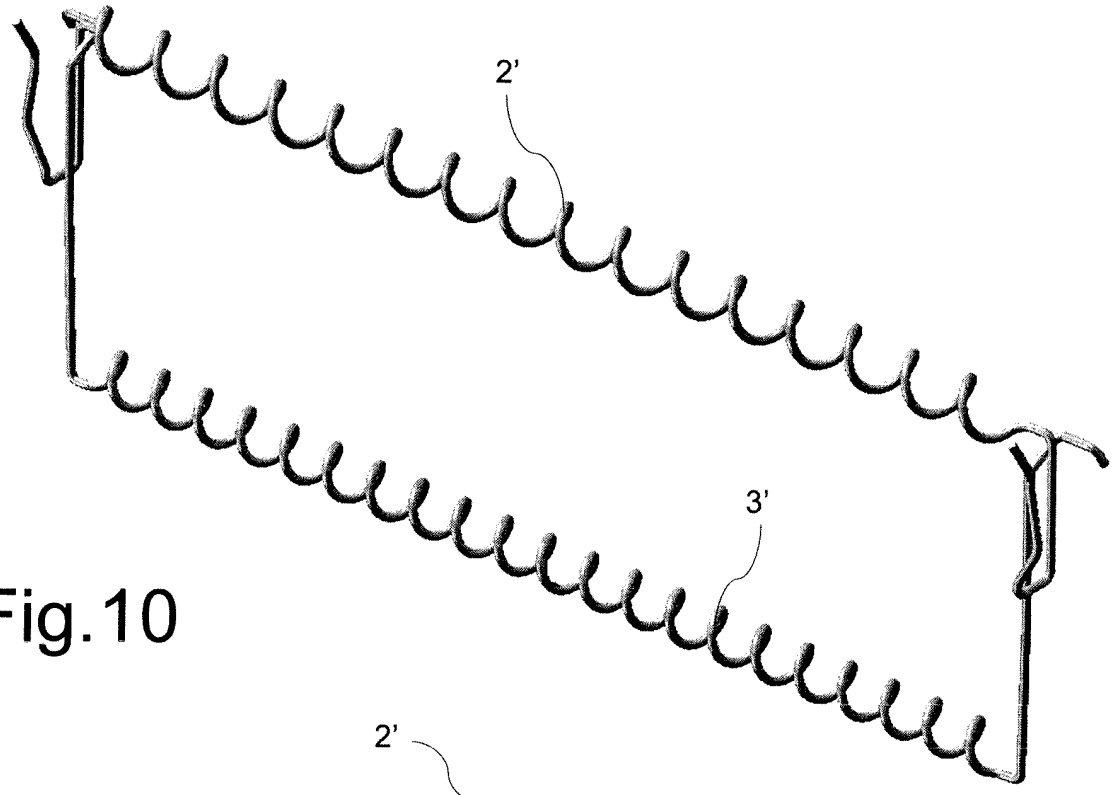


Fig.10

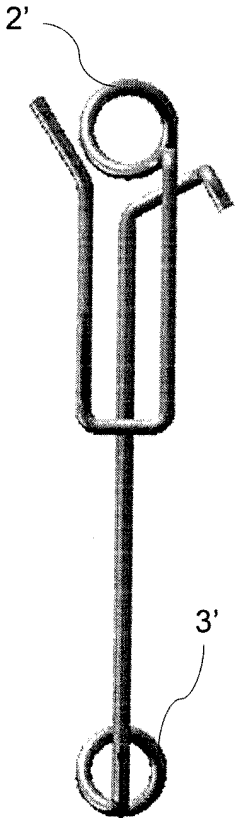


Fig.11

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EUROPEAN SEARCH REPORT

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 November 2013	Martin Gonzalez, G

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