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(19) **United States**(12) **Patent Application Publication****WATZENEGGER et al.**(10) **Pub. No.: US 2020/0375431 A1**(43) **Pub. Date: Dec. 3, 2020**(54) **DISHRACK FOR DISHWASHERS****Publication Classification**(71) Applicant: **FRIES Planungs-und
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(AT)(57) **ABSTRACT**

A dish rack (1) for dishwashers (2), the dish rack (1) having a grid-shaped rack base (4), which is formed from base webs (3), and side walls (5), the side walls (5) together with the rack base (4) surrounding a rack interior space (6) of the dish rack (1), and the rack base (4) and/or the side walls (5) having standing surfaces (8) on an underside (7) of the dish rack (1). These standing surfaces end in a standing plane (9) of the dish rack (1), and the base webs (3) have angled web regions (10) which, as seen in a sectional plane (11) orthogonal to the standing plane (9), are arranged at least in regions at an acute angle (12) to the standing plane (9).

(21) Appl. No.: **16/891,275**(22) Filed: **Jun. 3, 2020**(30) **Foreign Application Priority Data**

Jun. 3, 2019 (AT) A 211/2019

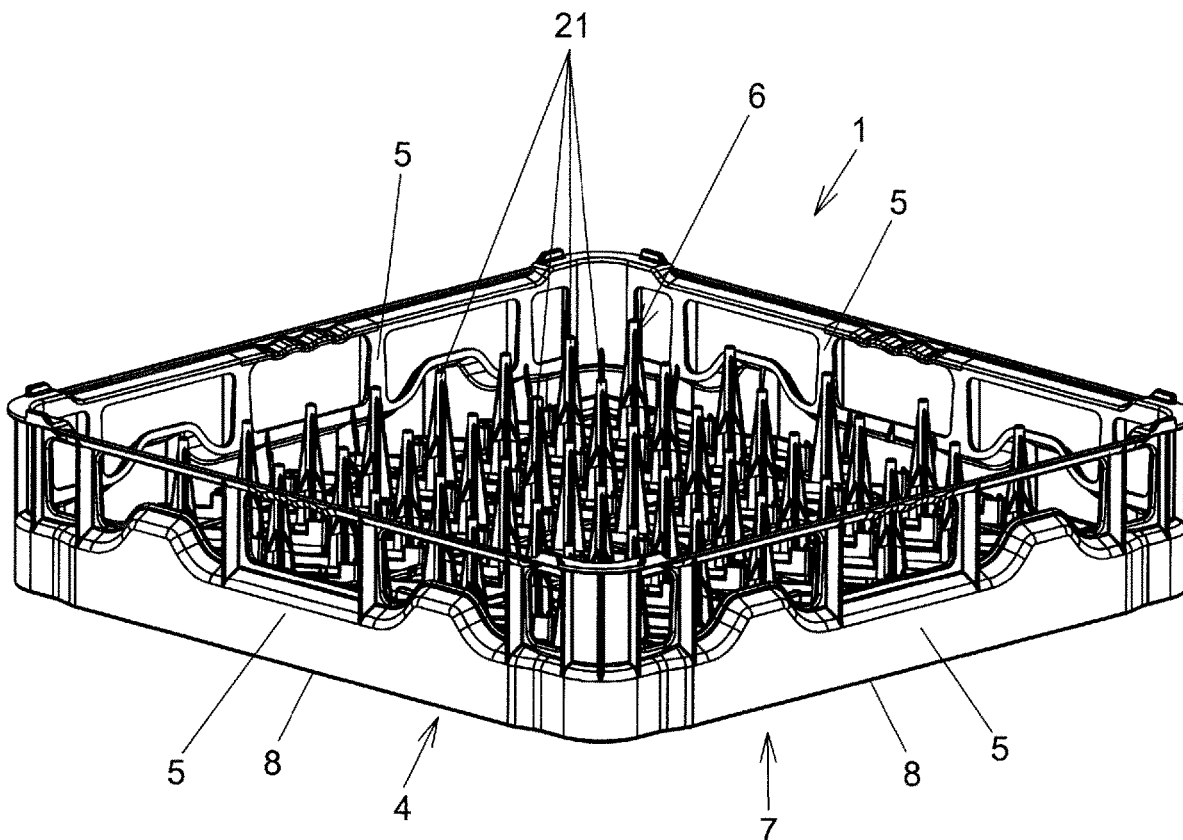


Fig. 1

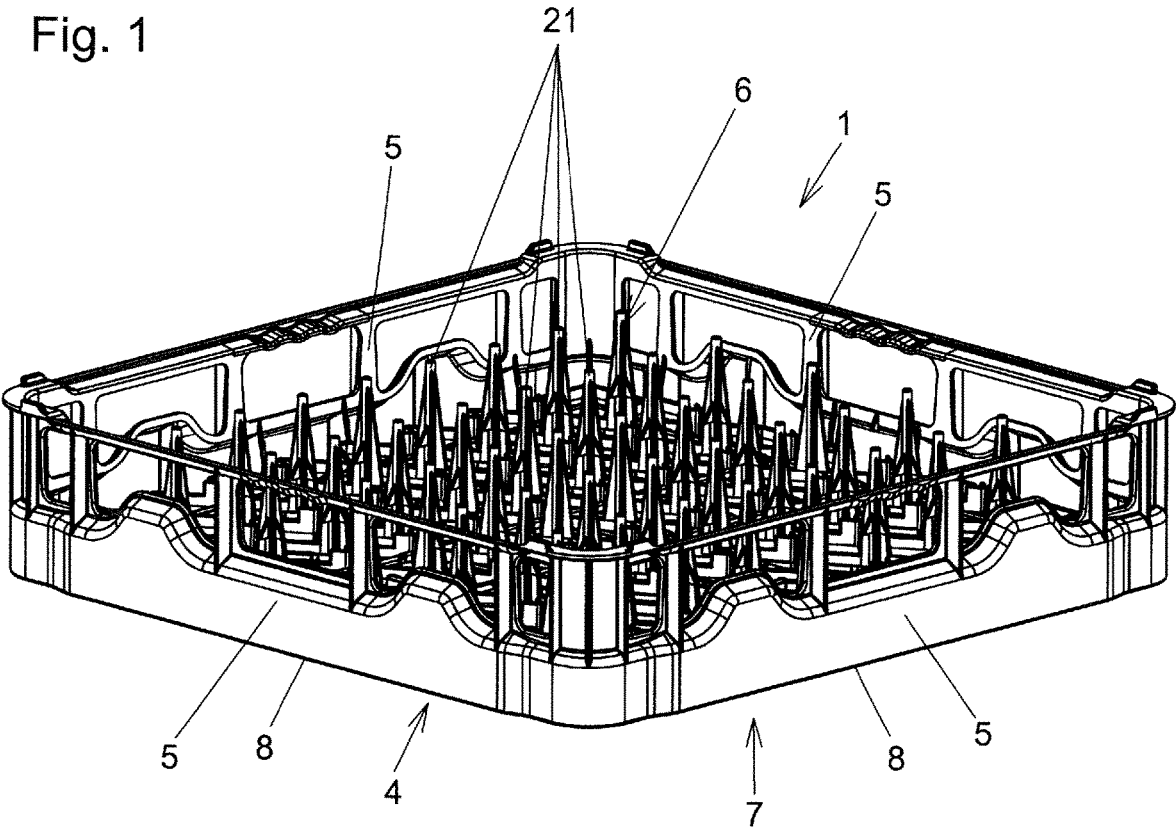


Fig. 2

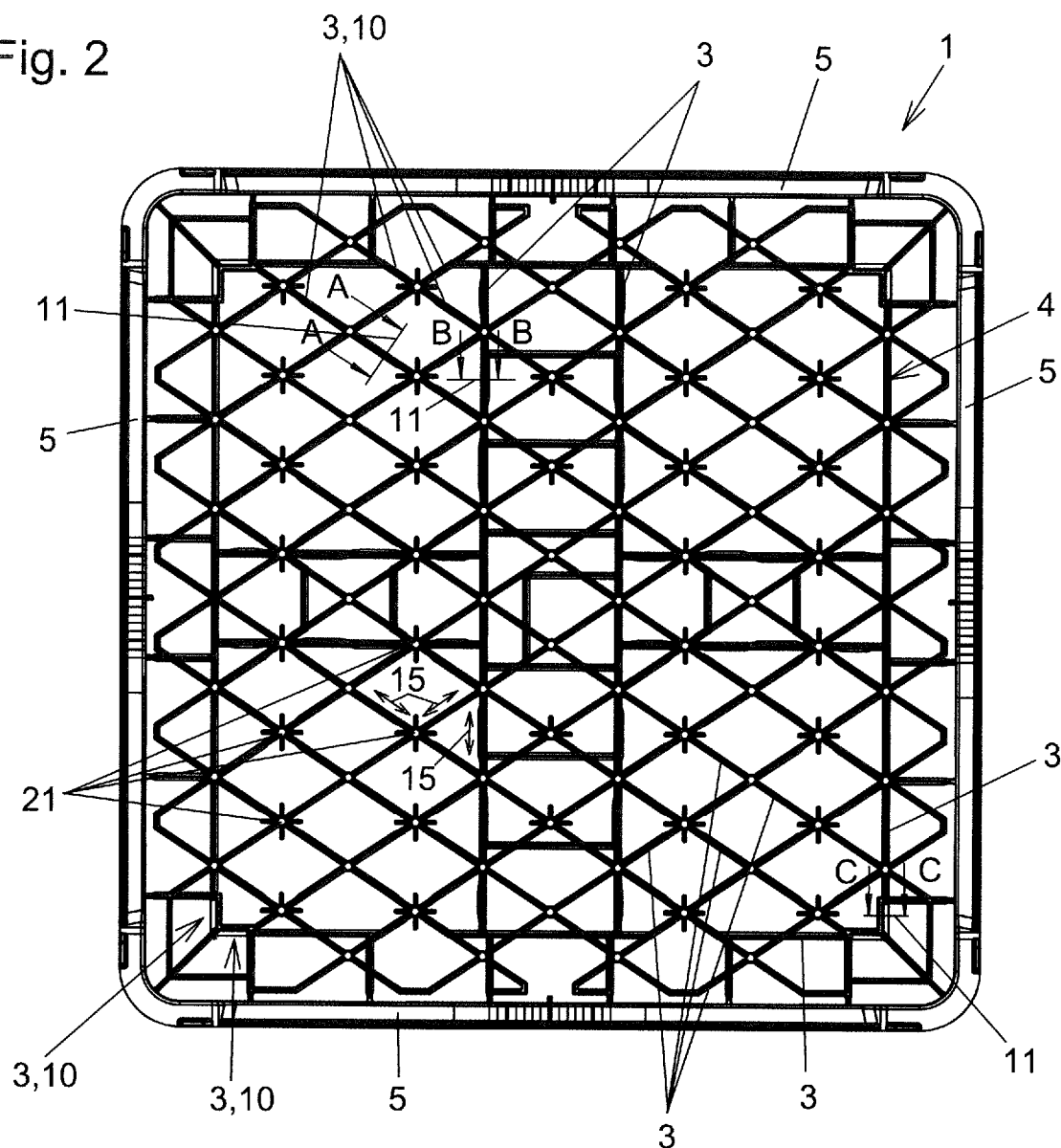


Fig. 3

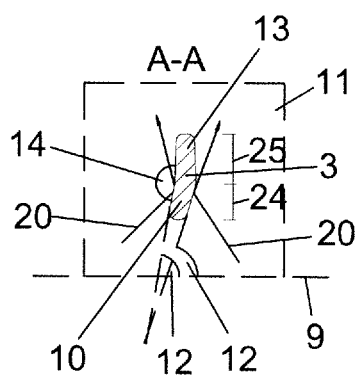


Fig. 4

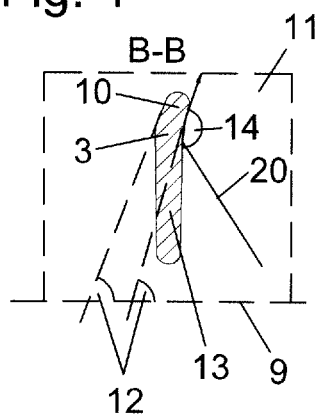


Fig. 5

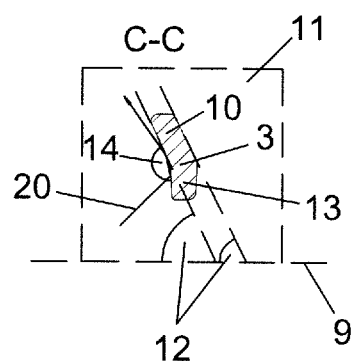


Fig. 6

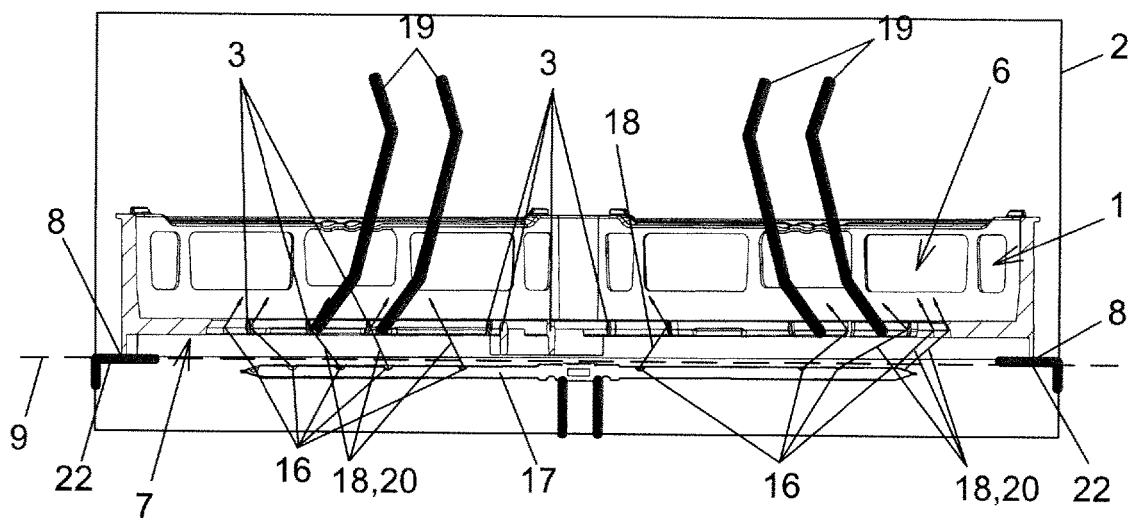
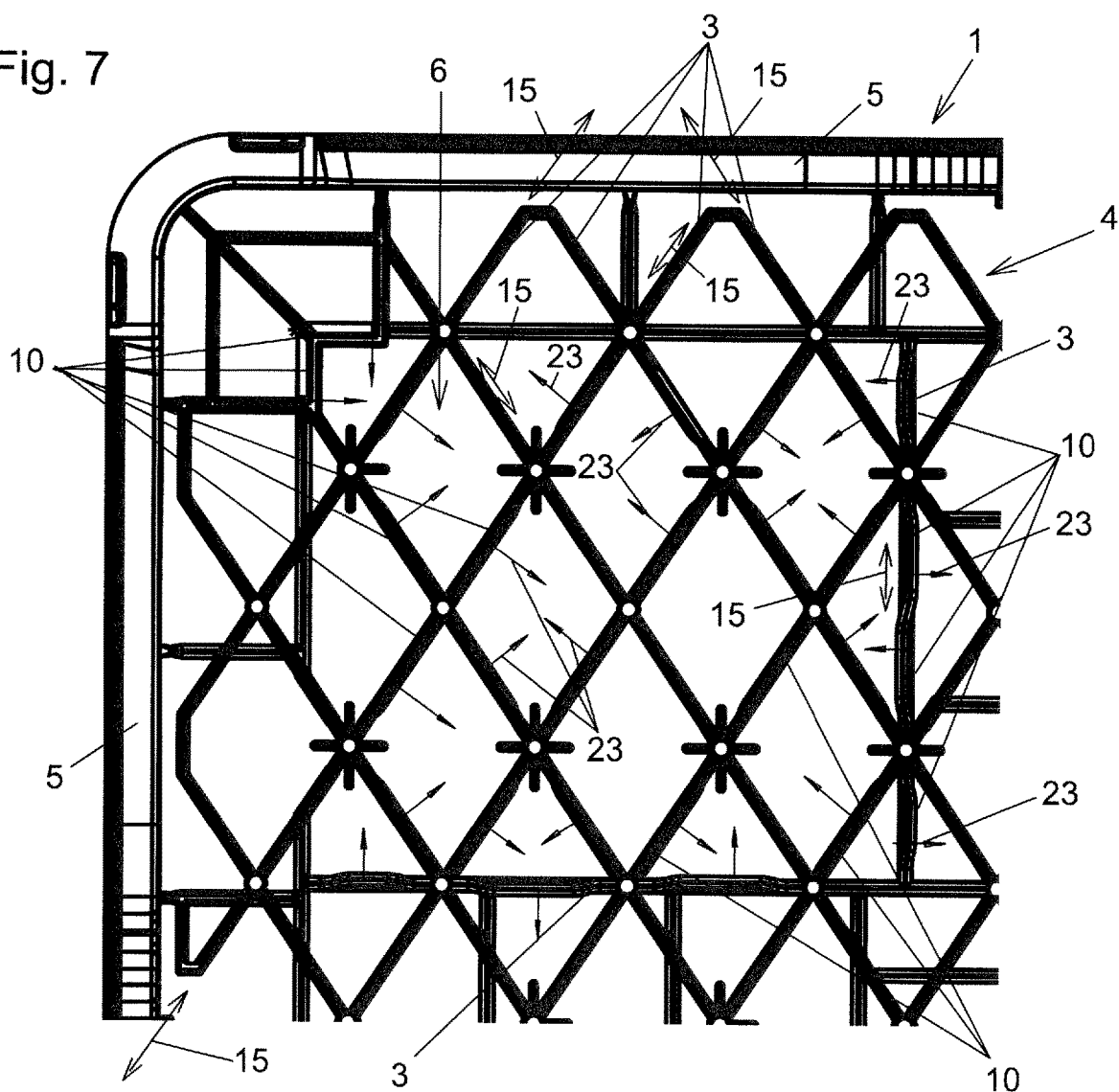


Fig. 7



DISHRACK FOR DISHWASHERS

INCORPORATION BY REFERENCE

[0001] The following documents are incorporated herein by reference as if fully set forth: Austrian patent application no. A 211/2019, filed Jun. 3, 2019.

TECHNICAL FIELD

[0002] The present invention relates to a dish rack for dishwashers, the dish rack having a grid-shaped rack base, which is formed from base webs, and side walls, the side walls together with the rack base surrounding a rack interior space of the dish rack, and the rack base and/or the side walls having standing surfaces on an underside of the dish rack, said standing surfaces ending in a standing plane of the dish rack.

[0003] Furthermore, the invention also relates to an arrangement comprising a dishwasher and a dish rack, and to a method for washing objects in a dishwasher, said objects being arranged in the rack interior space of a dish rack.

BACKGROUND

[0004] In the prior art, dish racks of the type in question are used for washing crockery, glasses, cutlery and the like in dishwashers. Especially in the industrial sector, such dish racks can also be used for washing other objects in dishwashers.

[0005] A dish rack of the type mentioned is disclosed, for example, in EP 1 287 780 B1.

SUMMARY

[0006] It is the object of the invention to improve dish racks of the type in question to the effect that they contribute to as good a washing result as possible.

[0007] According to the invention, it is provided for this purpose that the base webs have angled web regions which, as seen in a sectional plane orthogonal to the standing plane, are arranged at least in regions at an acute angle to the standing plane.

[0008] The angled web regions of the base webs deflect the washing liquid, which is sprayed into the dish rack from below in the dishwasher, in a targeted manner, and therefore the objects which are to be washed and are placed in the rack interior space are acted upon with washing liquid from as many different sides as possible. This makes it possible to at least substantially avoid there being regions of the objects to be washed that are not acted upon with washing liquid. Overall, the washing result is therefore improved by the angled regions of the base webs. Dish racks according to the invention can be used for washing crockery, glasses and cutlery, but also other objects in correspondingly suitable dishwashers. The dish racks according to the invention can accordingly be used both in the gastronomy sector and in industrial manufacturing. Dish racks according to the invention, for example if they are used for washing plates, can be equipped with special plate supports which are known per se and on which plates are supported during the washing operation. Said plate supports, if they are present, are then located in the rack interior space in a manner known per se and can preferably be integrally formed on or fastened to the rack base.

[0009] The rack interior space surrounded by the rack base and the side walls can be opened upward, i.e. on the side

facing away from the rack base. However, dish racks according to the invention can also be equipped with, optionally grid-like, covers or the like.

[0010] The dish racks can basically be manufactured from different materials. Dish racks made of plastic are preferred. The base webs and the side walls, preferably the entire dish rack, can be formed integrally. The dish racks according to the invention can be manufactured, for example, by injection molding.

[0011] On the rack base and/or the side walls, standing surfaces with which the dish rack can be placed on a plane are located on the underside of the dish rack. To this extent, the standing surfaces predetermine the standing plane of the dish rack, in which the dish rack, in the normal position, i.e. with the rack base downward, can be deposited on a generally horizontal underlying surface. The standing surfaces can be designed here in the shape of points, in the shape of lines or in some other way. Even when designed in the shape of points, there is ultimately always a certain surface, and therefore the term standing surface is also permissible in this case.

[0012] The orthogonal sectional plane through the base webs with the angled web regions is in each case a sectional plane orthogonal to the standing plane. As seen in said orthogonal sectional plane running in each case through the base web with the angled web region, the angled web regions are arranged at least in regions at an acute angle to the standing plane. As seen in said sectional plane, the base webs can be arranged completely at an acute angle to the standing plane. In this case, the base webs in this region consist exclusively of angled web regions.

[0013] In order to avoid areas being left unwashed, preferred variants of the invention, however, provide that the base webs, as seen in the sectional plane orthogonal to the standing plane, are themselves angled at least in regions. It can be provided in the invention that the base webs, as seen in the sectional plane orthogonal to the standing plane, additionally have orthogonal web regions above or below the angled web regions, wherein the orthogonal web regions, as seen in the sectional plane orthogonal to the standing plane, are arranged orthogonally to the standing plane. Overall, angled web regions therefore describe a region of a base web that, as seen in a corresponding orthogonal sectional plane, is arranged at least in regions at an acute angle to the standing plane. An orthogonal web region is a web region which, as seen in the corresponding orthogonal sectional plane orthogonal to the standing plane, is arranged orthogonally, i.e. at a right angle, to the standing plane.

[0014] An acute angle, as is known per se, means an angle which is greater than 0° and less than 90°, i.e. is less than an orthogonal angle. Within this context, it could also be said that the angled web regions are arranged angularly or at an angle to the standing plane, wherein the words at an angle or angularly describe angles which are within the range between 0° and 90°.

[0015] In case of doubt, the terms above and below relate to an operating position of the dish rack, in which the standing plane runs horizontally and the rack base forms the lower end of the dish rack.

[0016] The term grid-shaped rack base describes that the rack base has clearances or passage openings between the base webs, through which clearances or passage openings, for example, the washing liquid can enter the rack interior space through the rack base.

[0017] It is preferably provided that, as seen in the sectional plane orthogonal to the standing plane, one of the orthogonal web regions, preferably in each case, merges directly into one of the angled web regions.

[0018] Preferred variants of the invention furthermore provide that, as seen in the sectional plane orthogonal to the standing plane, one of the orthogonal web regions encloses an obtuse angle with one of the angled web regions. An obtuse angle, as is known per se, is an angle of greater than 90° but less than 180°.

[0019] So that the washing liquid deflected at the angled web regions can achieve the maximum effect in the rack interior space, it is preferably provided that the angled web regions are arranged below the rack interior space. In other words, the angled web regions are therefore not located in the region of the side walls of the dish rack.

[0020] Preferred variants of the invention provide that a base web has a sequence of angled web regions along its longitudinal extent.

[0021] It is preferably provided here that the angled web regions which in each case follow one another in the sequence are arranged spaced apart from one another in the direction of the longitudinal extent of the base web. It is also advantageous if the angled web regions of the respective base web are angled in directions differing from one another.

[0022] The base webs can run parallel to the side walls of the dish rack, as seen in a top view of the rack base or the standing plane. As seen in said top view, however, the base webs can also run through the dish rack parallel to a diagonal or at a different angle to the side walls of the dish rack. Mixed shapes of said base webs are also possible. Preferred variants of the invention make provision for at least some of the base webs to together form a diamond-shaped pattern. Both base webs running parallel to the side walls and base webs forming a diamond-shaped pattern may also be present in a rack base. By means of base webs which run parallel to the side walls and which reach further downward in the direction of the standing plane than the other base webs, a cross-shaped structure can be created in the rack base, which structure can serve to the effect that corresponding transport means of a dishwasher engage from below in said cross-shaped structure of the rack base in order to transport the dish rack through a corresponding dishwasher. Such cross-shaped structures in rack bases are known per se.

[0023] In principle, angled web regions according to the invention can be formed on all of the abovementioned base webs.

[0024] As seen in the top view of the dish rack or of the standing plane thereof, the dish rack, as known per se, can have a rectangular, in particular square basic shape, but also a basic shape shaped in some other way. The term rectangular or square basic shape also includes configurations in which the corners of said basic shape are rounded.

[0025] In addition to the dish rack per se, the invention also relates to an arrangement comprising a dishwasher and comprising a dish rack according to the invention, wherein the dish rack is arranged in the dishwasher and washing liquid nozzles of the dishwasher are arranged underneath the rack base, and a respective washing liquid dispensing direction of the respective washing liquid nozzles is directed toward the rack base. It is preferably provided here that the washing liquid nozzles are arranged in a rotatably mounted washing arm of the dishwasher, wherein the washing arm is then likewise located underneath the rack base. In this

arrangement, the washing liquid is sprayed by the washing liquid nozzles from below through the rack base onto the objects to be washed in the rack interior space. A relatively large amount of the washing liquid dispensed overall by the washing liquid nozzles passes through the clearances or passage openings in the rack base without being deflected in the process. If, however, the washing liquid strikes against the angled web regions of the base webs, it is deflected there, and therefore a multiplicity of different directions are formed in the rack interior space at which the washing liquid strikes against the objects which are to be washed and are mounted in the rack interior space. As explained at the beginning, this achieves a particularly good washing result.

[0026] In addition, the invention also relates to a method for washing objects in a dishwasher, said objects being arranged in the rack interior space of a dish rack according to the invention, wherein, in order to wash the objects in the dishwasher, the dish rack is arranged above washing liquid nozzles of the dishwasher, and washing liquid is sprayed from the washing liquid nozzles through the rack base into the rack interior space, wherein some of the washing liquid is deflected by the angled web regions of the base webs into the rack interior space.

[0027] The objects which are to be washed and which are arranged in the rack interior space may, as already stated above, be crockery, glasses and cutlery, but also other objects.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] Further features and details of preferred embodiments of the invention will be explained in the following description of the figures, in which:

[0029] FIG. 1 shows a perspective view of a dish rack according to the invention;

[0030] FIG. 2 shows a view of the upper side of said rack;

[0031] FIG. 3 shows the section along the orthogonal sectional plane A-A from FIG. 2;

[0032] FIG. 4 shows the section along the orthogonal sectional plane B-B from FIG. 2;

[0033] FIG. 5 shows the section along the orthogonal sectional plane C-C from FIG. 2;

[0034] FIG. 6 shows a schematic illustration of the arrangement of a dish rack according to the invention in a dishwasher in a diagonal section, and

[0035] FIG. 7 shows a detailed view of a partial region of the upper side of the dish rack shown here.

DETAILED DESCRIPTION

[0036] FIG. 1, in a perspective view obliquely from above, shows a dish rack 1 in which the base webs 3 have web regions 10 angled according to the invention, although the latter cannot be seen in this way in FIG. 1. As known per se, the dish rack 1 has a grid-shaped rack base 4 formed from base webs 3, and side walls 5. The side walls 5 and the rack base 4 together surround the rack interior space 6 of the dish rack 1. As shown in this exemplary embodiment, the side walls 5 can be perforated in regions with openings. In this exemplary embodiment, the rack interior space 6 is open upward. Standing surfaces 8 which end in a standing plane 9 of the dish rack 1 are located on the underside 7 of the side walls 5 and/or of the rack base 4. In the normal operating position of the dish rack 1 that is illustrated, for example, in FIG. 6, the standing plane 9 is generally a horizontal plane.

It can also be said that the standing surfaces **8** together span or define the standing plane **9**.

[0037] The dish rack **1** shown in FIG. 1 is a dish rack **1** designed especially for washing plates in dishwashers **2**. In this exemplary embodiment of said dish rack, plate supports **21** are formed in a manner known per se on the base webs **3**, against which plate supports the plates can be leant in a manner known per se in order thereby to be able to be arranged standing on their edge for the washing operation in the dish rack **1**. Said plate supports **21** are of course optional and may also be omitted, in particular if objects **19** other than, for example, glasses or cutlery are intended to be washed.

[0038] The dish rack **1** shown here has a square basic shape with rounded corners. As already explained at the beginning, dish racks **1** according to the invention may however of course also be formed with rectangular basic shapes or other basic shapes, optionally with rounded or else non-rounded corners. Dish racks **1** according to the invention are advantageously manufactured from plastic. It can be provided here that all of the components of the dish rack are connected integrally to one another. Dish racks **1** according to the invention can be produced, for example, by injection molding.

[0039] FIG. 2 shows a view from above of the upper side **7** of the dish rack **1** from FIG. 1. In FIG. 2, the standing plane **9** lies in the plane of the sheet. The rack interior space **6** is delimited downward by the rack base **4** which consists of a multiplicity of base webs **3** with clearances or passage openings remaining free in between. The base webs **3** can be formed running in different ways. In the exemplary embodiment shown here, there are base webs **3** which, in their longitudinal extent **15**, run parallel to one of the side walls **5**. Such base webs running in parallel form the cross-shaped structure which has already been mentioned at the beginning and which can serve to transport the dish rack **1** through a dishwasher **2**. In the exemplary embodiment shown here, some of the base webs **3**, however, also form a diamond-shaped structure. In this exemplary embodiment, the plate supports **21** are also formed at the intersecting points of said diamond-shaped structure. All of said base webs **3** can have angled web regions **10** according to the invention. Said web regions, as already stated at the beginning, can be arranged spaced apart from one another in the direction of the longitudinal extent **15** of the respective base web **3**. The angled web regions **10** are advantageously arranged under the rack interior space **6** and not under the side walls **5**. In the exemplary embodiment shown, the base webs **3** running in a diamond-shaped manner with respect to one another and the base webs **3** running parallel to the side walls **5** each have angled web regions **10**. Furthermore, in all four corner regions of the rack base **4** along the respective diagonal in relation to the respective rounded corners of the side walls **5**, base webs **3** which are offset inward and have respectively angled web regions **10** are provided, as indicated at the bottom on the left in particular in FIG. 2. As seen in the top view of the underside **7** of the dish rack **1**, said base webs **3** arranged in the corner regions enclose an orthogonal angle with one another.

[0040] FIGS. 3, 4 and 5 now show by way of example, as seen in each case in sectional planes **11** orthogonal to the standing plane **9**, sections through base webs **3** with angled web regions **10**. The sectional planes **11** incorporated in FIG. 2 are orthogonal to the plane of the sheet of FIG. 2, which

also forms the standing plane **9**. FIG. 3 shows the corresponding orthogonal sectional plane **11** along the sectional line A-A from FIG. 2, FIG. 4 along the sectional line B-B and FIG. 5 in a sectional line C-C from FIG. 2. The standing plane **9** and the respective orthogonal sectional planes **11** are in each case illustrated in FIGS. 3, 4 and 5. In FIGS. 3, 4 and 5, the orthogonal sectional planes **11** each lie in the plane of the sheet. The standing planes **9** are orthogonal, i.e. at right angles, to the plane of the sheet. It can readily be seen in all three figures, FIGS. 3, 4 and 5, that the base webs **3** in each case have angled web regions **10** which, as seen in the respective sectional plane **11** orthogonal to the standing plane **9**, are arranged at least in regions at an acute angle **12** to the standing plane **9**. It can also be seen in all three figures that said base webs **3** with the angled web regions **10**, as seen in the respective orthogonal sectional plane **11**, are themselves angled at least in regions, i.e. have two regions which are arranged at an angle to each other. In the exemplary embodiments shown here, said regions are in each case the angled web regions **10** and the orthogonal web regions **13**. As seen in the respective orthogonal sectional planes **11**, the angled web regions **10** are in each case arranged at an acute angle **12** to the standing plane **9**, wherein different angled web regions **10** can also be arranged at differently acute angles **12** to the standing plane **9**. As seen in the respective orthogonal sectional plane **11**, the orthogonal web regions **13** run orthogonally to the standing plane **9**. This can also be readily seen in FIGS. 3, 4 and 5. In all three figures, it is also the case that, as seen in the respective orthogonal sectional plane **11**, the respective orthogonal web region **13** encloses an obtuse angle **14** with the respective angled web region **10**. Generally speaking, the wall thicknesses of the base webs can be, for example, within the range of 1 mm to 10 mm, preferably of 2.5 mm to 4 mm. The length extent **24** of the angled region **10** can be in a ratio of 10:1 to 1:10, preferably 3:1 to 1:3, to the length extent **25** of the orthogonal web region **13**, wherein the length extents **24**, **25** are always measured in a direction running normally, i.e. orthogonally in all directions, to the standing plane **9**. In said orthogonal sectional planes **11**, the angles **12** between the angled web regions **10** and the standing plane **9** are advantageously within a range of between 30° and 85°, particularly preferably within a range of between 60° and 80°. The length of an angled web region **10**, as seen in the respective direction of the longitudinal extent **15** of the respective base web **3**, is advantageously at least 5 mm. All of the preferred value ranges mentioned can be used in very different embodiments of the invention.

[0041] FIGS. 3, 4 and 5 also show by way of example rays which depict washing liquid **20** deflected at the base webs **3** and in particular at the angled web regions **10**.

[0042] FIG. 6 shows by way of example an arrangement comprising a dishwasher **2** and a dish rack **1** according to the invention that is arranged therein, wherein the dishwasher **2** is illustrated only in highly simplified form. The dishwasher **2** can be designed as known per se in the prior art. FIG. 6 shows a vertical section through this arrangement along a diagonal through the dish rack **1** that is illustrated in FIGS. 1 and 2 and is mounted with its standing surfaces **8** on corresponding rails **22** of the dishwasher **2**. The operating position of the dish rack **1**, in which the washing operation is generally carried out in the dishwasher **2**, is therefore shown. In said operating position, the standing plane **9** of the dish rack **1** that is predetermined by the standing surfaces **8**

runs in a horizontal plane. Plates which are illustrated in highly schematized form in section in FIG. 6 are depicted in the rack interior space 6 as objects 19 to be washed. The plate supports 21 which are visible in FIG. 1 and on which said plates or objects 19 are supported cannot be seen in FIG. 6. The washing liquid nozzles 16 which, in the exemplary embodiment shown here, are formed in a rotatably mounted washing arm 17 of the dishwasher 2 are located below the rack base 4. The washing liquid dispensing directions 18 of the respective washing liquid nozzle 16 are directed toward the rack base such that the washing liquid 20 passes during the washing operation from below through the grid-shaped rack base 4 into the rack interior space 6 in order there to wash the objects 19 to be washed. A method according to the invention for washing objects 19 in the dishwasher 2, said objects being arranged in the rack interior space 6 of a dish rack 1 according to the invention, is therefore shown, wherein, in order to wash the objects 19 in the dishwasher 2, the dish rack 1 is arranged above washing liquid nozzles 16 of the dishwasher 2, and the washing liquid 20 is sprayed from the washing liquid nozzles 16 through the rack base 4 into the rack interior space 6, wherein some of the washing liquid 20 is deflected by the angled web regions 10 of the base webs 3 into the rack interior space 6. Other portions of the washing liquid 20 that do not strike against base webs 3 on penetrating the rack base 4 pass undeflected into the rack base interior space 6. The overall effect which is thereby achieved is that the objects 19 which are to be washed and which are arranged in the rack interior space 6 are struck by washing liquid 20 from different directions, which leads overall to a very good washing result.

[0043] FIG. 7 once again shows a view from above of the dish rack 1 of FIGS. 1 and 2, with only a partial region being illustrated in enlarged form. The direction arrows 23 indicate the directions in which the angled web regions 10 which are in each case formed in this region of the base web 3 are angled. This shows firstly that, in preferred embodiments like the embodiment shown here, the angled web regions 10 in each case following one another in sequence are arranged spaced apart from one another in the direction of the longitudinal extent 15 of the base web 3. Furthermore, it can be gathered from the illustration in FIG. 7 by way of example that the angled web regions 10 of the respective base web can be angled in directions differing from one another. In the exemplary embodiment shown here, the web regions 10 following one another of the base webs 3 running parallel to the side walls 5 are always inclined or angled in an alternating manner in mutually opposite directions 23. In this exemplary embodiment, with the base webs 3 arranged in a diamond-shaped manner, it is provided that in each case two mutually adjacent angled web regions 10 are angled in the same direction 23 and the angled web regions 10 then following said web regions in the direction of the longitudinal extent 15 of the respective base web 3 are in each case inclined in the other direction, as can likewise be seen by way of the direction arrows 23.

KEY TO THE REFERENCE NUMBERS

[0044] 1 Dish rack
 [0045] 2 Dishwasher
 [0046] 3 Base web
 [0047] 4 Rack base
 [0048] 5 Side wall
 [0049] 6 Rack interior space

[0050] 7 Underside
 [0051] 8 Standing surface
 [0052] 9 Standing plane
 [0053] 10 Angled web region
 [0054] 11 Orthogonal sectional plane
 [0055] 12 Acute angle
 [0056] 13 Orthogonal web region
 [0057] 14 Obtuse angle
 [0058] 15 Longitudinal extent
 [0059] 16 Washing liquid nozzle
 [0060] 17 Washing arm
 [0061] 18 Washing liquid dispensing direction
 [0062] 19 Object
 [0063] 20 Washing liquid
 [0064] 21 Plate support
 [0065] 22 Rail
 [0066] 23 Direction arrow
 [0067] 24 Length extent
 [0068] 25 Length extent

1. A dish rack for dishwashers, the dish rack comprising: a grid-shaped rack base formed from base webs; side walls connected to the rack base, the side walls together with the rack base surrounding a rack interior space of the dish rack; at least one of the rack base or the side walls having standing surfaces on an underside of the dish rack, said standing surfaces ending in a standing plane of the dish rack; and the base webs have angled web regions which, as seen in a sectional plane orthogonal to the standing plane, are arranged at least in regions at an acute angle to the standing plane.
2. The dish rack as claimed in claim 1, wherein the base webs, as seen in the sectional plane orthogonal to the standing plane, are angled at least in regions.
3. The dish rack as claimed in claim 1, wherein the base webs, as seen in the sectional plane orthogonal to the standing plane, further include orthogonal web regions above or below the angled web regions, and the orthogonal web regions, as seen in the sectional plane orthogonal to the standing plane, are arranged orthogonally to the standing plane.
4. The dish rack as claimed in claim 3, wherein, as seen in the sectional plane orthogonal to the standing plane, one of the orthogonal web regions, merges directly into one of the angled web regions.
5. The dish rack as claimed in claim 4, wherein, as seen in the sectional plane orthogonal to the standing plane, one of the orthogonal web regions encloses an obtuse angle with one of the angled web regions.
6. The dish rack as claimed in claim 1, wherein the angled web regions are arranged below the rack interior space.
7. The dish rack as claimed in claim 1, wherein at least one of the base webs (3) has a sequence of angled web regions along a longitudinal extent thereof.
8. The dish rack as claimed in claim 7, wherein the angled web regions which in each case follow one another in the sequence are arranged spaced apart from one another in a direction of the longitudinal extent of the base web.
9. The dish rack as claimed in claim 7, wherein the angled web regions of the respective base web are angled in directions differing from one another.
10. An arrangement comprising a dishwasher and the dish rack as claimed in claim 1, wherein the dish rack is arranged

in the dishwasher and washing liquid nozzles of the dishwasher are arranged underneath the rack base, and a respective washing liquid dispensing direction of the respective washing liquid nozzle is directed toward the rack base.

11. The arrangement of claim **10**, wherein the washing liquid nozzles are arranged in a rotatably mounted washing arm of the dishwasher.

12. A method for washing objects in a dishwasher, the method comprising:

arranging said objects to be washed in the rack interior space of the dish rack as claimed in claim **1**;

washing the objects in the dishwasher with the dish rack arranged above washing liquid nozzles of the dishwasher;

spraying washing liquid out of the washing liquid nozzles through the rack base into the rack interior space, wherein some of the washing liquid is deflected by the angled web regions of the base webs into the rack interior space.

13. The method of claim **12**, wherein the washing liquid nozzles are arranged in a rotatably mounted washing arm of the dishwasher.

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