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[54] METHOD AND STRUCTURE FOR CUSHIONING THE OPERATION OF A MOVABLE RACK IN A DISHWASHER

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[51] Int. Cl.A47b 88/14

[58] Field of Search312/311, 351, 341; 16/45; 301/63 PW

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[57]

ABSTRACT

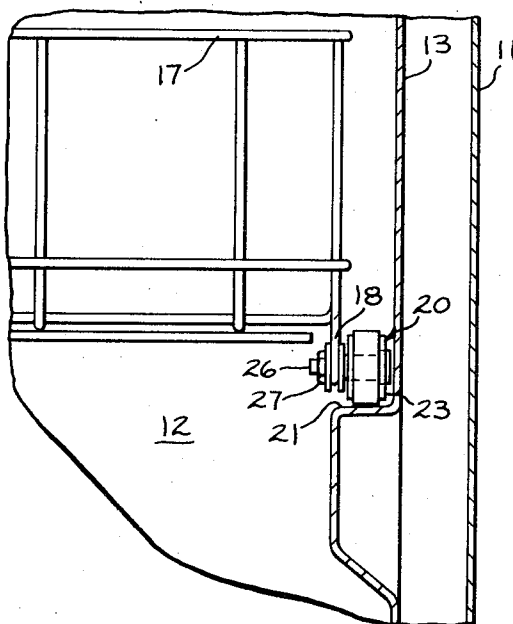
A slidable dish-supporting rack in a front-opening dishwashing machine wash chamber is provided with a unique wheel structure including a resilient tire on oppositely mounted rack wheels whereby wear on the track surface beneath the wheels is reduced and quieter, smoother movement of the rack is achieved.

9 Claims, 5 Drawing Figures

[56] References Cited

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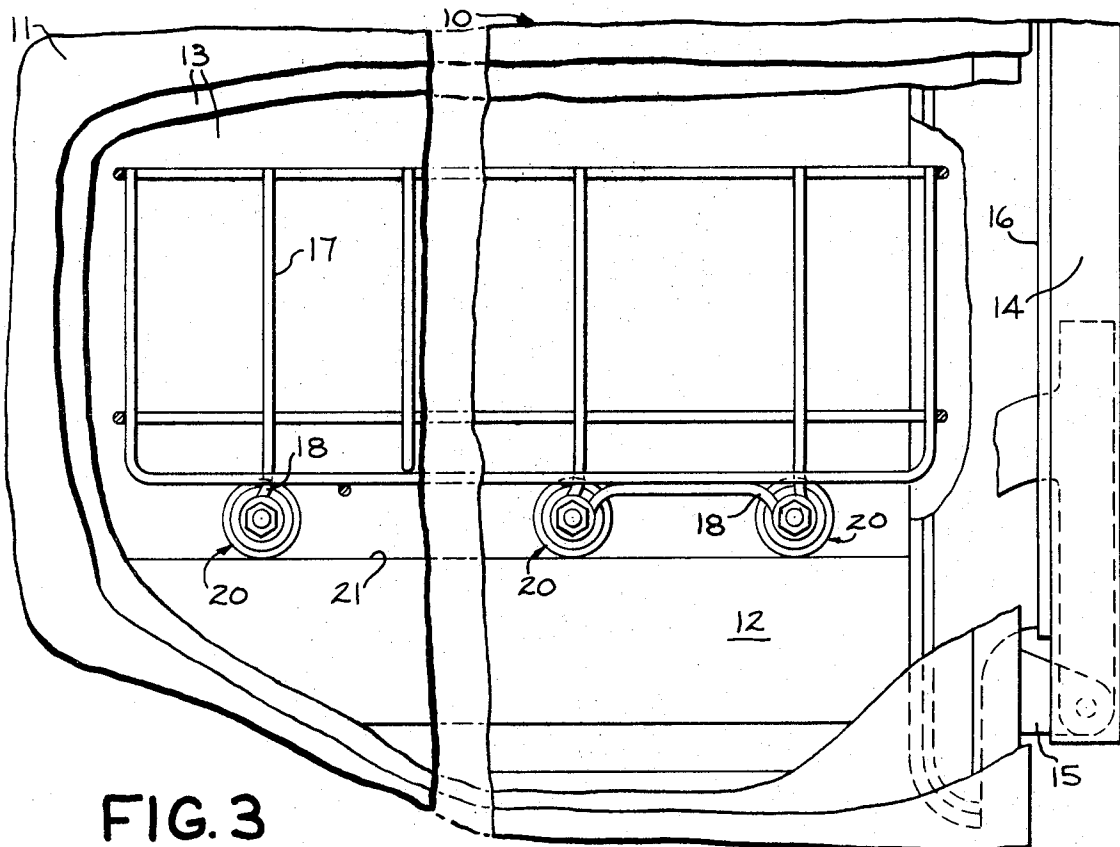


FIG. 3

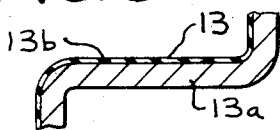


FIG. 1

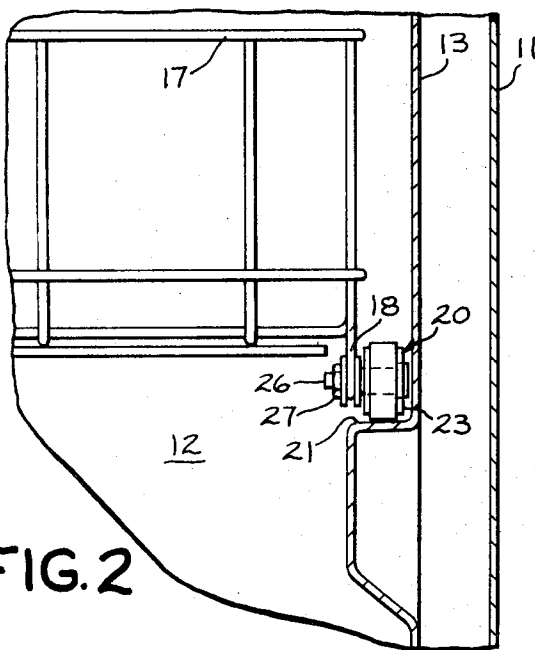


FIG. 2

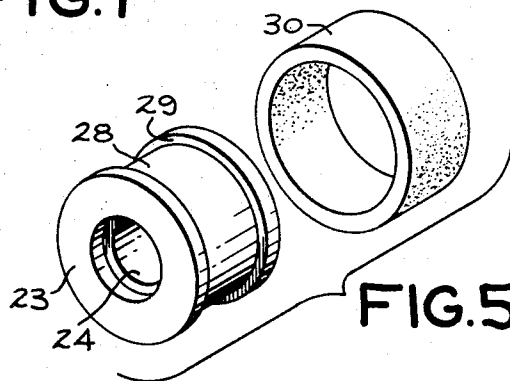


FIG. 5

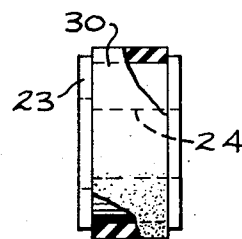


FIG. 4

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METHOD AND STRUCTURE FOR CUSHIONING THE OPERATION OF A MOVABLE RACK IN A DISHWASHER

BACKGROUND OF THE INVENTION

Heretofore it has become quite common to provide a dish-supporting rack in a front-opening dishwasher cabinet with wheels whereby the rack is movable outwardly through an open cabinet door to facilitate loading and unloading of the rack. Such wheels are typically molded from an inexpensive, substantially rigid-setting plastic such as polypropylene. This type of wheel may be inexpensively mass produced and will serve adequately during the average machine's life so long as the material is hard enough that it is not susceptible to permanent deformation from load-bearing in the wash chamber environment.

Experience has shown that although such wheels are dependable for their purpose, there are problems encountered wherein the wheels are mounted to roll on a ledge or track surface provided within the machine, particularly where such surface is susceptible to wear from the friction and weight of the rack that moves thereacross. The wheels may, after a while, pierce or mark the surface coating by running a track groove therein. Thereafter, food soil particles will be accumulated in the uneven surface or corrosion of the metal base beneath the surface will begin to appear therethrough. Since the movable lower rack in a front-opening dishwasher is generally movable out over the inner surface of the open cabinet door, the same problem may be encountered with respect to the door's surface.

Moreover, the typical plastic roller or wheel on a dishwasher rack usually is of a rather small diameter and its mounting arrangement is generally relatively simple, perhaps comprising only a bolt slipped through an opening in the center of the wheel. Such wheels can be noticeably rough-rolling to the extent that moving the rack on its wheels imparts a wobbling feeling to the hand and does not convey a feeling of quality and stability. This problem might, of course, be corrected by provision of a roller or ballbearing assembly for mounting the wheel to the rack, however, the cost of providing such an assembly is presently prohibitively expensive for the manufacturer seeking to maintain competitive prices in a particularly crowded field of manufacturing.

SUMMARY OF THE INVENTION

This invention relates generally to means for mounting a movable rack in an appliance cabinet and more particularly pertains to a movable rack in a dishwashing machine and an improved construction for wheels on which such a rack is mounted for movement upon a portion of the inner surface of the machine's wash chamber.

One aspect of the invention comprehends improved wheel structure on a dish-supporting rack in combination with an automatic dishwasher of the type including a wash chamber having top, bottom and side walls, an access opening in one of the side walls, and a wheeled rack movable from within the wash chamber outwardly through the access opening over tracking surfaces formed in opposite side walls of the wash chamber and the surface of the door to the access opening.

The wheel structure includes a plurality of wheels on the rack with each having at least a peripheral outer surface embodying the characteristics of resiliency, elasticity and a high resistance to deterioration from detergent-charged washing liquid employed in the dishwasher wash chamber.

Another aspect of the invention comprehends a method of protecting the surface of the wash chamber, and/or the cabinet door surface upon which the wheels of the rack move, from abrasion and deformation whereby the useful life of the surface material is extended. The method includes adapting a simple, inexpensive rack wheel to be used in contact with the wash chamber or door surface to receive a resilient annular peripheral portion for rotatably contacting the wash chamber and/or door surface.

Provision of the peripheral portion on the wheel not only extends the life of the surface over which it moves by inhibiting contact abrasion and deformation, but also serves to enhance the operation of the entire wheel structure. The material employed as the peripheral portion of the wheel has certain inherent properties whereby it will withstand continual temperature change and contact with washing liquid containing various chemical additives commonly used in dishwashing detergents.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary elevational view of a dishwasher cabinet having the side wall thereof cut away to reveal structural details within the wash chamber of the machine;

FIG. 2 is a fragmentary view taken from the front of the dishwasher cabinet of FIG. 1, with a portion of the cabinet wall shown in vertical section;

FIG. 3 is an enlarged view of a section of the wash chamber side wall shown in FIG. 2;

FIG. 4 is an enlarged view of a rack wheel shown in FIG. 2; and

FIG. 5 is a perspective view of the wheel shown in FIG. 4, as it appears when disassembled.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIG. 1, there is shown a portion of a cabinet of a dishwasher 10 including a cabinet side wall 11 and a wash chamber 12 in which dishes may be stored for washing. Such a wash chamber is normally defined by bottom and top walls and a back wall (not shown) and side walls such as side walls 13. In the embodiment illustrated, each side wall 13 comprises a rigid metal base 13a covered with a plastic coat 13b, as shown in FIG. 3. The access opening to the wash chamber 12 of the dishwashing machine in FIG. 1 is normally occupied by a door 14 that may be manually opened outwardly-downwardly by pivoting it on hinge 15. The door 15 has a surface 16 that constitutes a wall of the wash chamber 12 when the door 15 is closed, and may be constructed similar to the wall 13 in FIG. 3. Disposed within the wash chamber 12 is a dish-supporting basket or rack 17 formed of a rigid wire framework that is preferably plastic-coated both to prevent corrosion of the base material and to absorb shock to dishes contained therein. Leg portions 18 of the rack 17 extend downwardly beneath the rack and serve as support means for roller or wheel assemblies 20.

As is most clearly illustrated in FIG. 2, each side wall 13 of the wash chamber 12 is formed to have a ledge or rail projecting inwardly to provide a horizontally disposed tracking surface 21 serving as a load bed for the wheel assemblies 20. Each wheel assembly 20 includes a wheel 23 having a centrally disposed opening 24 therethrough to accommodate an axle bolt 26. The axle bolt 26, along with a nut 27 fastened to the shank of the bolt 26, serves as a simple and inexpensive arrangement or means for fastening the wheel 23 to the rack leg portion 18.

As shown in FIG. 5, each wheel body portion 23 preferably has an annular recess or groove 28 about its outer surface and outwardly defined by annular edge ridges 29. The groove 28 receives an annular resilient tire or peripheral portion 30 therein. The tire 30 is preferably formed from ethylene propylene terpolymer. The inside diameter of the tire 30 corresponds generally to the diameter of the wheel 23 taken at an intermediate position along the groove 28 whereby the tire portion 30 may be installed on the wheel 23 by stretching it over one of the ridges 29 whereupon it will retract to fit snugly into the recess 28, as shown in FIG. 4.

FIG. 3 illustrates that the wash chamber side wall 13 of the dishwashing machine 10, in accordance with the present invention, may be of a two-layer construction including the rigid sheet metal body shell 13a having an inwardly facing plastic coating or surface 13b. The surface 13b may be a coating, of the type deposited on the sheet metal body by a spraying

operation, of a plastic material such as polyvinyl chloride with stabilizers sprayed over an adhesive prime coat.

While it is anticipated that the wheel structure of the present invention will provide improved wear and operational characteristics in combination with a tub surface other than plastic such as vitrified enamel, it is believed that utilizing the wheel structure disclosed herein in combination with the plastic-coated type of tub results in a substantially greater realization of the benefits obtainable from the improved structure.

In developing the present invention and particularly in arriving at the material to be utilized as the peripheral portion of each cushioned wheel on the rack, it was determined that the peripheral portion material would have to have certain properties or characteristics enabling it to withstand the varying conditions in the washer chamber environment. Such material must support a load in such an environment while not being susceptible to permanent deformation or compression "set", and it has to be resistant to deterioration from the chemicals carried in the washing liquid within the wash chamber. It has to retain its shape and not swell when subjected to hot water. There are also the further requirements of initial and retained tensile strength and elasticity. Still further, it is required that such a material be one having sufficient strength and integrity that glass fibers or other filler are not required for reinforcement since this tends to raise the basic cost of the material and also may result in excessive abrasion to the tub or door surface material.

Although it would seem at first consideration that a material such as vinyl or any number of rubber compounds would provide the desired cushioning effect and the aforementioned physical characteristics, this does not prove to be the case. Rubber and similar compounds, for example, tend to swell and distort in a hot water and detergent solution over a period of time, and vinyl tends to soften and take a "set" after its initial subjection to such conditions. While the latter characteristic makes vinyl ideal for such materials as door gaskets where a set condition after initial subjection to the hot, moist environment is desirable, this same characteristic renders vinyl and similar materials unusable for the purpose of the present invention.

Therefore, the preferred embodiment of the present invention includes a solid tire on a polypropylene rack wheel wherein the tire or peripheral portion around the wheel is formed from ethylene propylene terpolymer. Insofar as it can be determined, the use of ethylene propylene terpolymer as a tire on a dishwasher rack wheel has not been heretofore disclosed. This material embodies the desired characteristics set forth heretofore and thus presents the advantage of a long life in the wash chamber environment even though it is continually subjected to extreme temperature change and to constant contact with washing liquid containing various detergent additives. Further, a material having such characteristics offers the advantage of being able to retain the simple, comparatively inexpensive rigid structure for a dishwasher rack wheel body portion, such as that constructed from polypropylene, while providing a comparatively free-gliding characteristic to the dishwasher rack.

The foregoing description and the accompanying drawings pertain to the presently preferred embodiment of the inven-

tion heretofore disclosed. It is not intended that the invention be limited either to that which has been shown in the accompanying drawings or described in the specification since it will be obvious to those skilled in the art that various changes and modifications may be made after benefit of this disclosure. It is therefore intended that the appended claims cover all changes and modifications as fall within the true spirit and scope of the invention.

I claim:

1. An automatic dishwasher of the type including a wash chamber having top, bottom and side walls, an access opening in one of the side walls, a wheeled rack movable from within the wash chamber outwardly through the access opening, a load bed means in the wash chamber supporting the wheel structure of the rack for movement thereupon, the wheel structure including wheels mounted along each side of the rack, at least one of the wheels having a body portion and a peripheral outer surface comparatively more resilient than the body portion, the peripheral outer surface having the characteristics of resiliency, elasticity, and high resistance to deterioration or permanent deformation from repeated subjection to heated detergent-charged washing liquid.
2. The invention of claim 1 wherein the peripheral outer surface of each wheel is formed from ethylene propylene terpolymer.
3. In combination with a dishwasher having wash chamber side walls with rack wheel tracking surfaces formed therein and wherein the tracking surfaces are of a plastic material, a dish-supporting rack having wheel structure movable against the tracking surfaces, the wheel structure including a wheel body portion adapted to carry a peripheral tire portion for protecting the plastic-coated tracking surfaces against abrasion, and said peripheral tire portion being more resilient than the plastic material of the tracking surfaces.
4. The invention of claim 3 wherein the plastic of the tracking surface is polyvinyl chloride.
5. The invention of claim 3 wherein the wheel body portion has an annular groove for receiving the peripheral tire portion.
6. The invention of claim 3 wherein the tire portion is formed from a material having the characteristic of resisting permanent deformation in the operating environment of the wash chamber of the washing machine.
7. A method of constructing a wheel structure for supporting a dish supporting rack in a dishwashing machine on a tracking surface in the machine's wash chamber, including:
 - providing a wheel body portion within an annular peripheral groove,
 - providing a tire portion to be carried in the groove formed from a material resistant to deterioration and permanent deformation from repeated subjection to the operative environment of the wash chamber of a dishwashing machine, and
 - installing the tire portion by stretching it into position on the wheel structure and in the annular groove thereof.
8. The method of claim 7 further including the step of constructing the tire portion from a material that is substantially more resilient than the material of the tracking surface.
9. The method of claim 7 including constructing the tire portion of ethylene propylene terpolymer.

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