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ADJUSTABLE RACK ASSEMBLY IN AN AUTOMATIC DISHWASHER

Filed July 1, 1969

2 Sheets-Sheet 1

FIG. 4

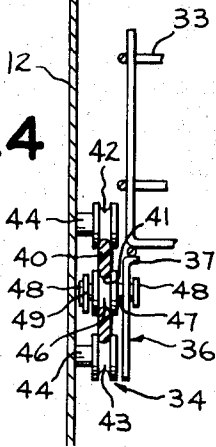


FIG. 5

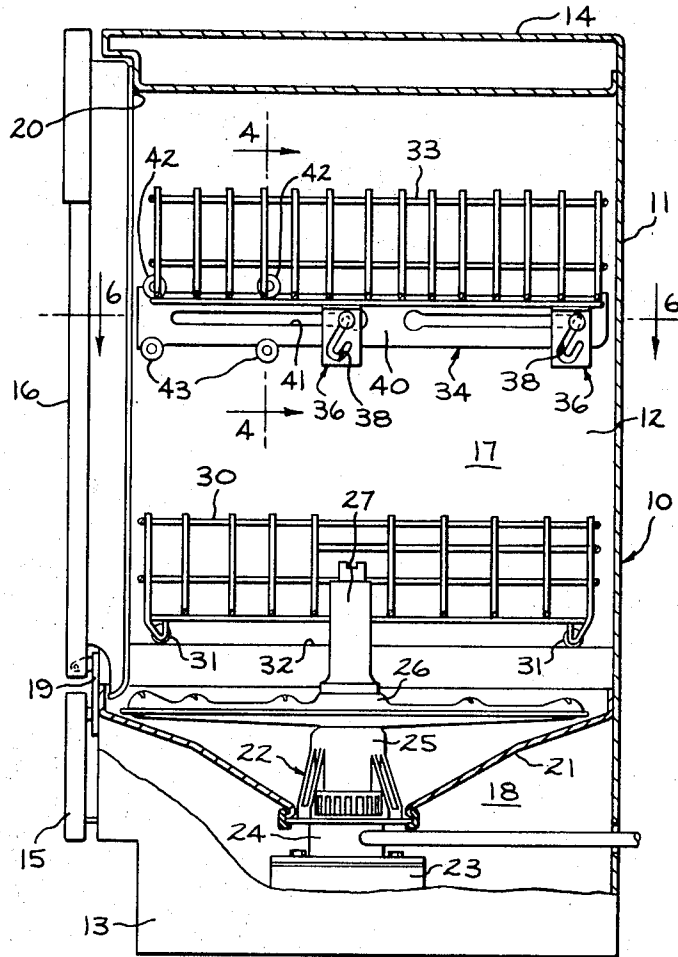
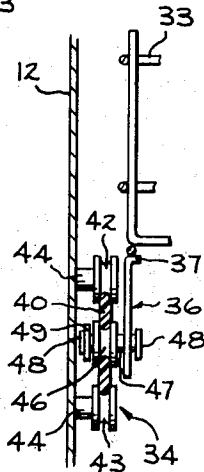


FIG. 1

FIG. 3

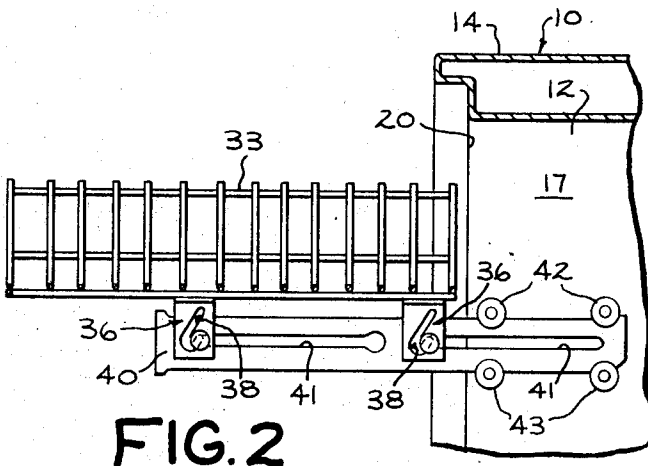
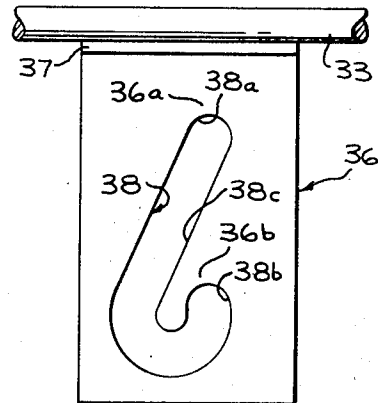


FIG. 2

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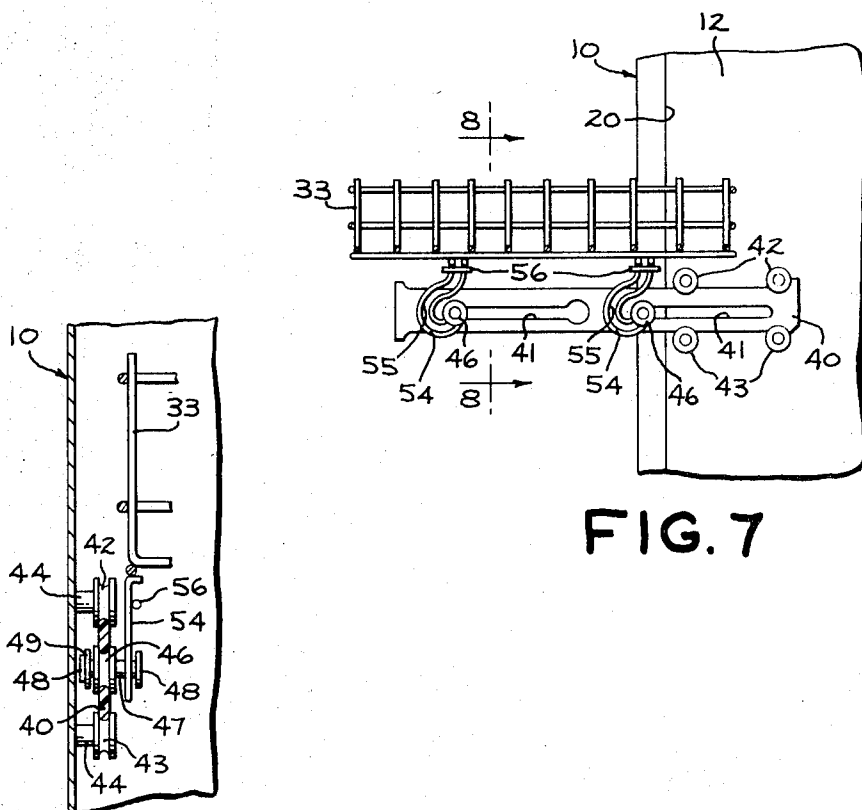
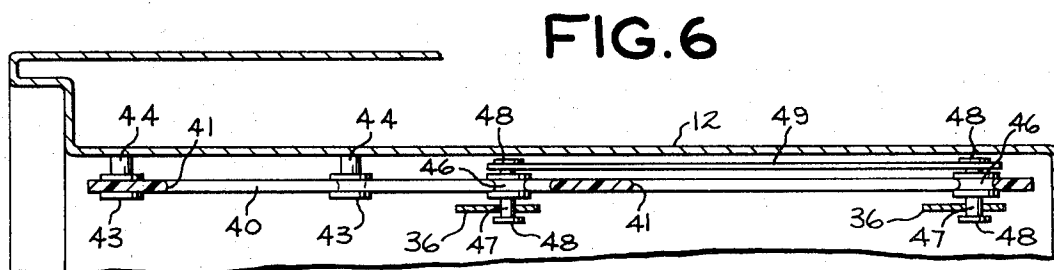


FIG. 7

FIG. 8

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ADJUSTABLE RACK ASSEMBLY IN AN AUTOMATIC DISHWASHER

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9 Claims

ABSTRACT OF THE DISCLOSURE

A dish-supporting rack in a dishwasher cabinet is provided with an improved rack assembly including improved means for facilitating manual vertical adjustment of the rack. The invention is specifically applicable to a front opening dishwasher having spaced apart upper and lower dish racks that are slidably mounted to be manually moved to an outward extended position in the access opening to facilitate loading and unloading tableware therein. The vertical adjustment means is provided in combination with the slidable support means of the upper rack.

BACKGROUND OF THE INVENTION

This invention relates generally to shelf or rack supporting structure in an appliance cabinet and particularly pertains to an improved means of manually shifting the dish supporting rack in a front loading dishwasher cabinet between predetermined levels to thereby provide more effective use of available space within the washing chamber of the machine.

It is conventional in a front loading domestic dishwashing machine to provide a pair of vertically spaced apart racks for supporting articles to be washed within the dishwasher's washing chamber. Generally, the lower and upper racks each have cross-sectional areas substantially equal to that of the horizontal cross section of the washing chamber and each is mounted to be independently slidable from its operative position within the washing chamber to a loading position where it extends horizontally outwardly from the front access opening of the cabinet. While the bottom rack is usually designed to receive and carry comparatively large articles for washing within the washing chamber, the top rack is positioned with its open end in close relation to the top wall of the cabinet and it is utilized for washing relatively small dishes and glassware. This general arrangement has been found adequate in most instances however there are occasions when the housewife desires to place an unusually large item such as a platter on the lower rack in the accepted "on edge" position and finds that the vertical spacing between the upper and lower rack is too close to permit including some such large items in the load to be washed. A similar problem is often encountered when an attempt is made to place tall items in the upper rack. The space between the upper rack and the cabinet top wall is satisfactory for most glasses and cups but will often not accommodate tall pilsener glasses or long stem crystalware.

One attempt to solve the latter problem has been the provision of an upper rack that can be vertically adjusted on its mounting means to increase or decrease the clearance between the under surface of the upper rack and the lower rack, or between the upper rack and the top wall of the dishwasher cabinet. One way this has been done is

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by the use of simple hooks extended from the rack support means to engage the horizontal rails on each side of the rack and thus permit selective changing of the engagement to a different rail level. Another arrangement involves a more sophisticated and comparatively expensive lever and jack device provided at each side of the rack. A need has continued, however, for a relatively simple upper rack vertical adjustment means that is easily and quickly operable, from a "rack-front" position, without the risk of accidentally dislodging the upper rack and dumping its load on the lower rack therebeneath.

Therefore, it is a primary objective of the present invention to provide an improved rack arrangement for a front opening dishwasher cabinet that not only incorporates a minimum number of relatively simple mechanical parts but makes possible a quick and foolproof height adjustment of a dishwasher rack between predetermined levels, regardless of whether the rack is empty or loaded with dishes when the adjustment is made.

It is a further objective of the present invention to provide a manual height adjustment means for a dish supporting rack in an automatic dishwasher that may be relatively inexpensively produced for installation in a front loading dishwasher wherein the dish supporting racks are slidably mounted for manual outward movement to facilitate loading and unloading of soiled tableware therein.

It is also an objective of this invention to provide a manually operated height adjustment means for a dish supporting rack that can be manipulated to raise one end or one side of the rack without changing the level of the respective other end or side thereof.

It is also a purpose of this invention to accomplish the foregoing objectives by a construction that will embody, as an inherent feature, a safeguard to prevent complete dislodgment of the adjustable rack during the readjustment operation.

SUMMARY OF THE INVENTION

Briefly stated, in one form of the present invention, there is provided a front opening automatic dishwasher having upper and lower spaced apart dish supporting racks mounted within its cabinet. The racks are adapted to be manually moved outwardly on slidable support means whereby each rack will extend through the front access opening of the cabinet to facilitate the loading and unloading of tableware therein. Adjustment means permitting manual height adjustment of the upper rack is provided in combination with the slidable support means of the upper rack. The adjustment means includes a plurality of rigid plates or brackets disposed in a spaced apart relation in equal numbers along the sides of the upper rack. Each of the rigid brackets is vertically oriented and has a plurality of spaced apart vertically aligned openings there-through. A curved slot interconnects the spaced apart openings in each bracket and thereby forms a vertically disposed curved trackway. A horizontally disposed stub shaft extends through a trackway of each bracket. The stub shaft may be an extended component of the slidable support means on which the rack is carried. The level of the upper rack can be vertically adjusted by manipulating the rack to thereby reposition the trackway of each bracket relative to the stub shaft extended therethrough.

The rigid brackets may be constructed from rigid sheet metal and are welded to extend downwardly as spaced apart pairs from the respective sides of the upper rack.

In a somewhat modified form of the invention, the brackets are constructed or shaped from heavy wire or formable rod stock and similarly attached to the respective sides of the upper racks. It is contemplated that the brackets may be fixed extensions of the upper rack itself, as heretofore described, or that the brackets may be rigid extensions of the slidable support means. In the latter embodiment of the invention, the laterally disposed stub shaft that extends for engagement in the trackway of each bracket would be an integral part of the rack.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a dishwashing machine, with the side wall and some of the parts broken away to illustrate details of a first embodiment of the improved rack assembly of the present invention;

FIG. 2 is a fragmentary side view of a portion of a dishwasher first illustrated in FIG. 1 but here shown with certain movable parts repositioned from their location in FIG. 1;

FIG. 3 is an enlarged view of a part of the dishwasher illustrated in FIG. 1, shown broken away from the rack assembly to illustrate part of the vertical adjustment means of the assembly in greater detail;

FIG. 4 is a fragmentary sectional view taken along line 4—4 of FIG. 1;

FIG. 5 is a sectional view, similar to FIG. 4, illustrating parts that have been repositioned from the location shown in FIG. 4;

FIG. 6 is a sectional view taken along line 6—6 of FIG. 1 to further illustrate the embodiment of the improved rack assembly first shown in FIG. 1;

FIG. 7 is a fragmentary side elevational view of a dishwasher illustrating a second embodiment of the improved rack assembly of the present invention; and

FIG. 8 is a fragmentary sectional view taken along line 8—8 of FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings and particularly to FIG. 1, there is illustrated a front opening automatic dishwasher including a cabinet 10 having a back wall 11, opposed side walls 12 and 13, and a top wall 14. The front side of the cabinet is provided with a lower removable front panel 15 and a substantially larger door 16 that is hinged at its lower end so that it may be opened outwardly-downwardly and away from a front access opening 20 leading to a substantially large washing chamber 17 within the cabinet 10. The interior of the cabinet 10 is divided by a washing chamber floor portion or bottom wall 21 into the washing chamber 17 and a lower motor-pump compartment 18. The bottom wall 21 slopes downwardly-inwardly toward its center to where a portion of a motor-pump assembly 22 extends upwardly there-through.

The motor-pump assembly 22 is an example of an assembly used in commercially produced dishwashing machines and it broadly comprises an electric drive motor 23 having a discharge pump 24 and a wash pump 25 operatively connected thereto. Mounted on top of the housing of the wash pump 25 is a rotatable reactive type spray arm 26 and a cylindrical vertically extensible spray device 27.

Within the washing chamber 17 is mounted a lower rack 30 having rollers 31 journaled to the respective lower rack corners. The rollers 31 are adapted to track on side wall ridges 32 to permit manual horizontal movement of the rack 30 outwardly to an extended position over the open door 16. Spaced above the lower rack 30, in the upper portion of the washing chamber 17, is an upper dish supporting rack 33 that is slidably attached to the opposed cabinet side walls 12 and 13 by respective slidable support means or roller assemblies 34. The upper rack 33 can thus be separately moved outwardly from the washing cham-

ber 17 to extend from the access opening 20 of the cabinet 10.

It should be noted, with reference to FIG. 1, that the racks 30 and 33 are shown substantially cutaway. Only the left hand side wall portion of each rack 30 and 33, as viewed from the front side of the cabinet 10, is shown in FIG. 1, and the support means 34 is only that portion which would be operatively associated with the left side of each of the racks 30 and 33. In other words, the lower rack 30, were it illustrated in its entirety in FIG. 1, would have two rollers attached to each lower side edge thereof, and the upper rack 33 would have a slidable support means or roller assembly 34 along each of its sides for supporting the rack on the respectively adjacent cabinet side wall. Therefore, the description hereafter of the slidable support means 34 for the upper rack 33 relates to support means which would be utilized at each side of the upper rack 33.

The slidable support means 34, as illustrated particularly in FIGS. 1 and 2, includes a pair of upper horizontally spaced apart rollers 42 and lower horizontally spaced apart rollers 43 therebeneath. The rollers 42 and 43 are rotatably attached to the inside surface of the side wall 12 of the cabinet 10, and each roller is constructed with spaced apart annular flanges defining therebetween a circumferential groove. This configuration of each of the rollers 42 and 43 adapts the rollers to carry a rigid slide bar 40 therebetween, for supporting the rack 33 in slidable horizontal movement outwardly through the access opening 20 of the cabinet 10. As shown in FIG. 1, the arrangement of the rollers 42 and 43 is toward the front side of the cabinet 10 so that adequate support will be provided for the slide bar 40 with the upper rack carried thereon, when the rack 33 is in its fully extended or cantilevered position (FIG. 2) and fully loaded with dishes to be washed in the dishwasher.

Attached to the lower side wall edge of the upper rack 33 is a pair of spaced apart vertically oriented brackets 36. The spacing of the brackets 36 is shown in FIG. 1, whereas FIG. 3 more clearly illustrates the form of each bracket 36. In this particular embodiment of the invention, each bracket 36 is formed from a planar plate or rectangular sheet metal section, and has an upper mounting end 37 that is turned perpendicular to the main body portion of the bracket 36.

As shown in FIGS. 4 and 5, the mounting end 37 of the bracket 36 may be joined by means of a weld to the lower side wall edge of the rack 33 whereby the bracket will extend downwardly in substantially vertical alignment with the rack's side wall.

Referring now to FIG. 3, the bracket 36 is provided with a curved inverted cane-shaped trackway 38, the configuration of which is described as follows. An upper opening or hole 38a is provided through bracket 36, and a similar hole 38b is disposed downwardly in substantial vertical alignment with the upper hole 38a. A vertically elongated curved slot 38c is provided to interconnect the openings 38a and 38b. The slot 38c has a width corresponding to the diameter of the openings 38a and 38b, and it has an intermediate curved portion that is disposed below and laterally offset from the lowermost opening 38b. The trackway 38 is so positioned in the bracket 36 that a substantial portion of the material making up the bracket 36 remains at each end of the trackway 36 to act as stop points or shoulder portions for supporting the weight of the rack. Thus, the area or portion of the bracket 36 immediately vertically adjacent the upper end of the trackway 38 serves as a shoulder portion 36a, and the portion or area of the bracket 36 that is immediately vertically adjacent the lower end of the trackway serves as a shoulder portion 36b.

The manner in which each bracket 36 interacts with other constituent elements of the improved rack assembly can be best understood with reference to FIGS. 4 and 6, which illustrate that a roller 46 is carried for slidable

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horizontal movement in each of two horizontally elongated slots 41 provided in the slide bar 40. Each roller 46 is journaled to rotate on a transverse pin-like roller axle or tracking member 47 having opposite ends extending outwardly from the respective sides of the roller 46. One end of the roller axle 47 extends through the trackway 38 of an adjacent bracket 36. The other end of the roller axle 47 protrudes away from the bracket and toward the side wall of the cabinet 10. As shown in FIG. 6, an elongated horizontally disposed spacer bar 49 is provided to interconnect the outer ends of the pair of spaced apart roller axles 47 and thereby maintain the associated rollers 46 a fixed distance from each other at all times during the operation of the slidable support means. Annular flange or head portions 48 are provided at each end of each roller axle 47 for the purpose of maintaining the axle 47 in position relative both to the bracket 36 and the spacer bar 49.

The upper rack 33, as shown in FIGS. 1 and 4, is positioned at its lowermost level of adjustment relative to the slidable support means 34 or slide bar 40. With the upper rack 33 in this position, the outer end of the axle 47 that extends through each bracket 36 is located at its extreme upper position within the trackway 38 of the bracket 36. The point of contact between the bracket 36 and the axle 47 is the bracket's shoulder portion 36a (FIG. 3) resting on the outer end of the axle 47.

The upper rack 33 may be adjusted vertically upwardly from the lowermost level of adjustment shown in FIG. 1 to a higher level (FIG. 2) by grasping the rack at either side thereof and lifting it upwardly and slightly rearwardly toward the back wall of the dishwasher. Such movement of the rack 33 will cause the brackets 36 to move upwardly, sliding the trackway upwardly relative to the respective axles 47. A light forward movement of the rack at this point will cause the lower end of the trackway 38 of each bracket 36 to move over and seat on its respective axle end 47. Each axle end 47 is then abutting against the vertically adjacent bracket shoulder portion 36b. Readjustment of the upper rack 33 back to its lower level of adjustment is accomplished by a reversal of the aforementioned steps. The construction of the upper rack is such that it will flex sufficiently to allow raising or lowering of just one side of the rack.

Illustrated in FIGS. 7 and 8 is another embodiment of the present invention that differs structurally from the embodiment shown in FIGS. 1 through 6 to the extent that brackets 54, extending from the lower side edges of the upper racks 33, are constructed from heavy wire or formable rod stock rather than rigid sheet metal. The adjustment operation of the rack assembly shown in FIGS. 7 and 8 is substantially the same as that of the first embodiment described with reference to FIGS. 1 through 6.

The upper rack 33 of the cabinet 10 shown in FIG. 7 is provided with a plurality of rigid wire legs or brackets 54 in equal number along each side of the rack 33. Each wire leg 54 is the structural equivalent of a bracket 36 shown in FIG. 3. The wire leg 54 has an outer configuration that conforms to the curved inner slot or trackway 55 defined by the framework of the leg 54. In this embodiment, the upper shoulder defining the upper end of the trackway 55 is a lateral cross bar 56 formed from a straight rigid wide and welded to the leg 54. The various component elements shown in FIGS. 7 and 8, other than those immediately heretofore described, are identical to the like elements shown in FIGS. 1 through 6. For example, the components of the slidable support means, including the slide bar 40 and the upper and lower rollers 42 and 43, etc., are identical to the parts shown in FIG. 1 and are therefore designated by the same numerals in FIGS. 7 and 8.

It is contemplated that either of the embodiments heretofore described may be modified by a reversal of parts and yet accomplish the same purpose. For example, with reference to FIG. 4, the bracket 36 and the axle 47 could

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be reversed whereby the bracket 36 would be carried as an extension of the roller 46 and a laterally extending projection integral to the lower edge of the rack 33 would be substituted for the axle 47. In this arrangement the bracket 46 would be vertically fixed relative to the rack 33, and thus upward and downward movement of the rack 33 would cause its extended side projection (not shown) to move relative to the trackway in the bracket 36.

It is further contemplated that the plurality of brackets 36 could be fixedly mounted to the inner surface of the opposed side walls of the dishwasher cabinet 11 whereby the rack 33 and the slidable support means 34 at each side thereof would be vertically movable as a unit relative to the fixed brackets 36.

As will be evident from the claims appended hereto, it is not intended that the invention be limited only to the embodiments described heretofore or to the particular detailed construction of the examples illustrated in the accompanying drawings.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an appliance cabinet having opposed walls defining a chamber having a load bearing rack positioned therein, adjustable means for mounting the rack, comprising:

- (a) a plurality of rigid brackets located in spaced apart relation along side edges of the rack,
- (b) each of said brackets having an irregular shaped trackway formed therein with upper and lower stop points therealong,
- (c) a rigid projection extending substantially laterally with respect to the rack and into said trackway of each of said brackets for selective engagement with said stop points to permit vertical manual adjustment of the level of the rack, and
- (d) means, including said brackets and said projections, supporting the rack from the opposed walls.

2. The combination set forth in claim 1 wherein each of said brackets is a substantially planar plate, and said trackway is a slot provided in said plate through which said projection extends to permit vertical manual adjustment of the level of the rack within the cabinet.

3. The combination set forth in claim 1 wherein each of said brackets is a substantially planar plate, said trackway is formed by upper and lower vertically aligned openings in said plate, and said openings are interconnected by a curved slot in said plate.

4. The combination set forth in claim 1 wherein each of said brackets is a plane form construction of rod stock whereby the outer edge configuration thereof is substantially similar to the shape of said trackway.

5. The combination set forth in claim 1 wherein said brackets are attached each in a fixed position to the side of the rack.

6. The combination set forth in claim 1 wherein said brackets are extended from opposite sides of the rack, and said projections are extended from slidable means mounted on said walls.

7. The combination set forth in claim 1, wherein said trackway is a slot in said bracket having at least two offset portions thereof in substantial vertical alignment with each other.

8. The combination set forth in claim 1 wherein each of said brackets is a substantially planar plate, said trackway is a slot in said plate formed in a curved configuration whereby the upper end of said slot defines said upper stop point of said trackway, and said lower stop point is below and in substantial vertical alignment with said upper stop point.

9. In a front-loading dishwasher of the type having a cabinet defining an inside washing chamber, an access opening through the cabinet to the washing chamber, and upper and lower dish supporting racks mounted within the washing chamber and movable outwardly,

for loading and unloading, through the access opening, improved vertically adjustable support means for the upper rack operatively connected to the means for mounting the upper rack comprising:

- (a) a plurality of brackets located along the side edges of the upper rack, 5
- (b) each of said brackets having an irregular shaped slot therein forming a trackway,
- (c) said trackway having at least two offset portions located in substantial vertical alignment with each other, 10
- (d) a plurality of vertically fixed tracking members each extending through one of said trackways in each of said brackets, and
- (e) a portion of said bracket that is adjacent each 15

of said trackway offset portions serving as a shoulder for distributing weight of the upper rack thereon.

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312—311