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VERTICALLY ADJUSTABLE ROTARY DISHRACK
FOR DOMESTIC DISHWASHER

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3 Sheets-Sheet 2

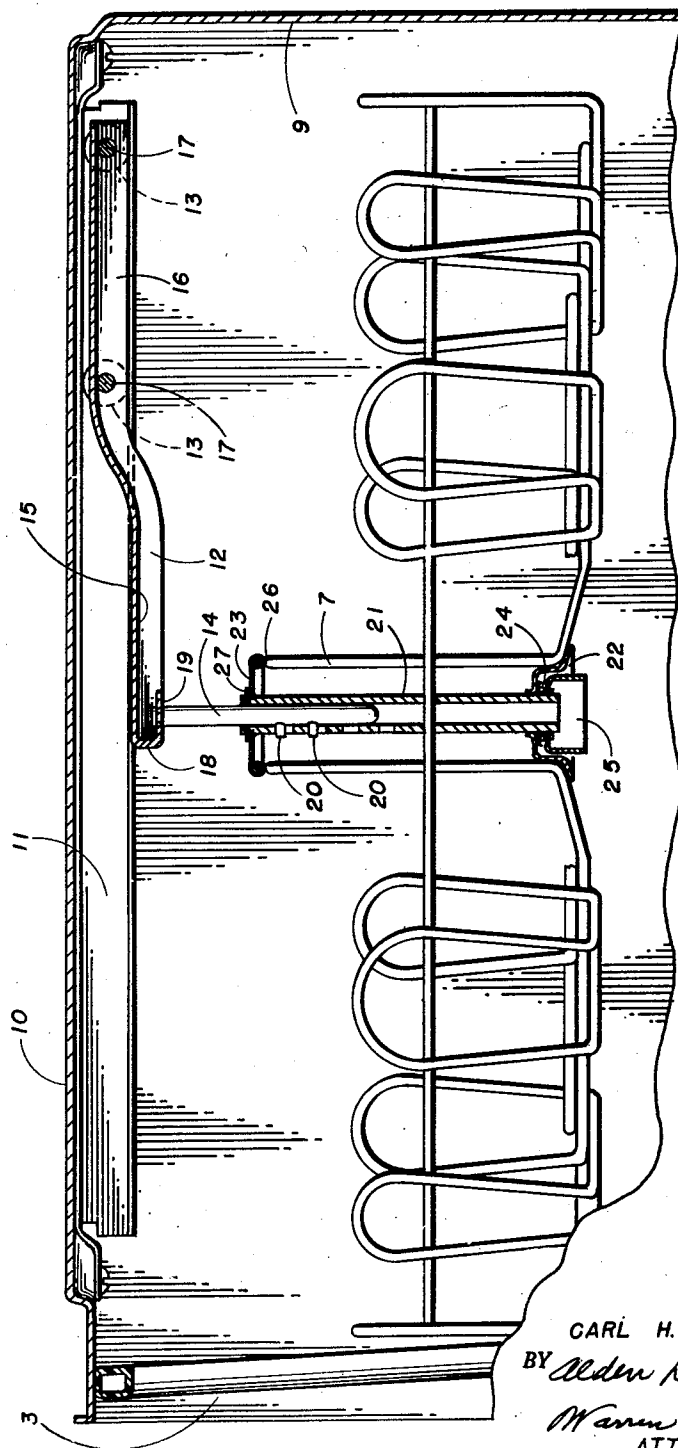


Fig. 3

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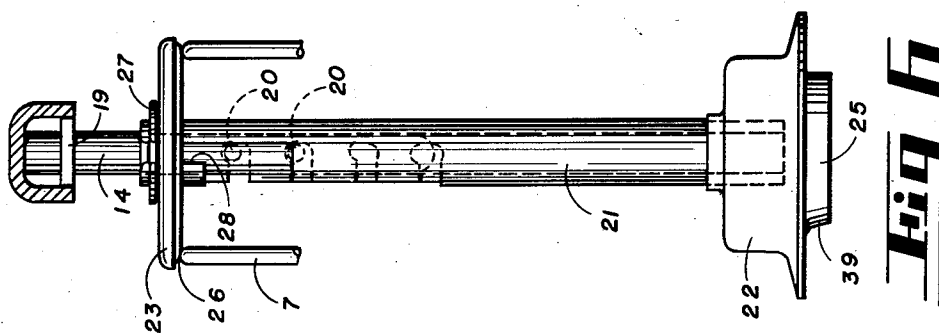
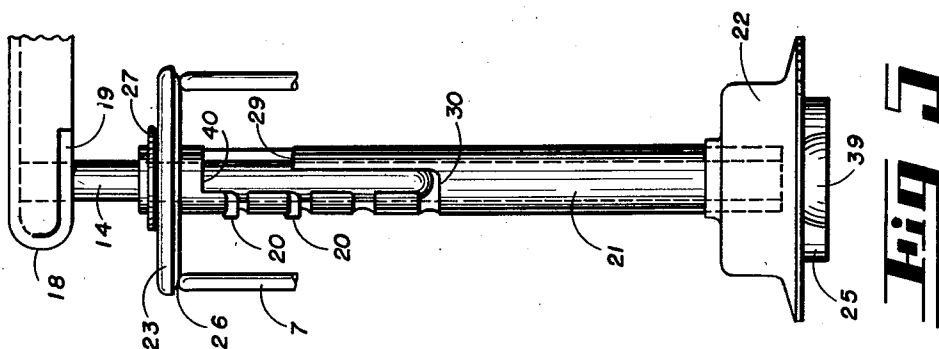
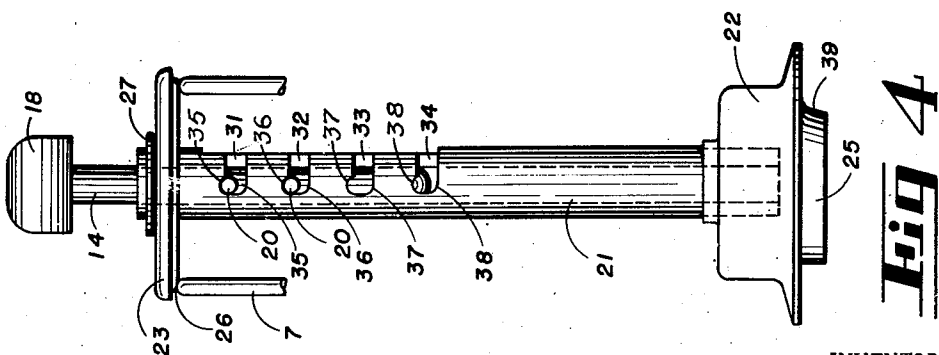
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VERTICALLY ADJUSTABLE ROTARY DISHRACK FOR DOMESTIC DISHWASHER

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8 Claims. (Cl. 134—158)

The present invention relates to an improvement for a dishwasher, particularly one designed for installation within the kitchen of a home, desirably as part of a kitchen cabinet and sink installation.

The invention is particularly useful in a dishwasher having a power driven impeller (or other water distributing means) located at the bottom of a washing vat which can be sealed closed so that dishes placed within the vat can be washed by the impact of the water thrown up through the dishes by the impeller. The water drains back to the bottom of the vat where it collects for a repetition of the cycle.

Normally, because of space limitations, upper and lower vertically spaced dishracks are provided. To assure that articles supported by the upper rack are thoroughly cleaned, this rack may be made rotatable, as set forth and claimed in Patent No. 2,710,011, entitled "Domestic Dishwasher Having Rotary Dishrack on Extensible Bracket" which issued to Lloyd H. Davidson on June 7, 1955. As shown in that patent, the upper rack is supported by an extensible bracket permitting withdrawal from the dishwasher to facilitate loading and unloading.

Since the types and sizes of cooking and eating utensils that are used in the average household vary greatly in size, it is difficult to choose optimum vertical spacing between the upper and lower dishracks. The position of the lower rack is normally determined by fixed dimensions of the washing vat and its access opening. If the level of the upper rack is also fixed, as shown in the before-mentioned patent, difficulty is sometimes encountered in supporting large size dinner plates and large pots in the lower rack. If these utensils touch the upper dishrack, rotation will be prevented and effectiveness of the dishwasher will be reduced. In such cases there is also danger that the user of the dishwasher may ram the lower rack into the dishwasher damaging either the utensils or the racks.

Were the upper rack located far enough above the lower rack to minimize the possibility of such interference, the upper rack would be, at all times, relatively remote from the impeller or other means relied upon for washing action. Obviously, the more remote the dishes are from the impeller, the less effective is the washing action. Thus, it is desirable to position the upper rack as close to the impeller as is practical.

The upper rack is usually used for holding drinking glasses, cups, and small dishes. Glasses are made in a wide variety of sizes and, when relatively tall glasses, such as ice tea glasses, are to be washed, it is desirable to lower the upper rack to provide clearance between the glasses and the bracket supporting the rack.

In order to meet all of the foregoing requirements, the improved rotary dishrack installation set forth in this specification has been devised. Briefly, the improved installation includes an extensible bracket slidably secured to the top interior of the dishwasher vat. From this bracket there depends a vertical spindle from which a

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pair of pins project horizontally. A circular dishrack is supported for rotation on the spindle; the dishrack is part of an assembly that includes a hollow shaft with slots for receiving the horizontal pins. The assembly also includes anti-friction bearings minimizing frictional resistance to rack rotation.

The spindle and hollow shaft are designed for mutual cooperation so that the dishrack may be readily and easily adjusted for use at a plurality of elevations. It is also possible to remove the dishrack from the spindle with very little effort.

In view of the foregoing, it will be obvious that a broad object of the present invention is to provide an improved vertically adjustable rotary dishrack for a dishwasher.

More specifically stated, it is an object of the invention to provide a rotary dishrack which may be positioned within a dishwasher at any one of a plurality of vertical elevations, and which may be easily removed from the dishwasher.

Another advantage of the invention is that vertical adjustability is provided without impairment of rotatability of the rack.

It is also an object of the invention to provide a dishrack which may be easily adjusted in position through manipulation by one hand of the user.

The novel features that are considered characteristic of the invention are set forth in the appended claims; the invention itself, however, both as to its organization and method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view drawn to a reduced scale showing a dishwasher of the type in which the present invention finds particular utility;

Fig. 2 is a side elevational view of the dishwasher with access door open, the upper and lower dishracks being shown in phantom lines and the side wall of the dishwasher cabinet being broken away to facilitate illustration of the interior thereof;

Fig. 3 is a fragmentary vertical sectional view taken through the top of the dishwasher vat showing the details of the upper dishrack mounting; and

Figs. 4, 5, and 6 show the front, side, and rear views, respectively, of the spindle and hollow shaft supporting the upper dishrack and providing vertical adjustability.

Attention is first directed to Fig. 1 showing a cabinet type dishwasher, generally designated 1, having an access door 2 hinged about its lower horizontal edge for opening and closing movements relative to access opening 3 of the dishwasher. The access door includes a rotary latch 4 which is used to hold the access door in sealed engagement with the cabinet. A rotary control knob 5 is also provided for controlling a motor driven timer (not shown) which regulates the sequence of dishwasher operation.

As indicated in Fig. 2, lower and upper dishracks 6 and 7 are provided for supporting a plurality of articles to be washed. Rack 6 includes rollers 8 engaging fixed rails (not shown) which support the dishrack within the dishwasher. To facilitate loading and unloading, this dishrack may be rolled out onto the access door when it is open, as shown in Fig. 2.

When both dishracks are inside the dishwasher, they are housed within a washing vat 9. Located at the bottom of this vat is a motor driven impeller (not shown), or other means, suitable for throwing water forcefully up through the dishracks. In this manner, the articles stored thereon are thoroughly cleansed.

Secured to top wall 10 of the vat and extending from

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front to rear are a pair of parallel channels 11 which slidably support a carriage 12. The carriage includes two pairs of rollers 13 which fit within the channels.

A vertical spindle 14 depends rigidly from the forward end of the carriage. Upper dishrack 7 is rotatably and adjustably supported by this spindle, as will be explained in greater detail shortly. Rotation is imparted to the dishrack by impingement of water from the impeller as it dashes against the articles being washed. Through this rotation thorough cleansing of all surfaces is assured.

Attention should now be directed to Fig. 3 which shows carriage 12 and spindle 14 in greater detail. The carriage is formed from sheet metal and includes a top wall 15 joined integrally with down-turned side walls 16. Axles 17 are secured to these side walls and engage rollers 13.

Top member 15 of the carriage is bent through 180° at 18 to define an underlying member 19 to which the spindle 14 is rigidly secured. The spindle includes a pair of forward projections in the form of fixed pins 20 for a purpose to be described shortly.

Telescopically surrounding the spindle and engaging the pins is a hollow shaft 21. A lower retaining cup 22 and an upper retaining cup 23 loosely surround this shaft. The lower retaining cup carries the weight of dishrack 7 and directly engages a ball bearing 24 which rests on a cup shaped knob 25 rigidly secured to the lower end of the hollow shaft 21. The upper retainer cup is secured to rack 7 by tabs 26. Snap ring 27 maintains axial assembly of the parts.

From a review of Fig. 3, it will be recognized that the retaining cups, bearing, hollow shaft, knob, and upper dishrack constitute a unitary assembly and that the rack may rotate freely about hollow shaft 21 when it is supported by spindle 14. The nature of this support and its adjustment may now be considered.

The hollow shaft 21 defines a plurality of recesses in the form of slots and notches. One slot which, for convenience, may be termed the "entrance" slot is indicated at 28. This slot extends from the top of the shaft parallel to its axis and merges into a second slot 29 of greater angular extent which may be termed the "transition" slot. The transition slot extends for approximately 90° around the hollow shaft and merges into a third slot 30, termed the "adjusting" slot, which again extends parallel to the axis of the shaft. These slots are well illustrated in Figs. 5 and 6.

A series of four "receiving" slots 31, 32, 33, and 34 extend at 90° from the adjusting slot 30 and merge integrally into a plurality of notches 35, 36, 37, and 38, respectively. These notches and slots are illustrated in Fig. 4.

In assembling the hollow shaft to the relatively fixed spindle 14, the entrance slot 28 is first brought into alignment with fixed pins 20. The hollow shaft is then raised until the lower pin comes into bearing engagement with the bottom of the transition slot 29. The hollow shaft is then rotated approximately 90° bringing the pins into alignment with the adjusting slot 30.

When the pins are disposed within this slot, the dishrack 7 and hollow shaft 21 may be adjusted vertically as desired. In the structure as illustrated, three different positions of vertical adjustment are available. Each position is determined by the passage of pins 20 into a pair of adjacent receiving slots 31 and 32, or 32 and 33, or 33 and 34. When the pins have been engaged with a pair of slots, the hollow shaft is again rotated approximately 90°, bringing the pins into engagement with the associated notches 35-38. Here the shafts may be brought to rest and will remain in engagement with spindle 14 while the dishrack is employed to rotatably support dishes and other utensils within the dishwasher.

In the event that the dishwasher is to be used to wash large dishes or cooking utensils, the upper dishrack may

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be raised to an extreme position with the pins 20 in engagement with notches 37 and 38. In this way, ample clearance will be provided between the upper and lower racks, and rotatability of the upper rack will not be impaired.

Should medium size dinner plates and medium size glasses be washed simultaneously, the pins may be engaged with notches 36 and 37, spacing the upper rack at an intermediate position above the lower rack.

The upper rack may be dropped as desired to its lowermost position of use with the pins in engagement with notches 35 and 36 to accommodate tall glasses.

In all positions of use, the spindle 14 remains relatively stationary within the dishwasher, and hollow shaft 21 remains in stationary engagement with it while dishrack 7 executes rotation by virtue of the washing action of the impeller located near the bottom of the vat. Anti-friction bearing 24 assures a minimum of frictional resistance to rotation.

It will be recognized by those skilled in the art that the upper dishrack may be totally removed from the dishwasher so that extra large items may be placed in the lower rack. This may be readily accomplished by reversing the foregoing procedure to bring pins 20 into alignment with slot 28. The entire rack assembly may then be dropped from the spindle 14.

To facilitate adjustment of the rack through manipulation by one hand of the user, the adjusting knob 25 may be provided with a finger grip 39. The user, by grasping knob 25, with his thumb or fingers engaging finger grip 39, may readily rotate, raise, and lower hollow shaft 21 to effect any of the before-described adjustments.

Attention is called to the wisdom of providing transitional slot 29. It will be recognized that this slot extends horizontally between two vertical slots, all formed in the hollow shaft. By providing the transitional slot, accidental disengagement of the hollow shaft from the spindle is prevented. For instance, if the position of the hollow shaft relative to the spindle is being adjusted and the user should accidentally lose his grip of knob 25, the upper rack will only drop until the upper pin comes into engagement with horizontal surface 40 of the transitional slot. Total disengagement of the hollow shaft from the spindle can only be attained by intentional rotation through approximately 90°, bringing the pins into alignment with slot 28.

In view of the foregoing, it will be appreciated that by means of the present invention adjustment of a rotary dishrack to a plurality of vertical positions is easily and positively attained. Adjustability is accomplished without sacrifice of rack rotation; there is no interference with the fore and aft movements of the supporting carriage, incidental to loading and unloading of the dishwasher.

The various features and advantages of the design and construction disclosed are thought to be clear from the foregoing description. Various other features and advantages not specifically enumerated will undoubtedly occur to those versed in the art, as likewise will many variations and modifications of the preferred embodiment of the invention illustrated, all of which may be achieved without departing from the spirit and scope of the invention.

Having described a preferred embodiment of my invention, I claim:

1. In combination, a movable carriage; a rigid spindle depending vertically from said carriage; one or more rigid pins extending horizontally from said spindle; a hollow shaft defining an axial entrance slot communicating with one end thereof, an axial adjusting slot spaced angularly from the entrance slot, and a transition slot interconnecting the entrance and adjusting slots; the entrance slot being proportioned to receive said pins when said shaft is raised vertically into engagement with said

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spindle; said transition slot being proportioned to permit rotation of said shaft relative to said spindle whereby said pins are brought into engagement with the adjusting slot; a plurality of horizontal receiving slots extending from said adjusting slot, the receiving slots terminating in notches for receiving said pins, engagement of said pins in certain of the receiving slots determining the vertical elevation of said hollow shaft relative to said spindle; and a circular dishrack rotatably supported by said hollow shaft.

2. A vertically adjustable rotary dishrack installation for use in a dishwasher having a washing vat with a horizontal top wall comprising channels secured to the top wall of the vat, a horizontally movable carriage having rollers engaging said channels, a vertical spindle depending from one end of said carriage, a plurality of fixed pins extending horizontally from said spindle, a hollow shaft defining axially spaced slots for receiving said pins, engagement of certain of the slots with said pins determining the vertical position of said shaft relative to said spindle, a dishrack, and means for rotatably supporting said dishrack on said hollow shaft.

3. A vertically adjustable rotary dishrack installation for use in a dishwasher having a washing vat with a forward access opening comprising channels secured to the top of the vat perpendicular to the access opening, a roller supported carriage slidably engaged with said channels for movement towards and away from the opening, a vertical spindle depending from said carriage, one or more pins fixed to and extending substantially horizontally from said spindle, a hollow shaft proportioned for engagement with said spindle and defining vertically spaced slots for receiving said pins, the slots of said shaft being arranged to provide vertical adjustment of said shaft relative to said spindle, a dishrack, vertically aligned retaining cups secured to said dishrack and rotatably surrounding said shaft, and an anti-friction bearing disposed between one of said cups and said shaft.

4. An improved dishrack installation for a dishwasher comprising a vertical spindle positioned within the dishwasher, pins secured to said spindle and extending horizontally therefrom, a hollow shaft engaged with said spindle and defining slots for receiving said pins, the slots

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being located at different vertical levels whereby vertical adjustment of said shaft relative to said spindle may be effected, and a dishrack supported upon said hollow shaft.

5. In a dishwasher, an improved dishrack installation comprising a vertical spindle, a projection on said spindle, a hollow shaft engaging said spindle, said shaft defining vertically spaced means receiving said projection and providing vertical adjustability, a dishrack supported by said shaft, and a knob secured to the lower end of said shaft for manipulation by the user of the dishwasher whereby vertical adjustment of said shaft is effected.

6. A dishrack installation comprising a vertical spindle; rigid means secured to and projecting from said spindle; a hollow shaft about said spindle defining a vertical entrance slot, a horizontal transition slot, a vertical adjusting slot, and horizontal receiving slots, said slots being proportioned to accommodate said means projecting from said spindle; disposition of said means within said adjusting slot making possible vertical adjustability of said shaft relative to said spindle; retaining cups loosely engaging said shaft; a dishrack engaging said retaining cups; an adjusting knob secured to the lower end of said shaft; and an anti-friction bearing between one of said retaining cups and said knob whereby said dishrack is rotatably and adjustably supported by said hollow shaft.

7. A dishrack installation for a dishwasher having a washing vat comprising a dishrack; adjustably engaged members in the form of a vertical spindle and hollow shaft, one of said members being secured to the dishrack and the other to the vat; and pins projecting from one of the said members into slots defined by the other member; the slots being spaced to permit vertical adjustability of said members.

8. A dishrack installation for a dishwasher having a washing vat comprising a dishrack; adjustably engaged telescopic members, one of said members being secured to the dishrack and the other to the vat; and projections from one of said members into recesses defined by the other member; the recesses being vertically spaced to permit vertical adjustability of said members.

No references cited.