

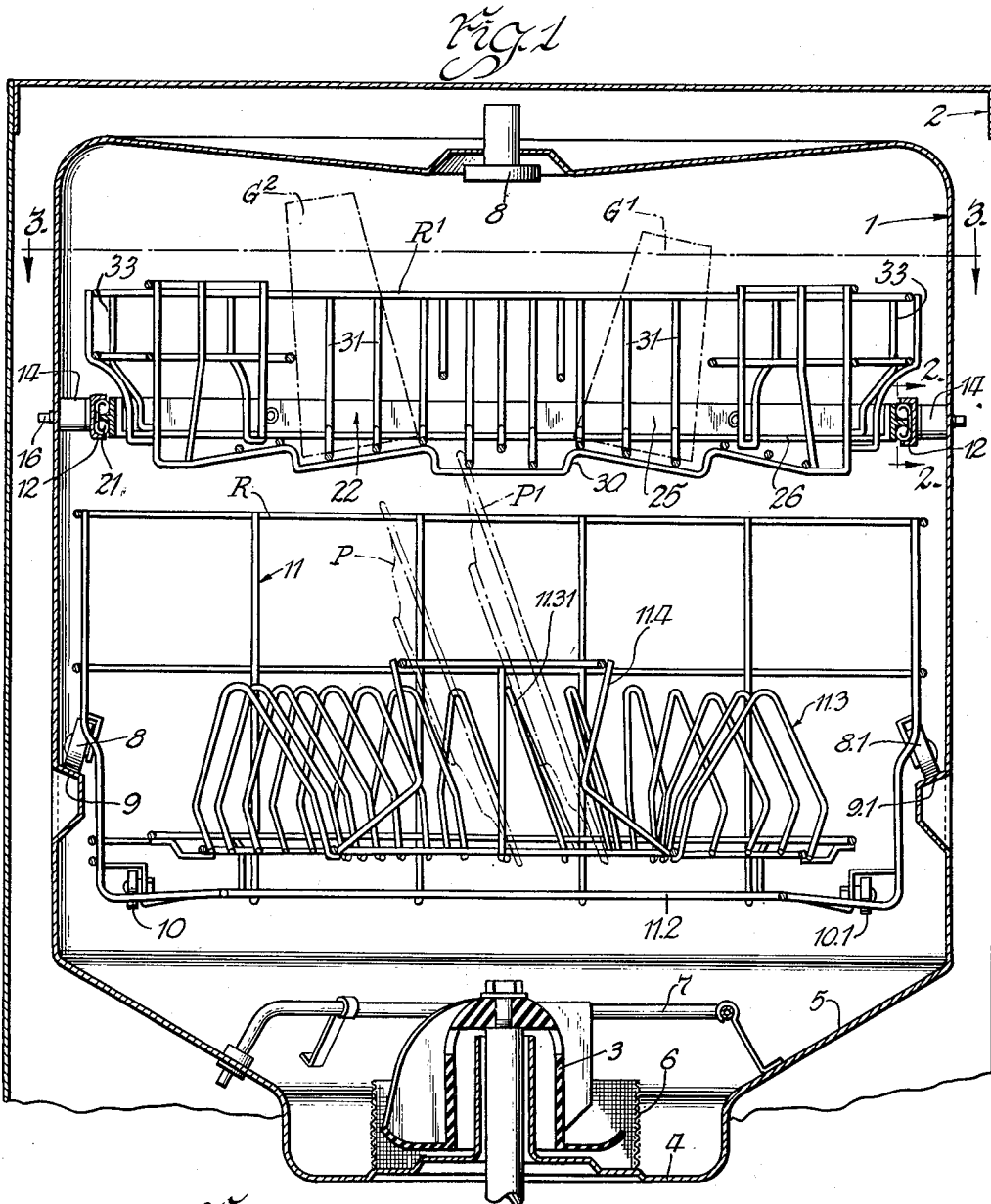
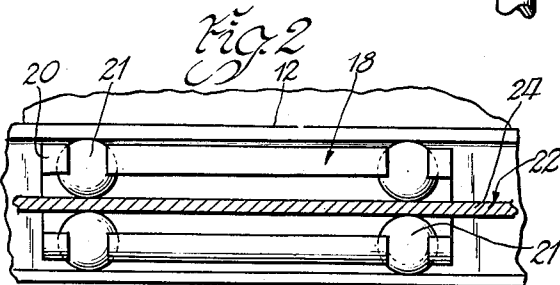
Aug. 11, 1953

J. G. RUSPINO
DISHWASHING MACHINE

2,648,588

Filed May 31, 1952

3 Sheets-Sheet 1



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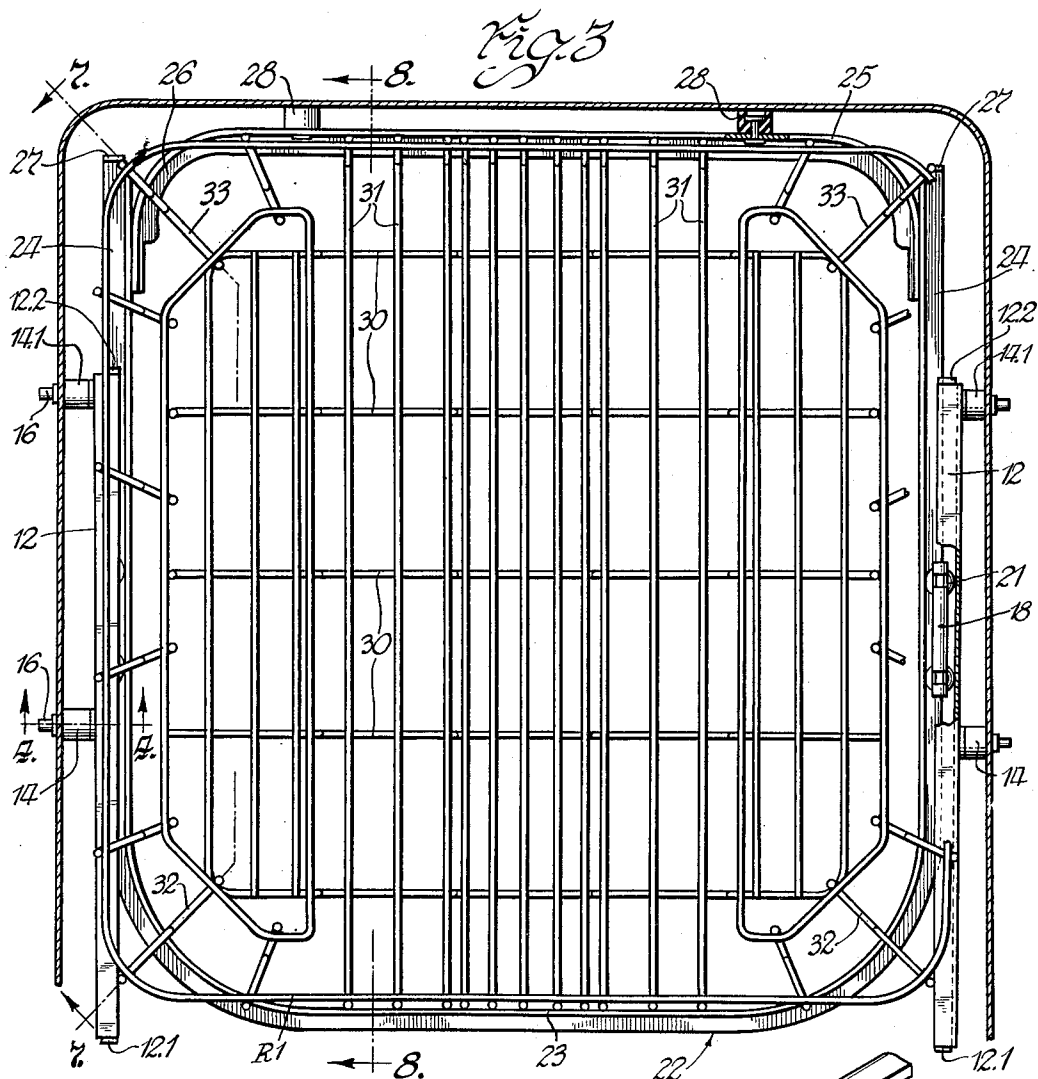
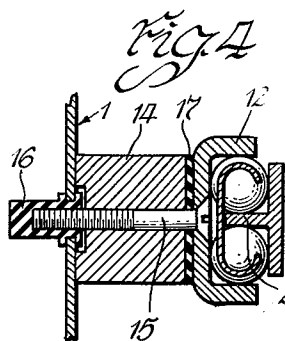
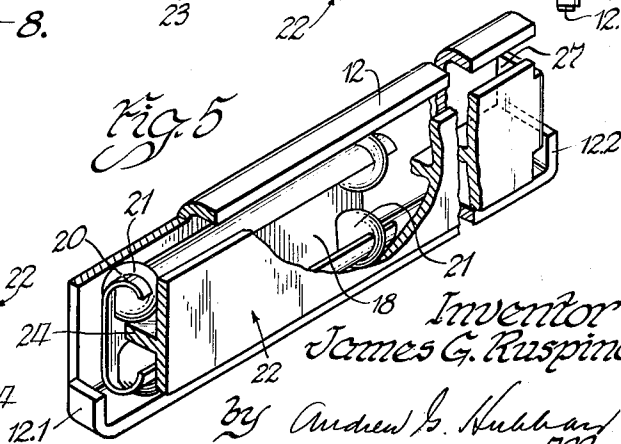
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3 Sheets-Sheet 2



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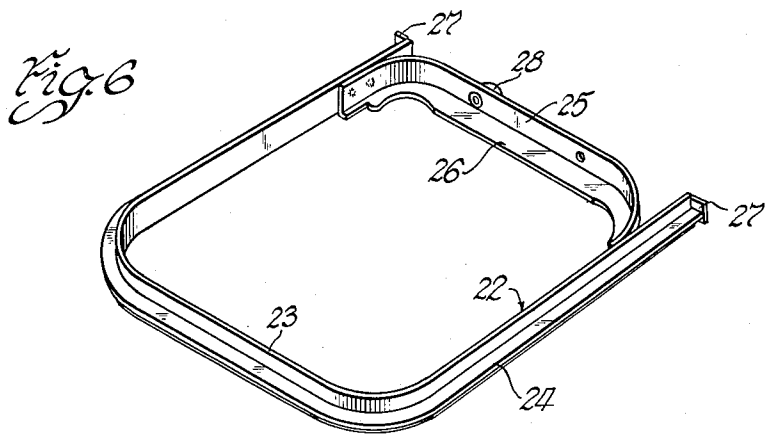
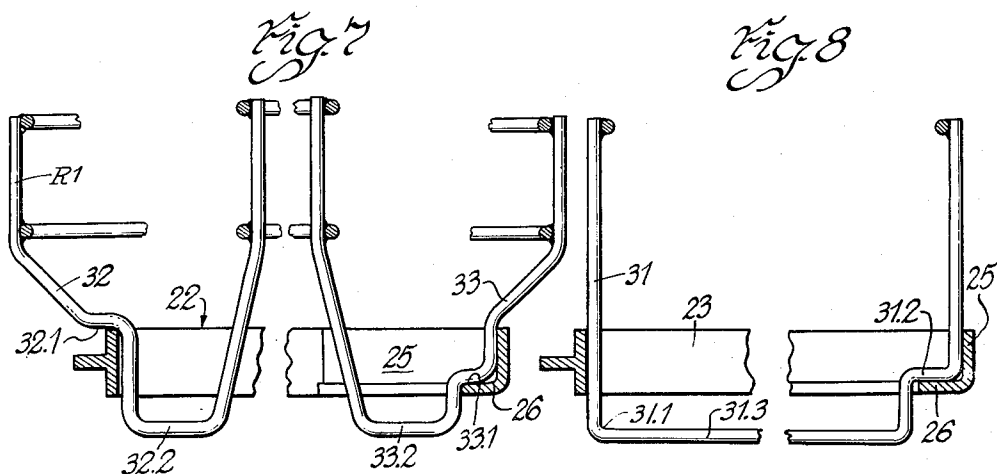
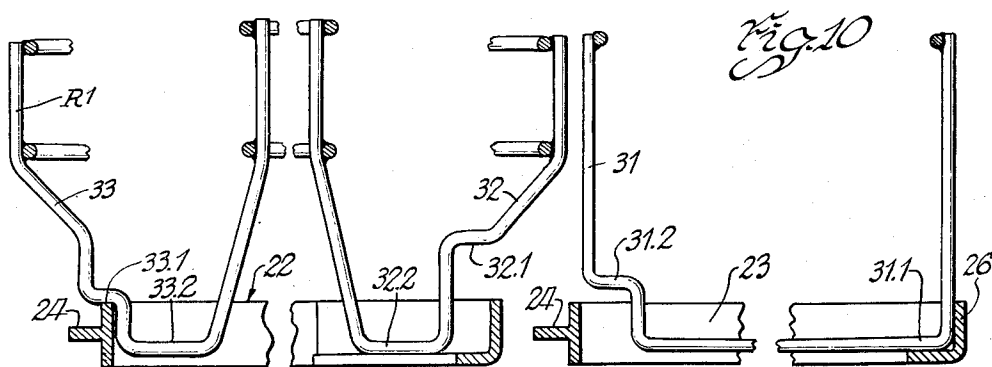
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DISHWASHING MACHINE

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Filed May 31, 1952

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,648,588

DISHWASHING MACHINE

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Application May 31, 1952, Serial No. 290,984

10 Claims. (Cl. 312—308)

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This invention relates to dishwashing machines of the front-loading type, and in particular to a novel arrangement of racks within which are placed the dishes, cups, drinking glasses, and the like to be washed.

It is a principal object of this invention to improve the accessibility and utility of said racks by independently mounting on roller supports a bottom plate rack and an upper cup and glass rack and arranging certain of said roller-supported means for adjustment of the clearance between said bottom and upper racks.

It is another object of the invention to provide a novel roller mounting arrangement for the upper rack, pursuant to which increased clearance space may be obtained with respect to the top of the washing vat to accommodate unusually tall glasses, or alternatively, increased space may be obtained between the upper and lower racks to accommodate unusually large diameter plates or the like in said lower rack.

It is a further object of the invention to provide a simplified glassware rack supporting structure which affords the advantages of a secure framework for supporting the rack and smooth roll-out operation, combined with means whereby the rack may be positioned on said supporting framework to obtain the above-noted clearance adjustment.

This invention has particular utility in domestic dishwashing machines which have rather rigid dimensional limitations. To be commercially competitive, a domestic dishwasher must be sized for installation below a kitchen sink drain board, or as part of a kitchen counter structure. As is well known, drain board and counter tops have been standardized at approximately 36" above the floor. The space available within the dishwasher casing or frame structure for the washing vat is limited to the space required for mounting below the vat the motor, control valve system, and plumbing drain connections. Another space-consuming factor is that most plumbing codes require that the water inlet system of the dishwasher have at least a one-inch vertical air gap between the discharge spout and the maximum overflow spill level of the machine. It is also well known in the dishwasher art that the lowermost rack must be spaced sufficiently above the impeller to insure the proper water distribution pattern over and about the articles being washed, and adequate drainage therefrom. Thus, it is not possible within the limited space available to provide fixed or permanent supports which would separate the upper and lower racks sufficiently to

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permit the simultaneous washing of exceptionally large size plates in the lower rack and tall glasses in the upper rack.

I am aware that it is not unusual in the art to equip dishwashers of the front-opening type with loading racks which are mounted on individual pull-out carriages or the like; and means have previously been proposed to locate the upper rack on one of two vertically spaced pull-out carriages so as to obtain increased clearance if necessary between the upper rack and the top of the vat or between the respective upper and lower racks.

In practicing my invention, however, I provide a single upper rack supporting structure having side rails arranged for roller mounting in trackways fixed to the sides of the washing vat, and I further provide on said structure an arrangement of supporting walls which, in cooperation with specially contoured portions of the frame structure of the rack, will securely support said rack in either of two positions providing greater or less clearance relative to the top wall of the washing vat. It is a feature of my invention that it is only necessary to turn the rack through 180 degrees in a horizontal plane and return it to the common support structure to achieve the desired spaced relationship.

Other features and advantages of my invention will be apparent from the following detailed description of a presently preferred embodiment, read in connection with the accompanying drawings, in which Fig. 1 is a front sectional elevation of a portion of a dishwasher embodying the present invention; Fig. 2 is a fragmentary detail, in sectional elevation on lines 2—2 of Fig. 1, showing a form of roller support for the rack-receiving support frame with respect to the trackways fixed to the sides of the vat; Fig. 3 is a plan view in section along lines 3—3 of Fig. 1 showing the assembled rack and support frame in operative position; Fig. 4 is a section on lines 4—4 of Fig. 3 showing a method of securing the supporting trackways to the sides of the vat; Fig. 5 is a fragmentary perspective of the assembled trackways, roller supports, and side rails of the support frame; Fig. 6 is a perspective of the support frame looking from above; Fig. 7 is a fragmentary section taken on lines 7—7 of Fig. 3 showing the rack corner structures resting on the support frame to give maximum clearance relative to the top of the vat; Fig. 8 is a fragmentary section taken on lines 8—8 of Fig. 3 showing the same clearance position of other supporting elements of the rack; and Figs. 9 and 10 are views similar to Figs. 7 and 8 showing the relationship of the

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rack elements to the rack-supporting frame to provide for maximum clearance between the upper and lower racks.

In Fig. 1 it may be considered that a dishwasher has a five-sided vat 1 suitably supported within a frame or casing 2; that said vat is open at the front (not shown); and that said open front is arranged to be closed by a bottom hinged door (not shown) which may be swung from a substantially vertical closed position to a substantially horizontal open position. The motor-driven impeller 3 is mounted for rotation about a vertical axis as shown, and is largely disposed within a sump 4 toward which the bottom wall 5 of the vat slopes. Not shown are the impeller drive motor, water fill and drainage controls, plumbing connections and the like, which are disposed within the casing below the vat. Placed about said impeller is a strainer or screen 6, and at a level calculated to be above the normal quiet water line is an electrical heating element 7. By means not shown, water is introduced into the vat in controlled amounts through a spray head or nozzle 8 and after the appropriate amount of water has been introduced, the rapidly rotating impeller throws the water violently about; and dishes, glassware, and the like, respectively in the lower rack R and the upper rack R1, are virtually bombarded with water particles whereby they are cleaned. As is well understood, it is necessary to place the lowermost rack sufficiently above the impeller to permit a proper water distribution pattern to be created thereby. In a well known domestic dishwasher, the clearance between the rack and the impeller is about one inch. The water distribution pattern is largely influenced by the arrangement of the articles in the lower rack.

The respective racks are mounted for individual withdrawal from the vat for loading with dirty dishes, etc., or the removal of them after they have been washed and dried, the latter operation being accomplished by the circulation within the vat of air which is heated by the then energized heating element 7. Lower rack R is provided with groups of wheels or rollers for cooperation with various guide rails and the like within the vat and on the door (not shown) when the latter is in open position. For example, a suitable plurality of side rollers 8, 8.1 rollably support the rack on rails 9, 9.1 projecting from the sides of the vat; and other sets of rollers such as 10, 10.1 are adapted to engage with rails or other supporting and guiding structures. No part of the dishwasher per se, or the roller mounting for the lower rack is claimed as being my invention; and for a more complete explanation of a typical front-loading dishwasher and rollable bottom rack structure, reference is here made to the presently pending application of Forrest A. Walker, S. N. 57,448, filed October 30, 1948, for "Washing Apparatus" and assigned to my present assignee.

The lower rack R may be of wire frame construction as is conventional in the art, having a suitably arranged outer framework 11, base framework 11.2, and a central framework 11.3, the latter comprising a plurality of substantially gable-shaped wire elements disposed in a circular path and inclining from the horizontal (note element 11.3.1). Usually platters, pans, etc., are placed about the outer portion 11 and plates such as indicated at P and P1 are racked individually between the gable-shaped wire members of the central framework 11.3. A center portion 11.4 is sometimes provided to accommodate a basket or

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the like (not shown) for containing table silver.

Pursuant to the present invention, the upper rack R1 is arranged to be drawn out from and returned to the vat independently of and without conflict with the lower rack. In a presently preferred embodiment, I provide simple channel-shaped trackways 12 and support said trackways in a common horizontal plane by suitable means, such as a collar 14 (Fig. 4) and screw 15 which enters a blind tapping 16 fixed to the tub wall. I prefer that the collars be of one of the synthetic rubbers or plastics which are resistant to hot water and the detergents commonly used in dishwashers. The collars are brought tightly against the wall of the vat. The collars themselves may be compressible, or a resilient washer 17 may be interposed between the channel 12 and the collar if desired.

In each side rail is a roller assembly 18 comprising a light metal ballrace 20 having suitable openings to receive in spaced relationship the ballbearings 21. The roller assemblies serve to support the rack support frame 22, as best shown in Figs. 2 and 4. The rack frame may advantageously be constructed from an extrusion aluminum alloy rail, having a vertical wall portion 23 and an outwardly extending flange 24. The front part of the rack support frame is advantageously constructed by bending said rail into U-shape, with parallel side legs. Flange 24 of the respective side portions fits between the upper and lower sets of balls, each of which as shown in Fig. 4 may be in engagement with the flange and vertical wall of the rack frame, and a flange and web of the channel-like rails 12. The rack frame is completed by a rear cross member 25 of angle shape to provide a rear wall having its top edge co-planar with the top edge of the rail portion 23, and a web 26 suitably below the level of said upper edge as presently described. It will be apparent that there is no reason other than structural strength and manufacturing convenience to have the flange 24 extend across the front of the frame. A suitable stop 27 is formed at each extremity of the frame side members and similar stops 12.1, 12.2 are struck up from the ends of the rail 12. Rubber bumpers 28 may be riveted or otherwise fixed to the rear of member 25 to provide cushioned stops engageable with the rear of the vat.

I have found it expedient slightly to "toe-in" the free ends of the side rails 12; so that when the frame is drawn forwardly to its full "out" position, the spring bias exerted by the rails 12 will rather tightly crowd the rollers against the side of frame 22. In practice this has been found to act as a simple but effective detent which holds the rack frame in withdrawn position. The "toe-in" of rails 12 may be accomplished by bending said rails slightly or by making the respective front mounting studs 14 slightly longer than the rear studs 14.1.

As somewhat schematically shown in Fig. 1, there may be a substantial difference in the size of dinner plates. The most frequently used dinner plate size indicated at P is of the order of 9½" in diameter; a full size dinner plate or place plate P1 may be 10½" in diameter. There is also a difference in a length of drinking glasses. A conventional highball glass G1 is about 6" long and a large size tumbler G2—and sometimes a "Pilsner" glass—may be nearly 7" long. Experience indicates that in the average household it is not usual for the extremely long glasses and the full size dinner plates to be used under circumstances that they would be washed

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together in the dishwasher; a dinner calling for the large size plates is ordinarily of rather formal nature and the use of exceptionally long glasses would be unlikely. Conversely, the long highball or Pilsner glasses are more appropriate for casual or informal occurrences where the smaller size dinner plates serve adequately.

Accordingly, I have constructed the cup and glassware rack R1 for placement to give maximum spacing from the top of the washing vat to accommodate the long glasses; or optionally, to provide maximum spacing between the bottom of rack R1 and rack R (and correspondingly less spacing between rack R1 and the top of the vat) to accommodate the large plates P1 without conflict between the upper and lower racks. The arrangement in Fig. 1 provides for washing long glasses; and as clearly appears, the large size plates P1 would then extend above the level of the bottom of rack R1 and it would be impossible to slide either rack relative to the other. On the other hand, there is adequate clearance for the smaller size plate P. To accommodate the larger plates, the rack R1 is adjusted to a higher level with respect to its rack frame, as presently explained.

Rack R1 is desirably of wire construction having a plurality of lateral wires 30 which, as best shown in Fig. 1, provide a rack bottom contour characterized by a succession of planes sloping downwardly; a plurality of longitudinal wires 31; and wires 32, 33 which extend angularly at the corners of the rack. Other variously disposed wires are as needed to complete the structure and give proper support and slope to the cups, glasses, and the like carried therein, but are not important to the present invention.

Referring now to Fig. 7, it will be seen that corner wire 32 has an offset 32.1 and a base 32.2 and that corner wire 33 has an offset 33.1 and a base 33.2. The longitudinal wires 31 have a simple rectangular bend 31.1 at one end and an offset 31.2 at the other. The base 31.3 is co-planar with the respective bases 32.2 and 33.2. It will, of course, be understood that the corner wires 32 are at one end of the rack and wires 33 are at the other; and that the shoulders 31.2 of the several wires 31 are in mutual alignment at the end of the rack at which are the corner wires 33. It will also be understood that the maximum length of the rack R1 represented by the spacing between the verticals of the wires 31 is such that the rack will fit easily within the support frame 22, and that the vertical plane of the corner wires 32, 33 and the spacing thereof will be within the arcuate corner areas of said frame.

It is apparent from Fig. 7 that the support frame has two rack-supporting walls which are in vertically spaced relation, viz., the upper edge of rail 23 and the surface of web 26. The relationship of the respective shoulder portions of the wires 31, 32 and 33 to said two-level support walls establishes the clearance of the rack R1 relative to the rack R. For example, Figs. 7 and 8 show the various rack support wires effective to place the rack R1 in the Fig. 3 position. Shoulders 32.1 of support wires 32 engage the upper edge of frame 22; shoulders 33.1 of support wires 33 rest upon the flange 26 of the frame rear cross member 25. The bottom portions 31.3, 32.2, and 33.2 of the respective support wires are in a common plane parallel to the plane of the frame 22. The shoulder 31.2 seats on web 26.

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Figs. 9 and 10 show a second relationship of the rack frame wires to the rack frame support 22. With corner wires 33 now positioned at the front of the rack frame, the shoulder 33.1 rests on the upper edge of frame member 23. Fig. 9 is intended to convey that the base 32.2 of corner wire 32 does not engage the web 26 of the frame member 25. As is apparent, the spacing between the bottom of shoulder 33.1 and the bottom of base 33.2 is equal to the vertical distance between the upper edge of frame member 23 and the upper surface of web 26. In Fig. 10 the rack wire 31 is shown in its relationship within the frame 22 so that its rectangular offset 31.1 is seated on the web 26. It may also rest against the vertical wall 25. The forward shoulder portion 31.2 is not in engagement with the frame walls, but the rack is nevertheless firmly supported by the corner wires 33 and the rear portion of wires 31. A comparison of Figs. 7, 8, 9 and 10 show that the dimensional relationships of the respective offset portions and base portions of the several frame wires are such as to place all base portions in a common plane.

In using the dishwasher, either rack may be loaded first and then pushed back into the vat. Assuming that the lower rack is the first to be loaded, it is drawn forwardly on its rollers, loaded, and returned to home position. Perhaps one or more large size plates within the lower rack interfere with the return of the rack by striking the upper rack R1. In such case, the lower rack is again drawn out and the upper rack drawn out on its frame 22 sufficiently to remove the rack from the frame. Because of the conflict, it is probable that the upper rack was in the position indicated in Figs. 7 and 8. To increase the clearance between the upper and lower racks, therefore, it is necessary only to remove the upper rack from the support frame 22, turn it 180 degrees in a horizontal plane, and then replace it in the frame. This will change the rack wire positions relative to the frame to that shown in Figs. 9 and 10, and additional clearance with respect to rack R will be gained.

It will be understood that where the guide rails are recited as being in a "horizontal plane" it is common practice to slope said rails downwardly toward the rear of the vat so that the loaded racks will normally move into the vat. As previously described, the "toe-in" of the rails 12 serves as a detent holding the rack frame in extended position during loading. It will also be understood that while there has been described what are at present considered to be the preferred embodiments of the invention, various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

I claim:

1. In a dishwasher of the type having a washing vat provided with a front opening and a lower rack supported in said vat to receive articles to be washed, said lower rack being movable through said front opening for loading or unloading, the improvement comprising guide rails secured in horizontally aligned relation on opposite sides of said vat above said lower rack, said guide rails commencing adjacent said front opening and extending toward the rear of said vat, roller means at the respective guide rails and movable therealong toward or away from said front opening, a frame member carried by said roller means, said frame member having a first support wall structure at one end thereof, a second support

wall structure at the opposite end thereof, said wall structures being at different horizontal levels, and an article-receiving rack arranged to be supported by said frame in either of two horizontal angle relationships therewith, said rack having structural elements engageable with said wall structures to establish one vertical space relation between said upper and said lower rack and engageable with said wall structures upon rotation of said rack to its second angular relation to position said upper rack at a different vertical relationship with respect to said lower rack.

2. The improvement in dishwashers according to claim 1, in which the end portions of the guide rails at the open end of the vat are unsupported and converge slightly toward each other to exert inwardly directed pressure on said roller means as said means approach said guide rail end portions.

3. The improvement in dishwashers according to claim 1, in which said guide rails are secured to the respective side walls of the vat by means including a plurality of resilient blocks disposed at intervals along the length of the rails, the foremost blocks, considered with respect to the opening in the vat, being well to the rear of the front end of said rails and being of greater length than the next succeeding blocks so as to reduce the spacing between said rails for the purpose of exerting a laterally directed force on the roller means as the latter are drawn forwardly to the end portions of the rails.

4. In a dishwasher of the type having a washing vat provided with a front opening and a lower rack supported in said vat to receive articles to be washed, said lower rack being movable through said front opening for loading or unloading, the improvement comprising guide rails secured in mutually parallel, horizontally aligned relation on opposite sides of said vat above said lower rack, said guide rails commencing adjacent said front opening and extending toward the rear of said vat, roller means at the respective guide rails and movable therealong toward or away from said front opening, a frame member carried by said roller means, said frame member having a first wall structure providing a supporting surface at one horizontal level, and a second wall structure spaced laterally from the first and providing a supporting surface at a different horizontal level, and an article-receiving rack arranged to be supported by said frame in either of two horizontal angle relationships therewith, said rack having structural elements supportable on said first and second structures to establish one vertical space relation between said upper and said lower rack and supportable on the same supporting structures upon rotation of said rack to its second angular relation to position said upper rack in a different vertical relationship with respect to said lower rack.

5. In a dishwasher of the type having a washing vat provided with a front opening and a lower rack supported in said vat to receive articles to be washed, said lower rack being movable through said front opening for loading or unloading, the improvement comprising guide rails secured in mutually parallel, horizontally aligned relation on opposite sides of said vat above said lower rack, said guide rails commencing adjacent said front opening and extending toward the rear of said vat, roller means at the respective guide rails and movable therealong toward or away from said front opening, a substantially rectangular open frame member carried by said roller means, said

frame member having a first support wall structure at one end thereof and a second support wall structure at the opposite end thereof, said wall structures being at different horizontal levels, and an article-receiving rack arranged to be removably supported by said frame in either of two horizontal angle relationships therewith, said rack having a first set of structural elements at one end thereof and a second set of structural elements at the opposite end thereof, the said sets of elements concurrently engaging said wall structures for any frame-supported position of said rack, said sets of structural elements having support portions at different elevations above a common base plane to position said rack at a different elevation relative to said support frame according to whether a particular one of the sets of structural elements is in engagement with the first or second support wall structures of the frame member.

6. In a dishwasher of the type having a washing vat provided with a front opening and a lower rack supported in said vat to receive articles to be washed, said lower rack being movable through said front opening for loading or unloading, the improvement comprising guide rails secured in horizontally aligned relation on opposite sides of said vat above said lower rack, said guide rails commencing adjacent said front opening and extending toward the rear of said vat, roller means at the respective guide rails and movable therealong toward or away from said front opening, a substantially rectangular, hollow, frame member having an outwardly extending flange cooperating with said roller means to support the frame for movement along said guide rails, said frame having co-planar supporting walls at one end thereof and supporting wall means at the opposite end thereof, said last-named wall means being spaced vertically from said first-named walls, and an article-receiving rack arranged to be supported within said frame in either of two horizontal angle relationships therewith, said rack having a first pair of support means at one end of said rack and a second pair of support means at the opposite end of said rack, each said pair of support means having a base portion and an outwardly offset portion above said base portion, all of said base portions being in a common plane; the offset portions of the first pair being in a common plane and the offset portions of the second pair being in a common plane at a lower height relative to said base portion than those of the first pair; the respective base and offset portions being so related to said first and second-named supporting walls that with the rack in one position on the frame the offset portions of the first-named pair of rack structures rest on the first-named rack supporting walls and the offset portions of the second-named pair rest on the second-named rack supporting wall means, and with the rack in its second position on the frame the base portions of the first-named pair of rack structures are in the plane of the second-named rack supporting wall means and the offset portions of the second-named pair rest on the first-named rack supporting walls, whereby the base portions of said rack will be in different height relation to the support frame for each of the rack positions.

7. The improvement in dishwashers according to claim 6, in which said second-named rack supporting wall means comprises a shelf extending from side to side of said frame at a level below said first-named supporting walls.

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8. The improvement in dishwashers according to claim 6, in which said frame member has arcuate corner portions, and said rack supporting wall structures are within said corner portions.

9. In a dishwasher of the type having a washing vat provided with a front opening and a lower rack mounted in said vat on means permitting the rack to be drawn from or returned into said rack through said front opening, the improvement comprising guide rails secured to the respective side walls of said vat in horizontally aligned substantially parallel relation above said lower rack, roller means mounted on said side rails for movement therealong toward or away from said front opening, a hollow rectangular frame member having flange means extending from its side portions into permanent engagement with said roller means to support the same therein, rack support elements on said frame member, an article-receiving rack, and means on said rack engageable with said support elements to support the rack within said frame at either of two different levels with respect to said lower rack.

10. In a dishwasher of the type having a washing vat provided with a front opening and a lower rack mounted in said vat on means permitting the rack to be drawn from or returned into said

rack through said front opening, the improvement comprising guide rails secured to the respective side walls of said vat in horizontally aligned substantially parallel relation above said lower rack, roller means mounted on said side rails for movement therealong toward or away from said front opening, a hollow rectangular frame member having flange means extending from its side portions into permanent engagement with said roller means to support the same therein, rack support elements on said frame member, an article-receiving rack, and shoulder means on said rack at different levels relative to the base thereof and engageable with said support elements to support the rack within said frame at a selected one of said different levels with respect to said lower rack.

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