Oct. 17, 1967 T. KRZEWINA 3,347,613

RACK SLIDE STOP

Filed Oct. 14, 1965

FIG. 1

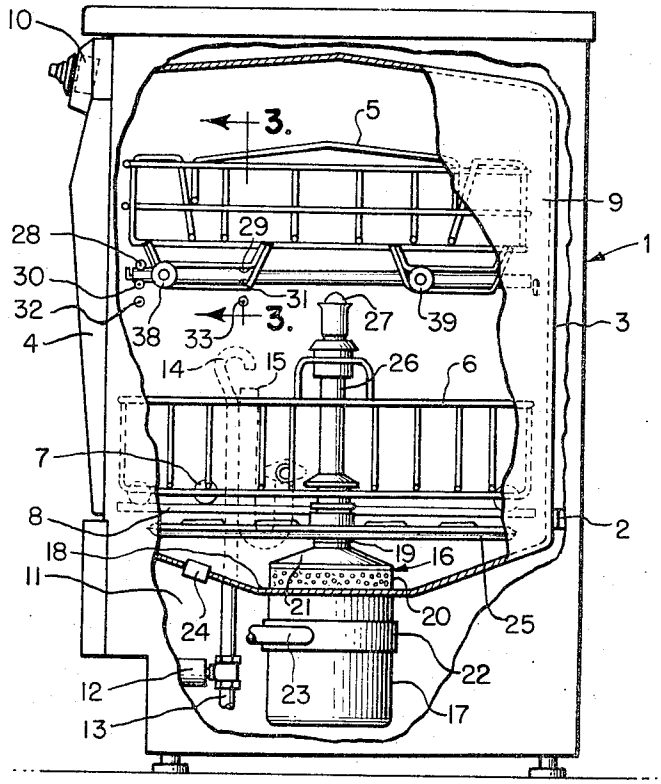


FIG. 3

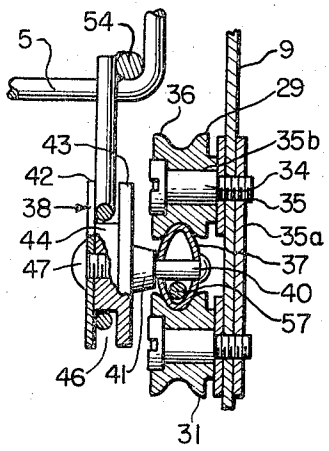


FIG. 5

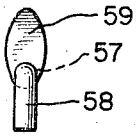


FIG. 2

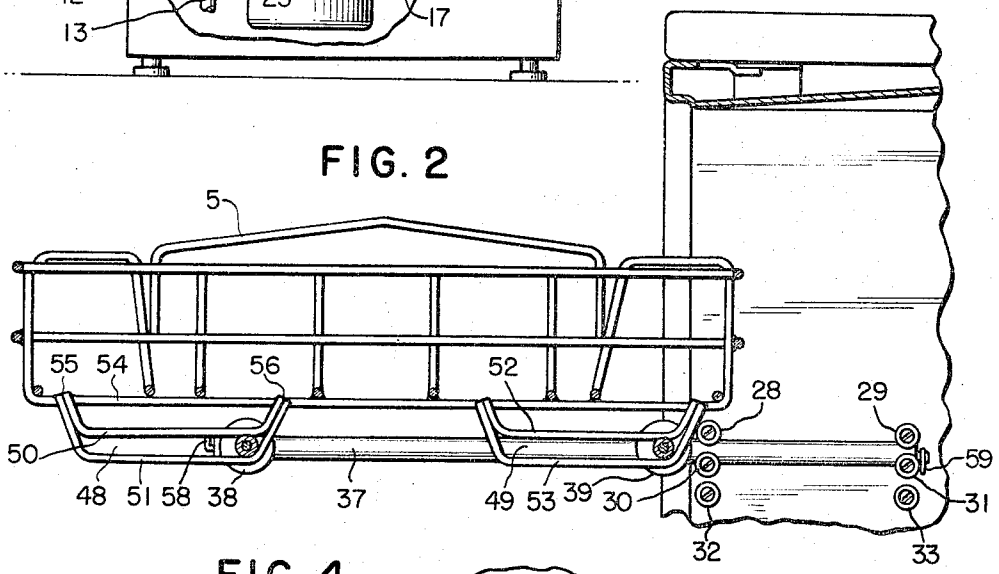
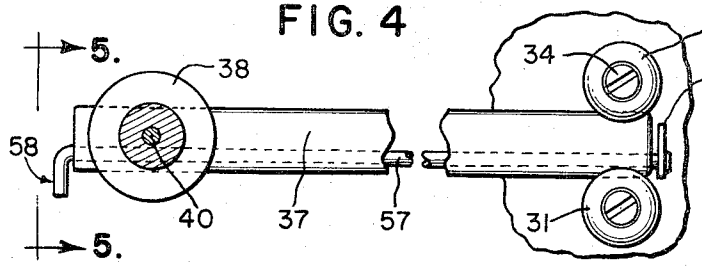


FIG. 4



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3,347,613

Patented Oct. 17, 1967

3,347,613

RACK SLIDE STOP

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Filed Oct. 14, 1965, Ser. No. 496,000

4 Claims. (Cl. 312—333)

ABSTRACT OF THE DISCLOSURE

A rack slide stop comprising a stop tab adapted to contact a roller supporting a track member to limit movement of the track member, a control arm and a rod interconnecting the control arm and the stop tab. Rotation of the control arm effects movement of the stop tab, through the rod, so that the track member and the rack it supports may be completely withdrawn from the chamber.

This invention relates to rack support systems, and more particularly to such systems which are particularly suitable for use in dishwashing apparatus of the type wherein a dish-receiving rack is arranged within a dishwasher tub which has an access opening at the front thereof.

It is frequently the case that the operator, in attempting to place larger dishes such as meat platters or mixing bowls in the lower rack of a front loading dishwasher, finds that the rack cannot be positioned within the dishwasher because there is inadequate space between the two racks to accommodate such larger dishes. A similar difficulty arises when one attempts to place a glass of greater than normal height in the upper rack of the dishwasher, and finds that the glass or other article protrudes above the top of the dishwasher chamber.

These problems may be obviated by providing rack and support structure which permit the upper rack of a dishwasher to be removed and reinserted at different elevations within the dishwasher chamber.

Various means have been proposed for releasably securing the upper rack of a dishwasher to its supporting structure. One such structure is disclosed by Fitzpatrick and Krzewina, in U.S. Patent No. 3,288,302, for "Rack Support System," and assigned to the General Electric Company, assignee of the present invention. In that system, a stop member in the form of a U-shaped pin is pivotally secured to the rear end of the rack. The pin normally engages the structure supporting the rack and permits only limited outward movement of the track member. By rotating the pin to a second position, the rack may be entirely removed from the dishwashing chamber.

The need for locating the stop member at the rear of the rack structure is apparent, since this location permits the rack to be moved axially in and out of the tub to the greatest extent possible, which facilitates the loading of utensils on the rack structure. However, a decided disadvantage of providing the stop member at the rear of the rack structure is that it is then not easily accessible to the operator, the rack forcing him to assume an awkward position to reach the stop mechanism which is still located within the dishwashing chamber.

It is, accordingly, a principal object of my invention to provide rack stop means for a dishwasher rack or the like, which includes means permitting the rack to be extended

outwardly of its supporting chamber to the greatest extent possible, and yet is easily accessible to the operator from the front of the rack, so that the stop means may be disengaged and the complete removal of the rack may then be effected.

It is a further specific object of my invention to provide a rack stop means which is carried by the rack structure and which is formed of economically made and assembled components, and yet provides the desired movability for the rack and which, where the use is in a dishwasher, is of a shape which tends not to retain food particles thrown against it.

In one aspect of my invention, I provide a chamber having side walls and a front opening, wherein there is an article support rack. Secured to the side walls are support means which support the rack for horizontal movement between a position entirely within the chamber to a position partly outside the chamber. A stop means, provided at the inner end of the rack, is movable from a first operative position wherein it engages the support means when the rack is partly outside the chamber, to a second inoperative position which permits complete removal of the rack from the chamber. Connecting means extend forwardly from the stop means to the outer end of the rack, i.e., to a point substantially adjacent the front opening of the chamber when the rack is entirely within the chamber. At the front end of the connecting means is a manually operable control member. Adjustment of the stop member between its operative and inoperative positions can thus be effected from the front of the rack by operation of the control member.

Other features and advantages of my invention will be apparent from the following detailed description of a presently preferred embodiment thereof, read in connection with the accompanying drawings in which:

FIGURE 1 is a side elevational view in cross-section of a dishwasher embodying my improved rack slide stop;

FIGURE 2 is an enlarged fragmentary view similar to FIGURE 1 illustrating my invention in a different position;

FIGURE 3 is a view along line 3—3 in FIGURE 1;

FIGURE 4 is an enlarged fragmentary side elevational view illustrating my invention in greater detail; and

FIGURE 5 is an end view taken along line 5—5 of FIGURE 4 and illustrating the control member of my invention.

Referring first to FIGURE 1, my invention is shown in an otherwise conventional domestic dishwasher in which an outer casing 1 includes a suitable structure 2 for the support of a dishwasher tub, or chamber 3. The tub and outer structure are constructed to provide registering front wall openings, with respect to which a door 4 is hinged at its bottom (hinges not shown) so as to swing between the normally closed vertical position shown in FIGURE 1, and a horizontal open position. Suitable gasket means (not shown) are normally interposed between the door and the periphery of the tub opening to provide for sealing against the leakage of water during operation of the machine.

A pair of vertically spaced racks 5 and 6 are provided within tub 3. Each of the two racks is formed of wire in the conventional manner so as to receive, in suitable position for washing, a varied assortment of dishes, glassware and the like (not shown). Also, each of the two racks is mounted so as to move horizontally forward (to

the left, as viewed in FIGURES 1 and 2) when door 4 is opened, so that the articles in the racks are accessible for loading and unloading purposes. Conventionally, rack 6 is provided with roller members 7 secured thereto. Rollers 7 roll on tracks 8 secured to side walls 9 of tub 3 and then, as the rack moves horizontally out of the tub, continue to roll on appropriately formed surfaces (not shown) provided on the inner face of the door which, as has been stated, is horizontal when open. The support arrangement for giving the desired movability to upper rack 5, including the stop means of my invention, will be discussed in detail herebelow, after the general description of the dishwasher is completed.

A conventional time cycle control 10 is mounted in a convenient location in the upper portion of door 4. By well known circuitry, control 10 is arranged to control the operating mechanism disposed in a machinery compartment 11 below the tub, programing the mechanism so as to provide a desired sequence of washing and rinsing operations, and a final drying operation. The mechanism within compartment 11 may include, for instance, a solenoid valve 12 connected by piping 13 to a hot water supply (not shown) and supplying water to tub 3 by way of a pipe 14 arranged in relation to a side wall inlet fitting 15 so as to provide the one inch air gap generally required by plumbing codes.

The operating components may further include a pump 16 arranged to be driven by a reversible electric motor 17 and providing for recirculation of water from the sump portion 18 of the tub through a cylindrical pump discharge outlet 19. This recirculation system will normally include a peripheral inlet to the pump, the inlet being provided with any suitable screening or filter device, such as that shown at 20. Pump 16 is essentially of the axial flow type, having a shroud or cover 21 which diverts the pump discharge to a vertical flow through outlet 19.

The pump structure of the dishwasher shown also includes in its lower portion a secondary pump chamber 22 containing a bladed rotor (not shown) which is effective to pump a substantial amount of liquid when rotating in one direction but has substantially no pumping action when rotated in the opposite direction. The discharge pump casing communicates with a discharge conduit 23 which carries vitiated fluids from the dishwasher to any suitable sewer or septic line (not shown) when the pump is rotating in the appropriate direction.

The operating mechanism may further include a conventional pressure operated switch, schematically shown at 24, which by well known electrical circuitry will open the solenoid valve 12 to prevent accumulation of more than a predetermined amount of water within the dishwasher tub.

Outlet 19 communicates with a reaction-type spray arm 25 having orifices arranged in the usual way so that, upon issuance of water therefrom, spray arm 25 is caused to rotate, the water upon issuance providing a cleansing effect on dishes contained in racks 5 and 6. In addition to the spray arm 25, the dishwasher may include a conduit 26 leading from the spray arm up to another water discharge device, such as that shown at 27, which is particularly suited to discharge liquid between the racks 5 and 6. This has the effect of improving the washing of articles in rack 5 and of rinsing down any food particles which may be on the articles in rack 6. It will be understood that member 27 may either be rotated by mechanical connection to spray arm 25 through conduit 26, or by having jet orifices of its own to provide the reaction force necessary for rotation.

It is desirable in machines of this type that the upper rack 5 be mounted so that it will move horizontally between a position entirely within tub 3, as shown in FIGURE 1, to a position substantially entirely outside the tub when door 4 is open. In this connection, it is a known expedient to use rollers mounted on the side walls of the tub, with a track member being mounted to move on the rollers and the rack then being mounted to move on the track member. With such an arrangement, the track member may move partly out of chamber 3, and then rack 5 may move partly beyond the end of the track member, the combination of the two factors providing substantially complete removal of the rack member from within tub 3.

A presently preferred supporting structure providing the environment for my invention will now be described. It will be understood that, while structure associated with the one side wall 9 shown in the figures, is featured throughout the following description, an identical structure is cooperatively provided in connection with the opposite side wall of the dishwasher so that the same supporting arrangement is provided on each side of the rack.

Rotatably mounted on wall 9 is a first upper pair of rollers including a front roller 28 and a back roller 29, a second intermediate pair of rollers including a front roller 30 and a back roller 31, and a third lower pair of rollers including a front roller 32 and a back roller 33. Each roller may be secured to the tub wall by any desired means. For instance, as shown clearly in the enlarged FIGURE 3, and in specific connection with roller 29, the roller is formed with a central opening through which a member 34 having a threaded portion 35 may be passed, the threaded portion engaging the tub wall 9 and an appropriate receiving member 35*a*. Member 34 provides a bearing surface 35*b* on which roller 28 may rotate freely.

Each of the rollers 28, 29, 30, 31, 32 and 33 has a peripheral groove, that is, the periphery thereof is concavely curved so as to provide a groove 36. Rollers 28, 30 and 32, and rollers 29, 31 and 33 are spaced vertically an equal distance from each other so as to receive therebetween an elongated track member 37. It will be observed that the pairs of vertically aligned rollers permit the upper rack 5 to be supported at two different elevations within tub 3. Obviously, additional pairs of rollers may be provided in a similar fashion so that the upper rack 5 may be supported at a plurality of elevations within the tub.

Track member 37 is preferably of a simple elliptical shape. The smoothly curved ends of the major axis of the ellipse of track member 37 are received in the peripheral grooves 36 of the rollers between the upper and intermediate rollers i.e., the major axis of the ellipse extends vertically.

Track member 37 has secured thereto a front roller 38 and a back roller 39. As is particularly well shown in FIGURE 3, each of these rollers may be secured to the track member 37 by any suitable means, such as, for instance, a rivet 40, which passes through the track member transversely in the direction of the minor axis of the ellipse, and is secured to a part 41 of the roller 38. Roller 38 is, in effect, made in two parts, the one part 41 as already described and the other being a part 42. Part 41 includes an outer portion 43 and a central groove-forming portion 44. Part 42 simply comprises an outer portion which, when part 42 is in position as shown, cooperates with the different portions of part 41 to form groove 46. Part 42 is secured to part 41 by any suitable device such as a threaded member 47 which is passed through parts 42 and 41 at the axis thereof. Thus, with part 41 secured to track 37, and with part 42 secured to part 41, a complete roller 38 secured to the track is provided.

It is readily observable from FIGURES 1 and 2, more particularly FIGURE 2, that the rollers 38 and 39 are received within horizontally extending slots 48 and 49 formed by the vertically spaced horizontally extending central sections of wires 50 and 51, in the case of roller 38, and wires 52 and 53, in the case of roller 39. Referring particularly to wires 50 and 51 they are both connected to each other and to the bottom wire 54 of rack 5 by any suitable means, such as, for instance, spot welding, both at their front ends 55 and at their back ends 56. The wires 50 and 51 may appropriately be formed of a wire similar in gauge to the same material of which the rest of rack 5

is formed; this has been found to improve the appearance of the rack, as a whole, and to permit assembly of the wires **50** and **51** to the other parts of the rack in exactly the same way as the remainder of the rack is assembled to each other.

Another advantage obtained is the ease of assembly of the rack to the track member and the rollers mounted on the track member. Referring particularly to FIGURE 3, it can readily be seen that portion **44** of part **41** may be passed through the slot **48** between the two wires **50** and **51**, and that thereafter the last portion **42** of the roller may be assembled so as to provide the roller groove **46** with the wire elements in position therein.

With this arrangement, each track member **37** may move axially in and out from a position entirely within tub **3**, as shown in FIGURE 1, to a position where part of it is out of tub **3**, as shown in FIGURE 2. The limit of motion of member **37** in going horizontally out of tub **3** may be predetermined by the provision of my rack stop means described in detail herebelow.

A presently preferred embodiment of the rack stop means forming the subject matter of my invention is best seen in FIGURES 3, 4 and 5. Referring first to FIGURES 3 and 4, it will be observed that disposed within at least one track member **37** is a longitudinally extending rod **57**. Rivets **40** (FIGURE 3) maintain rod **57** in the lower portion of track member **37**. At the outer end of track **37**, rod **57** terminates in a control arm **58** projecting substantially perpendicular to the axis of rod **57**. A stop tab **59** is rigidly secured to the inner end of rod **57** by flattening the end of rod **57** after tab **59** is mounted thereon. As shown in FIGURE 4, stop tab **59** is of a length slightly less than that of the major axis of the elliptical track member **37**. Rod **57** thus serves as a connecting means between control arm **58** and stop tab **59**. Plastic caps (not shown) having an opening through which the rod may pass, may be inserted at the ends of track member **37** to seal the interior thereof.

Normally, stop tab **59** extends downwardly as shown in FIGURE 2, and into the path of roller **31**. Tab **59** engages roller **31** as track member **37** is pulled out, thereby stopping further outward motion of track member **37** and rack **5**. When control arm **58** is rotated 180° as shown in FIGURES 4 and 5, tab **59** will likewise be so rotated and will now extend upwardly. Since tab **59** is shorter than the major axis of elliptical track member **37**, the tab is adapted when so positioned to pass between the pair of rollers **28** and **29**. This then permits track member **37** to be removed entirely from within the tub. Since the track member is secured to the rack, as heretofore explained, this therefore permits the rack to be easily removed from within the tub and reinserted at a different elevation therein when so desired.

While rod **57** could alternatively be mounted outside track member **37**, placing it within the hollow track member is more desirable, since it is then shielded from the washing operation and therefore cannot act as a "food catcher." In addition, mounting the stop mechanism on the rack structure reduces the number of mechanisms needed, otherwise stop means would have to be provided at each of the possible elevations within the tub. Where only two pairs of rollers are used, the rod could, of course, be mounted on the tub wall, since the rack could then only be placed at a single elevation within the tub.

From the foregoing, it is apparent that I have provided an improved rack stop for a dishwasher. In my present arrangement, the control means for the stop mechanism is readily accessible to the operator, and yet the stop mechanism is economical and mechanically simple. The rack itself may easily be removed from the tub and reinserted at a different elevation therein to accommodate unusually large glasses or platters, whichever the case may be.

While there has been described what is at present thought to be the preferred embodiment of my invention, it will be understood that 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 structure providing a chamber having side walls and a front opening, wherein there is an article-supporting rack, a rack support system comprising;
   (a) a pair of elongated track members of uniform cross-section;
   (b) support means secured to said walls and respectively supporting said track members for horizontal movement along their axes between positions entirely within said chamber to positions partly outside said chamber;
   (c) means securing said rack to said track members for horizontal movement therewith;
   (d) at least one of said track members including stop means operatively associated with the inner end thereof;
   (e) said stop means being movable to a first operative position wherein said stop means engage said support means upon said track members being moved a predetermined distance out of said chamber, thereby stopping further outward motion of said track members;
   (f) said stop means being movable to a second inoperative position which permits said track members and said rack to be moved horizontally until they are removed entirely from within said chamber;
   (g) connecting means within said one of said track members extending forwardly from said stop means to the outer end of said track member to a point near the front opening of said chamber; and
   ((h) said connecting means including a manually operable control member at the front end thereof, whereby adjustment of said stop means between its operative and inoperative positions can be effected from the front of said rack.

2. The combination according to claim **1** wherein said support means comprise pairs of upper, intermediate, and lower rollers, vertically spaced from each other so that each said track member may be received either between the said upper and intermediate rollers or the said lower and intermediate rollers, whereby said rack may be inserted at different elevations within said chamber.

3. The combination according to claim **1** wherein:
   (a) said track members have an elliptical cross section;
   (b) said means secured to said walls include at least upper and lower pairs of support members vertically spaced from each other so that each said track member is received between them;
   (c) each of said support members having a groove for receiving one of said track members, the major axis of the ellipse of said track member cross-section extending vertically;
   (d) said connecting means being movably mounted in the lower curved portion of said one of said track members whereby said track members shield said connecting means from said chamber.

4. The combination according to claim **1** wherein:
   (a) said connecting means comprises a longitudinally extending rod carried within said one of said track members along the bottom edge thereof, said rod being movably mounted for rotation about its longitudinal axis;
   (b) said stop means comprises a tab rigidly secured to said rod and extending substantially perpendicular thereto;
   (c) the length of said tab and the cross-section of said one of said track members being of a relation such that said tab in its operative position is adapted to extend beyond the periphery of said one of said track members and engage said supporting means upon a

predetermined horizontal displacement of said one of said track members out of said chamber;

(d) said tab in its inoperative position adapted not to extend beyond the periphery of said one of said track members, which thereby permits said one of said track members to be removed from said chamber.

References Cited

UNITED STATES PATENTS

1,228,067	5/1917	Severance	312—333
1,569,010	1/1926	Geimer	312—348
2,130,279	9/1938	Knight	312—348 X
2,315,053	3/1943	Hallock	211—153
2,789,024	4/1957	Heisler	312—333
3,288,302	11/1966	Fitzpatrick	312—339 X

FOREIGN PATENTS

824,093	11/1959	Great Britain.

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