Sept. 9, 1969 L. W. GUTH 3,466,105

DOOR-OPERATED RACK EXTENDING AND RETRACTING MEANS FOR A FRONT-OPENING APPLIANCE CABINET

Filed Dec. 21, 1967 4 Sheets-Sheet 1

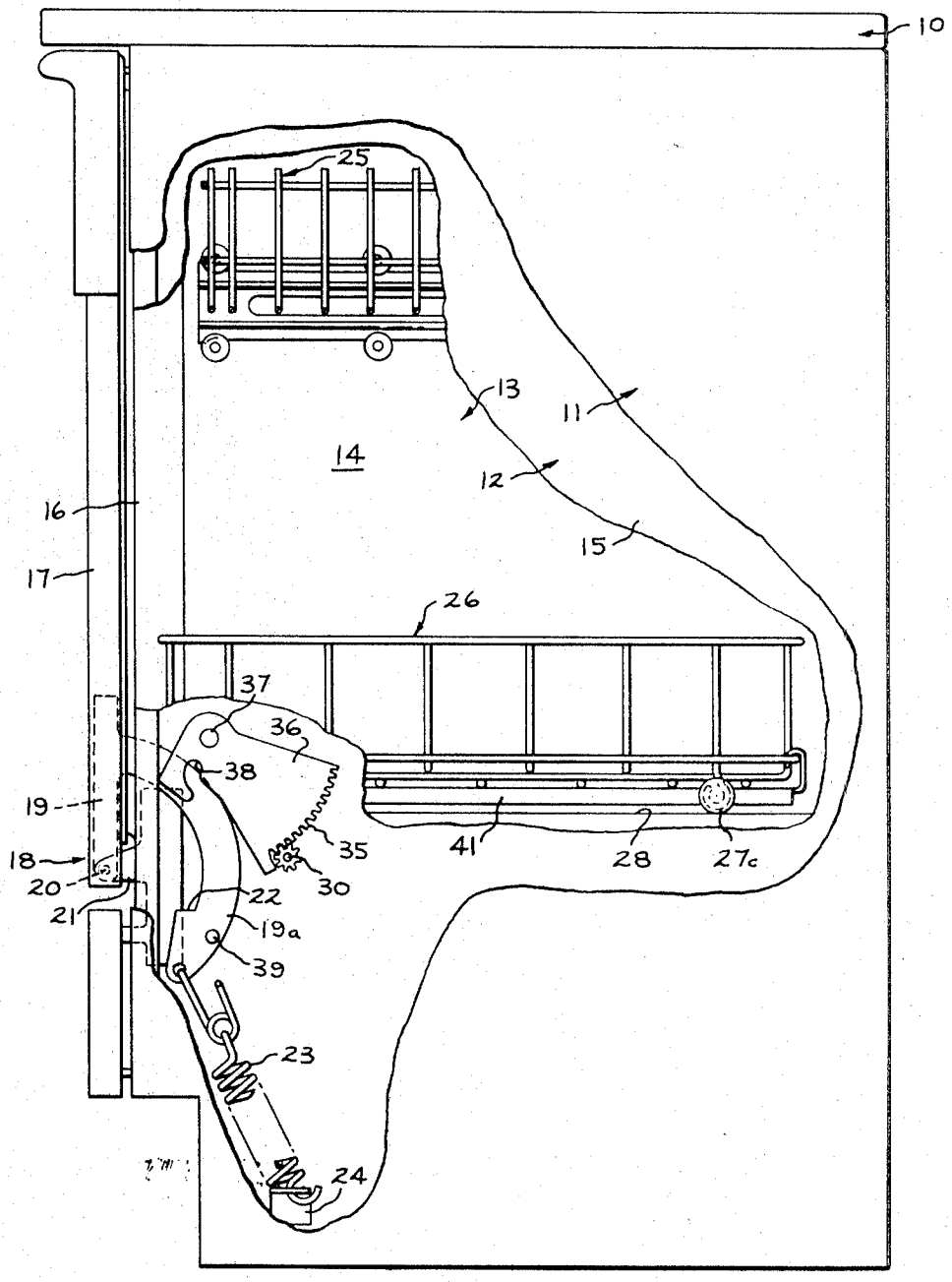


FIG. 1

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FIG.2

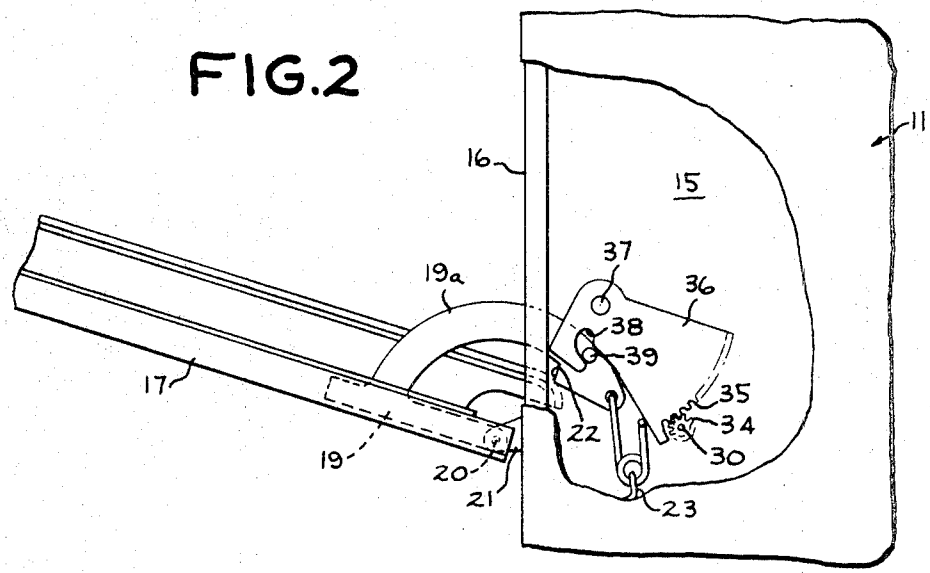
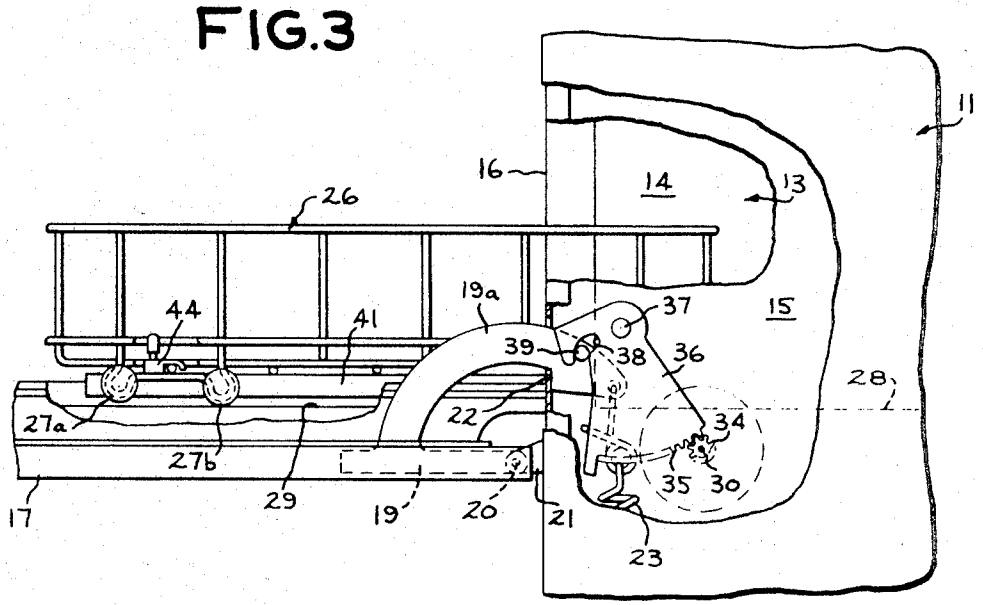


FIG.3



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DOOR-OPERATED RACK EXTENDING AND RETRACTING MEANS FOR A FRONT-OPENING APPLIANCE CABINET

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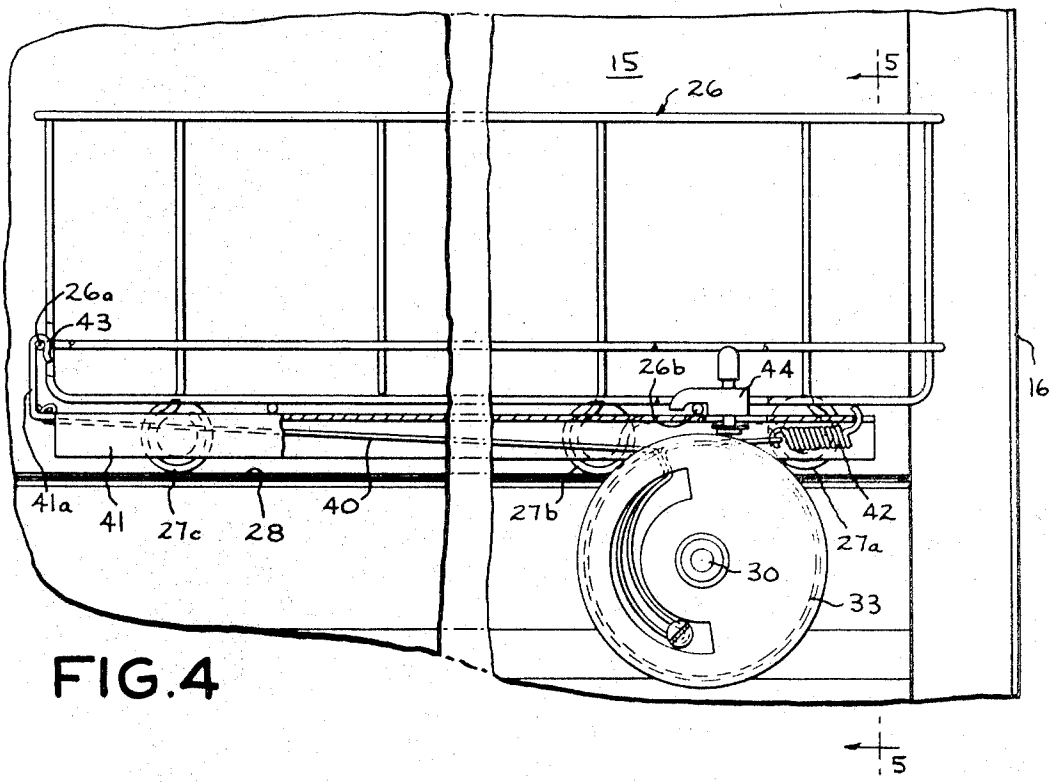
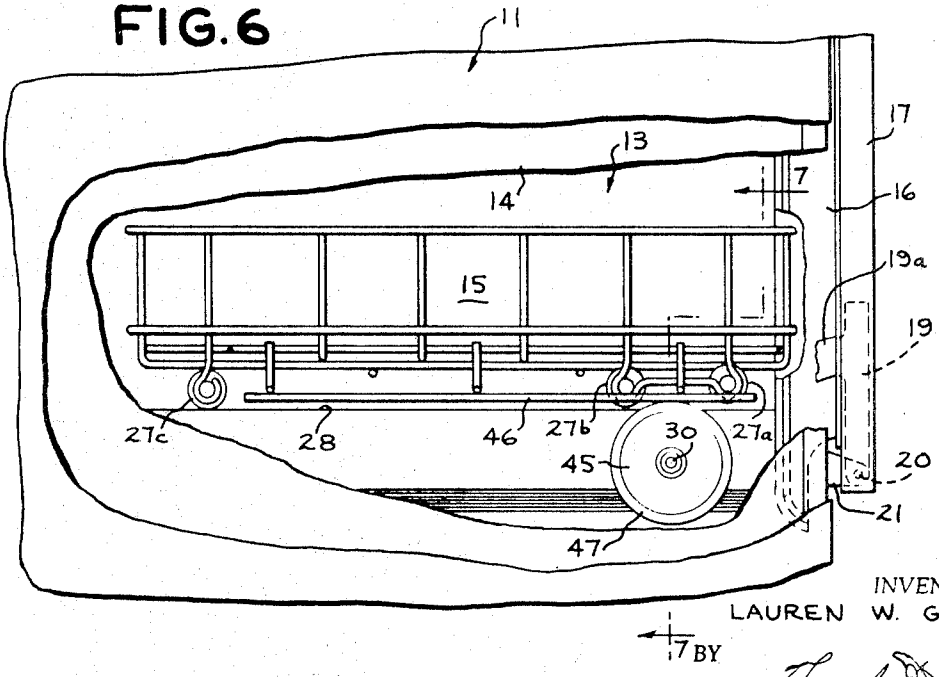


FIG.4

FIG.6



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DOOR-OPERATED RACK EXTENDING AND RETRACTING MEANS FOR A FRONT-OPENING APPLIANCE CABINET

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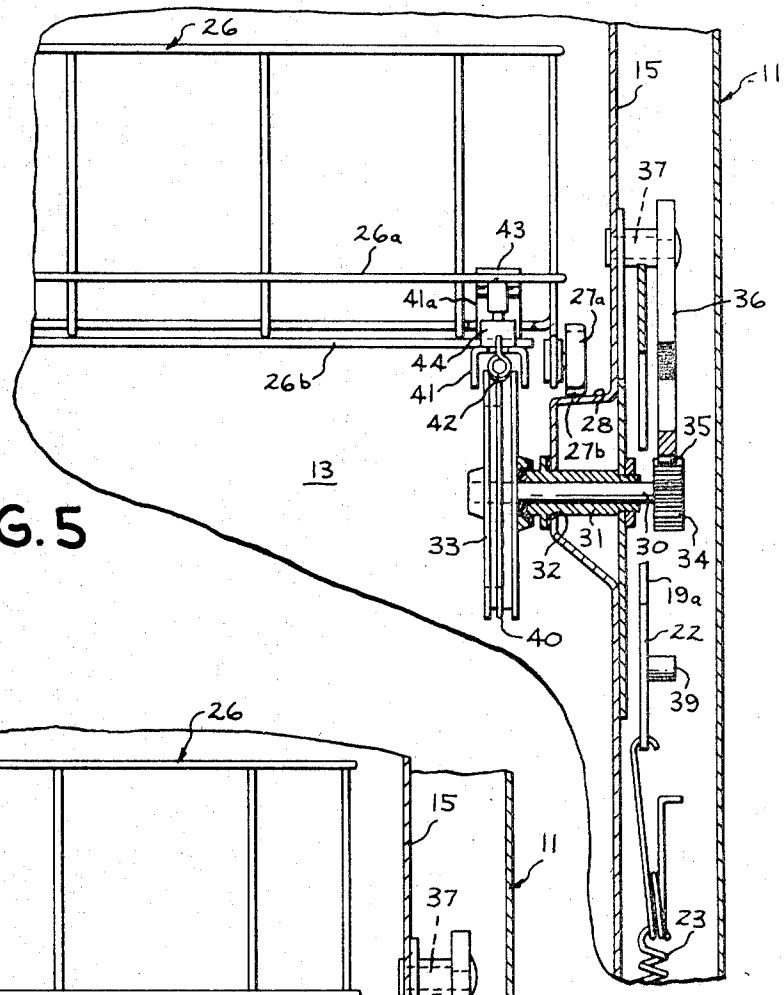


FIG. 5

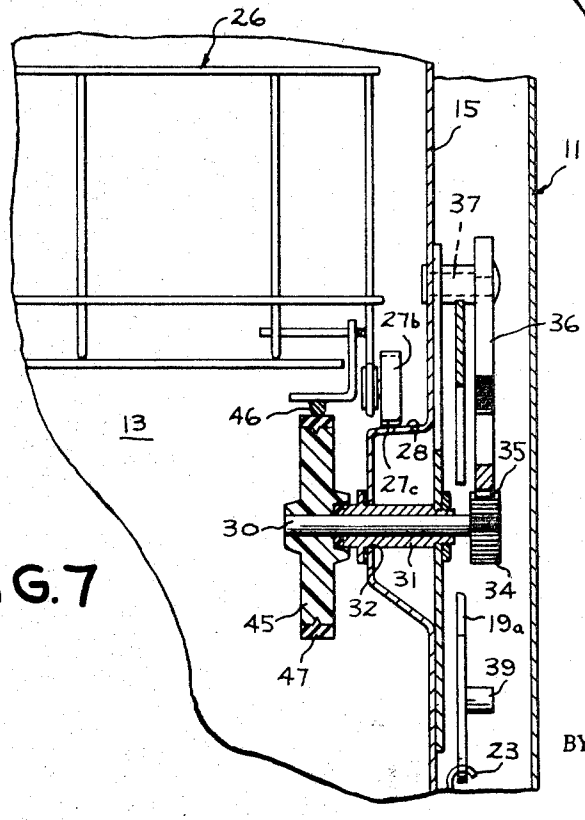


FIG. 7

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United States Patent Office 3,466,105 Patented Sept. 9, 1969

3,466,105

DOOR-OPERATED RACK EXTENDING AND RETRACTING MEANS FOR A FRONT-OPENING APPLIANCE CABINET

Lauren W. Guth, Louisville, Ky., assignor to General Electric Company, a corporation of New York

Filed Dec. 21, 1967, Ser. No. 692,447
Int. Cl. A47b 96/16; F24c 15/16
U.S. Cl. 312—274 12 Claims

ABSTRACT OF THE DISCLOSURE

Door-operated means for extending or retracting an article-receiving rack of an appliance, such as a dishwasher or the like, of the front-opening horizontally-hinged drop-door type. The appliance includes a cabinet structure forming an enclosure having a front wall provided with an access opening and a door for the opening hinged for pivotal movement about its bottom edge between a generally vertical fully closed position and a substantially horizontal fully open position. An article-receiving rack is supported within the enclosure for movement through the access opening on first track means within the enclosure and second track means on the door inner surface, which are horizontally aligned when the door is in its fully open position. Drive means are mounted on one of the enclosure walls for engagement with the movable rack. The drive means are operable, when actuated, to propel a major portion of the rack through the access opening in a fore-and-aft direction. Means carried by the door for pivotal movement therewith are provided for actuating the drive means during only the final few degrees of pivotal opening movement and the initial few degrees of closing movement of the door, whereby the drive means are operated only when the enclosure and door track means are generally horizontally aligned.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates generally to appliances and more particularly to door-operated means for extending and retracting an article-receiving rack of a dishwasher of the front-opening drop-door type.

Dishwashing machines often include a cabinet structure forming a washing enclosure having an access opening through the front side wall thereof. The access opening is usually provided with a door hinged at its bottom for pivotal movement from a vertical to a horizontal position to permit access to the washing enclosure. In such machines, rack means are provided for supporting articles to be washed within the washing enclosure. These rack means commonly include an open framework rack supported on rollers that rest upon tracks on the enclosure side walls at the lower portion of the enclosure. The door is also provided with tracks which align with the enclosure tracks when the door in its horizontal or fully open position, and the rack is manually rolled along the enclosure and door tracks to position the same over the open door to facilitate loading of the rack. Following loading, the rack must be manually rolled on the door and enclosure tracks to a retracted position wholly within the enclosure tracks to a retracted position wholly within the enclosure and the door, then, manually closed by an additional subsequent manual operation. Hence, it would be desirable if the door and the rack could be interconnected so that manual opening and closing of the door would simultaneously respectively result in automatic extension and retraction of the rack,

whereby the conventionally required additional manual operations of the rack could be eliminated.

Description of the prior art

U.S. Patents No. 3,058,479 and 3,248,158 disclose door-operated means for extending an article-receiving rack of a dishwasher of the front-opening drop-door type. However, these prior-art means operate to extend only a small fraction of the rack onto the open door and the dishwasher operator is still required to manually further extend the rack in order to conveniently load the same.

SUMMARY OF THE INVENTION

The present invention provides improved door-operated means for extending and retracting the article-receiving rack of an appliance, such as a dishwasher or the like, of the front-opening horizontally hinged drop-door type, wherein the rack is supported for movement through the access opening on first rack means within the enclosure and on second track means on the door, which are horizontally aligned when the door is in its fully open position. In accordance with the present invention, drive means are mounted on a wall of the enclosure for engagement with the movable rack. The drive means are operable, when actuated, to propel a major portion of the rack through the enclosure opening in a fore-and-aft direction. Means carried by the door for hinged pivotal movement therewith are provided for actuating the drive means during only the final few degrees of the opening or the initial few degrees of the closing movements of the door, whereby the drive means are operated only when the enclosure and door track means are generally horizontally aligned.

BRIEF DESCRIPTION OF THE DRAWING

The present invention is illustrated in the accompanying drawings, wherein:

FIGURE 1 is a right side elevational view, with parts broken away to illustrate details, of an automatic dishwasher incorporating the present invention, with the washing enclosure access opening door shown in its vertical or fully closed position;

FIGURE 2 is a fragmentary view similar to FIGURE 1, showing in detail the condition of the door-operated rack extending and retracting means as the door approaches its final few degrees of opening movement or completion of its initial few degrees of closing movement;

FIGURE 3 is a view similar to FIGURE 2, but showing the condition of the rack extending and retracting means with the door in its horizontal or fully open position;

FIGURE 4 is an enlarged partly broken fragmentary elevational view of the interior of the right side wall of the washing enclosure of the dishwasher of FIGURE 1, with portions of the lower rack and the means for engaging the same to the door-operated drive means shown in cross-section;

FIGURE 5 is a view taken substantially along line 5—5 of FIGURE 4;

FIGURE 6 is a view similar to FIGURE 4 of another form of the present invention; and

FIGURE 7 is a view taken substantially along lines 7—7 of FIGURE 6.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawings and particularly to FIGURE 1 thereof, there is illustrated an automatic dishwasher **10** having a cabinet structure including an outer cabinet **1** and an inner cabinet **12**. It should be noted at the outset that the present invention is not limited in its application to a dishwasher, but may be employed with any appliance cabinet structure. The application of the

present invention in a dishwasher in for purposes of illustration only.

A washing enclosure **13** is defined within the inner cabinet **12** which includes left and right side walls **14** and **15**, and the outer and inner cabinets **11** and **12** are constructed with flanged registering front wall openings mated together to provide an access opening **16** to the washing enclosure **13** so that articles may be placed therein or removed therefrom.

A door **17** is provided for the access opening **16** and is hinged about its bottom edge by hinge means **18** so as to pivot about a horizontal axis between a non-horizontal or generally vertical fully-closed position (FIGURE 1) and a substantially horizontal fully-open position (FIGURE 3).

The hinge means **18** comprise two hinge mechanisms that are respectively provided adjacent the left and right sides of the bottom of the door **17**. While only the right hinge mechanism is shown in the drawings, it should be understood that the left is generally similar in structure. Each of the left and right hinge mechanisms includes a door-mounted hinge member **19** that is hinged by a horizontally-arranged pin **20** to a stationary hinge member **21** that protudes from the front of the cabinet structure beneath the access opening **16**. Each door-mounted hinge member **19** is formed with a generally arcuately-shaped hinge arm **19***a*, which has a distal end that projects rearwardly and downwardly into the space between the outer and inner cabinets **11** and **12** through an aperture provided in the access opening flange. The distal end of each hinge arm **19***a* is provided with a stop surface **22** which engaged the rear face of the inner cabinet access opening flange as the door **17** reaches its horizontal fully open position (FIGURE 3). A tension spring **23** is connected between the distal end of each hinge arm **19***a* and a bracket **24** secured to the base of the cabinet structure. Each spring **23** serves as a counterbalance to facilitate closure of the door **17**.

A pair of vertically spaced open-framework racks **25** and **26** are provided within the washing enclosure **13**. Each of the racks **25** and **26** is formed of wire rods in a conventional manner so as to receive, in suitable position for washing, a varied assortment of articles, such as dishes, glassware and the like (not shown). Also, each of the racks **25** and **26** is mounted so as to move generally horizontally outwardly through the opening **16** (to the left as seen in FIGURES 1–3) when the door **17** is fully open, so that the racks are made accessible for loading and unloading purposes.

The support system for giving this mobility to the upper rack **25** may be of any conventional design. For example, the upper rack **25** may be provided with a slide-out mechanism (not specifically shown), as described and claimed by Norman L. Kendt in U.S. Patent 3,096,-125, issued July 2, 1963 and assigned to the General Electric Company, assignee of the present invention. Since the exact slide mechanism provided for the upper rack **25** is not critical to the present invention, it is not described in detail herein.

The lower rack **26** has a horizontal cross-sectional area substantially equal to that of the enclosure **13** and is provided with a series of roller sets **27***a*, **27***b* and **27***c* on the left and right edges of its bottom. When the rack **26** is positioned wholly within the enclosure in its fully retracted position, at least the rear set of the rollers **27***c* rest upon parallel horizontal surfaces or tracks **28** provided on the interior of the enclosure left and right side walls **14** and **15**. The enclosure tracks **28** extend forwardly from the rear of the enclosure and terminate adjacent the access opening **16**. As best shown in FIGURE 3, other tracks **29** are provided on the inner face of the door **17** which, when the door **17** is pivoted to its fully open position, are horizontally aligned with the enclosure tracks **28** to permit a major portion of the rack **26** to be rolled generally horizontally onto the open door **17**.

As previously indicated, the present invention is particularly concerned with providing means operable by the manual opening and closing of the door **17** to respectively simultaneously automatically perform the extension and retraction of the lower rack **26** from and into the enclosure **13**, whereby the conventionally required additional manual operations for extending and retracing thereof can be eliminated. As described in detail hereinafter, the present invention provides such door-operated means and further provides that they are operable during only the final few degrees of the opening and initial few degrees of the closing movements of the door **17** about the hinge pins **20**, when the enclosure and door tracks **28** and **29** are generally horizontally aligned, whereby undesirable cocking of the rack **26** is avoided during its extension or retraction through the enclosure access opening **16** by the door-operated means of the present invention.

In accordance with a first form of the present invention (FIGURES 1–5), a horizontally-arranged first axle **30** is rotatably journalled in a bearing **31** secured by suitable means in an opening **32** in the enclosure right side wall **15** just below and rearward of the front edge of the right enclosure track **28**. Of course, suitable sealing means are provided to prevent the escape of wash fluid from the enclosure **13** through the spaces between the opening **32** and bearing **31** and the axle **30** and the bearing **31**. A drive pulley **33** is mounted on the inner end of the axle **30** for rotation therewith, and a pinion **34** is similarly mounted on the outer end of the axle **30**. The pinion **34** is meshed with the teeth **35** of a gear segment **36**, which is pivotally mounted on a horizontally-arranged second axle **37** that is fixed on the exterior of the enclosure right side wall **15**, above and forward of the first axle **30**. The gear segment **36** is formed with or has attached to it a notched cam surface **38** which opens downwardly toward the bottom of the dishwasher **10**.

The cam surface **38** is adapted to receive a cam following actuator member or pin **39** mounted on the right door hinge arm **19***a*. The cam following actuator member **39** is adapted to be slidably moved along the cam surface **38** by pivotal movement of the door **17** about the hinge pins **20**, to thereby pivot the gear segment **36** about the fixed axle **37**, thus causing rotation of the pinion **34** and pulley **33**.

As best shown in FIGURES 4 and 5, the pulley **33** is connected by a surrounding cable **40** to an elongate channel-shaped carriage member **41** which is, in turn, detachably connected the right side of the bottom of the lower rack **26**. The legs of the channel-shaped carriage member **41** extend downwardly over and are guided for fore-and-aft movement relative to the right enclosure side wall **15** by the upper edge of the pulley **33**.

One end of the cable **40** is directly attached to the carriage member **41** adjacent the rear end of its web. The opposite end of the cable **40** is connected through a tension spring **42** to a point adjacent the front end of the carriage member web. The spring **42** performs the dual functions of taking up slack in the cable **40** and also biasing the carriage member web toward the upper edge of the pulley **33**. This arrangement maintains alignment of the carriage member **41** over the pulley **33**, even though the lower rack **26** may be detached from the carriage member **41** and completely removed from the dishwasher **10**.

The lower rack **26** is removably mounted on the carriage member **41** by engaging one of the transverse wire rods **26***a* on forming its upstanding rear end in a downwardly and forwardly opening hook **43** formed by an upwardly projecting portion **41***a* of the rear end of the carriage member web and by fastening a transversely-extending wire rod **26***b* adjacent the front of the rack bottom with a clamp member **44** pivoted atop and adjacent the front end of the carriage member web. Obviously, with arrangement, the lower rack **26** can be readily

detached from the carriage member **41** and completely removed from the dishwasher **10**, if desired.

Undesirable cocking of the rack **26** during its extension or retraction through the enclosure access opening **16** is avoided by so arranging the cam following actuator member **39** on the door hinge arm **19***a* and the cam surface **38** on the gear segment **36** that the follower-induced pivotal movement of the gear segment **36**, which causes rotation of the pinion **34** and pulley **33** that, in turn, imparts fore-and-aft movement of the carriage member **41** and the lower rack **26**, is limited to the final few degrees of the opening and initial few degrees of the closing movements of the door **17**, when the enclosure and door tracks **28** and **29** are generally horizontally aligned with one another. As best illustrated in FIGURES 2 and 3, the cam following actuator member **39** is slidably engaged in the notched cam surface **38** and outward or inward propulsion of the carriage member **41** and rack **26** through the opening **16** respectively commences or ends when the door **17** is within a few degrees, for example 17°, of the horizontal plane. Furthermore, as shown in FIGURES 3 and 4, the foremost set of rollers **27***a* are journalled on the rack **26** at a slightly higher elevation than the other roller sets **27***b* and **27***c*, whereby they can be rollingly engaged with and guided by the door tracks **29** when the door **17** is slightly above the horizontal plane, and, thus, further function to avoid undesirable cocking of the rack **26**.

Assuming that the lower rack has been attached by the above-described hook **43** and clamp member **44** to the carriage member **41**, as shown in FIGURES 4 and 5, and that the door **17** is in its fully closed position (FIGURE 1), the form of the present invention shown in FIGURES 1–5, preferably operates in the following manner. The dishwasher operator manually pivots the door **17** downwardly about the hinge pins **20** toward its fully open position (FIGURE 3). The rack **26** will remain in its retracted position, wholly within the enclosure **13**, until the door **17** is within a few degrees of the horizontal plane and the enclosure and door tracks **28** and **29** are generally horizontally aligned with one another (FIGURE 2), whereupon the cam following actuator member **39** on the door hinge arm **19***a* enters the notched cam surface **38** on the gear segment **36**. Once the cam following actuator member **39** enters the notched cam surface **38**, continued manual downward movement of the door **17** about the hinge pins **20** (FIGURE 3) moves the follower **39** along the cam surface **38** causing the gear segment **36** to pivot about the fixed axle **37** (clockwise as seen in FIGURES 1–3). This, in turn, rotates the pinion **34** and pulley **33** (counterclockwise as seen in FIGURES 1–3) to propel the carriage member **41** outwardly through the access opening **16** (to the left as seen in FIGURES 1–3), rolling the rack roller sets **27***a–c* along the generally horizontally aligned enclosure and door tracks **28** and **29** to extend a major portion of the rack **26** over the top of the open door **17**. Of course, downward movement of the door **17** is stopped by the engagement of the hinge arm stop surfaces **22** against the rear face of the access opening flange as the door reaches the fully open or horizontal position (FIGURE 3).

The lower rack **26** can now be retracted wholly within the enclosure **13** by a single manual operation of pivoting the door **17** upward about the hinge pins **20**. This upward movement of the door **17** is, of course, assisted by the counterbalance springs **23**. The initial few degrees of this upward manual movement of the door **17** cause the cam following actuator member **39** to slide along the cam surface **38**, pivoting the gear segment **36** about the fixed axle **37** (counter-clockwise as seen in FIGURES 1–3) which, in turn, rotates the pinion **34** and pulley **33** (clockwise as seen in FIGURES 1–3) and thus propels the carriage member **41** and the attached lower rack **26** inwardly through the access opening **16** (to the right as seen in FIGURES 1–3) to a retracted position wholly within the enclosure while the enclosure and door tracks **28** and **29** are generally horizontally aligned with one another (FIGURES 2 and 3).

FIGURES 6 and 7 illustrate details of another form of the present invention which is generally similar to that described above, but which substitutes a drive wheel **45** for the pulley **33** on the inner end of the axle **30**. In this alternative form of the present invention, the cable **40**, carriage member **41** and spring **42** are omitted and the lower rack **26** is merely frictionally engaged with the drive wheel **45**. As illustrated in FIGURES 6 and 7, this frictional engagement is accomplished by providing a rail **46** fixed on the bottom of the lower rack adjacent its right edge. The rail **46** extends in a fore-and-aft direction and can be frictionally engaged with the upper edge of a tire **47**, which may be formed of an elastomeric material and suitably fixed around the outer circumference of the drive wheel **45**.

When the rack **26** is in its retracted position wholly within the enclosure **13** (FIGURE 6), the rear of the rack **26** is supported by the rear rollers **27***c*, which rest upon the enclosure tracks **28**, and the front of the rack **26** is supported by the rail **46**, which rests on the drive wheel tire **47**. In this retracted position, both of the front roller sets **27***a* and **27***b* are elevated from the enclosure tracks **28**.

Assuming that the lower rack **26** is positioned wholly within the enclosure **13** with its rail **46** in frictional engagement with the upper surface of the drive wheel tire **47** (FIGURES 6 and 7) and that the door **17** is in its fully closed position (FIGURE 1), this alternative form of the present invention (FIGURES 1–3 and 6–7) preferably operates in the following manner. The dishwasher operator manually pivots the door **17** downwardly about the hinge pins **20** towards its fully open position (FIGURE 3). The rack **26** will remain in its retracted position wholly within the enclosure, until the door **17** is within a few degrees of the horizontal plane and the enclosure and door tracks **28** and **29** are generally horizontally aligned with one another (FIGURE 2), whereupon the cam following actuator member **39** on the door hinge arm **19***a* enters the notched cam surface **38**. After the cam following actuator member **39** enters the notched cam surface **38**, continued manual downward movement of the door **17** about the hinge pins **20** (FIGURE 3) moves the cam following actuator member **39** along the cam surface **38**, causing the gear segment **36** to pivot about the fixed axle **37** (clockwise as seen in FIGURES 1–3). This, in turn, rotates the pinion **34** and the drive wheel **45** (counterclockwise as seen in FIGURE 3) to propel the frictionally engaged rail **46** and the attached lower rack **26** outwardly through the enclosure access opening **16** (to the left as seen in FIGURES 1–3). As the rotation of the drive wheel **46** propels the rail **46** and the attached lower rack **26** outwardly through the opening **16**, the front roller sets **27***a* and **27***b* are rollingly engaged with the door tracks **29** and guided therealong to extend a major portion of the rack **26** over the top of the open door **17**. When the balance point of rail **46** passes outwardly over the top of the drive wheel tire **47**, the rear rollers **27***c* are elevated from the enclosure tracks rack **26**, thus leaving the rear portion of the rack **26** supported by the rail **46** that rests on the upper edge of the tire **47**, and the front of the rack is supported by the rollers **27***b* which rest on the door tracks **29**. Downward movement of the door **17** is stopped by engagement of the hinge arm stop surfaces **22** against the rear of the access opening flange as the door **17** reaches open or horizontal position (FIGURE 3).

The lower rack **26** can now be retracted wholly within the enclosure **13** by a single manual operation of pivoting door **17** upward about the hinge pins **20**. This upward movement of the door **17** is, of course, assisted by the counterbalance springs **23**. Retraction of the rack **26** is also accomplished by this alternative form of the present invention during only the initial few degrees of closing movement of the door **17**, when the cam follower **39** is

within the notched cam surface **38**, and when the enclosure and door tracks **28** and **29** are generally horizontally aligned (FIGURES 2 and 3). The initial few degrees of this manual upward movement of the door **17** causes the cam following actuator member **39** to slide along the cam surface **38**, pivoting the gear segment **39** to slide along the cam surface **38**, pivoting the gear segment **36** on the fixed axle **37** (counter-clockwise as seen in FIGURES 1–3) which, in turn, rotates the pinion **34** and drive wheel **45** (clockwise as seen in FIGURES 1–3) and thus propels the frictionally engaged rail **46** and attached lower rack **26** inwardly through the access opening **16** (to the right as seen in FIGURES 1–3) to a retracted position wholly within the enclosure (FIGURES 1 and 2). As the balance point of the rail **46** passes inwardly over the tire **47**, the rear rollers **27***c* are lowered into contact with the enclosure tracks **28** to provide support for the rear of the rack and the front of the rack is supported by the rail **46** which, of course, rests on the tire **47**.

Thus, it can be seen, that the present invention provides improved means for extending and retracting the article-receiving rack of an appliance, such as a dishwasher or the like, of the type including a cabinet of the front-opening horizontally-hinged drop-door type, which are operable by the manual opening and closing of the door to respectively simultaneously automatically extend and retract a major portion of the rack generally horizontally through the cabinet opening, whereby the conventionally required additional manual operations for extending and retracting the rack can be eliminated.

As will be evident from the foregoing description, certain aspects of the present invention are not limited to the particular details of construction of the forms illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. For example, other equivalent means, such as a rack and pinion, could be substituted for the drive wheel **45** and frictionally engaged rail **46** in the form of the invention shown in detail in FIGURES 6 and 7. Furthermore, the cam surface **38** on the gear segment **36** of both of the illustrated invention forms could be modified so that the door **17** and the pulley **33** or drive wheel **45** are actuated by the door-carried cam following actuator member **39** only during the final few degrees of the door opening movement, whereby the door-operated means of the present invention would operate only to extend the lower rack **26** but not to retract it. Also, while the present invention is illustrated as being installed only at the enclosure right side wall **15**, it obviously could be installed at the left side wall **14** or installed in duplicate at both side walls **14** and **15**.

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

1. In an appliance, such as a dishwasher or the like, of the type including a cabinet structure forming an enclosure having a wall provided with an access opening and a door for the opening hinged for pivotal movement between non-horizontal fully closed position and a substantially horizontal fully open position, and an article-receiving rack supported for movement through the opening on first track means within the enclosure and second track means on the door, which are horizontally aligned when the door is in its fully open position, door-operated means for respectively simultaneously extending a major portion of the rack through the opening upon opening of the door and retracting the rack wholly within the enclosure upon closing of the door, comprising:

(a) drive means mounted on a wall of the cabinet structure for engagement with the rack and operable, when actuated, to propel a major portion of the rack through the access opening; and

(b) actuator means mounted on the door for hinged pivotal movement therewith for actuating said drive means during only the final degrees of opening and initial degrees of closing movements of the door when the enclosure and door track means are generally horizontally aligned.

2. The invention of claim **1**, further including means for detachably connecting the rack to said drive means, whereby the rack can be readily completely removed from the appliance.

3. The invention of claim **1**, further including means for frictionally engaging the rack to said drive means, whereby the rack can be readily completely removed from the appliance.

4. The invention of claim **1**, wherein said drive means comprises:

(a) a first axle rotatably journalled in a wall of the enclosure and having an inner end inside the enclosure and an outer end outside the enclosure;

(b) a drive member mounted on said inner end of said axle for rotation therewith;

(c) means for engaging the rack with said drive member;

(d) a pinion mounted on said outer end of said axle for rotation therewith;

(e) a second axle fixed on the cabinet structure outside of the enclosure;

(f) a gear segment provided on said second axle and meshed with said pinion; and

(g) cam means on said gear segment pivotally movable therewith about said second axle;

(h) said cam means being engageable with said actuator means for movement thereby during only the final degrees of opening and initial degrees of closing movements of the door when the enclosure and door track means are generally horizontally aligned.

5. The invention of claim **4**, wherein:

(a) said drive member comprises a wheel; and

(b) said means for engaging the rack with said drive member comprise

(i) tire means mounted on said wheel and

(ii) rail means fixed on the rack and frictionally engageable with said tire means.

6. The invention of claim **4**, wherein:

(a) said drive member comprises a pulley; and

(b) said means for engaging the rack with said drive member comprise

(i) a carriage member connected by cable means to said pulley and guided by said pulley for movement relative to the enclosure, and

(ii) means for detachably connecting the rack to said carriage member, whereby the rack can be readily completely removed from the appliance.

7. In an appliance, such as a dishwasher or the like, of the type including a cabinet structure forming an enclosure having a wall provided with an access opening and a door for the opening hinged for pivotal movement between a non-horizontal fully closed position and a substantially horizontal fully open position, and an article-receiving rack supported for movement through the opening on first track means within the enclosure and second track means on the door, which are horizontally aligned when the door is in its fully open position, door-operated means for simultaneously extending a major portion of the rack outwardly through the opening upon opening of the door comprising:

(a) drive means mounted on a wall of the cabinet structure for engagement with the rack and operable, when actuated, to propel a major portion of the rack through the access opening;

(b) actuator means mounted on the door for hinged pivotal movement therewith for actuating said drive means to propel the major portion of the rack outwardly from the enclosure during only the final degrees of opening movements of the door when the enclosure and door track means are generally horizontally aligned.

8. The invention of claim **7**, further including means for detachably connecting the rack to said drive means,

whereby the rack can be readily completely removed from the appliance.

9. The invention of claim **7**, further including means for frictionally engaging the rack to said drive means, whereby the rack can be readily completely removed from the appliance.

10. The invention of claim **7**, wherein said drive means comprises:

(a) a first axle rotatably journalled in a wall of the enclosure and having an inner end inside the enclosure and an outer end outside the enclosure;

(b) a drive member mounted on said inner end of said axle for rotation therewith;

(c) means for engaging the rack to said drive member;

(d) a pinion mounted on said outer end of said axle for rotation therewith;

(e) a second axle fixed on the cabinet structure outside of the enclosure;

(f) a gear segment pivoted on said second axle and meshed with said pinion; and

(g) cam means on said gear segment pivotal therewith about said second axle;

(h) said cam means being engageable with said actuator means for movement thereby to cause said drive member to rotate to propel the rack outwardly from the enclosure during only the final degrees of opening movements of said door when the enclosure and door track means are generally horizontally aligned.

11. The invention of claim **10**, wherein:

(a) said drive member comprises a wheel; and

(b) said means for engaging the rack with said drive member comprise

(i) tire means on said wheel and

(ii) rail means fixed on the rack and frictionally engageable with said tire means.

12. The invention of claim **10**, wherein:

(a) said drive member comprises a pulley; and

(b) said means for engaging the rack with said drive means comprise

(i) a carriage member connected by cable means to said pulley and guided by said pulley for movement relative to the enclosure, and

(ii) means for detachably connecting the rack to said carriage member, whereby the rack can be readily completely removed from the appliance.

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