Sept. 21, 1954 G. J. FEDERIGHI ET AL 2,689,639

MECHANISM FOR MOVING DISH-CONTAINING BASKETS

Filed April 13, 1951

4 Sheets-Sheet 1

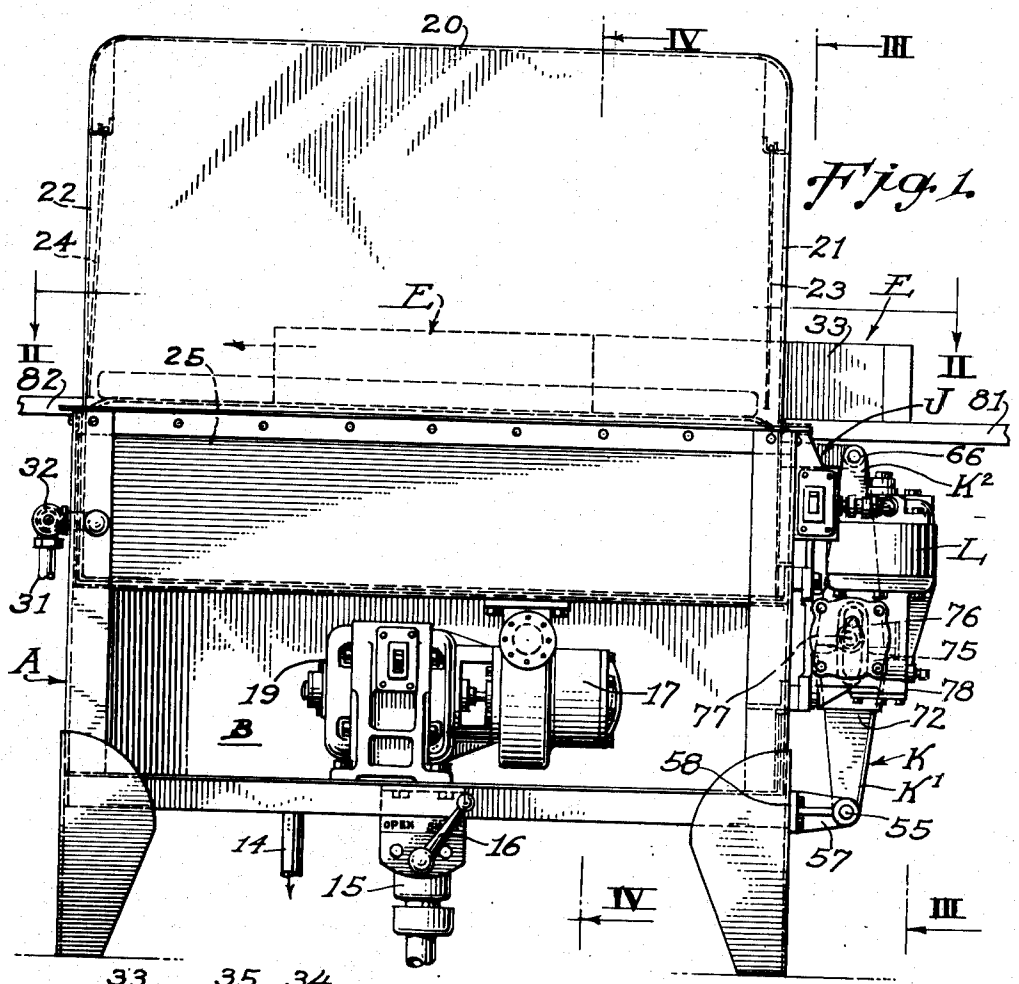


Fig. 1.

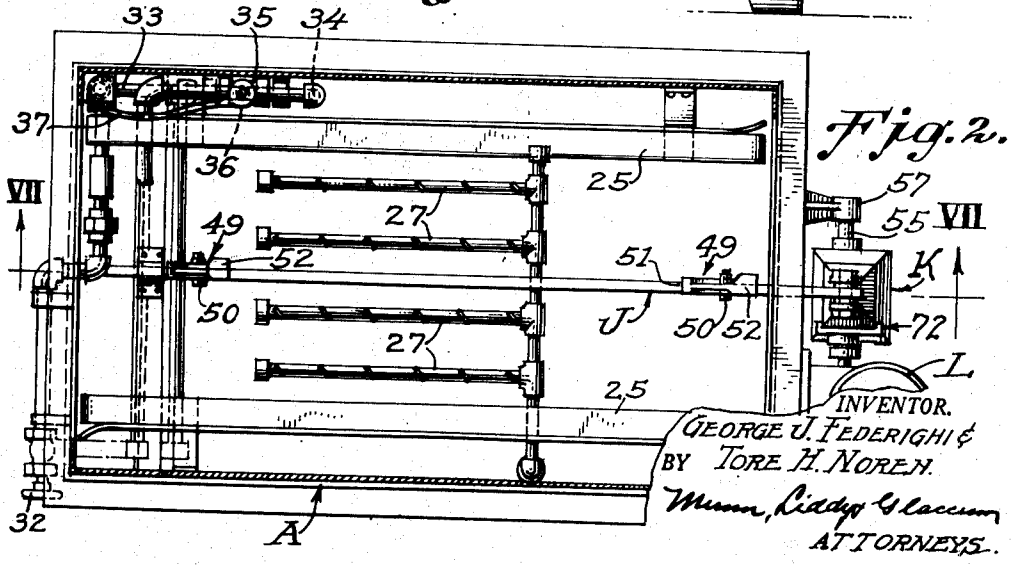


Fig. 2.

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4 Sheets-Sheet 2

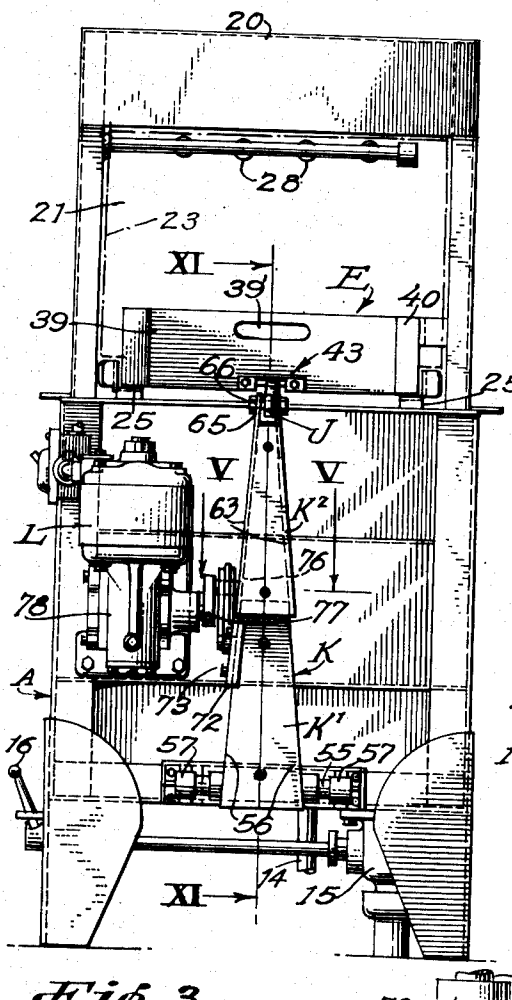


Fig. 3.

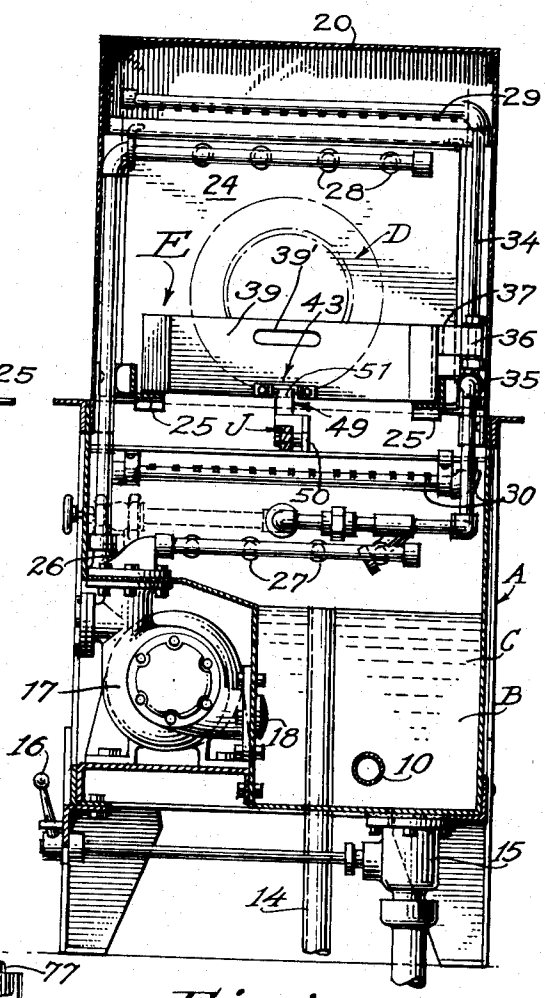


Fig. 4.

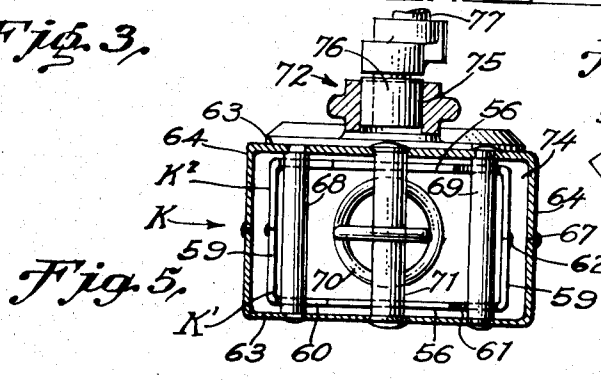


Fig. 5.

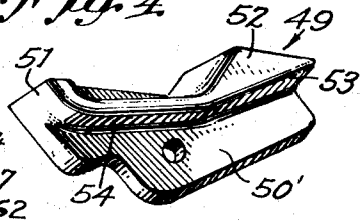


Fig. 6.

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4 Sheets-Sheet 3

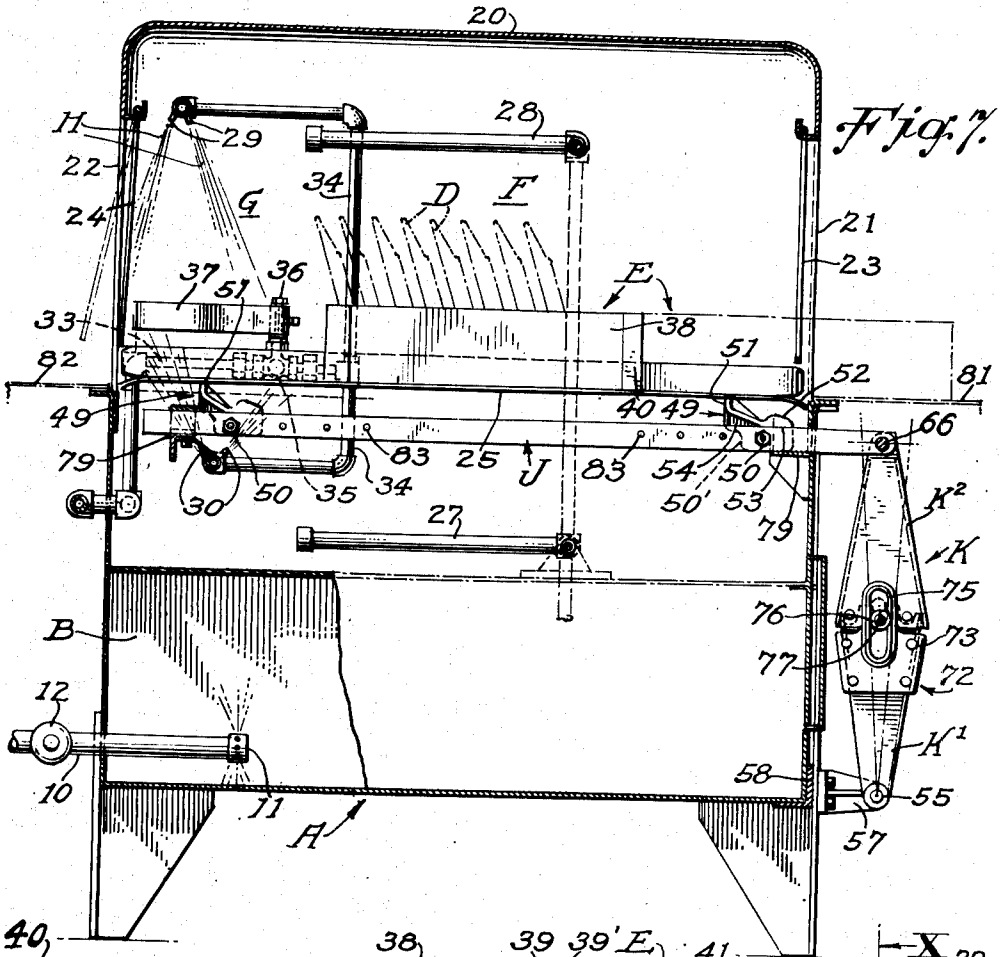


Fig. 7.

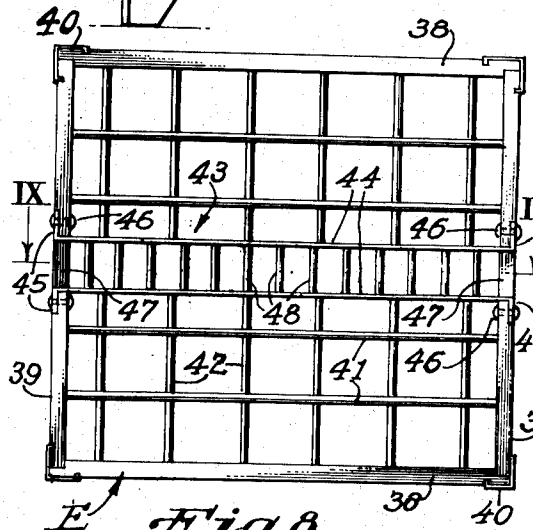


Fig. 8.

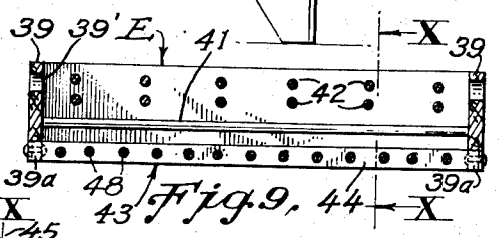


Fig. 9.

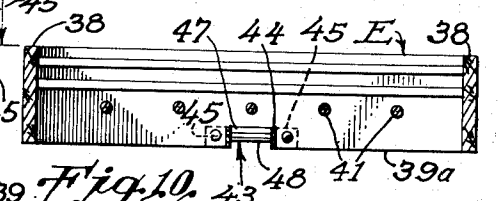


Fig. 10.

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MECHANISM FOR MOVING DISH-CONTAINING BASKETS

Filed April 13, 1951 4 Sheets-Sheet 4

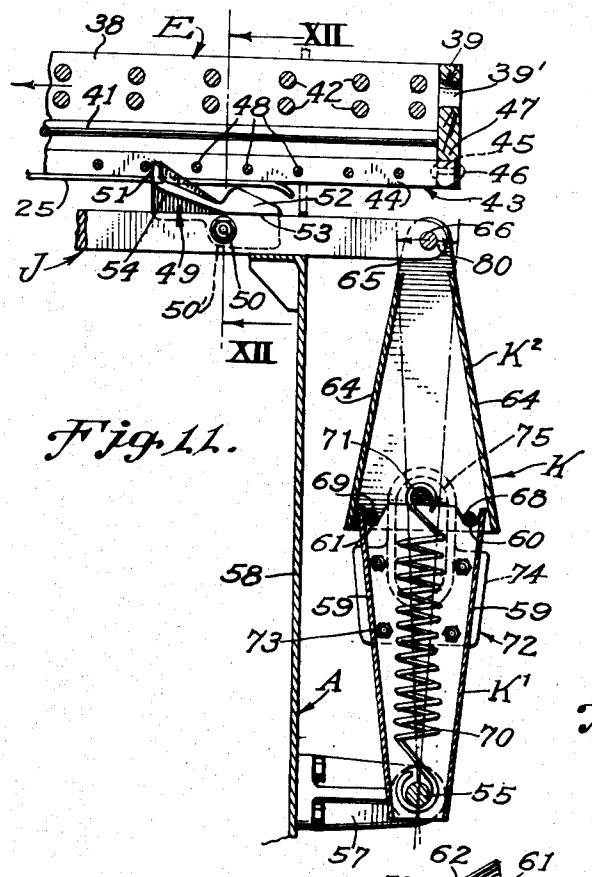


Fig. 11.

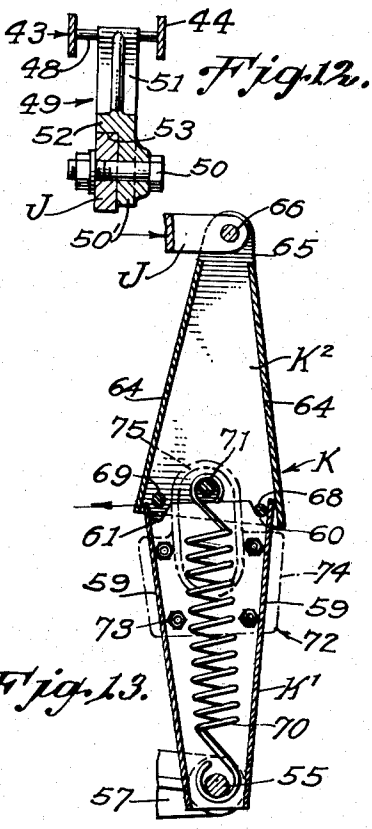


Fig. 12.

Fig. 13.

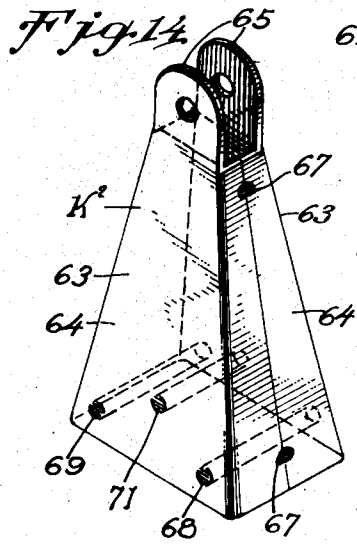


Fig. 14.

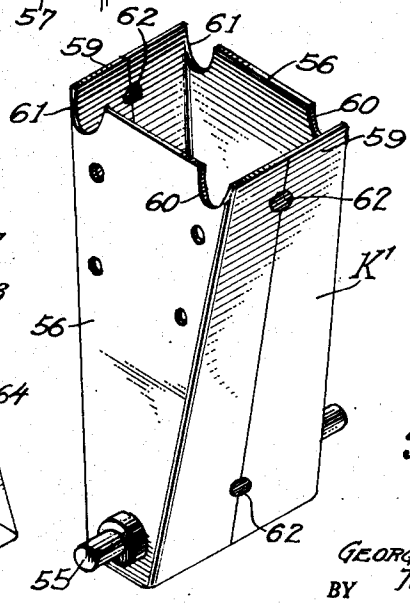


Fig. 15.

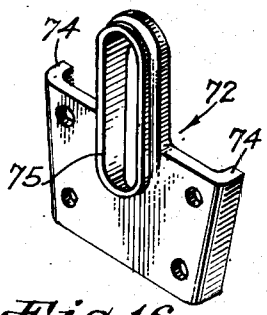


Fig. 16.

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2,689,639

UNITED STATES PATENT OFFICE

2,689,639

MECHANISM FOR MOVING DISH-CONTAINING BASKETS

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San Francisco, Calif.

Application April 13, 1951, Serial No. 220,954

3 Claims. (Cl. 198—218)

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The present invention relates to improvements in a mechanism for moving dish-containing baskets through an automatic dish-washing machine. It consists of the combinations, constructions and arrangement of parts, as hereinafter described and claimed.

In conventional dish-washing machines now on the market, it has been the practice to employ a motor-driven pump for discharging detergent-containing water over dishes as the latter are advanced through the machine. Moreover, such machines provide for rinsing the dishes before they clear the machine, and this rinsing is accomplished automatically as the dish-containing baskets are advanced.

These conventional machines utilize a gear-reduction unit on the pump motor, which is connected to a pawl bar for moving the baskets of dishes through the machine. However, it has been found that this arrangement places undue strain on the pump motor; leakage of oil from the reduction unit into the pump motor often occurs, fouling the motor brushes; and the motor of the pump is subjected to the heat of the water heater and the hot water itself. Also, considerable wear on the pawl bar, and the mechanism for operating the latter, often results in improper advancing of the dish-containing baskets; and at times the baskets remain in the rinsing compartment. These failures consume an excess amount of rinsing water, which will dilute the washing water.

An object of our invention is to provide a mechanism for advancing the dish-containing baskets that is separate and independent from the pump motor. Our improved mechanism is driven by a second motor, which is mounted outside of the heat zone; the mechanism is positive in operation; the baskets are advanced at the proper speed and pass through the rinsing compartment without causing an excess amount of rinsing water to be used. In the event that the baskets should become jammed in the machine, a yielding lever of the basket-advancing mechanism will flex temporarily. This lever will reset itself as soon as the jammed basket is removed.

As a further object, we provide pawls for engaging with rungs of ladders provided on the baskets. These pawls are swingably-mounted on a reciprocating pawl bar by means of bolts; however, the pawls are so constructed as to relieve these pivot bolts of much as the strain when the pawls are advancing the baskets.

Other objects and advantages will appear as the specification continues. The novel features of our invention will be set forth in the claims hereunto appended.

Drawings

For a better understanding of the invention, reference should be had to the accompanying

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drawings, forming part of this application, in which:

Figure 1 is a side elevational view of our improved dish-washing machine;

Figure 2 is a horizontal sectional view taken along the plane II—II of Figure 1;

Figure 3 is an elevational view of the basket-inserting end of the machine, as seen from the plane III—III of Figure 1;

Figure 4 is a transverse vertical sectional view taken along the plane IV—IV of Figure 1;

Figure 5 is a horizontal sectional view taken through the yielding lever, as seen from the plane V—V of Figure 3;

Figure 6 is a perspective view of one of the pawls that we employ for advancing the dish-containing baskets;

Figure 7 is a longitudinal vertical sectional view taken along the plane VII—VII of Figure 2, portions being shown in elevation;

Figure 8 is a bottom plan view of one of our baskets;

Figure 9 is a longitudinal sectional view of the basket, taken along the plane IX—IX of Figure 8;

Figure 10 is a transverse sectional view of the basket, taken along the plane X—X of Figure 9;

Figure 11 is a fragmentary vertical sectional view taken along the plane XI—XI of Figure 3, illustrating the yielding lever in normal upright position and suggesting the arc of swing of this lever;

Figure 12 is a transverse sectional view taken along the plane XII—XII of Figure 11, and disclosing the pawl engaging with a horizontal ladder carried by the basket;

Figure 13 is a view similar to Figure 12, and showing the relative positions of the parts of the yielding lever when a basket becomes jammed in the machine;

Figures 14 and 15 are isometric views of the upper and lower parts, respectively, of the yielding lever; and

Figure 16 is an isometric view of a bracket, which is adapted to be anchored to the lower part of the yielding lever, and provided with a slot to receive an eccentric roller of the basket-advancing motor.

While we have shown only the preferred form of our invention, it should be understood that various changes, or modifications, may be made within the scope of the annexed claims without departing from the spirit thereof.

Detailed description

In carrying our invention into practice, we provide a supporting cabinet-like structure indicated generally at A. This structure has a reservoir B extending lengthwise thereof in its lower portion, which contains the washing water C (see

Figure 4). Detergents are placed in this water to aid in washing the dishes D.

Any suitable means may be provided for heating the washing water, such as steam or gas. For this purpose, we show a steam pipe 10 extending into the reservoir B for injecting steam into the latter. A silencer 11 is coupled onto the discharge end of this pipe, while a valve 12 controls the flow of steam into the reservoir. In Figure 4, we show an overflow pipe 14 for carrying away excess water from the reservoir.

Moreover, a drain valve 15 is provided at the bottom of the reservoir B, and the draining of the water is controlled by a handle 16. A water pump 17 has its inlet 18 communicating with the reservoir (see Figure 4). This pump is operated by a motor 19, see Figure 1.

The upper part of the cabinet-like structure A defines a hood 20 having an entrance opening 21 at the front thereof and an exit opening 22 at its rear. The openings 21 and 22 may be closed by the drop-curtains 23 and 24, respectively.

The dishes to be washed are placed in baskets designated generally at E, the construction of which will be set forth as the specification continues. These baskets are guided on a pair of horizontal spaced-apart rails 25 extending lengthwise through the bottom portion of the hood.

It will be noted that the interior of the hood 20 defines washing and rinsing compartments F and G, respectively (see Figure 7). The outlet 26 of the water pump (see Figure 4) is connected to a plurality of slotted pipes 27, which are arranged horizontally beneath the baskets E. Also, the pump outlet is coupled to a plurality of slotted pipes 28 mounted horizontally above these baskets. During operation of the dishwashing machine, hot detergent-containing water C is discharged upwardly by the pipes 27 and downwardly by the pipes 28 so as to wash the dishes D.

After the dishes have been washed, the baskets E are advanced into the rinsing compartment G. Upper and lower spray nozzles 29 and 30, respectively, are arranged above and below the baskets to discharge hot rinsing water H over the dishes. This water is supplied from any suitable source and flows through a pipe 31, which has a manually-actuated valve 32 therein (see Figure 1). From this pipe, the hot rinsing water is conveyed by a main pipe 33 and branch pipes 34 to the nozzle 29—30 (see Figures 2 and 7).

The spraying of the hot rinse water from the nozzles 29 and 30 is controlled by the forward advancement of the baskets E; that is, toward the left in Figure 7. This is accomplished by placing a basket-operated valve 35 in the main pipe 33. The stem 36 of this valve has an arm 37 projecting therefrom, which is disposed to be deflected by the baskets E into a position for opening the valve 35 as the baskets pass through the rinsing compartment G (see Figures 2, 4 and 7). After each basket leaves the hood 20 through the exit opening 22, the valve 35 is closed automatically to cut off flow of the rinsing water.

It is customary to use rinsing water of about 180° F., and this water drains downwardly into the open-top reservoir B. Of course, an excess amount of rinsing water in the reservoir will dilute the detergent-carrying wash water C, which will result in washing the dishes without enough of detergent. Moreover, the heating of the rinsing water is costly.

Accordingly, the baskets E must be advanced along the rails 25 without becoming jammed in the rinsing compartment, which would hold the valve 35 in open position. Therefore, it is important that the baskets be advanced positively by mechanism that is not subject to wearing or developing lost motion.

The mechanism for advancing the baskets E includes a reciprocating bar J and a yielding lever K. The latter is actuated by a motor L, which is mounted on the front end of the cabinet-like structure A. This motor is disposed on the outside of the structure so that it will be cooled by the atmosphere.

Referring now to the details of the baskets, as shown in Figures 8 to 10, inclusive, each basket includes a rectangular frame made up of longitudinal sides 38 and transverse ends 39. The ends have hand-gripping openings 39' therein. Reinforcing brackets 40 are provided on the exterior corners of the basket (see Figure 8). The top and bottom of this rectangular frame are opened so as to allow the washing and rinsing waters to flow through the interior of the frame. For the purpose of supporting the lower edges of the dishes D, longitudinal bars 41 are anchored to and extend between the ends 39. The dishes are spaced apart and held in generally upright positions (see Figure 7) by transverse bars 42 that are fastened to the sides 38.

A horizontally-disposed ladder 43 is mounted longitudinally of each basket E. This ladder is provided with side rails or bars 44 having angle-shaped ends 45, which are secured by rivets 46 to the transverse ends 39 of the basket frame (see Figure 8). The ends 39 are notched, as at 47, to allow the lower edges of the bars 44 to be flush with the underneath edges 39a of these transverse ends (see Figures 9 and 10). Spaced-apart rungs 48 are fixed to the bars 44 of the ladder so as to extend transversely therebetween.

Returning now to the reciprocating bar J, it will be observed that a pair of spaced-apart pawls 49 are swingably secured by pivot bolts 50 to this bar. The forward end of each pawl is provided with an upwardly-extending nose 51, see Figure 6, which is designed to engage with the rungs 48 of the ladder 43 (see Figures 11 and 12). The back portion of each pawl in the rear of the pivot bolts 50 is enlarged to provide a weighted end 52, which will swing the pawl by gravity into the position shown in Figure 11; that is, the nose 51 will engage behind one of the rungs of the ladder.

In order to relieve the pivot bolts 50 of the pawls from the greater part of the strain as the pawls advance the baskets E to the left in Figures 7 and 11, the weighted end 52 projects over the bar J (see Figures 6 and 12). The underneath surface 53 of this weighted end is adapted to bear against the top edge of the bar to take the strain as the pawl pushes the baskets E forwardly. Upon retraction of the bar J to the right in Figure 11, the pawl will swing counter-clockwise about its pivot bolt 50, allowing the nose 51 to move beneath the next rung in the ladder. The underneath surface 54 of the nose end of the pawl overlies the top of the bar J and limits counter-clockwise swinging of the pawl. The surfaces 53—54 are arranged at an angle relative to each other, and are positioned to one side of the flange 50' on the pawl through which the bolt 50 passes.

The structural features of our yielding lever K are disclosed in Figures 1–3, 5, 7, 11 and 13–16, inclusive. This lever includes lower and upper bell-shaped parts K1 and K2, respectively, which

normally swing together as a unit. However, these two parts will yield in the event that a dish-containing basket E becomes jammed in the dish-washing machine.

As shown in the drawings, the lower part K1 has a shaft 55 fixed thereto so as to project beyond opposite side walls 56 thereof (see Figure 15). The ends of this shaft are journalled in brackets 57, which are mounted on and parallel the front end wall 58 of the cabinet-like structure A. The side walls 56 converge upwardly relative to one another, as shown in Figures 3 and 15, while the front and rear walls 59 diverge upwardly with respect to each other (see Figures 11, 12 and 15). This lower part is mounted for swinging toward and away from the front wall 58. The side walls 56 of the lower part K1 have two pairs of notches 60—60 and 61—61 fashioned adjacent to the front and rear walls, respectively.

In practice, the lower part K1 is open at its top and bottom and is made from two metallic pieces, which are channel-shaped in horizontal section. The flanges of these channels are butted against one another and are spot welded together at 62, as clearly disclosed in Figure 15.

Referring now to the upper part K2 of the yielding lever, it is made in the shape of a truncated pyramid (see Figure 14), and is opened at its top and bottom. The side walls 63 and the front and rear walls 64 converge upwardly, with these side walls terminating in a pair of spaced-apart perforated ears 65. The forward end of the reciprocating bar J is swingably connected between these ears by a bolt 66.

The upper part K2 is fashioned from a pair of metallic pieces having channel-shaped cross-sections. As shown in Figures 5 and 14, the flanges of these channels register with one another and are spot-welded together at 67.

As shown in Figures 5, 11, 13 and 14, front and rear transverse rods 68 and 69, respectively, are provided on the upper part K2. When the axes of the parts K1 and K2 are aligned with one another, as in Figure 11, the rods 68 and 69 are seated in the notches 60 and 61, respectively. A coil spring 70 is disposed interiorly of the parts K1 and K2, and has its lower end anchored to the transverse shaft 55. The upper end of this spring is anchored to a transverse rod 71, the ends of which are welded to the side walls 63 of the upper part K2.

Assuming that the lower part K1 is swung counterclockwise in Figure 11, but the bar J is held against forward movement due to a basket E jamming in the machine, the rod 68 will continue being seated in the notches 60, as shown in Figure 13. Under these conditions, the rod 69 will rise above the bottom of the notches 61. As soon as the jammed basket is removed, the spring 70 again will return the parts K1 and K2 to axial alignment with each other. Thus, we have termed the parts K1 and K2 as constituting a "yielding lever."

For imparting swinging movement to this yielding lever, a bracket indicated generally at 72 is fastened to the lower part K1 by bolts 73 (see Figures 3, 7, 11 and 13). This bracket has marginal flanges 74 that converge downwardly so as to conform to the taper of the front and rear walls 59 of the lower part K1 (compare Figures 15 and 16).

The bracket 72 has an elongated slot 75 fashioned therein for receiving an eccentric roller 76 (see Figures 1, 3, 5 and 7). This roller is moved in a circular path by an output shaft 77 of a gear reduction unit 78 of the motor L (see Figure 3). It is quite apparent that the eccentric roller will impart swinging movement to the parts K1 and K2, with the roller moving up and down in the slot 75.

In the event that no obstruction is encountered by the baskets E during their forward movement, the parts K1 and K2 will swing as a unit about the shaft 55, which will reciprocate the bar J. The latter is mounted for rectilinear movement by guides 79 (see Figure 7). The arc of swing of the upper end of the yielding lever K is indicated at 80 in Figure 11.

This arc of swing is made approximately one-quarter of an inch longer than the spacing between adjacent rungs 48 of the basket ladder 43. Of course, we do not wish to be limited to this dimension. However, it does insure the fact that after a pawl 49 has engaged with one of the ladder rungs during advancement of a basket E, and thereafter the bar J is retracted, the pawl will engage behind the next rung of the ladder. This excess amount of travel of the bar J will take care of all normal wear on the moving parts of the basket-advancing mechanism.

It will be noted from Figure 7 that two pawls 49 are provided, one adjacent to the entrance opening 21 and the other near the exit opening 22. When a basket is placed on a table 81 at the entrance to the hood and pushed through the opening 21, the right-hand pawl in Figure 7 will engage with the ladder rungs and advance the basket through the washing compartment F. As the basket moves through the rinsing compartment G, the left-hand pawl in Figure 7 will advance the basket through the exit opening onto a receiving table 82.

Summary of operation

The operation of our improved dish-washing machine is summarized briefly as follows:

We will assume that the reservoir B contains washing water C having the proper amount of detergent therein, that the steam pipe 10 (or other heating means) has raised the temperature of this water to the required level, and that the water pump 17 has been placed in operation. Under these conditions, the washing water will be discharged upwardly from the pipes 27 and downwardly from the pipes 28 in the washing compartment F. Moreover, we will assume that the manual valve 12 has been opened so that hot rinsing water H will be discharged from the nozzles 29 and 30 in the rinsing compartment G when the basket-operated valve 35 is opened.

The motor L is turned on, which will oscillate the yielding lever K back and forth through the arc 80 indicated in Figure 11. The machine now is ready to receive the dishes to be washed.

The dishes are racked in the basekts E, as suggested in Figures 4 and 7. These dish-containing basekts are placed on the table 81, and are pushed one at a time into the entrance opening 21 of the hood 20. Initially, the right-hand pawl 49 in Figure 7 will engage with the rungs 48 of the basket ladders 43, advancing the baskets step by step through the washing compartment F.

When the baskets are pushed into the rinsing compartment G, they will open the valve 35 automatically, allowing the rinsing water to issue from the nozzles 29 and 30. The left-hand pawl 49 in Figure 7 will advance the baskets through the rinse compartment G, step by step and out the exit opening 22 onto the receiving table 82.

During forward movement of the reciprocating bar J, the underneath surfaces 53 of the pawls will bear against the top of this bar, relieving the pivot bolts 50 of most of the strain. When the bar J is retracted, the nose ends 51 of the pawls will pass beneath the rungs of the basket ladders lying in their path of movement, and thereafter swing again by gravity into positions where the nose ends will engage with other rungs. The bar J has a number of openings 83 to allow the pawls 49 to be adjusted therealong.

In case a basket E should become jammed in the machine, the eccentric roller 76 will continue to oscillate the lower part K1 of the yielding lever K. However, the upper part K2 will swing into an angular position relative to the lower part, as suggested in Figure 13, thus permitting the bar J to remain stationary until the jammed basket has been removed.

The motor L is mounted on the end of the cabinet-like structure A on the outside of the machine, where it will be cooled by the circulating air. This motor is arranged within easy reach of the operator standing at the feed end of the dish-washing machine.

We claim:

1. In a mechanism for moving dish-containing baskets through an automatic dish-washing machine: a reciprocating bar; a pawl having a vertically arranged flange pivotally secured to the bar; the pawl having a projection extending laterally from one side of the flange and overlying the upper edge of the reciprocating bar; the projection having its under surface provided with two bar-contacting portions that are arranged at an angle with respect to each other for limiting the swinging movement of the pawl in both directions; the forward end of the projection cooperating with the adjacent portion of the forward end of the flange for forming an upwardly-extending basket-pushing nose disposed forwardly of the pivot; the rear portion of the projection constituting a weight that is arranged rearwardly of the pivot; the nose being movable in an up and down direction and limited in its movement by the two bar contacting portions of the projection; the weighted end of the pawl being swingable by gravity to raise the nose and normally hold it in raised position; the bar-contacting surface portion associated with the weighted end, when contacting the bar, relieving the pivot of a substantial amount of strain when the nose is utilized for advancing a basket.

2. In a mechanism for moving dish-containing baskets through an automatic dish-washing machine: a cabinet-like structure; a reciprocating bar extending into the structure for advancing dish-carrying baskets through the structure; one end of the bar projecting clear of the structure; a yielding lever disposed exteriorly of the structure and having an upper part pivoted to the bar and a lower part pivoted to the structure; the upper and lower parts of the lever normally being arranged in axial alignment with one another; yielding means pivotally interconnecting said lever parts for permitting them to swing out of axial alignment with each other when a basket being advanced by the reciprocating bar, becomes jammed; a motor mounted exteriorly of the cabinet-like structure and having a shaft with an eccentric roller mounted thereon; the lower part of the lever having a slotted member adapted to receive the roller so that an actuation of the roller will cause the lower lever part to oscillate about its pivot and to swing the upper lever part therewith for reciprocating the bar; said yielding means permitting the lower part to continue to operate should the reciprocating bar become jammed, the upper part swinging about its pivotal connection with the bar and its pivotal connection with the lower part while the bar remains jammed.

3. In a mechanism for moving dish-containing baskets through an automatic dish-washing machine: a cabinet-like structure having at least one wall; a reciprocating bar extending into the structure for advancing dish-carrying baskets through the structure; one end of the bar projecting clear of the said wall and extending at right angles thereto; a yielding lever disposed exteriorly of the structure and having an upper part with its top pivoted to the projecting portion of the bar and a lower part with its base pivoted to the structure on an axis that parallels the said wall; the upper and lower part of the lever normally being arranged in axial alignment with one another and swingable in a plane that parallels the length of the bar and is at right angles to the said cabinet wall; yielding means pivotally interconnecting said lever parts for permitting them to swing out of axial alignment with each other when a basket being advanced by the reciprocating bar, becomes jammed; the upper lever part being in the shape of a rectangular pyramid with the opposed faces that extend in substantially the same direction as the said cabinet wall, being in the shape of triangles whose bases parallel the said cabinet wall; the lower lever part having four walls, two of the opposed walls of which are in the shape of truncated triangles whose tops are normally disposed close to and parallel the bases of the said triangularly-shaped opposed walls of the upper part, and whose bases are substantially longer than the said tops of the truncated triangles; the pivotal support between the lower lever part and the cabinet-like structure extending along the said axis that parallels the said wall, a distance at least equal to the length of the bases of the truncated triangle walls of the lower lever part; whereby the elongated pivotal support for the lower lever part will withstand lateral strains in the direction of the length of the pivot axis; the pivot connection between the upper lever part and the bar lying in a perpendicular plane that bisects the length of the pivot axis between the lower lever part and the cabinet wall; a motor mounted exteriorly of the cabinet and having a shaft with an eccentric roller mounted thereon; the lower lever part having a slotted member for receiving the roller so that an actuation of the roller will cause the lower lever part to swing and the upper lever part to reciprocate the bar; said yielding means permitting the lower part to continue to operate should the bar become jammed.

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