

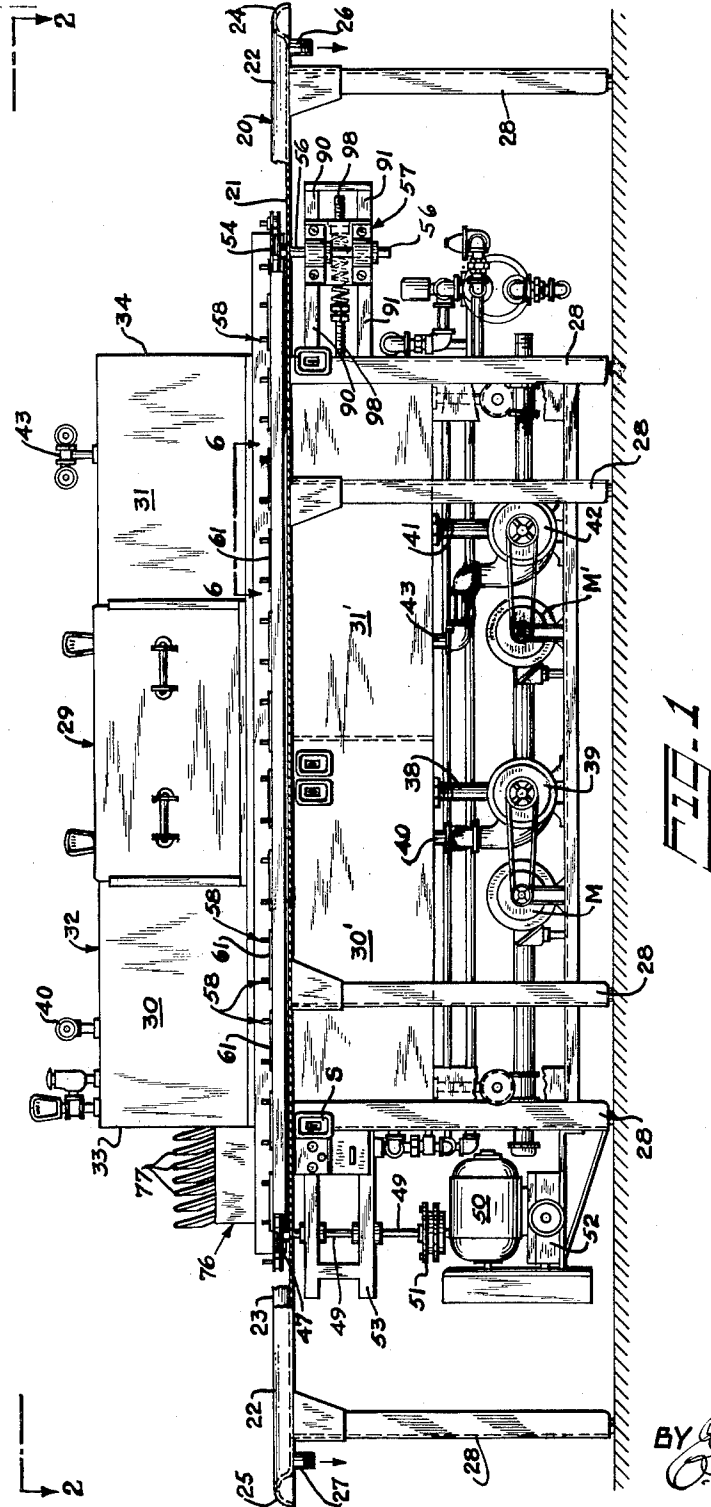
June 26, 1962

H. F. LYMAN
DISHWASHING MACHINE

3,040,874

Filed Sept. 1, 1959

5 Sheets-Sheet 1



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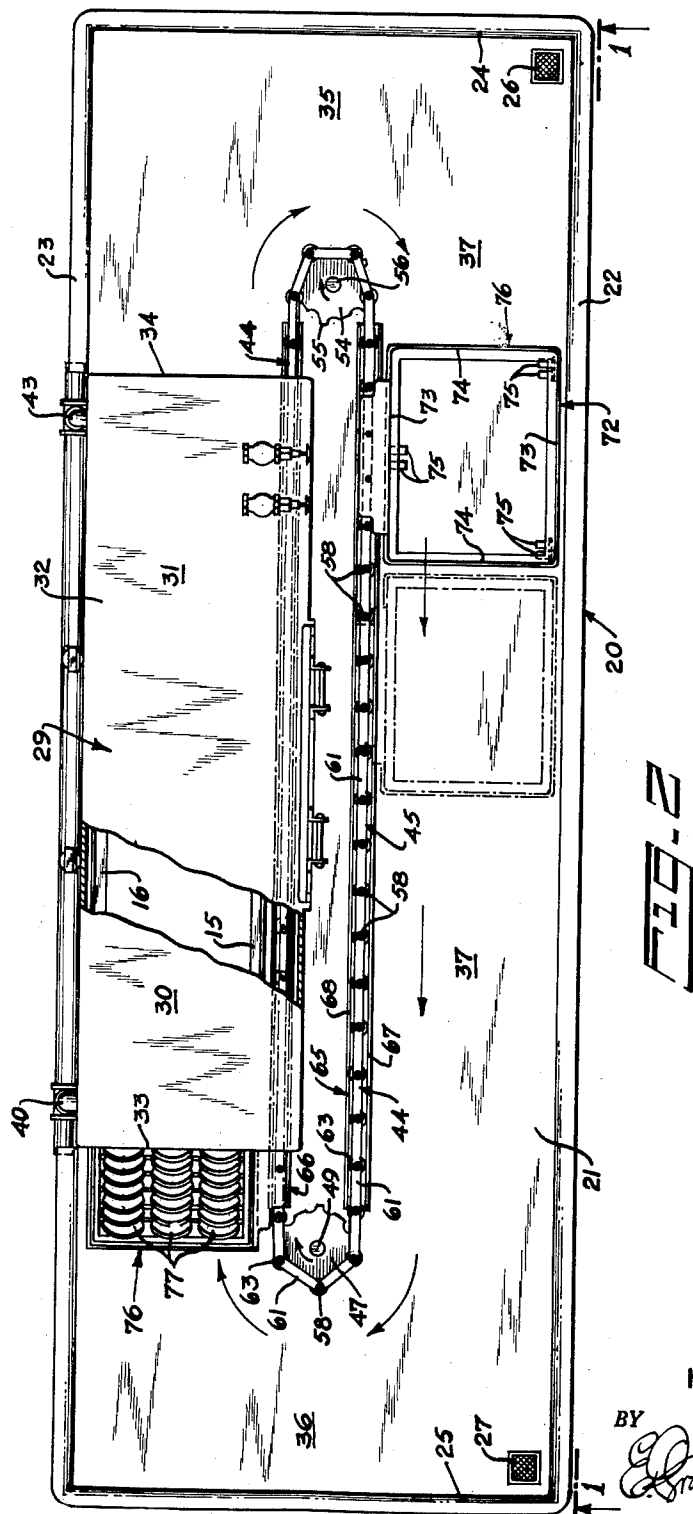
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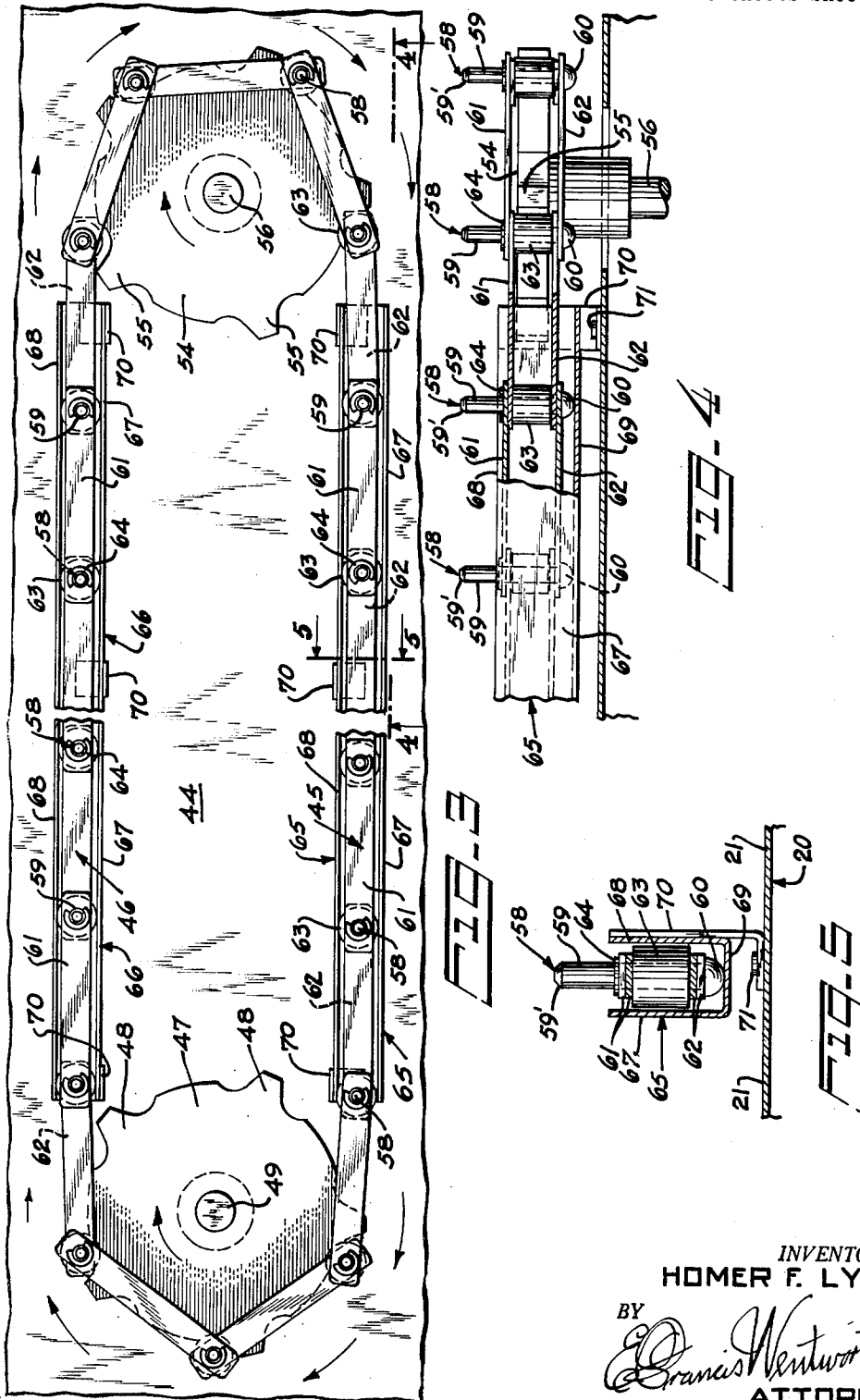
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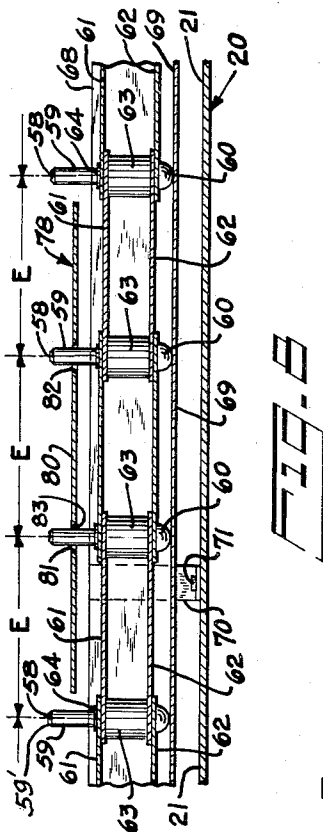
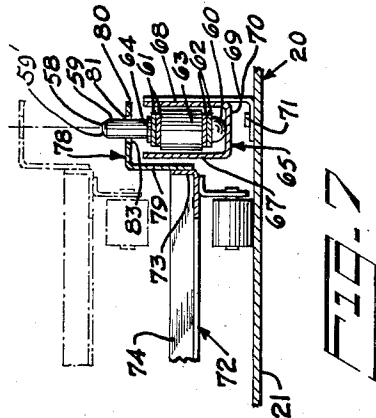
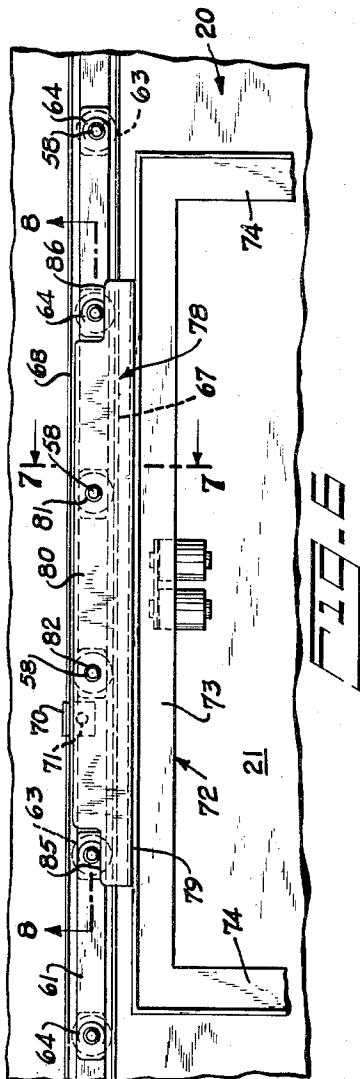
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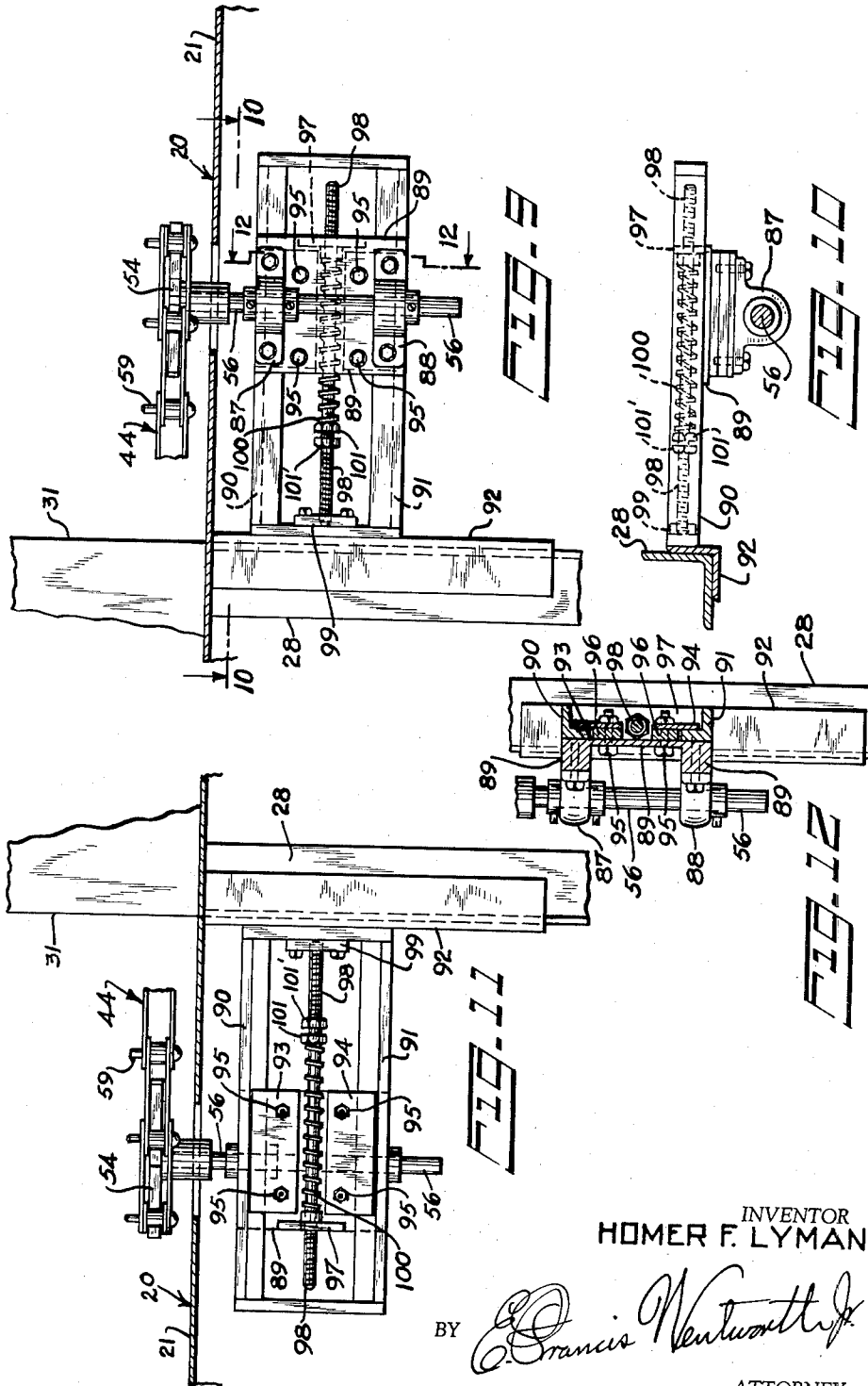
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DISHWASHING MACHINE

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6 Claims. (Cl. 198—181)

This invention relates to dishwashing apparatus and more particularly to dishwashing machines in which dishes are conveyed by means of an endless conveyor through a dishcleaning chamber.

The present invention provides a dishwashing machine having a horizontal table and a dishcleaning compartment. A horizontal endless conveyor loop is movably mounted in relationship to the table and the dishcleaning compartment and is constructed and arranged to receive a plurality of dish carriers and move them from the table, through the dishcleaning compartment and thereafter return them to the table. The conveyor loop of the present invention comprises a plurality of adjacent, horizontally spaced, vertically extending dish-carrier mounting pins, a plurality of horizontally extending, elongated upper plates arranged rectilinearly with the opposite ends thereof in lapping relationship with the adjacent ends of the next adjacent top plates, and a plurality of horizontally extending lower plates arranged rectilinearly with the opposite ends thereof in lapping relationship with the adjacent ends of the next adjacent lower plates, the upper and lower plates being disposed in vertically spaced horizontal planes. The upper plates and the lower plates are pivotally mounted adjacent at the lapping ends thereof on said mounting pins and thereby are connected together to form an endless conveyor loop. Cylindrically-shaped spacing means are rotatably mounted on said pins to maintain the upper and lower plates in spaced relationship to one another and to revolvably engage a guideway in which the conveyor loop moves. The mounting pins project upwardly beyond the upper plates to receive the mounting member of a dish-carrier, said mounting member having apertures therein of such size and so spaced apart as to removably engage the upwardly projecting portion of adjacent mounting pins.

The invention will be understood from the following description when considered in connection with the accompanying drawings forming a part thereof and in which:

FIG. 1 is a side elevational view of a dishwashing machine embodying the present invention and taken on the line 1—1 of FIG. 2;

FIG. 2 is a plan view taken on the line 2—2 of FIG. 1;

FIG. 3 is an enlarged plan view of the endless conveyor loop shown in FIGS. 1 and 2;

FIG. 4 is a side view taken on the line 4—4 of FIG. 3;

FIG. 5 is an enlarged transverse sectional view taken on the line 5—5 of FIG. 3;

FIG. 6 is an enlarged plan view taken on the line 6—6 of FIG. 1 and showing a dish-carrier mounted on the endless conveyor loop;

FIG. 7 is a transverse sectional view taken on the line 7—7 of FIG. 6;

FIG. 8 is a sectional view taken on the line 8—8 of FIG. 6;

FIG. 9 is an enlarged side elevational view of the conveyor loop tensioning device as shown at the right of FIG. 1;

FIG. 10 is a plan view taken on the line 10—10 of FIG. 9;

FIG. 11 is a side elevational view of the side of the conveyor loop tension device opposite to the side thereof illustrated in FIGS. 1 and 9, and

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FIG. 12 is a sectional view taken on the line 12—12 of FIG. 9.

Like characters of reference refer to like parts throughout the several views.

Referring to the drawings (FIGS. 1 and 2) the reference numeral 20 designates a horizontal table having an upper flat surface 21, opposite upwardly extending longitudinal side edges 22 and 23 and opposite upwardly extending end edges 24 and 25. Drainage from the table flows through downpipes 26 and 27. The table is supported on a plurality of legs 28.

A dishcleaning compartment 29 comprising, as shown in FIGS. 1 and 2, a dishwashing section 30 and a dishrinsing section 31 is disposed at one side of table 20. The sections 30 and 31 are in tandem or in continuity rectilinearly. Dishcleaning compartment 29 has an upper casing or hood 32 with an entrance end 33 in spaced relationship to the end edge 25 of the table and an exit end 34 in spaced relationship to end edge 26 of the table 20. The compartment 29 extends transversely of the table 20 from the side edge 23 thereof to a point short of the center thereof and longitudinally thereof short of the opposite ends of the table so that there are open end areas 35 and 36 at opposite ends of the table and an open longitudinally extending side area 37 on the table surface.

The dishwashing and dishrinsing sections 30 and 31 of dishcleaning compartment 29 are conventional. The upper part of dishwashing section 30 has therein conventional spraying apparatus (not shown) by means of which sprays of washing liquid under pressure are directed onto dishes to be washed after the dishes are conveyed through entrance 33 of section 30 as will hereinafter be described. After the liquid passes over the dishes, it is recirculated by pumping it from a tank portion 30' of section 30 through an outlet pipe 38 by a pump 39 driven by a motor M and returned under pressure to spray devices in the upper part of section 30 through pipes 40 (FIGS. 1 and 2). Likewise, upper part of dishrinsing section 31 has therein conventional spraying apparatus through which sprays of rinsing liquid under pressure are directed onto dishes to be rinsed as the dishes are conveyed from dishwashing section 30 through dishrinsing section 31 toward exit 34, as will hereinafter fully be described. Rinsing liquid which has been used for rinsing the dishes passes downwardly into a tank portion 31' of rinsing section 31 whence it is recirculated under pressure to the rinse spraying apparatus by pump 42, driven by motor M, through outlet pipe 41 and pipe 43 (FIGS. 1 and 2). L-shaped track members 15 and 16 (FIGS. 2) extend through compartments 30 and 31 from entrance 33 to exit 34 at the level of surface 21 of the table along which tracks dishes to be cleaned are conveyed, as will hereinafter be described.

Endless conveyor loop 44 of the present invention is arranged in vertically spaced relationship with the surface 21 of table 20 intermediate the opposite side edges 22 and 23 of table 20 (FIG. 2) so that the opposite longitudinal legs 45 and 46 of loop 44 are substantially parallel to edges 22 and 23 respectively and the opposite ends of the loop 44 are in spaced relationship with opposite end edges 24 and 25 of table 20, leg 46 of the loop passing through dishcleaning compartment 29 along and in laterally spaced relationship to the inner side of said compartment while leg 45 of loop 44 travels substantially parallel to leg 46 but outwardly of compartment 29 and through side area 37 of table 20 laterally adjacent said compartment.

Loop 44 is driven by sprocket wheel 47 at one end thereof and is located in spaced relationship with end edge 25 of table 20 and adjacent entrance 33 of compartment 29 (FIGS. 1, 2 and 3). Wheel 47 has teeth

48 that engage loop 44 in driving relationship. Sprocket wheel 47 is fixedly mounted on vertical drive shaft 49 which is driven by a motor 50 through a slip clutch 51 and gear reducer 52. Drive shaft 49 is rotatably mounted against vertical and longitudinal movement in mounting 53 on table 20 (FIG. 1).

At the opposite end thereof, loop 44 engages sprocket wheel 54 having teeth 55 which engage the loop. Sprocket wheel 54 is fixedly mounted on shaft 56 which, in turn, is mounted in a tensioning device 57, hereinafter fully described, which tensioning device is adapted to exert an adjustable longitudinal force on the loop so as to retain the desired tightness thereon.

Conveyor loop 44 comprises a plurality of dishtray mounting pins 58 (FIGS. 3, 4 and 5) which extend vertically and are spaced equi-distant to and in rectilinear relationship with one another. The pins have an upwardly projecting portion 59 at one end thereof chamfered at 59' and a semi-rounded head 60 at the opposite end. A plurality of horizontally extending, elongated upper plates 61 are arranged rectilinearly of one another, the opposite ends of each of the plates 61 lapping the adjacent ends of the next adjacent plates 61 (FIGS. 3 and 4). Each of the plates 61 are pivotally mounted at their lapping end portions on a pin 58. A plurality of horizontally extending, elongated lower plates 62, are arranged rectilinearly of one another parallel to and in vertically spaced relationship below upper plates 61. The opposite ends of each of the plates 62 lap the adjacent ends of the next adjacent plates 62 and are pivotally mounted at their lapping end portions on a pin 58 adjacent head 60. The upper plates 61 and the lower plates 62 are maintained in spaced relationship with the portion 59 of pins 58 projecting above plates 61, by a cylindrical-shaped spacer 63 revolvably mounted on each of the pins 58. Spacer 63 is of such diameter as to project beyond the plates 61 and 62 and to engage opposite sides of a channel in which endless conveyor loop is guided in its travel as will hereinafter be described. A clip 64 on each of the pins 58 prevents upward longitudinal movement of plates 61 and 62 and spacer 63 on pins 58.

Opposite legs 45 and 46 of conveyor loop 44 are guided in U-shaped channels 65 and 66 respectively (FIGS. 3, 4 and 5). Channels 65 and 66 have opposite sides 67 and 68 which are rotatably engaged by spacers 63 and a bottom 69 which is slidably engaged by the head 60 of pins 58. L-shaped mounting members 70 secured to the top of table 20 by rivets 71 retain channels 65 and 66 in position in spaced relationship to the top surface 21 of said table (FIGS. 3, 4 and 5).

Referring more particularly to FIGS. 6, 7 and 8, dishes to be cleaned are conveyed by the endless conveyor loop 44 on a dishtray 72 into the dishcleaning compartment 29 for cleaning and outwardly thereof after completion of the cleaning operation (normally washing and rinsing). The dishtray 72 is readily positioned on the conveyor loop 44, is retained steady without wobbling or side-to-side movement as it travels with the loop through its path of movement into and out of the dishcleaning compartment and is easily removable from the conveyor loop 44 after the dishcleaning operation is completed.

The dishtray 72 comprises a rectangular carriage having L-shaped opposite side members 73 and L-shaped opposite end members 74. Each dishtray 72 has a plurality of casters 75 thereon which engage the upper surface 21 of the table 20 in freely rotatable relationship therewith. The side members 73 and end members 74 are connected to form a rectangular-shaped tray of such size that the side members and end members thereof engage the opposite sides and opposite ends respectively of a conventional, rectangular-shaped dishrack 76 arranged to hold a plurality of dishes 77.

An inverted L-shaped mounting lug 78 (FIGS. 7 and 8) is secured to one side member 73 of the dishtray 72. The lug 78 comprises an upright leg 79 secured by welding or otherwise to side member 73 of the dishtray and a

horizontally extending leg 80. The leg 80 has spaced apertures 81 and 82 therein which apertures are spaced apart a distance equal to the distance between the dishtray mounting pins 58 of the conveyor loop 44. The apertures 81 and 82 are of such diameter as to easily slidably engage pins 58 and are chamfered at 83 so as to readily be guided onto the pins. As shown, the horizontally extending leg 80, at the opposite ends thereof, has recesses 84 and 85 therein which recesses are of such size and shape as to bear on pins 58. The leg 80 is of such length that apertures 81 and 82 therein engage next adjacent dishtray mounting pins 58 of conveyor loop 44 while recesses 85 and 86 engage the next pins 58 which respectively flank said next adjacent pins 58. The upright leg 79 projects upwardly such distance that it is in spaced relationship with upper plates 61 of conveyor loop 44 when the casters 75 of dishtray 72 are in engagement with the upper surface 21 of table 20 so that the weight of the dishtray 72 is borne by the table and not by the conveyor loop 44 thereby preventing wear on the conveyor loop.

So that the conveyor loop 44 may be retained under the proper tension to remain tight and such tension may be adjustable, a tensioning device 57, shown more particularly in FIGS. 9, 10, 11 and 12, is provided. As shown, shaft 56, on which sprocket wheel 54 is mounted, is revolvably mounted in upper bearing 87 and lower bearing 88 which bearings are bolted to a slide plate 89. A guideway is formed by upper inverted L-shaped guide 90 and lower L-shaped guide 91 secured in vertically spaced parallel relationship to one another on an upright channel member 92 fixedly mounted on one end thereof to leg 28 of table 20 (FIGS. 1, 9, 10, 11 and 12). Slide plate 89 slidably engage the vertically extending legs of guides 90 and 91 along one surface of the guides while opposite slide plates 93 and 94 slidably engage the opposite surfaces of the vertically extending legs 90 and 91. Slide plates 93 and 94 are mounted on slide plate 89 by bolts 95. Spacers 96 (FIG. 12) retain the plate 89 and plates 93, 94 in spaced relationship to one another so that the plates slideably engage the vertically extending legs of guides 90 and 91.

Slide plate 89 has a transverse projection 97 extending toward plates 93, 94, vertically intermediate guides 90 and 91. A screw-threaded rod 98 parallel to guides 90 and 91 at one end thereof extends through projection 97 in sliding relationship thereto. The opposite end of rod 98 is screwed into a fitting 99 on channel member 92. Rod 98 extends through a spring 100 one end of which spring bears against projection 97 and the other end of which bears against an adjusting nut 101 screwed onto rod 98 and held in position by lock nut 101'.

To tighten endless conveyor loop 44, adjusting nut 101 is turned on the screw threads of rod 98 to move to the right (FIGS. 1, 9 and 10). This tends to compress spring 100 which bears on projection 97 at the end thereof opposite the end on which nut 101 bears. This moves slide plates 89, 93 and 94 to the right (FIGS. 1, 9 and 10) on guides 90 and 91 which, in turn, since bearings 87 and 88 are attached to plate 89, moves shaft 56 and sprocket 57 mounted thereon to the right (FIGS. 1, 2, 3, 4 and 9). Since shaft 49 with sprocket 47 thereon is mounted against vertical and longitudinal movement in mounting 53 on table 20 (FIG. 1), movement of sprocket 54 to the right as hereinabove described serves to tighten endless conveyor loop 44 in its relationship to sprocket wheels 47 and 54. When the proper setting is attained, nut 101' is turned into abutting relationship with nut 101 locking nut 101 in position so that the setting will be retained. Turning of adjusting nut 101 in the opposite direction to that above described would lessen the tension on spring 100 and permit movement of slide plates 89, 93 and 94 to the left (FIGS. 1, 9 and 10) thereby loosening the endless conveyor loop 44 in its relationship to sprocket wheels 47 and 54.

In operation, the tensioning device 57 is adjusted so

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that the endless conveyor loop 44 is retained in tight relationship to sprocket wheels 47 and 54 under tension of spring 100. Such adjustment is made by turning adjusting nut 101. When such nut is turned on the screw threads of rod 98 so as to move to the right (FIGS. 1, 9 and 10), spring 101 is compressed moving slide plates 89, 93 and 94 to the right. Shaft 56 mounted on slide plate 89, likewise moves to the right (FIGS. 1, 2, 3, 4 and 9) carrying with it sprocket wheel 54. Such movement tightens endless conveyor loop against sprocket wheels 47 and 54. Turning the adjustment nut 101' and the adjustment nut 101 in the opposite direction lessens the tension on spring 100. Slide plates 89, 93 and 94 and shaft 56 with sprocket wheel 54 thereon then move to the left (FIGS. 1, 9 and 10) loosening the endless conveyor loop 44 in its relationship to the sprocket wheels.

When the desired adjustment on conveyor loop 44 is completed, as above described, the loop is placed in motion by actuating switch S (to left of FIG. 1) to its "on" position permitting flow of electricity to motor 50 which rotates drive shaft 49 through gear reducer 52 and clutch 51. Shaft 49 turns sprocket wheel in a clockwise direction which drives endless conveyor loop 44 in a direction from right to left (FIGS. 1 and 3). Sprocket wheel 54 and shaft 56 are turned in a clockwise direction.

During travel of endless conveyor loop 44, cylindrically-shaped spacers 63 revolvably mounted on the pins 58, engage the opposite sides 67 and 68 of U-shaped channels 65 and 66, so as to guide the travel of loop 44 and prevent wobbling thereof while the heads 60 of pins 58 slidably engage the bottom 69 of said channels.

Dishtrays 72 with dishracks 76 therein are conveyed by endless conveyor loop 44 along the surface 21 of table 20, and through dishwashing section 30 and dishrinsing section 31 of dishcleaning compartment 29. Preferably the relative size of the dishrack and dishtray is such that a tight engagement between them is maintained so that the dishrack and dishtray are unitary.

Dishes to be cleaned are placed in dish-rack 76. When the dishrack with dishtray 72 thereon is filled with dishes to be cleaned, it is brought into such position in relationship with conveyor loop 44 that spaced apertures 81 and 82 on leg 80 of mounting lug 78 on dishtray 72 slidably engages the upwardly projecting portion 59 of next adjacent mounting pins 58 of the loop. Usually, an operator lifts the dishrack filled with dishes to be cleaned, which has the dishtray on the bottom thereof, from a position remote from table 20 to a position above and to the right of side area 37 of the table (FIG. 2). The dishrack is then lowered into such position that apertures 81 and 82 on mounting lug 78 engage pins 58, as above described, and the casters 75 on the dishtray 72 engage the surface 21 of table 20. Because each of the pins 58 have upwardly projecting portions 59, the dishtray 72 and dishrack 76 are easily removably attached by an operator to moving conveyor loop 44 as chamfer 59' on pins 58, chamfer 83 in apertures 81 and 82 as well as recesses 85 and 86 in mounting lug 78, act to guide apertures 81 and 82 onto pins 58.

After the dishtray 72 is removably secured to the conveyor loop 44, as above described, the conveyor moves the dishtray, with the dishrack thereon, from the right (FIG. 2) toward the left along surface 21 of side area 37 of table 20 and thence through the end area at the left end of the table and thence into dishwashing section 30 of dishcleaning compartment 29.

In dishwashing section 30, the dishes are washed in a conventional manner by sprays of wash-water directed upon them as the conveyor 44 moves the dishtray and dishrack from the left toward the right (FIG. 2) through said section on tracks 15 and 16. Movement of such dishtray and said dishrack is continued by conveyor loop 44 on tracks 15 and 16 into dishrinsing section 31 where-

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in the dishes are rinsed in a conventional manner by sprays of rinse water directed upon them. After the dishes are rinsed in section 31, continuing travel of conveyor loop 44 moves the dishtray and dishrack outwardly of section 31 and onto the end portion of table 20 at the right, FIG. 2. As the dishtray and dishrack move through said end portion and onto side area 37 of the table surface 21, the dishrack is lifted upwardly by an operator, the dishtray moving upwardly therewith. The apertures 81 and 82 disengage pins 58 of the conveyor loop as the dishtray and dishrack are moved upwardly and away from the table 20.

It readily will be understood that while a dishtray and dishrack are being conveyed along side area 37 of table 20 into dishcleaning compartment 29, other dishtrays and dishracks of dishes to be cleaned are continuously placed in position as above described and by removably securing them to conveyor loop 44 along side area 37 of table 20. Dishracks of cleaned dishes, likewise, are continuously removed from table 20 after passing outwardly of dishrinsing section 31 of dishcleaning compartment 29.

In its travel as above described, a dishtray 72 is retained steady and against a wobbling or side-to-side movement while conveyor loop 44 has a free, direct and guided movement through channels 65 and 66, because apertures 81 and 82 in mounting lug 78 engage adjacent mounting pins 58 while recesses 85 and 86 in mounting lug 78 engage the next adjacent pins 58 of conveyor loop 44 which respectively flanks said adjacent mounting pins 58 and cylindrically-shaped spacers revolvably engage the sides 67 and 68 of said channels 65 and 66.

Should any drag which interferes with the movement of the loop be placed on conveyor loop 44, for example by an operator in placing or in removing a dishtray from its relationship to the conveyor loop, slip-clutch 51 becomes operative to stop further rotation of drive shaft 49 by motor 50 until such drag is removed.

Although one embodiment of the invention has been illustrated and described in detail, it is to be expressly understood that the invention is not limited thereto. Various changes can be made in the design and arrangement of the parts without departing from the spirit and scope of the invention as the same will now be understood by those skilled in the art.

What is claimed is:

1. In a dishwashing machine having a horizontal table with dishwashing apparatus associated with an oblong portion thereof, a horizontal endless conveyor loop movably mounted in relation to said table and adjacent said dishwashing apparatus, means at opposite ends of said loop through which the loop is actuated, a dish-carrier horizontally offset from the conveyor loop, said conveyor loop comprising a plurality of adjacent horizontally spaced vertically extending dish-carrier mounting pins, a plurality of horizontally extending elongated upper plates arranged in rectilinear relationship to one another, a plurality of horizontally extending lower plates arranged in rectilinear relationship to one another, said upper and lower plates being disposed in vertically spaced horizontal planes, the upper plates and the lower plates being pivotally mounted adjacent the opposite ends thereof on said mounting pins, the mounting pins each having a portion thereof projecting upwardly beyond the upper plate, cylindrically-shaped spacing means coaxially and revolvably mounted on the dish-carrier mounting pins, the diameter of said spacing means being greater than the width of said plates, the opposite ends respectively of said spacing means engaging the upper and lower plates of the conveyor loop to maintain said upper and lower plates in horizontally spaced relationship to one another, and a U-shaped guideway having spaced oppositely disposed parallel sides positioned in relationship to said table so that at least a portion of the legs of the conveyor loop passes through the guideway, the

oppositely disposed parallel sides being so spaced from one another that said cylindrically-shaped spacing means movably engage said sides of the guideway, the bottoms of said mounting pins being arranged to engage the bottom of said U-shaped guideway, said dish-carrier having mounting means laterally extending therefrom to a point beyond the dish-carrier mounting pins, the mounting means having apertures therein of such size and so spaced apart as to removably engage the upwardly extending portion of next adjacent dish-carrier mounting pins of the conveyor loop

2. In a dishwashing machine according to claim 1 and including parallel guideways disposed in relationship to said table so that the opposite legs of the conveyor loop pass through the guideways.

3. In a dishwashing machine according to claim 1 wherein said dish-carrier is rectangularly shaped, said dish-carrier mounting means comprising an L-shaped mounting member positioned on one side of said carrier, one leg of the mounting member extending in a horizontal plane and having apertures therein of such size and spaced apart such distance as to removably engage the upwardly extending portion of at least two adjacent mounting pins.

4. In a dishwashing machine according to claim 1 wherein said dishwashing apparatus is arranged at one side of said horizontal table and in spaced relationship with the opposite ends thereof and wherein said endless conveyor loop has one leg thereof passing through the dishwashing apparatus and the other leg passing along the opposite side of said table, said guideway being mounted on both said one side and said opposite side of said horizontal table so that both said legs of the conveyor loop pass through the guideway.

5. In a dishwashing apparatus according to claim 4 further including sprocket wheels at opposite ends of said conveyor loop, means for driving one of said sprocket wheels thereby actuating said conveyor loop, the other sprocket wheel being mounted in respect to said table so as to have movement longitudinally of the loop, and means for adjusting the position of said other sprocket wheel longitudinally of the loop.

6. In a dishwashing machine having a horizontal table with dishwashing apparatus associated with a portion thereof, a horizontal endless conveyor loop movably mounted in relation to said table and adjacent said dishwashing apparatus, means at opposite ends of said

loop through which the loop is actuated, a dish-carrier horizontally offset from the conveyor loop, said conveyor loop comprising a plurality of adjacent horizontally spaced vertically extending dish-carrier mounting pins, a plurality of horizontally extending elongated upper plates arranged in rectilinear relationship to one another, a plurality of horizontally extending lower plates arranged in rectilinear relationship to one another, said upper and lower plates being disposed in vertically spaced horizontal planes, the upper plates and the lower plates being pivotally mounted adjacent the opposite ends thereof on said mounting pins, the mounting pins each having a portion thereof projecting upwardly beyond the upper plate, cylindrically-shaped spacing means coaxially and revolvably mounted on the dish-carrier mounting pins, the diameter of said spacing means being greater than the width of said plates, the opposite ends respectively of said spacing means engaging the upper and lower plates of the conveyor loop to maintain said upper and lower plates in horizontally spaced relationship to one another, and a U-shaped guideway having spaced oppositely disposed parallel sides positioned in relationship to said table so that at least a portion of the legs of the conveyor loop passes through the guideway, the oppositely disposed parallel sides being so spaced from one another that said cylindrically-shaped spacing means movably engage said sides of the guideway, the bottoms of said mounting pins being arranged to engage the bottom of said U-shaped guideway, said dish-carrier having mounting means laterally extending therefrom to a point beyond the dish-carrier mounting pins, the mounting means having four apertures therein so rectilinearly spaced from one another and of such size and shape as to vertically slidably engage the upwardly extending portion of four next adjacent dish-carrier mounting pins of the conveyor loop, the endmost apertures being cut-out portions from said mounting means whereby said mounting means is horizontally disengaged from the endmost mounting pins at the curved ends of said conveyor loop.

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