United States Patent [19]

James

[11] **3,804,104**

[45] **Apr. 16, 1974**

[54] **DISHWASHING APPARATUS**

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[22] Filed: **May 8, 1972**

[21] Appl. No.: **250,875**

[52] **U.S. Cl.** **134/72,** 134/104, 134/113, 134/194, 198/135

[51] **Int. Cl.** **A47l 15/24,** B08b 3/02

[58] **Field of Search** ..... 134/48, 58 D, 60, 68, 72, 134/115 G, 95, 131, 193, 194, 104; 198/135

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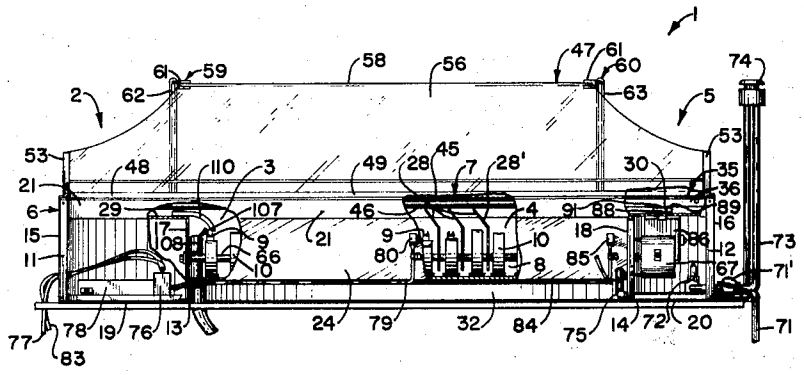
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[57] **ABSTRACT**

A dishwashing apparatus operative to move dishes, glasses silverware, and the like from a loading station to a cleansing area and a rinsing area and an unloading station includes a housing supporting an endless foraminous conveyor above a liquid chamber having a cleansing liquid portion and a rinsing liquid portion and a plurality of sets of liquid moving members and liquid directing members arranged and positioned within the liquid chamber to receive cleansing liquid and rinsing liquid and direct same toward the conveyor and articles thereon in the respective areas.

8 Claims, 10 Drawing Figures



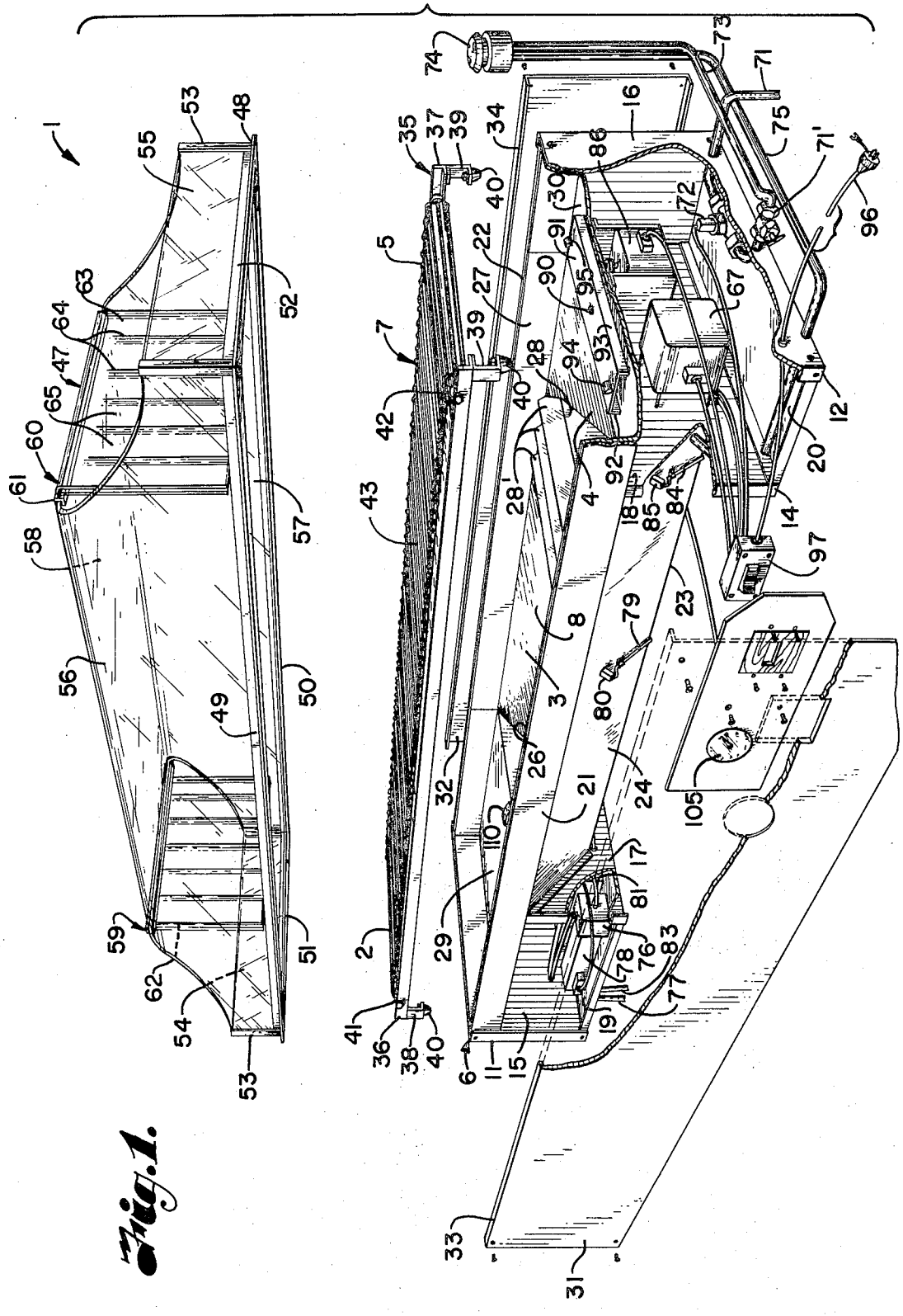


Fig. 1.

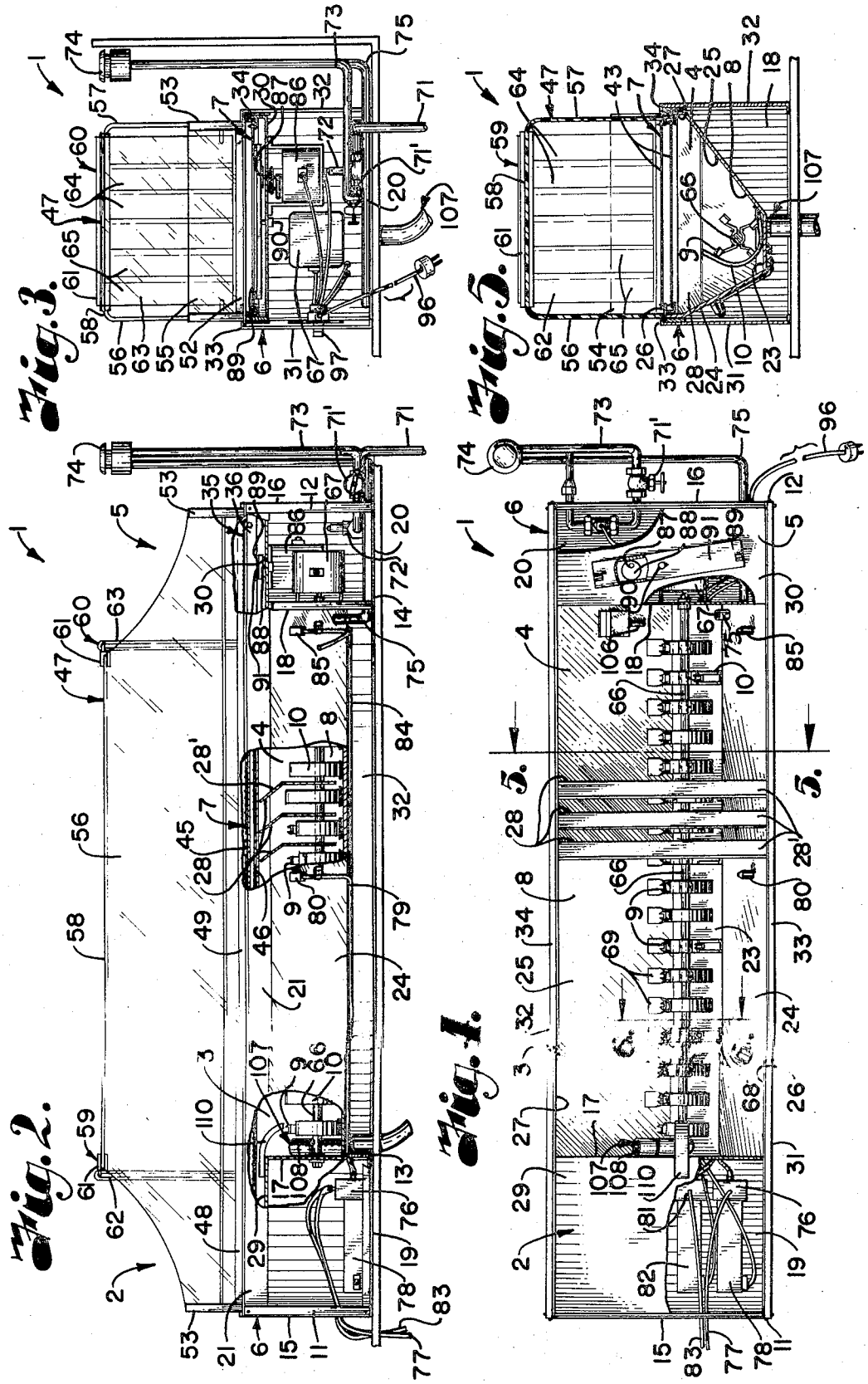

Fig. 3.
Fig. 2.
Fig. 4.
Fig. 1.

Fig. 6.

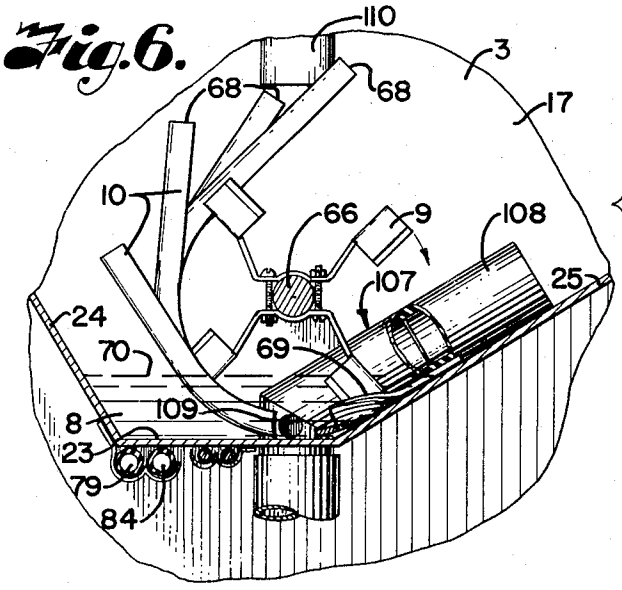


Fig. 7.

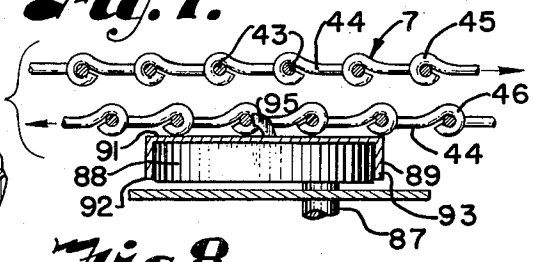


Fig. 8.

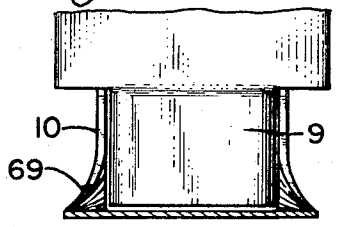


Fig. 9.

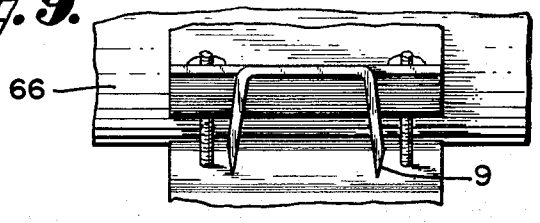
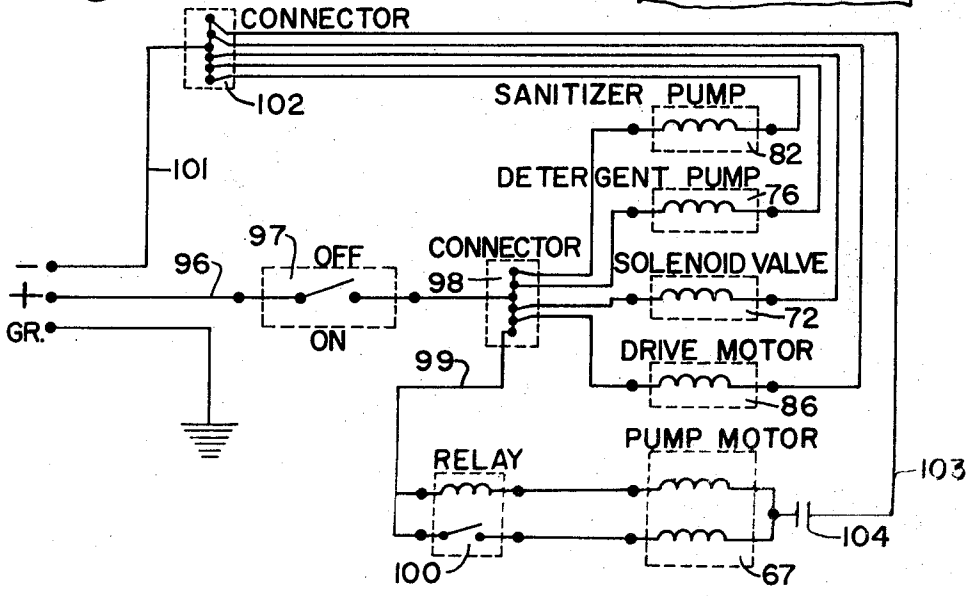


Fig. 10.



DISHWASHING APPARATUS

The present invention relates to dishwashing apparatus and, more particularly, to a dishwashing apparatus operative to move articles to be washed from a loading station to a cleansing area and a rinsing area and an unloading station in a substantially continuous movement.

The principal objects of the present invention are: to provide a dishwashing apparatus having automatic operation to move articles to be washed from a loading station to a cleansing area and a rinsing area and an unloading station; to provide such a dishwashing apparatus having components therein operative to direct wash or cleansing liquid and rinse liquid toward a foraminous conveyor and articles to be washed supported thereon; to provide such a dishwashing apparatus operative to continuously change liquid therein and flush away soil during operation thereof; to provide such a dishwashing apparatus operative to maintain a selected liquid level during operation and to automatically drain when turned on; to provide such a dishwashing apparatus providing a continuous supply of water, detergent or cleansing agent, and a chemical sanitizer or germicide at a rate coordinated with the rate of supplying liquid to and draining liquid from the unit; to provide such a dishwashing apparatus permitting simultaneous loading at one end thereof and unloading at an other end thereof; to provide such a dishwashing apparatus having a transparent hood assembly to permit viewing of the cleansing and rinsing of the articles; to provide such a dishwashing apparatus which continuously flushes a loading space or station and cleansing and rinse portions of a liquid chamber automatically; and to provide such a dishwashing apparatus which is economical to manufacture, durable in use, positive in operation, simple in construction and operation, and which is particularly well adapted for the proposed use.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

The drawings constitute a part of this specification and include an exemplary embodiment illustrating various objects and features of the dishwashing apparatus of the present invention.

FIG. 1 is an exploded perspective view of a dishwashing apparatus embodying features of the present invention.

FIG. 2 is a front elevational view of the dishwashing apparatus with portions removed and portions broken away to better illustrate operative components therein.

FIG. 3 is an end elevational view with portions of a housing broken away to show operative components in one end thereof.

FIG. 4 is a plan view with portions removed to show liquid directing members within a liquid chamber.

FIG. 5 is a transverse sectional view taken on line 5—5, FIG. 4 and showing members separating a liquid chamber into a cleansing area and a rinsing area.

FIG. 6 is an enlarged fragmentary transverse sectional view taken on line 6—6, FIG. 4 and showing means for directing liquid toward a conveyor and articles thereon.

FIG. 7 is an enlarged fragmentary longitudinal sectional view showing upper and lower runs of a conveyor and means for effecting movement thereof.

FIG. 8 is an enlarged fragmentary elevational view of a liquid moving blade and a liquid directing chute receiving the blade therein.

FIG. 9 is an enlarged fragmentary end elevational view of a liquid moving blade.

FIG. 10 is a schematic wiring diagram for the dishwashing apparatus with the essential operating parts diagramatically shown.

Referring more in detail to the drawings:

As required, detailed embodiments of the present invention are disclosed herein, however, it is to be understood that the disclosed embodiments are merely exemplary of the invention which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriate detailed structure.

In the disclosed embodiment of the present invention, the reference numeral **1** generally designates a dishwashing apparatus operative to move articles, such as dishes, plates, glasses, silverware, and the like, from a loading station **2** to a cleansing area **3** and a rinsing area **4** and an unloading station **5**. The dishwashing apparatus **1** includes a housing **6** supporting an endless foraminous conveyor for movement above a liquid chamber **8** having a portion in the cleansing area **3** and a portion in the rinsing area **4** and a plurality of sets of liquid moving members or blades **9** and liquid directing members or chutes **10** arranged and positioned within the cleansing and rinsing portions of the liquid chamber **8** and in alignment with respective sets of liquid moving members **9** to receive cleansing liquid and rinsing liquid respectively and direct same toward the conveyor **7** and articles (not shown) thereon.

The illustrated housing **6** includes longitudinally spaced end legs **11** and **12** arranged in pairs at opposite ends of the housing **6** and intermediate legs **13** and **14** arranged in pairs and spaced from the end legs **11** and **12** respectively. End walls **15** and **16** extend between the end legs **11** and **12** respectively to close opposite ends of the housing **6.** Intermediate walls **17** and **18** extend between the intermediate legs **13** and **14** and are spaced from and substantially parallel with the adjacent end walls **15** and **16.** Bottom closure walls **19** and **20** are positioned at opposite ends of the housing **6** and extends between an end wall and an adjacent intermediate wall to define compartments at opposite ends of the housing **6** for enclosing operative components. Front and rear upper side edge members **21** and **22** respectively extend between the end wall **15** and **16** and are suitably secured to the end legs **11** and **12** and to the intermediate legs **13** and **14.** The upper side edge members **21** and **22** have upper edges substantially aligned with upper edges of the end walls **15** and **16** to define an upper or top edge of the housing **6.**

The illustrated liquid chamber **8** extends between the intermediate walls **17** and **18** and is defined by a wall having a bottom portion **23** and side portions **24** and **25** extending upwardly from the bottom portion **23** and having generally upright upper edge portions **26** and **27** respectively suitably secured to the front and rear side edge members **21** and **22.**

A plurality of vanes or baffles **28** are positioned in the liquid chamber **8** and extend between the side portions **24** and **25** and the upper edge portion **26** and **27** to thereby divide the liquid chamber **8** into the cleansing area **3** and the rinsing area **4.** The vanes or baffles **28** each have an inclined upper portion **28'** positioned to direct liquid toward a portion of the conveyor **7** above the cleansing area **3** and thereby substantially prevent liquid from the cleansing area **3** being directed into the rinsing area **4** which would result in an undesirable mixing of cleansing liquid and rinsing liquid.

The loading station **2** is defined by an upper wall **29** extending between the end wall **15** and the intermediate wall **17.** The upper wall **29** is sloped for drainage from the end wall **15** toward the liquid chamber **8.** The unloading station **5** is defined by an upper wall **30** extending between the end wall **16** and the intermediate wall **18** and being sloped for drainage toward the liquid chamber **8.**

It may be desirable to enclose the sides of the housing **6** and particularly the compartments formed adjacent opposite ends thereof, therefore, front and rear panels **31** and **32** respectively are suitably secured to the end legs **11** and **12** and extend therebetween. The front and rear panels **31** and **32** preferably have upper edges **33** and **34** respectively positioned in covering relation with the upper edges of the side edge members **21** and **22** and the upper edge portions **26** and **27** of the liquid chamber defining wall.

In the illustrated structure, the conveyor **7** is movably supported on a conveyor assembly **35** which is mounted in an upper portion of the housing **6** and which is movable therefrom. The conveyor **7** is effective to move the articles to be cleaned above the blades **9** and the chutes **10** and the conveyor **7** and the articles thereon may be moved in a circular path or a linear path. In the illustrated embodiment, the movement of the conveyor **7** is lineal. The conveyor assembly **35** includes laterally spaced front and rear elongated side rails **36** and **37** respectively. End legs **38** and **39** depend from opposite ends of each of the side rails **36** and **37** and the end legs **38** and **39** have supports or glides **40** depending therefrom and engageable with the upper walls **29** and **30** adjacent respective opposite ends of the housing **6.** The side rails **36** and **37** are suitably maintained in spaced relation and end shafts **41** and **42** extend between and have opposite ends thereof rotatably mounted on the side rails **36** and **37** adjacent respective opposite ends thereof, as in suitable bushings (not shown). Suitable rollers are sleeved on the end shafts **41** and **42** and are engaged by opposite end portions of the conveyor **7.**

The conveyor **7** is illustrated as a belt formed of a plurality of longitudinally spaced transversely or laterally extending rods or wires **43** connected by laterally spaced longitudinally extending portions **44.** The conveyor belt parts are pivotally or otherwise connected to form a belt flexible or bendable longitudinally to a curvature of small radius said conveyor belt being relatively rigid in a transverse direction to support articles thereon without excessive deflection. The conveyor **7** is an endless foraminous member having an upper run **45** and a lower run **46** joined into a continuous or endless structure engageable with and movable around the rollers mounted on the end shafts **41** and **42.** The upper and lower runs **45** and **46** are relatively close to require a minimum of height.

It is desirable to support side edges of the upper and lower runs **45** and **46** of the conveyor **7,** therefore, the side rails **36** and **37** each have vertically spaced upper and lower flanges extending outwardly therefrom and substantially aligned in respective vertically spaced planes. Suitable intermediate support members extend between the side rails **36** and **37** and are positioned above the upper walls **29** and **30** thereby providing unobstructed passage of liquid through the upper and lower runs **45** and **46** of the conveyor **7.**

The dishwashing apparatus **1** includes a hood assembly **47** positioned to retain therein liquid directed through the conveyor **7** to impinge on the articles (not shown) thereon which are to be cleaned and rinsed. The illustrated hood assembly includes a base frame **48** having elongated laterally spaced side members **49** and **50** and longitudinally spaced end members **51** and **52** extending between facing opposite ends of the side members **49** and **50.** Corner posts or upright standards **53** extend upwardly from the base frame **48** and are positioned at the respective intersections of the side members and end members thereof.

End walls **54** and **55** extend upwardly from the end members **51** and **52** respectively of the base frame **48** and side walls **56** and **57** extend upwardly from the side members **49** and **50** respectively of the base frame **48** and the end walls **54** and **55** and the side walls **56** and **57** have the ends thereof supported by respective corner posts or standards **53.** A top wall **58** extends between upper edges of the side walls **56** and **57** and the top wall **58** is positioned above the liquid chamber **8.**

It is desirable to substantially enclose a space above the liquid chamber **8** to retain the liquid within the space, therefore, spaced curtain assemblies **59** and **60** are mounted on the top wall **58** and depend therefrom in substantial alignment with respective opposite ends of the liquid chamber **8,** as defined by the intermediate walls **17** and **18** respectively. In the illustrated structure, a suitable mounting strip **61** is mounted on each of the opposite ends of the top wall **58** and supports curtains **62** and **63** depending therefrom. The curtains **62** and **63** preferably are spaced apart layers of heavy fabric, such as fiberglass coated with teflon, and preferably having slits **64** therein to define a plurality of strips **65** in the adjacent layers thereof, the slits **64** of the curtains **62** are offset laterally of the slits in curtains **63** to aid in preventing liquid from passing outwardly of the curtains.

Cleansing liquid and rinsing liquid are directed toward articles on the foraminous conveyor **7** by the water moving blades **9** and the water directing chutes **10.** In the illustrated structure, the water moving blades or impellers **9** each have an arm portion extending outwardly from an elongated shaft **66,** as later described, and terminating in a substantially U-shaped end portion having outwardly extending and laterally spaced side members which terminate in sharpened ends, as best seen in FIG. **9,** which permits the end portion of the impellers or blades **9** to easily enter the liquid with a minimum of resistance. The impellers or blades **9** are arranged in sets, preferably of four blades **9** per set and arranged in circumferentially spaced relation around the elongated shaft **66** which has respective opposite ends thereof rotatably supported on opposite ends of the liquid chamber **8** as defined by the intermediate walls **17** and **18,** as in suitable bearings (not shown).

The elongated shaft **66** extends substantially parallel with the direction of travel of the conveyor **7** whereby rotation of the elongated shaft **66** effect movement of the sets of impellers or blades **9** through the respective liquid within the cleansing area **3** and rinsing area **4** of the liquid chamber **8** to urge a portion of the liquid upwardly and into the respective chutes **10.**

A suitable drive motor **67** is operatively connected to one end of the elongated shaft **66** for selectively effecting rotation thereof. The drive motor **67** may have a suitable gear reduction unit (not shown) operatively connected thereto and to the shaft **66** for effecting a desired rate of rotation of the shaft **66** and the plurality of sets of impellers or blades **9** mounted thereon.

The chutes **10** are longitudinally spaced between the intermediate walls **17** and **18** and each is illustrated as a generally channel shaped member having a first portion defining an arcuate path which is generally circular and corresponds to a portion of the path travelled by a free end by each of the impellers or blades **9** in the respective sets of blades and an end or discharge portion **68** directed toward a portion of the conveyor **7** and articles (not shown) thereon. It is preferable that the chutes **10** each have an entrance portion **69** positioned below a normal liquid level **70** within the liquid chamber **8** and the discharge portion **68** at different angles whereby collectively the water impellers **9** direct water in a manner that all articles are contacted by the water jetting thereagainst.

The dishwashing apparatus **1** may be connected to any suitable source of hot water having a temperature within the range of 120° to 140° F.. In the illustrated structure, a suitable conduit **71** is connected to the source (not shown) of hot water and has a suitable control valve **71'** mounted therein and operative for adjustable flow control to permit operation on water pressures in the range of 15 to 100 pounds per square inch. The conduit **71** having the control valve **71'** therein communicates with a suitable solenoid valve **72** which is remotely controlled to permit flow of the hot water into the liquid chamber **8.** A conduit **73** extends between the solenoid valve **72** and a suitable vacuum breaker **74** and a conduit **75** extends between the vacuum breaker **74** and the rinsing area **4** of the liquid chamber **8** to thereby supply hot water at a desired rate, such as in the nature of one gallon per minute, to the liquid chamber **8.**

A suitable cleansing agent, such as a liquid detergent, is supplied to the cleansing area **3,** as by a suitable pump **76** communicating with a source of liquid detergent (not shown) by means of a suitable flexible conduit **77.** A motor **78** is operatively connected to the pump **76** for driving same to effect flow of the liquid detergent through a detergent supply conduit **79** communicating with a suitable detergent injector **80** mounted on one of the walls defining the cleansing area **3** within the liquid chamber **8** and preferably positioned above the normal liquid level **70** therein. The injector **80** preferably has means for metering the amount of liquid detergent injected into the cleansing area **3** of the liquid chamber **8** to thereby coordinate same with the amount of hot water supplied to the liquid chamber **8.**

It may be desirable to use certain rinse additives in the form of sanitizers, germicides, and the like, such as iodine or 5¼ percent hypochloride. In the illustrated structure, a sanitizer pump **81** is operatively connected to a drive motor **82** to effect flow of the sanitizer through a conduit **83** extending between the pump **81** and a source (not shown) of the sanitizer. A conduit **84** extends between the sanitizer pump **81** and a suitable injector **85** operatively to inject a selected quantity of the sanitizer into the rinsing station **4** of the liquid chamber **8.**

Other suitable rinse additives including drying agents, descaling agents, and the like may also be injected into the liquid within the rinsing area **4** of the liquid chamber **8** to thereby substantially reduce water spotting and shorten drying time especially in hard water areas for articles moved by the conveyor **7.**

The conveyor **7** is intermittently moved, as later described, to move articles between the loading station **2** and the unloading station **5.** A motor is operatively connected to a reciprocating structure having an abutment engaging the conveyor **7** to move same in response to movement of the reciprocating structure in one direction and disengage the abutment on return movement.

In the illustrated structure, movement of the conveyor **7** is effected by operation of a drive motor **86** positioned below the upper wall **30** in the unloading station **5** and operative to rotate a driven shaft **87** extending upwardly through the upper wall **30** and having a cam **88** mounted on an upper end thereof and positioned above the upper wall **30** and engageable with an elongated arm **89** pivotally mounted on the upper wall **30** in the unloading station **5** of the housing **6** and having means on the elongated arm **89** engageable with the conveyor **7** for effecting movement thereof in response to rotation of the cam **88.**

The illustrated elongated arm **89** is pivotally mounted on an upstanding shaft **90** extending upwardly from the upper wall **30** and the arm **89** has a planar upper portion **91** positioned substantially parallel with and below the lower run **46** of the conveyor **7** and the arm **89** has spaced flanges **92** and **93** depending from opposite edges of the planar upper portion **91** and positioned to be engaged by the cam **88.** Spaced upstanding abutments or projections **94** and **95** are positioned adjacent respective opposite ends of the planar upper portion **91** of the elongated arm **89** and the upstanding abutments or projections **94** and **95** are each illustrated as generally arcuate members facing in the same direction and having an upper end thereof engageable with the rods **43** of the conveyor **7.**

The cam **88** effects a reciprocable movement of the projections **94** and **95** whereby a forward movement of one projection occurs while rearward movement of the other projection occurs. The cam **88** is eccentrically mounted on the shaft **87** and has a peripheral edge which is alternately engageable with facing surfaces of the spaced flanges **92** and **93.** The cam **88** is positioned between the shaft **90** supporting the arm **89** and one end of the arm **89** whereby alternate engagement of the peripheral edge of the cam **88** with the facing surfaces of the flanges **92** and **93** effects pivotal movement of the arm **89** and thereby reciprocating movement of the ends of the arm **89.**

The projections or abutments **94** and **95** each have an end defining an abutment surface engageable with respective rods **43** of the conveyor **7** an inclined upper surface engageable with lower surfaces of the rods **43** of the lower run **46** of the conveyor **7** during reciprocating movement of the ends of the arm **89.** The one

projection engages one of the rods **43** of the lower run **46** of the conveyor **7** to effect forward movement of the upper run **45** and the articles thereon. The upper surface of the other projection engages and lifts up the rods **43** while moving under same and to a position to effect moving engagement therewith on the return movement of the respective end of the arm **89** to thereby effect intermittent forward movement of the upper run **45** of the conveyor **7.**

FIG. **10** illustrates the controls for operation of the dishwashing apparatus **1** wherein suitable conductors are connected to a source of electric power, such as 120 volt alternating current. A conductor **96** is connected to an on-off switch **97** which is mounted on the front panel **31** and electrically connected to a suitable connector strip **98.** Suitable conductors extend between the connector strip **98** and the solenoid valve **72,** the motor **78** for the detergent pump **76,** the drive motor **82** for the sanitizer pump **81,** and the drive motor **86** for effecting intermittent movement of the conveyor **7.** A conductor **99** extends between the connector strip **98** and a motor starting relay **100** for the drive motor **67,** for rotating the elongated shaft **66** and the sets of blades **9** mounted thereon.

A conductor **101** extends between the source of electrical power and a connector strip **102** electrically connected to the solenoid valve **72,** the motor **78** for the detergent pump **76,** the drive motor **82** for the sanitizer pump **81,** and the drive motor **86** for effecting movement of the conveyor **7.** A conductor **103** extends between the connector strip and a suitable condenser **104** electrically connected to the drive motor **67** for rotating the elongated shaft **66.**

It is desirable to observe the temperature of liquid during operation of the dishwashing apparatus **1,** therefore, a suitable dial **105** is mounted in the front panel **31** and is operatively connected to a suitable temperature sensing device or element **106** preferably positioned within the liquid chamber **8** for measuring the temperature of the liquid therein.

Use of a dishwashing apparatus constructed as illustrated and described is extremely simple and requires only turning the switch **97** to the "on" position to complete a circuit to effect a current flow to the drive motor **67** thereby effecting rotation of the elongated shaft **66,** current flow to the drive motor **86** which effects movement of the conveyor **7** and current flow to the solenoid valve **72** which starts water flowing continuously from the water supply source into the liquid chamber **8.** The switch **97** also completes a circuit which effects current flow to the motor **78** for the detergent pump **76** and to the drive motor **82** for the sanitizer pump **81.** Clear water flows into the rinsing station **4** of the liquid chamber **8** through the conduit **75** and at the rate determined by the control valve **71'**, such as at the rate of 1 gallon per minute.

Detergent and sanitizer are injected into the liquid chamber **8** to enhance washing and sterilization of the articles moved by the conveyor **7.** The detergent and sanitizer or germicide are injected at a rate to correspond with the rate of the flow of clear hot water into the liquid chamber **8.** Liquid must drain from the liquid chamber **8** at a rate substantially equal to the rate of flow into the liquid chamber **8** through the conduit **75.** Therefore, a drain **107** is positioned in the liquid chamber **8** for flow of liquid outwardly therethrough and to a suitable means for disposal thereof (not shown). The drain **107** has an open top upper portion **108** extending to the normal liquid level **70** and an opening **109** positioned below the normal liquid level **70.** One of the sets of impeller blades **9** is positioned adjacent the opening **109** in the drain **107** whereby rotation of the elongated shaft **66** effects movement of liquid away from the opening **109** to thereby substantially eliminate draining of liquid from the liquid chamber **8** through the opening **109** during operation whereby the liquid level is at the top of the drain **107.** Extensions may be applied to the drain **107** to raise the open top and thereby the liquid level during operation and rotation of the shaft **66.** When operation is stopped all of the liquid in the liquid compartment will drain through the opening **109.** The chutes **10** are positioned along the path of the continuous flow of liquid and the drive motor **67** rotates the shaft **66** and the sets of impeller blades **9** thereon to recirculate the changing liquid over the articles at approximately 80 gallons per minute. When the switch **97** is moved to the "off" position, the liquid within the liquid chamber **8** automatically drains through the opening **109** in the drain **107.**

Articles such as dishes, silverware, glasses, cups, and the like are moved through the hood assembly **47** and onto the conveyor **7** at a position above the upper wall **29** of the loading station **2.** Material on the dishes and in the glasses and cups falls onto the upper wall **29,** therefore, a liquid directing chute **110** is positioned adjacent the intermediate wall **17** and arranged to receive liquid from one of the sets of impeller blades **9** to thereby direct liquid onto the sloping upper wall **29** to flush material, such as garbage, therefrom, the material and liquid moving down the sloping wall **29** to the liquid chamber **8** adjacent the drain **107.**

The articles to be washed are independently supported on the upper run **45** of the conveyor **7.** Plates, bowls, cups, glasses, and the like are placed face down and one at a time directly on the upper run **45** of the conveyor **7** and it is preferable that the articles to be washed be separated as individual items and not stacked or placed in trays for best washing and rinsing action.

Particular features of the present invention include the cooperation of the blades **9** and the chutes **10** in directing liquid onto articles to be washed and the continuous flow of liquid from a rinsing area or station to a cleansing area or station during continuous introduction of fresh liquid into the rinsing area and continuous draining of liquid from the cleansing area. The flow of the liquid is from the rinsing area to the cleansing area while the conveyor **7** moves the articles to be cleaned in the opposite direction or from the cleansing area to the rinsing area.

The liquid intake of the blades **9** is from the sides thereof and the spacing between sets of blades **9** permits recirculating the liquid to be thrust toward the conveyor **7** again. The blades **9** distribute the liquid as a spray substantially evenly over the conveyor **7** while the chutes **10** concentrate and intensify the spray into a substantially solid stream to thereby provide stronger washing action. The sides of the blades **9** are formed as knife edges to thereby substantially increase the flow of liquid moved by the blades **9.**

It is to be understood that while I have illustrated and described one form of my invention, it is not to be limited to the specific form or arrangement of parts herein described and shown.

What I claim and desire to secure by Letters Patent is:

1. A dishwashing apparatus comprising:
a. an endless foraminous conveyor having substantial flexability in a longitudinal direction to bend on a small radius and substantial rigidity in a transverse direction;
b. means supporting said conveyor with an elongated substantially horizontal upper run and a lower run adjacent and under the upper run, said upper run being adapted to independently support and carry each of a plurality of articles to be washed;
c. means operatively connected to said conveyor for moving same and articles carried thereon over wash and rinse positions; and
d. means below said conveyor and operative to direct washing and rinsing liquid upwardly through the conveyor runs to impinge on articles carried thereby and moved over the respective wash and rinse positions, said liquid directing means comprising an elongated shaft rotatably mounted in the liquid chamber and having drive means operatively connected thereto for rotating same and a plurality of sets of blades mounted on said shaft and longitudinally spaced therealong and adapted to move through the liquid within the liquid chamber and a plurality of chutes mounted in said liquid chamber with one chute for each set of blades and adapted to receive liquid from the respective set of blades and direct the liquid upwardly through the conveyor runs and onto articles carried by said conveyor upper run.

2. A dishwashing apparatus comprising:
a. a housing having spaced ends;
b. an endless foraminous conveyor mounted on said housing for travel between the ends of said housing, said conveyor having a run adapted to support articles to be washed while travelling between the ends of said housing;
c. said conveyor having a plurality of longitudinally spaced laterally extending rods;
d. means operably connected with said conveyor for effecting movement thereof between the ends of said housing;
e. said means for effecting movement of said conveyor includes a drive motor having a driven shaft extending therefrom and a cam mounted thereon and an elongated arm pivotally mounted on said housing and engageable by the cam intermediate the ends of said arm and having means on said arm engageable with the rods of said conveyor whereby movement of the cam effects movement of the arm and thereby movement of said conveyor;
f. a liquid supply;
g. first means communicating with the liquid supply for supplying a cleansing liquid to a cleansing area;
h. second means communicating with the liquid supply for supplying a rinsing liquid to a rinsing area;
i. means directing the cleansing liquid toward said conveyor and articles thereon in the cleansing area;
j. means for directing the rinsing liquid toward said conveyor and articles thereon in the rinsing area.

3. A dishwashing apparatus as set forth in claim 2 wherein:
a. said arm is positioned below said conveyor and has a planar portion substantially parallel with said conveyor and spaced flanges depending from the planar portion and engageable by the cam;
b. said means on said arm engageable with said rods of said conveyor comprises an upstanding projection adjacent each end of the planar portion of said arm;
c. the upstanding projections are each generally arcuate members and face in the same direction; and
d. said elongated arm is pivotally mounted on a shaft positioned centrally of the planar portion and said cam is positioned between the shaft and one end of said arm.

4. A dishwashing apparatus as set forth in claim 3 wherein:
a. said housing has walls defining a liquid chamber positioned below said conveyor;
b. the liquid chamber has a drain for flow of liquid outwardly therethrough;
c. the drain has a portion extending above normal liquid level in the liquid chamber and an opening positioned below normal liquid level; and
d. one of said sets of blades is positioned adjacent the opening in the drain whereby rotation of said elongated shaft effects movement of liquid away from the opening to substantially reduce draining of liquid from the liquid chamber and thereby control the amount of liquid flowing through the drain.

5. A dishwashing apparatus comprising:
a. a housing having spaced ends;
b. an endless foraminous conveyor mounted on said housing for travel between the ends of said housing, said conveyor having a run adapted to support articles to be washed while travelling between the ends of said housing;
c. means operably connected with said conveyor for effecting movement thereof between the ends of said housing;
d. a liquid supply;
e. first means communicating with the liquid supply for supplying a cleansing liquid to a cleansing area;
f. second means communicating with the liquid supply for supplying a rinsing liquid to a rinsing area;
g. means directing the cleansing liquid toward said conveyor and articles thereon in the cleansing area;
h. means for directing the rinsing liquid toward said conveyor and articles thereon in the rinsing area;
i. said means for directing cleansing liquid toward said conveyor and articles thereon and said means for directing rinsing liquid for said conveyor and articles thereon comprising:
1. an elongated shaft rotatably mounted on said housing and extending substantially parallel with the direction of travel of said conveyor;
2. means operatively connected to said elongated shaft for selectively effecting rotation thereof;
3. a plurality of sets of blades mounted on said elongated shaft and longitudinally spaced therealong and a portion of said sets of blades being positioned within the cleansing area and an other

portion of said sets of blades being positioned within the rinsing area and each blade extending outwardly from said shaft, said sets of blades each being adapted to move through liquid and urge a portion of the liquid upwardly;

4. a plurality of chutes positioned with one chute for each set of blades, said chutes being channel shaped members defining an arcuate path having a generally circular portion corresponding to a portion of the path travelled by a free end of each of the blades in said respective set of blades and an end portion extending toward said conveyor and articles thereon.

6. A dishwashing apparatus comprising:

a. a housing having spaced ends;

b. an endless foraminous conveyor mounted on said housing for travel between the ends of said housing, said conveyor having a run adapted to support articles to be washed while travelling between the ends of said housing;

c. means operably connected with said conveyor for effecting movement thereof between the ends of said housing;

d. side, end and bottom walls in said housing defining a liquid chamber positioned below said conveyor, said liquid chamber being of less length than said conveyor with a portion of the conveyor extending beyond one end wall of the liquid chamber and forming a loading portion thereof, said liquid chamber having an open drain at a predetermined level and adjacent said one end wall thereof for flow of liquid outwardly from the liquid chamber;

e. walls in said housing defining a garbage receiving station below said loading portion of said conveyor and sloping toward the liquid chamber and discharging therein at said one end wall adjacent said open drain;

f. a liquid supply;

g. first means communicating with the liquid supply for supplying a cleansing liquid to a cleansing area;

h. second means communicating with the liquid supply for supplying a rinsing liquid to a rinsing area;

i. means in the liquid chamber directing the cleansing liquid upwardly toward said conveyor and articles thereon in the cleansing area;

j. means in the liquid chamber for directing the rinsing liquid upwardly toward said conveyor and articles thereon in the rinsing area;

k. means including a liquid directing chute in the liquid chamber adjacent said one end wall for receiving a portion of the upwardly directed cleaning liquid and directing same into the garbage receiving station to flush garbage therefrom to the liquid chamber.

7. A dishwashing apparatus comprising:

a. a housing having spaced ends;

b. an endless foraminous conveyor mounted on said housing for travel between the ends of said housing, said conveyor having a run adapted to support articles to be washed while travelling between the ends of said housing;

c. means operably connected with said conveyor for effecting movement thereof between the ends of said housing;

d. a liquid supply;

e. first means communicating with the liquid supply for supplying a cleansing liquid to a cleansing area;

f. second means communicating with the liquid supply for supplying a rinsing liquid to a rinsing area;

g. means directing the cleansing liquid toward said conveyor and articles thereon in the cleansing area;

h. means for directing the rinsing liquid toward said conveyor and articles thereon in the rinsing area;

i. walls in said housing defining a liquid chamber positioned below said conveyor;

j. walls in said housing defining a garbage receiving station below a portion of said conveyor and adjacent the liquid chamber;

k. means communicating with the liquid chamber for directing liquid into the garbage receiving station to flush garbage therefrom;

l. a hood assembly mounted on said housing and positioned above said conveyor and having an entrance portion positioned above the garbage receiving station and an unloading portion;

m. means on said hood assembly for substantially enclosing a portion thereof above the liquid chamber to retain liquid therein;

n. said means for supporting and moving articles comprises an endless foraminous conveyor mounted on said housing and positioned above the liquid chamber;

o. said means for directing water and mixture of cleansing agent and water toward the articles to be washed comprises an elongated shaft rotatably mounted on certain of the walls defining the liquid chamber and extending substantially parallel with the direction of travel of said conveyor and having drive means operatively connected thereto for rotating same and a plurality of sets of blades mounted on said elongated shaft and longitudinally spaced therealong and positioned within the first portion and within the second portion of the liquid chamber and adapted to move through liquid within the liquid chamber and move a portion thereof upwardly and a plurality of chutes mounted in the liquid chamber and positioned with one chute for each set of blades and shaped and arranged to receive liquid from said respective sets of blades and direct the liquid toward said conveyor and articles thereon;

p. the liquid chamber having a drain for flow of liquid outwardly therethrough and having a portion extending to normal liquid level within the liquid chamber and an opening positioned below normal liquid level; and

q. one of said sets of blades is positioned adjacent the opening in the drain whereby rotation of said elongated shaft effects movement of liquid away from the opening to substantially reduce draining of liquid from the liquid chamber and thereby control the amount of liquid flowing through the drain.

8. A dishwashing apparatus comprising:

a. a housing having spaced ends;

b. an endless foraminous conveyor mounted on said housing for travel between the ends of said housing, said conveyor having a run adapted to support

articles to be washed while travelling between the ends of said housing;

c. means operably connected with said conveyor for effecting movement thereof between the ends of said housing;

d. a liquid supply;

e. first means communicating with the liquid supply for supplying a cleansing liquid to a cleansing area;

f. second means communicating with the liquid supply for supplying a rinsing liquid to a rinsing area;

g. means directing the cleansing liquid toward said conveyor and articles thereon in the cleansing area;

h. means for directing the rinsing liquid toward said conveyor and articles thereon in the rinsing area;

i. walls in said housing defining a liquid chamber positioned below said conveyor;

j. walls in said housing defining a garbage receiving station below a portion of said conveyor and adjacent the liquid chamber;

k. means positioned within the liquid chamber and communicating with the garbage receiving station for directing liquid into same to flush garbage therefrom;

l. a hood assembly mounted on said housing and positioned above said conveyor and having an entrance portion positioned above the garbage receiving station and an unloading portion;

m. means on said hood assembly for substantially enclosing a portion thereof above the liquid chamber to retain liquid therein;

n. said hood assembly is defined by spaced side walls and spaced end walls extending between respective opposite ends of the side walls and top wall positioned above the liquid chamber;

o. said means for substantially enclosing a portion of said hood assembly includes spaced curtains extending substantially normal to the side walls and depending from the top wall of said hood assembly and positioned adjacent respective opposite ends of the liquid chamber;

p. said conveyor has a plurality of longitudinally spaced laterally extending rods;

q. a drive motor is mounted on said housing and has a driven shaft extending upwardly therefrom with a cam mounted thereon;

r. an elongated arm is pivotally mounted on said housing and engageable by the cam intermediate the ends of said arm to effect movement thereof;

s. said arm has means thereon engageable with the rods of said conveyor whereby movement of the cam effects movement of the arm and thereby movement of said conveyor;

t. said garbage receiving station being positioned below the loading portion of said hood assembly.

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