W. J. LYNCH.

DISH WASHING MACHINE.

APPLICATION FILED OCT. 7, 1919.

1,406,465.

Patented Feb. 14, 1922.

4 SHEETS—SHEET 1.

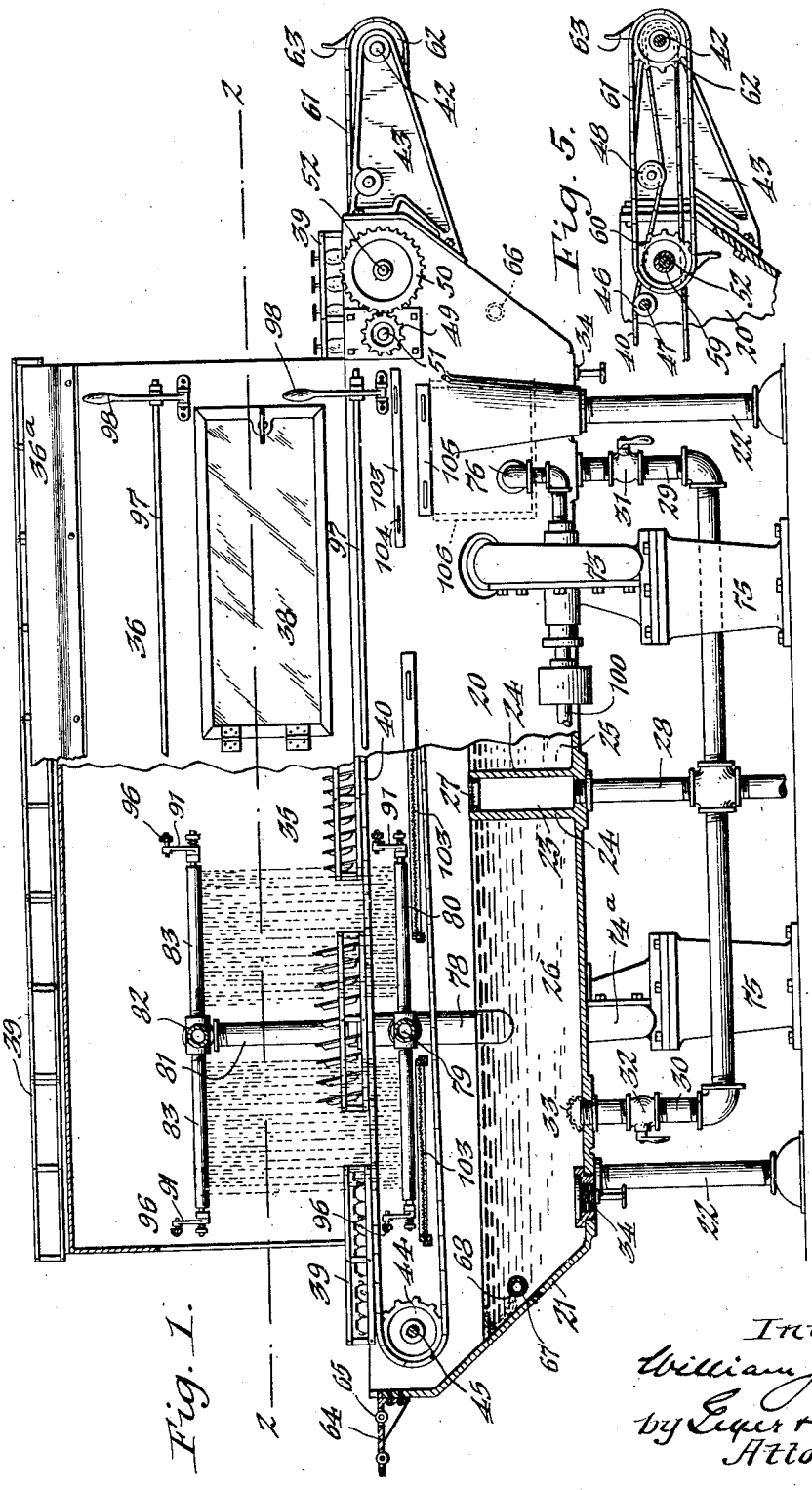


Fig. 1.

Fig. 5.

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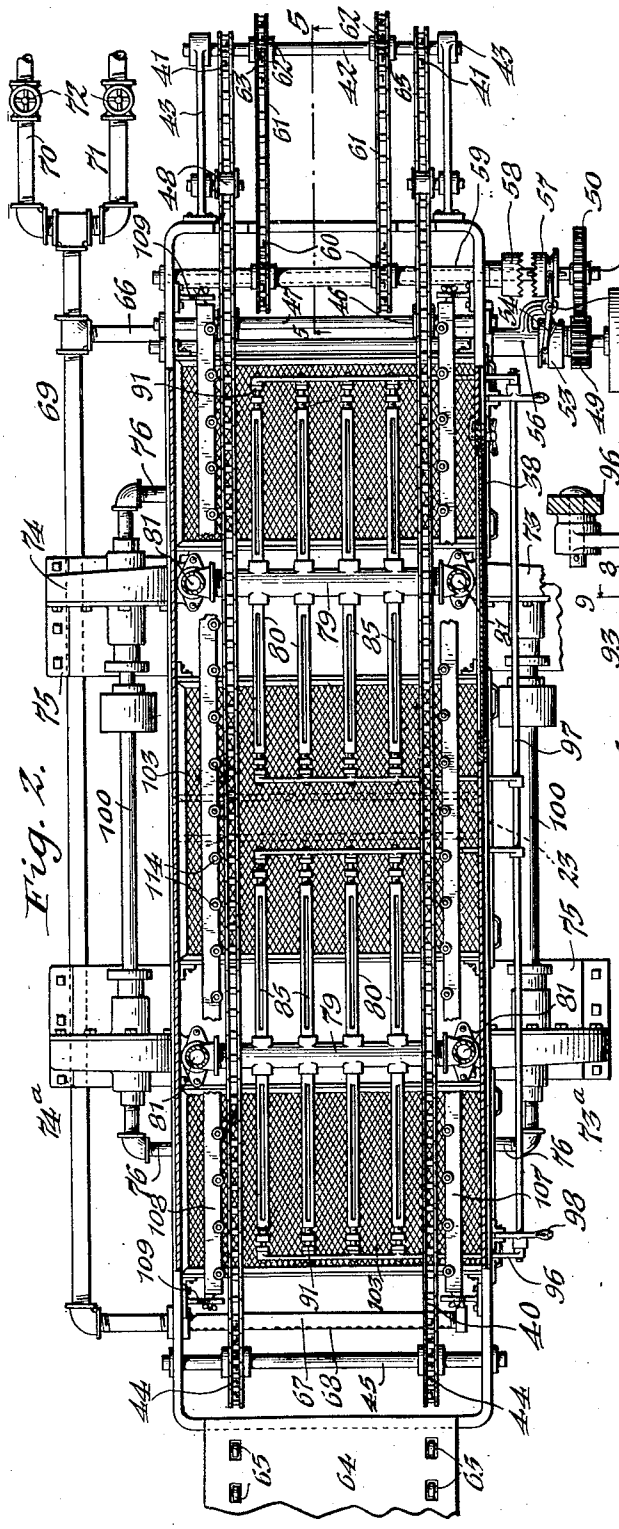


Fig. 2.

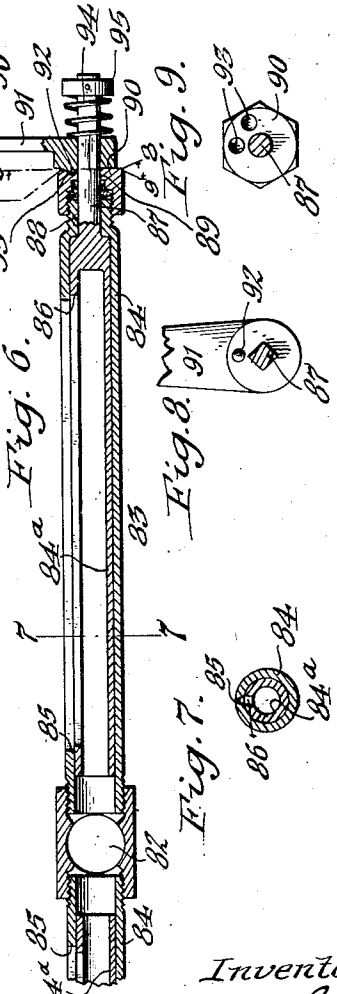


Fig. 6.

Fig. 9.

Fig. 8.

Fig. 7.

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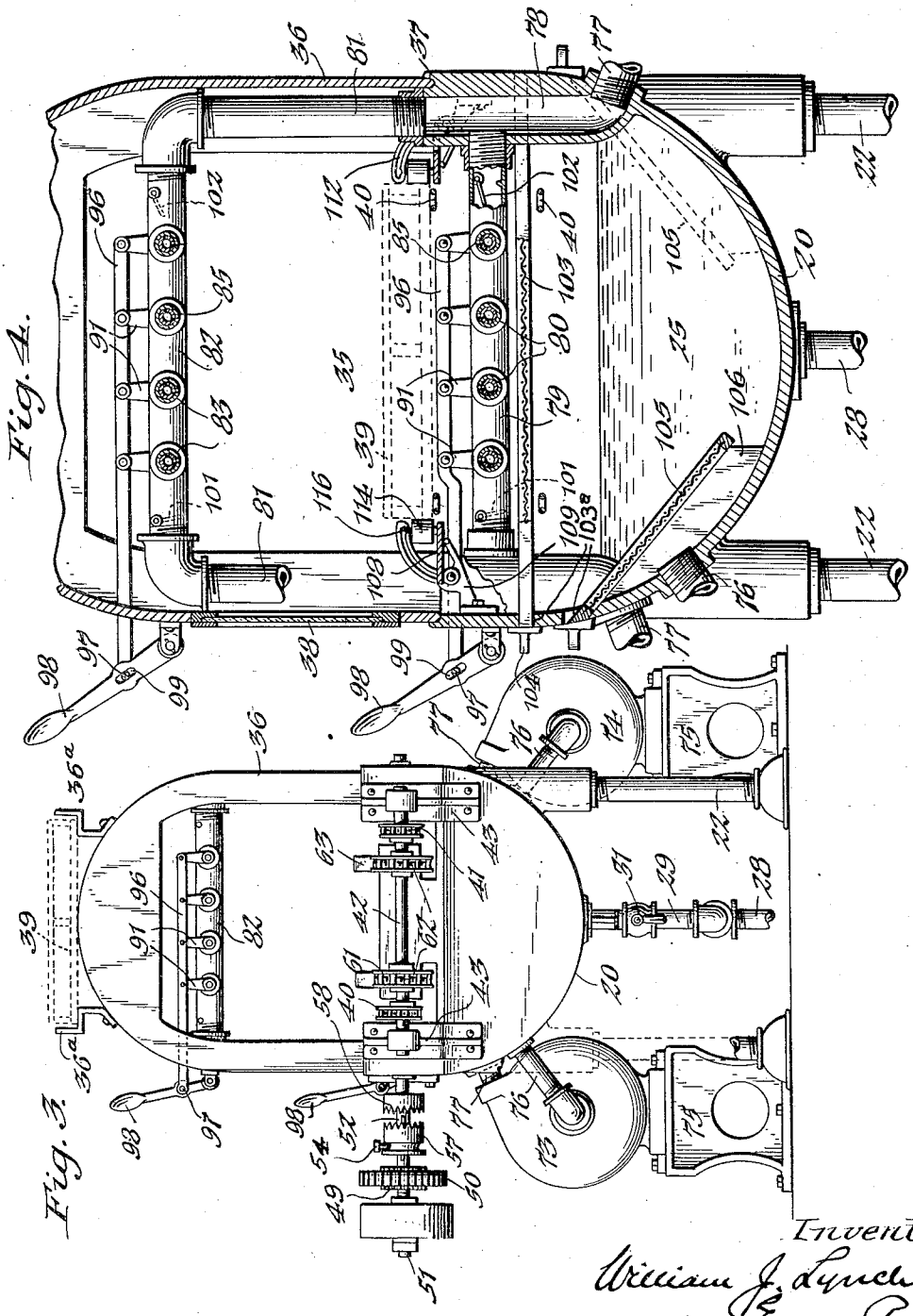


Fig. 4.

Fig. 3.

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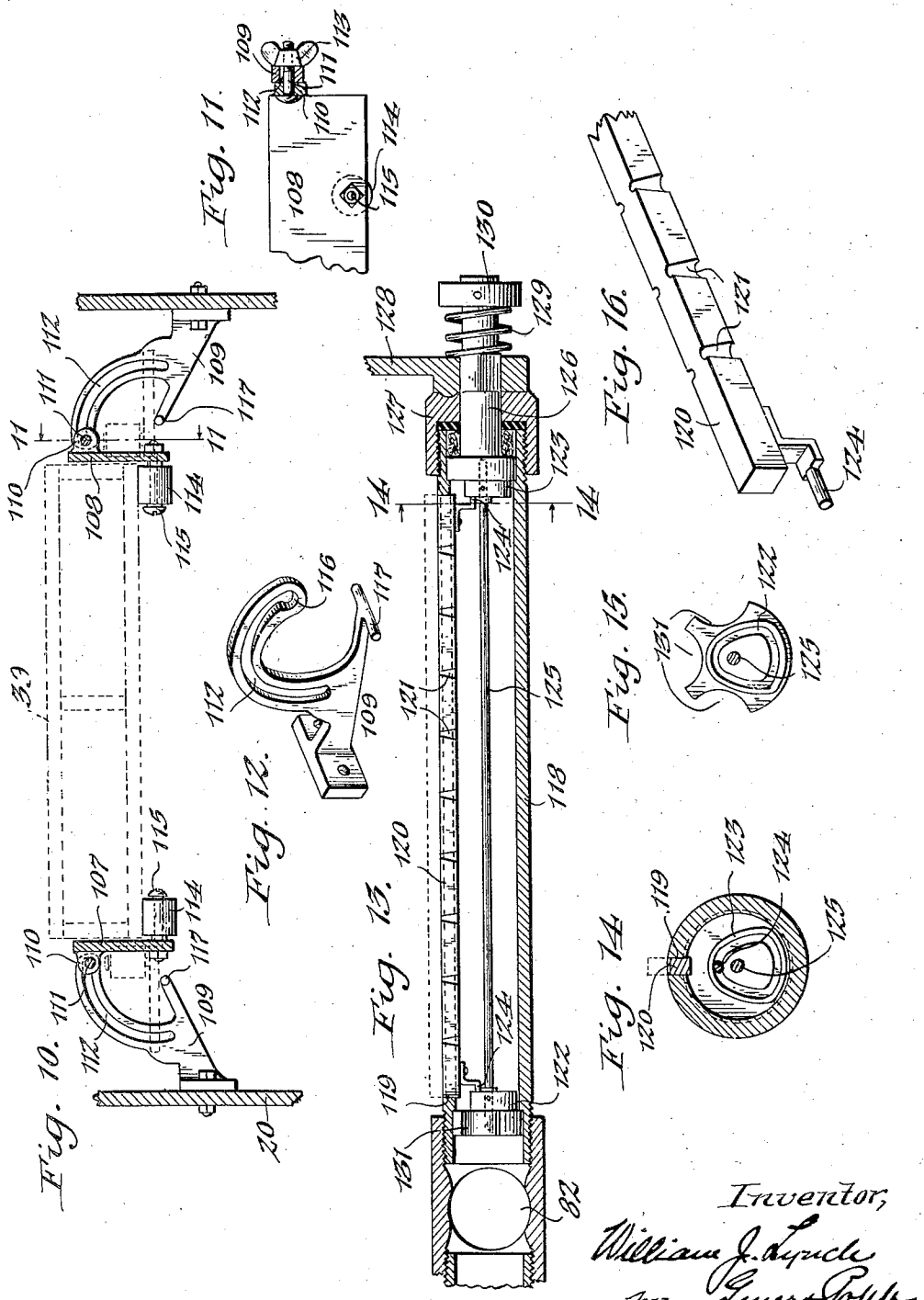


Fig. 11.

Fig. 16.

Fig. 10.

Fig. 12.

Fig. 13.

Fig. 15.

Fig. 14.

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UNITED STATES PATENT OFFICE.

WILLIAM J. LYNCH, OF BUFFALO, NEW YORK.

DISH-WASHING MACHINE.

1,406,465. Specification of Letters Patent. Patented Feb. 14, 1922.

Application filed October 7, 1919. Serial No. 328,998.

To all whom it may concern:

Be it known that I, WILLIAM J. LYNCH, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Dish-Washing Machines, of which the following is a specification.

This invention relates to a machine for washing dishes and the like and which is more particularly adapted for use in hotels, restaurants, hospitals, etc., where it is necessary to wash large numbers of dishes thoroughly and expeditiously.

One of the objects of this invention is to provide a machine of this character with an improved liquid spray system to which the dishes are subjected while passing through the machine and which is controlled by one of a plurality of pumps communicating with the supply tanks of the machine, while the others are in reserve, so that when repairs are required, it is not necessary to shut down the machine.

Another object of the invention is to provide means for successively feeding the dish holding trays or racks intermittently through the machine.

A further object is to provide removable screens beneath the conveyor mechanism for collecting refuse and solid particles removed from the dishes after washing.

A further object of the invention is to provide an improved means for guiding the trays through the machine when it is not desired to utilize the intermittent conveyor mechanism.

A still further object is to provide a machine of this character which is durable and efficient in operation, and of a sanitary construction, whereby the parts can be removed and thoroughly cleaned.

In the accompanying drawings:

Figure 1 is a side elevation of the improved machine, partly in section. Figure 2 is a horizontal section thereof on line 2—2, Fig. 1. Figure 3 is a view of the front or inlet end of the machine. Figure 4 is a fragmentary cross section thereof, on an enlarged scale. Figure 5 is a vertical section on line 5—5, Fig. 2. Figure 6 is an enlarged longitudinal section of one of the spray pipes and associated parts. Figures 7, 8 and 9 are cross sections thereof on the correspondingly numbered lines in Fig. 6. Figure 10 is an enlarged fragmentary cross section showing my improved means for supporting and guiding the dish holding trays through the machine. Figure 11 is a vertical section on line 11—11, Fig. 10. Figure 12 is a perspective view of one of the supporting brackets. Figure 13 is a longitudinal section of a modified form of spray pipe embodying my invention. Figure 14 is a cross section thereof on line 14—14, Fig. 13. Figure 15 is a face view of one of the operating cams. Figure 16 is a fragmentary perspective view of the spray bar.

Similar characters of reference indicate corresponding parts throughout the several views.

20 indicates the main casing of the machine which may be constructed of cast iron and of any desired shape or form, but preferably semi-circular in cross section and having a horizontal bottom portion and inclined end walls 21. This casing is supported above the floor by suitable legs 22.

Arranged centrally and transversely of the casing is an overflow compartment or passage 23 the walls 24 of which extend the full distance across said casing and are preferably integral therewith. These transverse walls divide this casing into tanks or compartments 25, 26, which contain the liquid used in washing and rinsing the dishes, the tank 25 arranged in front of the machine, containing hot soapy water to which the dishes are initially subjected, and the tank 26, arranged in the rear end of the machine, containing the hot rinsing water to which the dishes are thereafter subjected for final cleansing. The overflow passage is common to both tanks and the water in the latter is constantly maintained at the height of the mouth of the overflow. By this construction, the water in one tank is prevented from emptying into the other tank, thereby preventing the water in one tank from mixing with the water in the other tank and keeping the rinsing water clear and free from soap suds and refuse resulting from the initial washing of the dishes. A suitable screen 27 is arranged in the open upper end of the overflow passage which prevents the larger particles of matter from entering the same, while the lower end communicates with a drain pipe 28 which leads to the sewer. Each tank 25, 26 is also provided with a drain pipe 29, 30, respectively, leading to the sewer and provided with corresponding valves 31, 32 for

controlling the draining of the tanks when it is desired to clean the same. These drains may also be provided with screens 33 for preventing the larger particles of matter from entering the pipes and clogging them. To remove the larger particles of matter remaining in the tanks after draining the liquid therefrom, a screw plug 34 is arranged at the outer end of each tank, which is preferably adapted to unscrew upwardly into the tank and the sediment therein swept out through the opening in which said plug is normally screwed.

Arranged above the tanks is a chamber 35 enclosed by a hood 36 which is preferably constructed of sheet metal. This hood is removably supported in a channel or groove 37 arranged in the upper edge of the main casing 20 and is closed at its top and sides but open at its ends to permit of passing the dishes therethrough. Suitable glass doors 38 are arranged in one or both sides of the hood to allow access to the interior when desired and also permit the operator to observe the washing operation of the dishes while in transit through the machine.

The dishes to be washed are placed in suitable trays or racks 39 which may be of any well known construction and which are adapted to travel forwardly lengthwise through the machine during the washing operation. Any suitable conveyor may be used for moving the rays forwardly through the machine, but I employ an intermittent feed mechanism which is preferably constructed as follows:

40 indicates a main conveyor composed of two chains or belts of the endless type arranged on opposite sides of the chamber 35 so as to support the dish holding trays at both sides thereof, and which have their upper operative stretches running lengthwise of the machine and moving forwardly. At their front turns, these conveyor belts pass around a pair of front sprocket wheels 41, 41 which are mounted on a horizontal transverse front shaft 42 carried by brackets 43, 43, securely fastened at opposite sides of the front end of the casing 20, while the rear turns of these belts pass around a pair of rear sprockets 44, 44 which are mounted on a transverse horizontal shaft 45 suitably journaled in the rear end of said casing. The front sprocket wheels 41 are smaller in diameter than the front sprocket wheels 44 which permits the front shaft 42 to turn at a greater speed than the rear shaft 45 for a purpose hereinafter described. The upper or operative stretches of these belts are maintained in a horizontal plane by providing idler wheels 46, 46 mounted on a horizontal shaft 47 journaled in the side walls of the casing and adapted to be engaged by the underside of the operative stretches of said belts, while idler wheels 48, 48 suitably carried by the brackets 43, 43 are adapted to be engaged by the upper side of the operative stretches of the belts, as shown in Figs. 2 and 5. Intermittent motion is transmitted to the conveyor belts 40 through the medium of intermeshing gear wheels 49, 50 secured to the horizontal transverse shafts 51, 52, respectively, journaled in suitable bearings in the main casing of the machine. Mounted on the shaft 51 is a grooved cam 53 adapted to be engaged by one arm of a horizontally-swinging lever 54 pivoted at 55 to the bearing bracket 56, through the other arm of said lever engaging a grooved clutch collar 57 keyed to the shaft 52 and adapted to reciprocate longitudinally thereon. The clutch collar 57 is adapted to intermittently engage a corresponding clutch collar 58 mounted on a hollow shaft 59 surrounding the shaft 52 and journaled in suitable bearings in the casing 20. Mounted on this hollow shaft are a pair of sprocket wheels 60, 60 which transmit motion to the shaft 42 for driving the main conveyor belt through an auxiliary conveyor 61, preferably composed of two chains or belts passing around said sprocket wheels and the sprocket wheels 62, 62 mounted on said shaft 42. The upper stretches of this conveyor are in the same parallel plane as the upper stretches of the conveyor belts 40 and serve to propel the dish trays from the former to the main conveyor belt. The belts 61 travel at a greater speed than the conveyor belts 40 owing to the peripheral speed of the sprocket wheels 62 being greater than that of the smaller sprocket wheels 41. This increased speed of the belts 61 over the conveyor belts 40 gives the dish trays an initial push or movement before alighting on the main conveyor, thus permitting of arranging the trays in closer proximity of each other and filling the machine to its maximum capacity. The chains 61 may be provided with suitable feed wings 63.

After leaving the exit or rear end of the machine, the dish holding trays pass from the conveyor belt onto a platform 64 suitably secured to the main casing of the machine and preferably provided with one or more sets of rollers 65 which are mounted on the platform and serve to support the trays thereon and permit said trays to be easily manipulated by the operator.

Arranged transversely and horizontally at the outer ends of the tanks 25 and 26 and adjacent the inclined walls 21 of the casing 20 are pipes 66, 67 provided with a plurality of openings 68 in the side thereof adjacent said walls which supply a continuous flow of water into the respective tanks. These pipes are connected to a main supply pipe 69 having the branches 70, 71 con-

nected therewith, each of which is provided with a valve 72 for regulating the supply of water to the pipes 66, 67. The pipe 70 may be utilized for a hot water supply and the pipe 71 for a cold water supply. By having a constant flow of water into the tanks and arranging the pipes adjacent the inclined walls so that the water is directed against said walls, a constant current is maintained at the surface of the water in the tanks and all grease and smaller particles of matter removed from the dishes is caused to flow toward the overflow 23 and into the sewer.

73, 73ª, and 74, 74ª represent two sets of centrifugal pumps which are employed to pump the water from the tanks 25 and 26 to the spraying system of the machine, the first mentioned set of pumps being arranged on one side of the machine and each connected with one of said tanks, while the other set of pumps is arranged on the other side of the machine and each connected with the corresponding tanks, the purpose of the two sets of pumps being that when one set is out of order or undergoing repairs, the other set may be employed, thereby making it unnecessary to stop the operation of the machine. The spraying system associated with each tank and supplied with water by these pumps is composed of spraying devices preferably disposed above and below the conveyor belt, so that the dishes thereon are subjected to voluminous sprays of water directed toward the top and bottom thereof. These pumps are preferably mounted on platforms 75 arranged adjacent the casing 20. Inasmuch as both sets of pumps and spraying devices associated therewith are identical in construction, a description of one set of the same will cover both.

The suction or intake end of the pump 73 is connected by a pipe 76 with the tank 25 containing the hot soapy water for the initial washing of the dishes, while the discharge from said pump is conducted through a pipe 77 communicating with a vertical passage 78, preferably cast integral with the main casing 20 of the machine.

Communicating with this passage, is a manifold 79 arranged horizontally and transversely of the tank, and below the upper operative stretch of the conveyor belt, which is provided with a plurality of spray pipes 80 from which the water is discharged under pressure so that the dishes passing through the machine are thoroughly subjected to an upward voluminous spray or sheet of hot soapy water. As shown in the drawings, these spray pipes extend from opposite sides of the manifold and are arranged horizontally and longitudinally of the machine.

Connected to and communicating with the passage 78 is a pipe 81 arranged vertically and adjacent the wall of the hood 36 which conducts the water to a manifold 82 arranged transversely of the hood and above the conveyor, and provided with a plurality of spray pipes 83 extending from opposite sides of said manifold and from which the water is discharged under pressure, so that the dishes in transit through the chamber 35 are thoroughly subjected to a downward spray of hot soapy water. The suction or intake end of the pump 73ª is connected to the tank 26 containing hot rinsing water while the discharge from the same is conducted to upper and lower manifolds 82ª and 79ª, in a manner identical with that previously described and associated with the pumps 73.

The spray pipes of both upper and lower manifolds associated with both sets of pumps are preferably constructed as follows:

Each spray pipe comprises an outer fixed cylindrical section 84 having a screw threaded connection with the manifold and an inner cylindrical section 84ª adapted to rotate within said outer section and communicate with the manifold. The outer section is preferably provided with an upwardly-tapering longitudinal discharge opening 85 while the inner section is provided with a smilar opening 86 which is adapted to register with the opening 85 in said outer section for permitting the discharge of water therefrom. A solid portion of the inner section is adapted to cover the opening of the outer section when it is desired to shut off the water entirely. The inner section 84ª of each spray pipe is provided with an extension or shank 87 which projects from the outer end of said section through an opening 88 in the outer section 84 and an opening 89 in a packing sleeve or nut 90 screwed to the outer end of the last mentioned section. Rigidly secured to the exposed outer end of this shank is an arm 91 adapted to control the rotation of the inner section, to cause the opening and closing of the discharge opening of the outer section, and whose hub is provided in the inner face thereof with a projection 92 adapted to interlock with one or more corresponding recesses or depressions 93 in the opposing face of the packing nut 90. A spring 94 surrounding the shank 87 and interposed between a collar 95 thereon and the adjacent portion of the arm 91 serves to keep the latter in constant engagement with the packing nut, so that the projection 92 of said lever will automatically drop into one of the corresponding depressions in said packing nut at a predetermined point in the rotation of the inner section 84ª to effect the opening or closing of the discharge openings of the spray pipe. Each arm 91 of the several spray pipes is pivotally connected to a horizontal transverse link 96 which passes

through an opening in the adjacent part of the machine and whose outer free end is pivotally connected to a tie rod 97 arranged lengthwise of the machine and adjacent to one side thereof. An operating lever 98 is pivoted for vertically swinging movement at either end of the machine and provided above said pivoted point with a vertical slot 99 adapted to receive one end of the tie rod 97 so as to permit the latter to have a vertical movement necessary in operating said lever to simultaneously control the opening and closing of the several spray pipes through the medium of the link 96. As shown in the drawings, the upper set of spray pipes are controlled in the same manner but independently of the lower set of spray pipes.

Any suitable means may be employed for driving the pump shaft 100 connected to both pumps of each set.

The upper and lower manifolds communicating with both sets of pumps are provided at their opposite inlet ends with suitable check valves 101, 102, controlled by the pressure of the water being admitted to said manifold from either set of pumps. When the set of pumps 74, 74[a] are in operation, the water is conducted to the manifolds 79, 82, through the check valves 102 which are thereby opened owing to the pressure of the water exerted thereon, while the check valves 101 are closed by the pressure of the water admitted into said manifold, after which it is conducted to the several branches or spray pipes 80, 83.

Screens 103 are removably arranged above the tanks 25 and 26 and preferably extend transversely thereof and are in the form of drawers so that they can be conveniently withdrawn from the machine for cleaning purposes without stopping the machine or interfering in any way with the other parts thereof. To permit of the insertion and removal of these drawers, a slot or opening 103[a] is provided in the side wall of each tank above the water line thereof. These screens are disposed below the lowermost set of manifolds and spray pipes and are adapted to catch the refuse and other matter removed from the dishes during the process of washing the same. These screens may be provided with suitable handles 104 for withdrawing the same from the machine. A removable screen 105, also in the form of a drawer, is arranged over the inlet or suction pipe 77 connected with each pump for preventing solid matter from being drawn into the pump and impairing the operation of the same. As shown in Figs. 1 and 4, this screen is preferably inclined downwardly and directly over the suction inlet and is supported on a frame 106 integral with the casing 20, and surrounding said inlet.

Arranged lengthwise on the top of the hood 36 are a pair of supporting or guide rails 36[a] suitably secured thereto and which are used for returning the dish trays from the rear end of the machine toward the front end thereof after the washed dishes have been removed therefrom. The racks are successively fed onto these guide rails by an operator who takes care of the dishes after coming from the machine.

The operation of the machine is as follows:

Assume the rear set of pumps 74, 74[a] to be in operation and the front set of pumps 73, 73[a] inoperative and in reserve. The pumps 74, 74[a] are operated through the medium of the driving shaft 100, driven in any suitable manner for example, by an electric motor, and draw water from the corresponding tanks 25, 26 into the casing of the pumps and force the same through passages 78 and pipes 81 to the manifolds 79, 82 connected therewith and hence to the spray pipes 80, 83 controlled by the operating levers 98, where the same is discharged under pressure into conical sheets above and below the dishes. The trays or racks containing the dishes to be washed are placed by the operator onto the auxiliary feed belts 61 by which they are propelled to the main conveyor belts 40 traveling at a somewhat slower speed than said first mentioned belts, both belts having intermittent motion so as to operate simultaneously and permit of leaving the dishes in the machine a sufficient length of time to thoroughly wash and rinse the same. The dish holding trays are successively fed into the machine in the manner just mentioned, and pass intermittently from the front end to the rear end thereof. In their travel through the machine, the dishes are first subjected from above and below the same, to the conical sheets of hot soapy water discharged from the upper and lower spray pipes. This water is continuously circulated by the pumps from the tank 25 to the corresponding manifolds where it is discharged through the spray pipes to wash the dishes after which it descends into the tank and is used again. This initial washing removes most of the refuse and solid matter from the dishes, said refuse and matter being collected on the screens 103 provided therefor. The grease and finer particles of matter which pass through the screens into the tank are carried to the central overflow 23 owing to the continuous flow of water entering said tank through the pipe 66. The water from the latter is directed upwardly against the inclined end wall of the tank so as to produce a current on the surface of the water therein in the direction of the overflow compartment. After the dishes have been thoroughly sub-

jected to this washing process they are intermittently propelled forwardly and subjected to the clear rinsing water circulated from the tank 26 through the upper and lower spray pipes in the same manner as with the initial washing process. Any matter removed from the dishes during this final rinsing process is collected on the screens below the racks, and the grease and finer particles carried to the overflow 23 by the current produced in the tank from the continuous flow of water therein. After the final rinsing the trays pass out through the rear end of the machine onto the platform 64 from which they are taken to a convenient place and dried. After the dishes are removed from the trays, the latter are returned to the front end of the machine over the supplemental guide rails 36ª arranged on the top of the hood 36.

When it is not desired to use the intermittent conveyor mechanism for propelling the dish trays through the machine, I employ a track mechanism lengthwise of the machine which permits of successively feeding the trays therethrough manually. 107 and 108 indicate two longitudinal guide rails arranged lengthwise on opposite sides of the machine and each adjustably supported at its opposite ends in brackets 109 suitably secured to the casing 20 of the machine. Each guide rail is provided at its opposite upper ends with an outwardly projecting lug 110 adapted to receive a bolt 111 which is arranged to engage a segmental slot 112 in the bracket 109 and reliably secured thereto by a wing nut 113. Carried by these guide rails and preferably at their lower ends are a plurality of rollers 114, the axes of which are horizontal or at right angles to the plane of the rails. These rollers may be mounted on the rails in any suitable manner, bolts 115 being shown in the drawings for this purpose. In the position of the parts shown by full lines in Fig. 10, the same are in their operative position, the rollers serving to support the tray, shown in dotted lines and the rails serving to guide the same and prevent lateral displacement thereof. In this position, the bolts 111 are adapted to seat themselves in a semi-circular recess 116 provided in the bottom of the outer portion of the segmental groove of the bracket, as shown clearly in Fig. 12. When this mechanism is not in use, the guide rails are swung to a horizontal position, as shown by dotted lines in Fig. 10 and by full lines in Fig. 4, this being accomplished by simply loosening the wing nuts and turning the rails outwardly about the fulcrum pin 117 projecting from the lower portion of the bracket until the bolts 111 reach the bottom of the segmental groove 112, after which the wing nut can be screwed up tightly. The rollers have their axes vertical in this position and afford the advantage of serving to guide the dish trays when travelling on the conveyor belt, and thereby prevent lateral displacement of the same. The rails and brackets are out of the path of the conveyor belt and interfere in no way with the moving conveyor.

In Figs. 13, 14, 15 and 16, are shown a modified form of spray device used in connection with the intake manifold. This device consists of a cylindrical section or pipe 118 having a screw connection with the manifold and arranged to communicate therewith. Movably arranged in a longitudinal slot 119 in the upper side of this pipe is a spray bar 120 provided in opposite sides thereof with upwardly-tapering semi-circular openings 121 through which the water is discharged for spraying the dishes. This spray bar is adapted to be disengaged from the slot in the pipe 118 for the purpose of facilitating cleaning thereof, by providing two grooved cams 122, 123 in opposite ends of said pipe which are engaged by pins 124 secured to the underside of the opposite ends of the spray bar. These cams are prevented from longitudinal displacement and are connected by a tie rod 125 to permit them to be rotated together. The cam 123 is provided with a shank 126 projecting through the outer end of the pipe and an opening in the packing nut 127 screwed to the end of said pipe. An arm 128 is secured to this shank which permits of rotating the cams to cause the raising and lowering of the spray bar. This arm may be yieldingly held against the packing nut by a spring 129 interposed between a collar 130 and said arm. The cam 122 is provided in its periphery with notched portions 131, between which and the inner wall of the pipe 118 the water from the manifold is transmitted to said pipe. The spray bars of the several pipes may be controlled simultaneously as described in the preferred construction.

This improved dish washing machine is very efficient and economical in operation and is capable of washing large numbers of dishes quickly and thoroughly. Furthermore, the various parts of the machine which require cleaning are readily accessible for this purpose, thereby affording the advantage of having a sanitary machine at all times.

I claim as my invention:

1. A dish washing machine comprising a casing having a plurality of tanks therein, means for supporting dish holding trays in transit through said machine, a spraying system for each tank disposed above said trays and consisting of a manifold, a plurality of spray pipes communicating with said manifold and each provided with a discharge opening, means for simultaneously controlling the opening and closing of the latter in said pipes, and means for forcing

the water from each of said tanks to said manifold.

2. A dish washing machine comprising a casing having a plurality of tanks therein, means for supporting dish holding trays in transit through said machine, a manifold communicating with each tank, a plurality of spray pipes connected with said manifold and communicating therewith and each comprising inner and outer sections provided with discharge openings adapted to register one with the other, and means for simultaneously controlling the discharge of water from said pipes.

3. A dish washing machine comprising a casing having a plurality of tanks therein, means for supporting dish holding trays in transit through said machine, a manifold communicating with each tank, a plurality of spray pipes connected with said manifold and communicating therewith and each comprising an outer section provided with a longitudinal discharge opening and an inner section adapted to rotate within said outer section and provided with a discharge opening adapted to register with the opening in said outer section, and means for simultaneously controlling the rotation of the inner sections of said pipes to cause the opening and closing of said discharge openings.

4. A dish washing machine comprising a casing having a plurality of tanks therein, means for supporting dish holding trays in transit through said machine, a manifold communicating with each tank, a plurality of spray pipes connected therewith and each comprising a rotatable inner section and a fixed outer section provided with discharge openings adapted to register one with the other, an arm connected to said inner section, a link pivotally connected to each of said arms for simultaneously operating the latter, and means for controlling the movement of said link to cause the opening and closing of the discharge openings of said pipes.

5. A dish washing machine comprising a main frame, and means for guiding dish holding trays in their movement through said frame including guiding devices arranged lengthwise on opposite sides of the path of said trays, each guiding device being tiltable to a horizontal or vertical position and provided with members arranged at right angles to each other so that in one position of each guiding device one of its members engages the underside of the tray and the other, the side thereof, and in another position one of its members engages the side of the tray and the other member is inoperative.

6. A dish washing machine comprising a casing having a tank, a spraying system communicating with said tank, and means for guiding dish holding trays in transit through said casing including two rails arranged lengthwise thereof, brackets secured to said casing and upon which said rails are supported so as to be shiftable to a horizontal or vertical position, rollers carried by said rails and arranged to support the trays in one position of said rails, and means for clamping the rails in either position on said brackets.

7. A dish washing machine comprising a casing having a tank, a spraying system communicating with said tank, and means for guiding dish holding trays in transit through said casing including two rails arranged lengthwise thereof and each tiltable in a horizontal or vertical position, brackets secured to said casing and each provided with a segmental slot, clamping means carried by said rails and adapted to engage said slots to hold the rails in adjusted position and rollers carried by said rails arranged at right angles thereto.

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