May 10, 1932. W. L. LINDGREN 1,857,728

DISHWASHING MACHINE

Filed Dec. 28, 1929 7 Sheets-Sheet 1

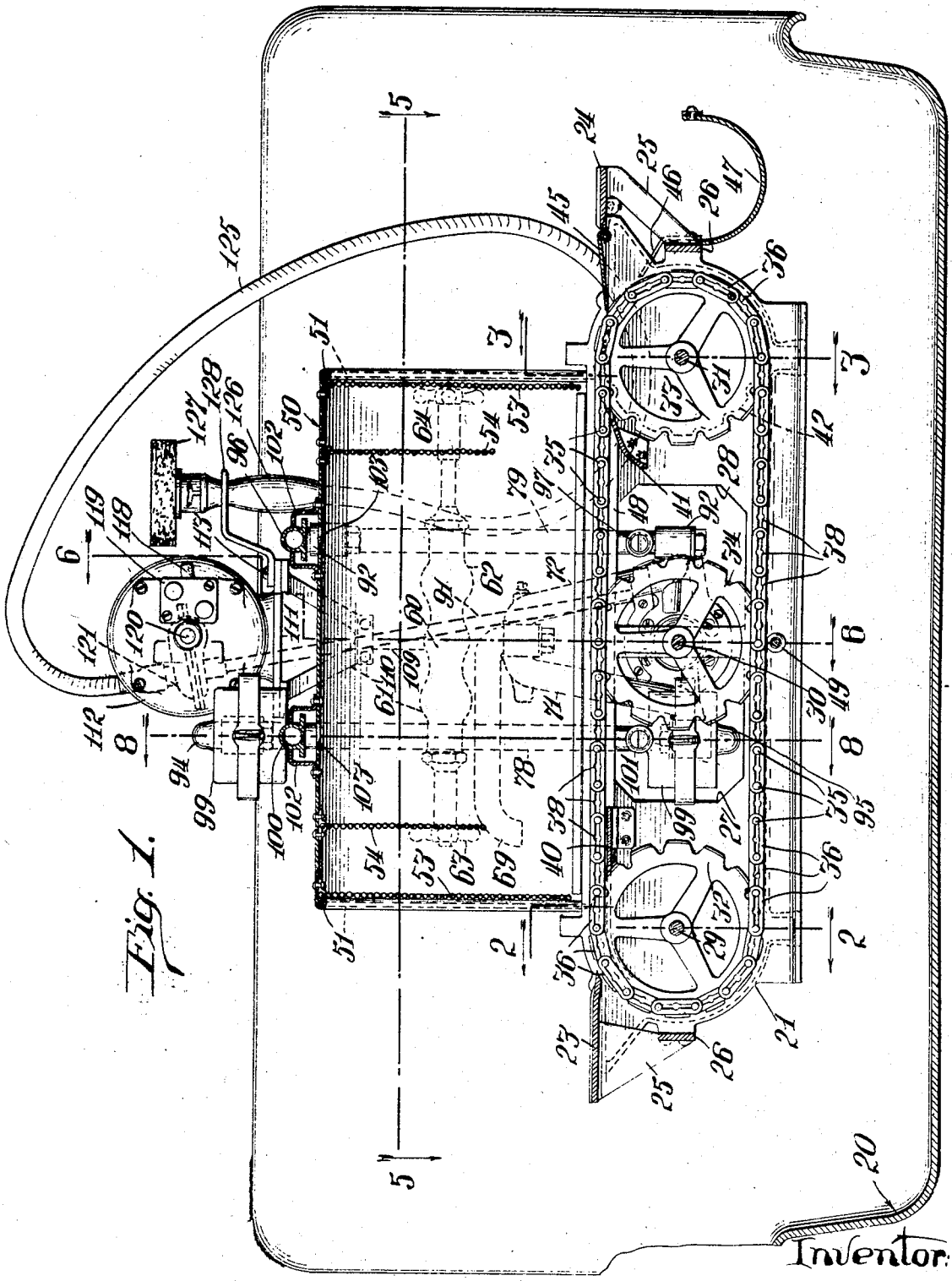

Fig. 1.

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Fig. 2.

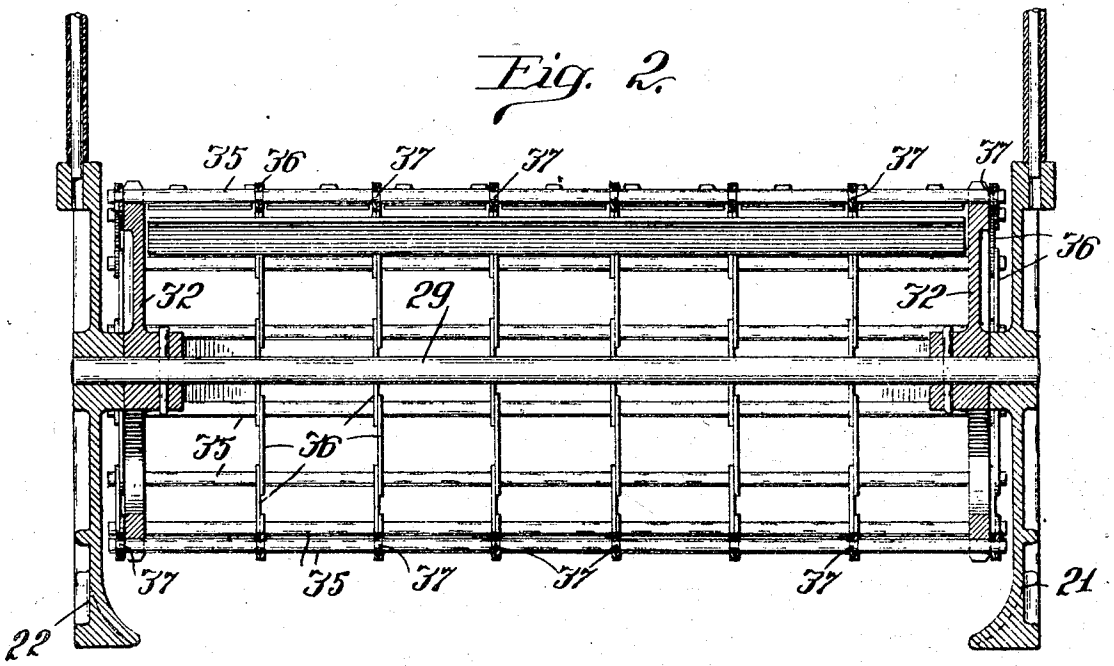


Fig. 3.

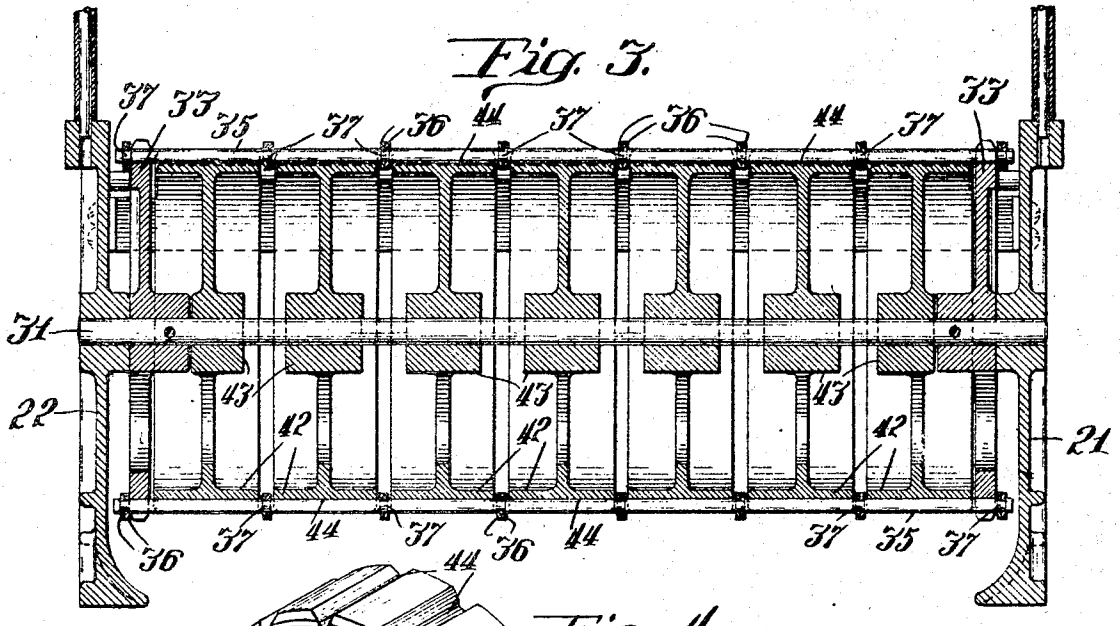
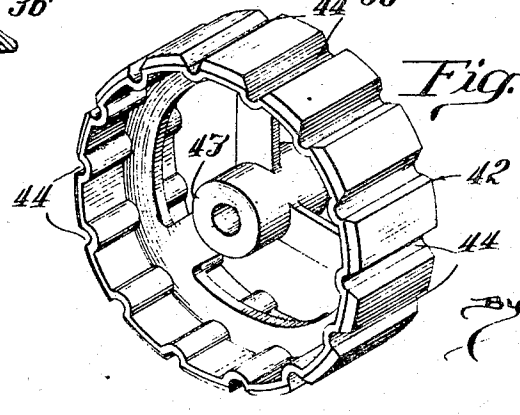


Fig. 4.



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May 10, 1932. W. L. LINDGREN 1,857,728

DISHWASHING MACHINE

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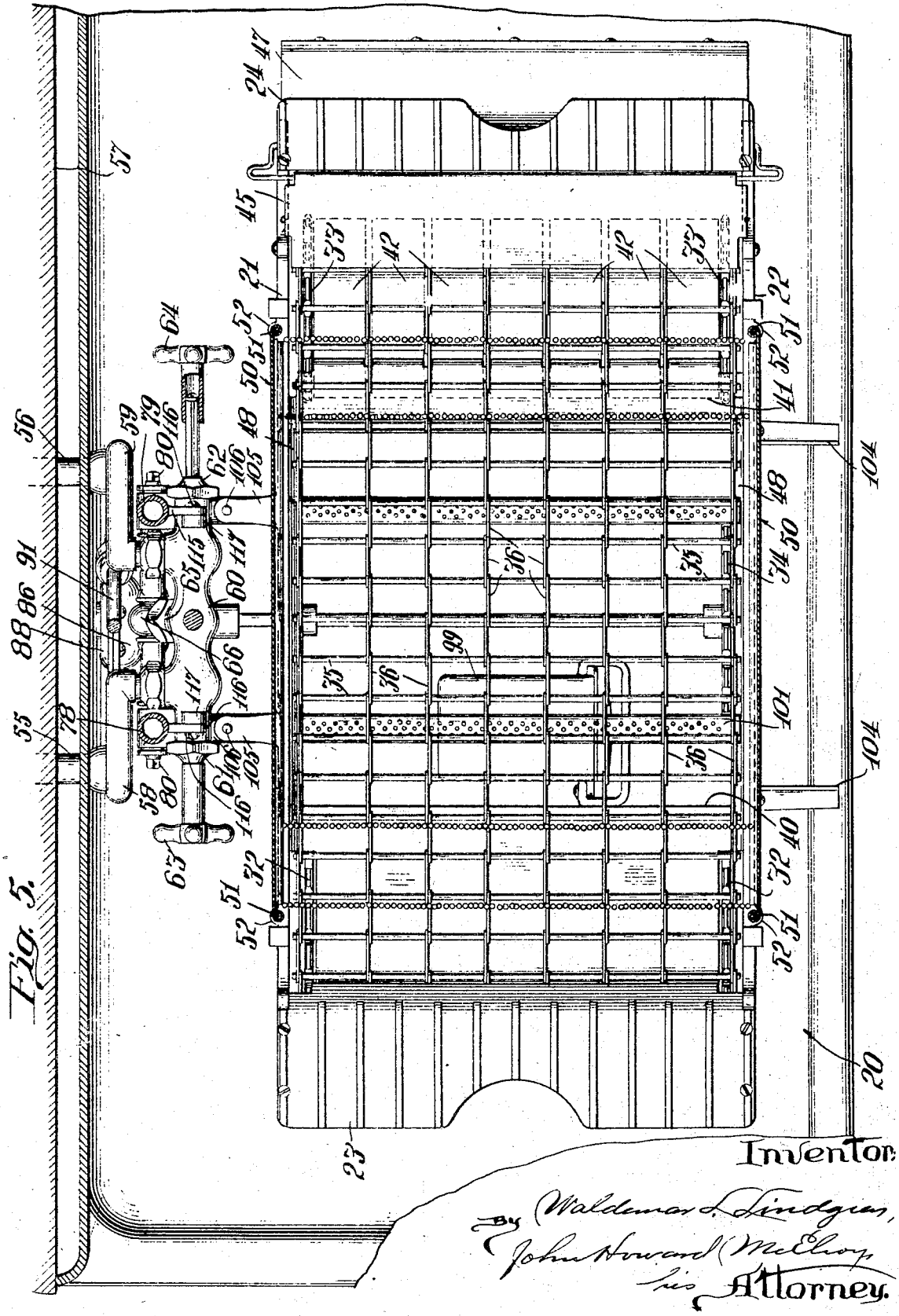

Fig. 5.

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DISHWASHING MACHINE

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Fig. 6.

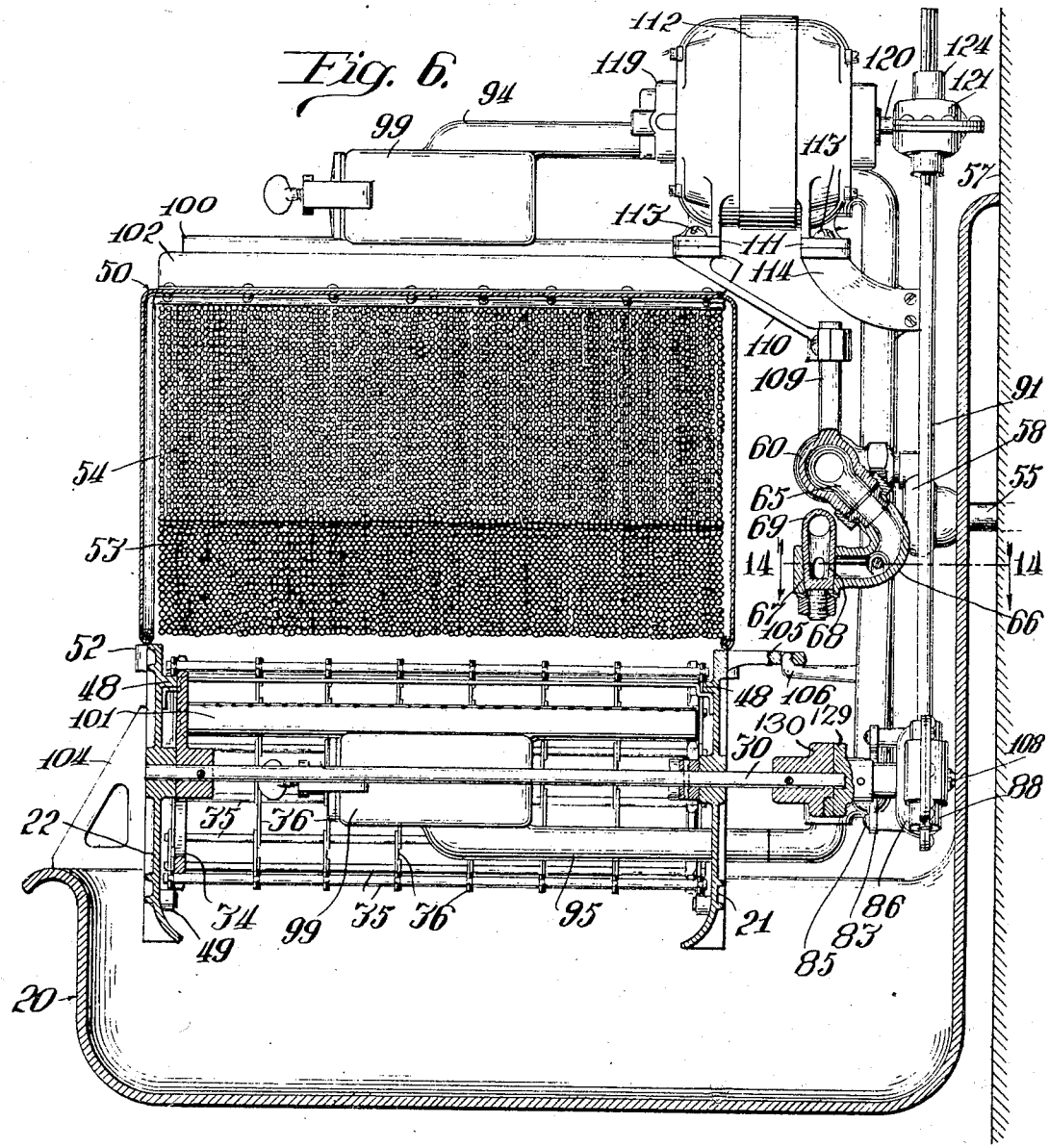
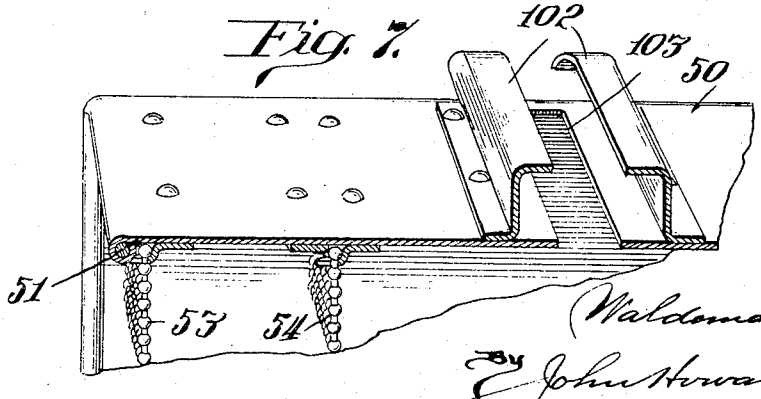


Fig. 7.



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DISHWASHING MACHINE

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Fig. 8.

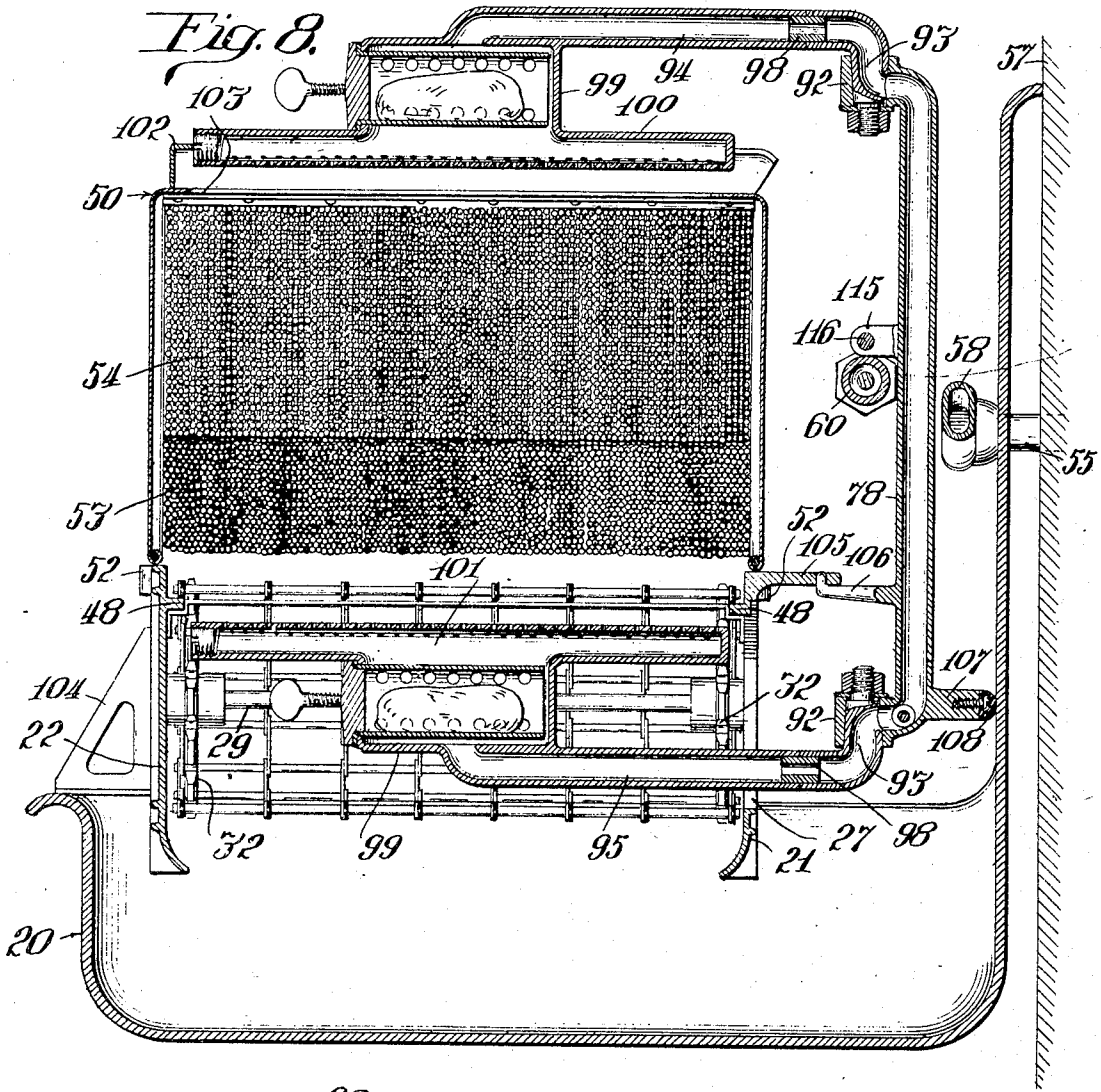
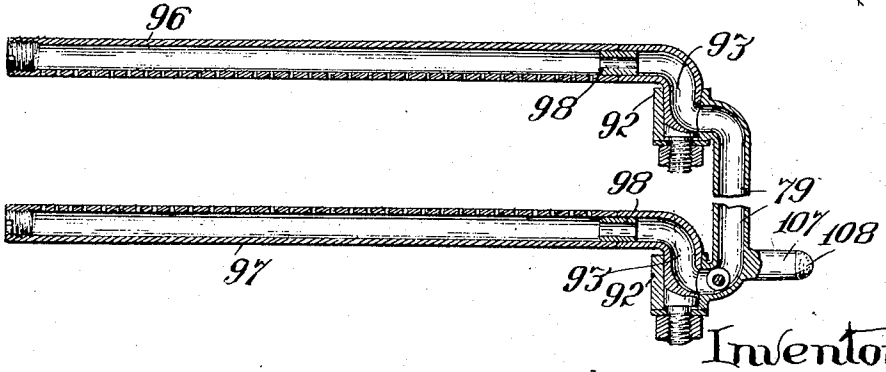


Fig. 9.



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DISHWASHING MACHINE

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Fig. 10.

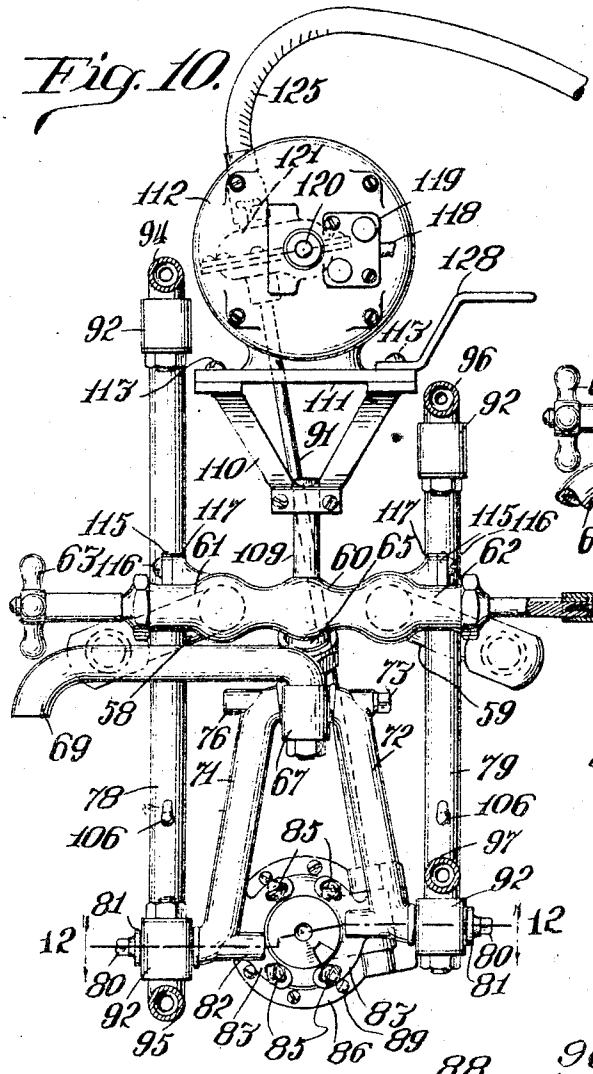


Fig. 11.

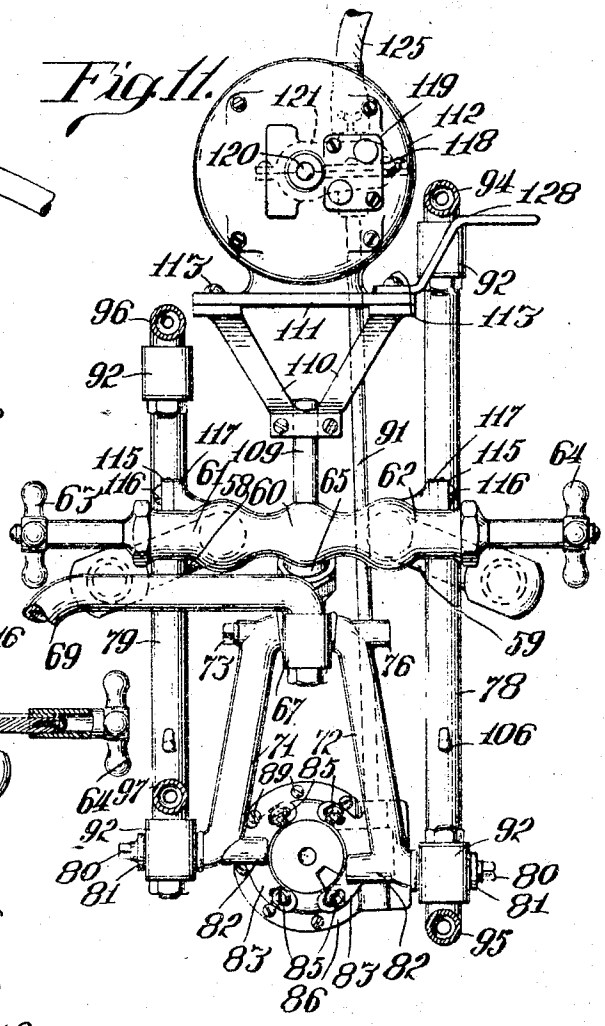
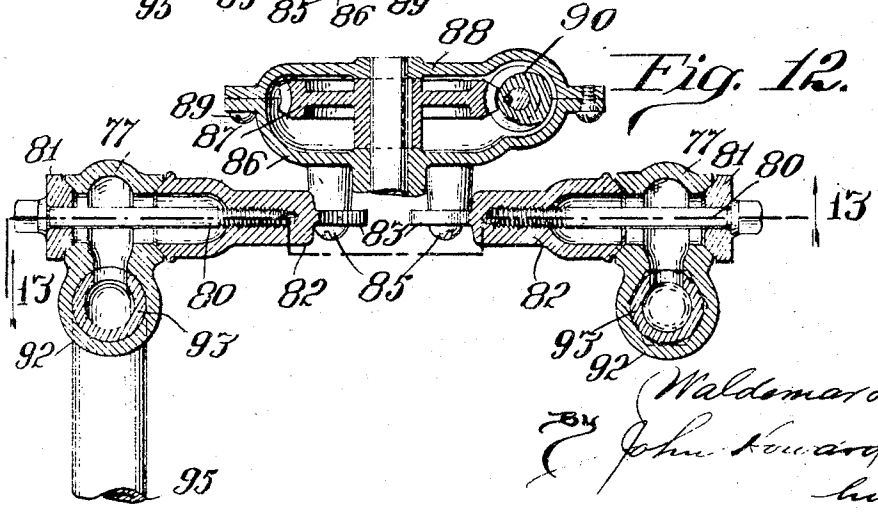


Fig. 12.



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DISHWASHING MACHINE

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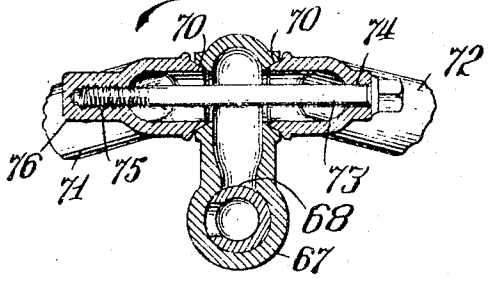
Fig. 14.



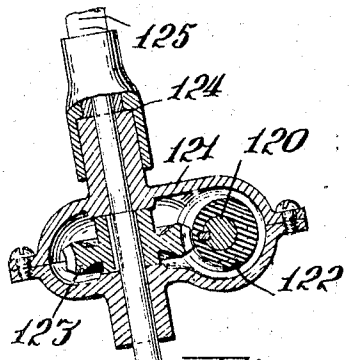
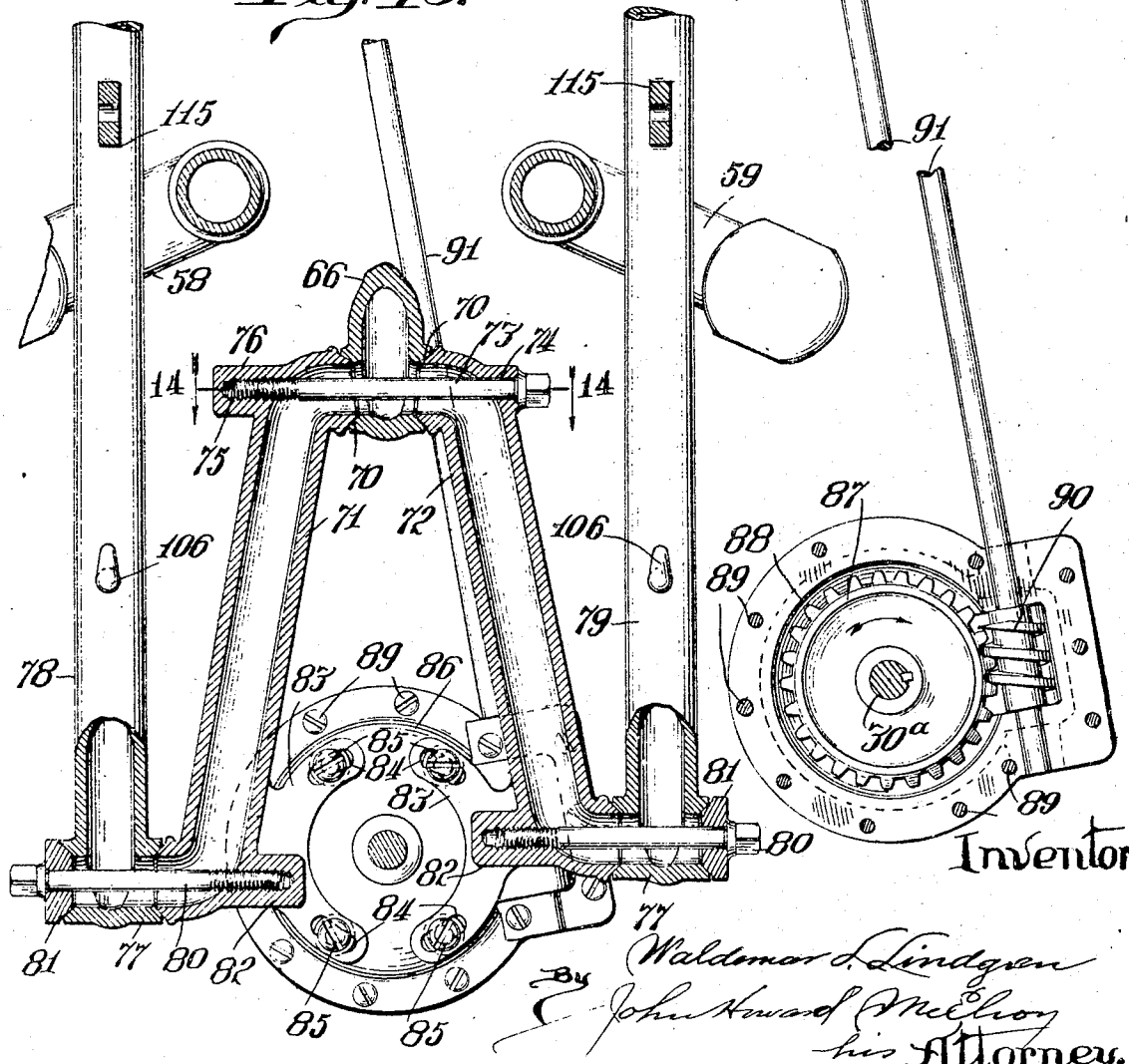


Fig. 15.

Fig. 13.



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Patented May 10, 1932 1,857,728

UNITED STATES PATENT OFFICE

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DISHWASHING MACHINE

Application filed December 28, 1929. Serial No. 417,056.

My invention is concerned with dish washing machines of the type shown in my Patents Nos. 1,798,425, 1,798,426 and 1,798,428, dated March 31, 1931, and consists of certain improvements on the structures shown in the aforesaid patents designed to make the machine more effective in its operation and to remove certain objections I have found by practice inhere in the aforesaid structures.

The complete machine and its operation will be described in detail, and the novel combinations and features particularly pointed out in the claims.

To illustrate my invention, I have annexed hereto seven sheets of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which,—

Fig. 1 is a front elevation of the machine in place in a sink, with the machine proper in central vertical longitudinal section;

Figs. 2 and 3 are vertical sections, on a larger scale, on the lines 2—2 and 3—3 of Fig. 1;

Fig. 4 is a perspective view of one of the wheels going to make up the drum seen in vertical section in Fig. 3;

Fig. 5 is a plan view in horizontal section on the line 5—5 of Fig. 1;

Fig. 6 is a sectional view, on an enlarged scale, on the line 6—6 of Fig. 1;

Fig. 7 is a perspective view of one corner of the cover in section, showing how it accommodates the upper spray members when the machine is in place;

Fig. 8 is a view similar to Fig. 6, but in section on the line 8—8 of Fig. 1;

Fig. 9 is a vertical section of the two clear-water spray pipes, showing their connections to the liquid supply;

Fig. 10 is a view, in front elevation, of the faucet connections, with the dish-washing machine removed and the spray pipes in section;

Fig. 11 is a view similar to Fig. 10, but illustrating the parts arranged for the conveyor to move in the opposite direction without changing the direction of rotation of the motor;

Fig. 12 is a horizontal section as seen on the line 12—12 of Fig. 10, but on a larger scale;

Fig. 13 is a view in section on the line 13—13 of Fig. 12;

Fig. 14 is a detail in section on the line 14—14 of Fig. 13; and

Fig. 15 is a detached view, partly in section, of the driving shaft and connections between the motor and the driving shaft of the conveyor.

My dish-washing machine is of the type adapted to be mounted in the customary sink 20. The conveyor, which is best shown in Figs. 1 to 6, and 8, is mounted in a frame made up of two longitudinal side pieces 21 and 22, which are spaced apart and rigidly held together by the stationary end pieces 23 and 24. These end pieces 24 preferably have the downwardly extending webs 25 at their ends which connect the horizontal portion with the vertical portions 26. The side piece 22 is preferably imperforate, except for the bearings for the hereinafter mentioned shafts, but the rear side piece 21 is provided with a pair of apertures 27 and 28 to receive the lower spray members to be subsequently described. The three shafts 29, 30 and 31 are journaled in bearings formed in the side pieces, and the shafts 30 and 31 rotate in operation, although the shaft 29 might be stationary with the sprocket wheels 32 on the ends thereof rotating on the shaft, instead of with the shaft. The shaft 31 has secured at its ends, just inside of the side pieces, the pair of sprocket wheels 33, and the shaft 30 has secured on it, immediately adjacent the side piece 22, the driving sprocket wheel 34.

The conveyor belt is preferably constructed of a plurality of horizontal and parallel rods 35 which are connected to form a skeleton belt by the links 36, which are stamped out of sheet metal and are of the design shown in Fig. 1, where it will be seen that each has a longitudinal slot with rounded ends extending substantially the length of the link and of a width to receive the reduced portion of its co-operating rod forming the annular channel 37. The slot has at some point therein, preferably the middle, the enlarged portion 38 which permits the link being slipped over the end of the rod at this point and moved

to the desired channel 37 with which it is to co-operate. With this construction, it will be readily observed that I have produced a simple and inexpensive skeleton carrier which permits the water to be thrown upward through the upper run and on to the dishes and kitchen utensils carried by the skeleton belt.

As I have found that there is a tendency for the knives, forks and spoons to get into the openings in the belt, and assume a vertical position therein, instead of lying on it horizontally, I place between the side pieces and immediately adjacent the under side of the upper run of the belt and the wheels 32, the sheet-metal cross piece 40, which prevents the knives, forks, spoons, etc., from assuming a vertical position and insures their being started on their way extending horizontally on the conveyor. As there may be some displacement of these articles from the action of the jets of water on them, I provide, adjacent the under side of the upper run of the belt and the sprocket wheels 33, the sheet-metal cross piece 41, which is secured at its ends to the side pieces and is curved as shown, so that if any end of a knife, fork or spoon should extend through the belt and project downward, it will be cammed back up into place as it arrives over this inclined cross piece 41.

I have previously found much difficulty in preventing the knives, forks and spoons from becoming entangled with the belt as it curved around the wheels 33 to the discharge end, and to prevent this possibility, I fill the space between the wheels 33 with a series of wheels 42, one of which is seen in perspective in Fig. 4, and which have the hubs 43 adapted to be threaded on and preferably secured to the shaft 31, and with the grooves 44 in their peripheries to receive the rods 35. The peripheries of the disks 42 are, as shown in Fig. 3, separated just enough to accommodate the links 36 as they pass around the drum thus formed. This drum-like construction prevents any possibility of the knives, forks and spoons becoming entangled with the belt at this point, and where they are to be taken off of the machine immediately by an attendant, I have the sheet-metal plate 45 hinged to the edge of the end piece 24 turned down to the full-line position shown in Fig. 1. If for any reason it is desired that the cutlery be taken care of automatically as it leaves the machine, I turn this projecting plate 45 upward and outward as far as it will go into a position in which the knives, forks and spoons can be carried around the drum and strike the inturned upper end 46 of the sheet-metal trough 47, which is fastened to the cross piece 26 of the end plate 24.

The side pieces 21 and 22 have projecting inwardly from their upper edge a rib 48, which serves to support the adjacent links and hold the upper run of the skeleton belt or carrier horizontal. The side piece 22 has journaled thereon, directly beneath the shaft 30, a roller 49 which engages the links at that end and prevents any possible sagging that would carry the rods meshing with the recesses in the sprocket wheel 34 out of engagement therewith.

To prevent the water which strikes the dishes being washed and the washing machine itself from spattering out from over the sink, I provide a generally rectangular cover which consists of the sheet-metal portion 50, which is of an inverted-trough shape, and is carried by the correspondingly shaped wires or rods 51, which have their ends secured in the lugs 52 projecting horizontally from the side pieces 21 and 22 near their ends. As the varying size dishes must be free to pass under and emerge from the cover, and as it is desirable to prevent spattering out from the ends, I provide the flexible main curtains 53, depending downwardly at each end and extending clear down to the conveyor, and their action is reinforced by another pair of similar curtains 54, which, however, do not extend downwardly so far. These curtains are preferably made up of very fine metal chains hanging vertically downward in contact with the adjacent chains, each link preferably being the shape of a small ball, such chains being in general use for operating electric-light fixtures. I have found that these flexible curtains of this construction do not offer any substantial resistance to the passage of the dishes beneath them, while at the same time they furnish an effectual barrier to the water which would otherwise be splashed out from the ends of the cover. By lifting the wire ends 51 out of their recesses in the lugs 52, the cover can be removed, if desired.

By reference to Fig. 5, it will be seen that the hot and cold water pipes 55 and 56 extend from the wall 57 through the side of the sink 20, and are connected by the special supporting tubes 58 and 59 with a mixer 60, which, instead of the customary vertical valves, preferably has horizontally operating valves 61 and 62 to open and close the hot and cold water supplies. In order to enable me to conveniently operate these valves around the end of the dish-washing machine, I preferably make the valve stems rectangular and mount on them the telescoping valve handles 63 and 64, which can be extended, as seen in Fig. 5, in order to make their operation easier without having to reach so far around the end of the dish-washing machine.

The mixer 60 has extending rearwardly and downwardly from the center of the back thereof the outlet extension 65, to which is connected the tubular elbow 66 which has at its forward end the valve seat 67 formed therein for the valve 68 formed on the inner end of the customary spout 69, which can be

turned horizontally to any desired angle, and which when the washing machine is in use, will be turned parallel to the rear wall of the sink. Opening out from the side of this elbow 66, as best seen in Fig. 13, are a pair of circular apertures 70 having beveled edges to receive the beveled ends of the two tubular connections 71 and 72 which are secured in place by the screw bolt 73 passing through an aperture 74 in the upper part of the connection 72, and threaded into the recess 75 formed in the lug 76 on the connection 71 designed to receive said recess. This makes a simple connection sufficiently water-tight for use in such a structure. At the lower end, these connections 71 and 72 are turned outward and provided with the beveled ends cooperating with the beveled T-heads 77 of the vertical pipes 78 and 79. The pipes 78 and 79 are secured to the connections 71 and 72 by the screw bolts 80, identical with the screw bolt 73, passing through the beveled disks 81 closing the ends of the T-heads and threaded into apertures formed in the lugs 82 projecting inwardly from the lower ends of the connections 71 and 72. These connections also have extending inwardly from the rear side at the bottom the substantially semicircular flanges 83, which are provided with slots 84 by which they can be secured by the screws 85 to the adjacent half 86 of the casing for the worm gear wheel 87 secured on the adjacent end of a shaft 30^a. The rear half 88 of the casing is secured to the front half by the screws 89, and the casing contains a recess adapted to receive the worm 90 secured on the shaft 91 extending diagonally upward, the connections for the upper end of which will be described later.

The pipes 78 and 79, as best seen in Figs. 8 and 9, have formed on their upper and lower ends the forwardly-projecting, vertically-extending beveled valve-seats 92 to receive the downwardly or upwardly extending, as the case may be, valve ends 93 of the pipes 94, 95, 96 and 97, the passage through the tubes and valve ends being so shaped, as clearly seen in Figs. 8 and 9, that when the pipes 94, 95, 96 and 97 extend outwardly at right angles to the rear wall of the sink, they are in communication with the pipes 78 and 79, and when they are swung around at right angles thereto and parallel to the rear wall of the sink, the water is cut off from the horizontal pipes. The pipes are preferably made in two sections, as seen, which are joined by having their adjacent ends brazed or otherwise secured to the short tubes 98, which have the function of reducing the velocity and flow of the water to the necessary extent to accommodate the dish-washing machine to the particular pressure that is furnished in the location where it is installed.

The pipes 94 and 95 have soap boxes 99 of the type shown in my aforesaid patents associated therewith and interposed between the ends of the pipes and the spray pipes 100 and 101, which spray pipes are provided with the customary perforations directed downwardly and upwardly, respectively, so that the soapy water will be thrown downward and upward, respectively, on to the dishes carried between them by the conveyor.

To accommodate the spray pipes 96 and 100, which are provided at their lower sides with the horizontal flanges seen in cross section in Fig. 1, I secure on the top of the casing 50 the pair of inverted metal troughs 102, which have the slots 103 in the upper sides thereof to receive the tubular portions of the spray pipes 96 and 100, as seen in Fig. 1. This construction serves to position the spray pipes relative to the cover 50.

The conveyor frame is supported at its front side by the pair of brackets 104 extending forwardly from the side frame 22 and resting on the edge of the sink 20, and is also supported by the pair of brackets 105 projecting rearwardly from the top of the side piece 21 and having an aperture therein to receive the upwardly extending end of the lug 106 projecting forwardly from each of the pipes 78 and 79. The tubes 78 and 79 are provided at their lower ends opposite the valve seats 92 with projections 107, which preferably have rubber tips 108 secured thereto and adapted to rest against the rear wall of the sink, as shown in Fig. 8.

As seen in Figs. 1, 5, 10 and 11, the mixer 60 has projecting upwardly from the center thereof the supporting rod 109, which has secured on the upper end thereof the V-shaped bracket 110, with the arms thereof extending outwardly and forwardly and terminating in the horizontal portions on which rest the front edge of the base 111 of the motor 112, being secured thereto by the screws 113. As seen in Fig. 6, the pipes 78 and 79 have secured to lugs formed on the back thereof, near their upper ends, brackets 114 (omitted in Figs. 10 and 11, but seen in Fig. 6) which have the horizontal upper ends adapted to receive the rear portion of the base of the motor 112 secured thereto by screws 113. The pipes 78 and 79 also have, extending forwardly from the central portions thereof, ears 115, best shown in Figs. 5 and 8, which are secured by screws 116 to the ears 117 projecting upwardly from the mixer 60. The motor 112 is, of course, provided with wires 118 leading to a suitable source of current supply, and with the switch box 119, by which it can be turned off and on. Its armature shaft 120 extends rearwardly therefrom into the gear casing 121, seen in Figs. 6 and 15, which contains the worm 122 secured on the armature shaft 120, and the worm gear wheel 123 secured on the upper end of the shaft 91. This shaft 91 preferably extends through a bearing 124 on the upper

end of the gear casing 121, and is connected to a flexible shaft 125, which has a handle 126 on the non-rotating covering portion, which handle is adapted to manipulate the scouring brush 127, which is detachably secured on the end of the flexible rotating shaft, a bracket 128 being preferably secured on the top of the motor base plate, as seen in Fig. 1, to hold the brush when not in use. It will be understood that the brush is used in finishing up work that the spray mechanism alone of the washing machine is incapable of doing.

As clearly shown in Figs. 10 and 11, the connections 71 and 72 are reversible on the gear casing 86, 88, so that the shaft 91 can extend substantially vertically to bring the gear casing on the right-hand side of the motor, as seen in Fig. 11, or somewhat more inclined to bring the gear casing 121 on the left-hand side of the motor, as seen in Fig. 10, thus reversing the direction of movement of the conveyor without reversing the motor. Whether the arrangement shown in Fig. 10 or that shown in Fig. 11 is employed will depend upon the character of the sink and whether or not it is necessary to have the upper run of the conveyor belt move to the right or left, as the case may be.

The shaft 30ª in the gear casing 86, 88 has secured on its forward end a clutch member 129 with a recess in the center of its clutch face to receive the end of the shaft 30, which has the co-operating clutch member 130 secured thereon.

With the construction shown and described, it will be obvious that when it is desired to remove the dish washer, all that is necessary is to slide the conveyor and its cover casing forwardly, disengaging the clutch mechanism and leaving the spray pipes in their normal position as the conveyor is withdrawn, after which they can be swung at right angles parallel to the rear wall of the sink, which is then capable of use in the ordinary manner. The conveying mechanism is made of aluminum, and the removable portion is consequently light enough so that it can be readily handled as described above.

The operation of the washing machine when in place will be obvious from the foregoing description of the mechanism.

While I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out its purposes, it will be understood that it is capable of modification, and that I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

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

1. In a dish-washing machine, the combination with a frame, of an endless skeleton conveyor member therein, means for operating said conveyor member, a cover for the upper run of the conveyor member having transverse slots in the top thereof, horizontal spray pipes extending transversely of the cover above said slots, and inverted troughs over said slots, the tops of said troughs removably receiving the spray pipes.

2. In a device of the class described, the combination with a sink, of conveyor mechanism supported therein, faucet connections for said sink, soapy and clear water spray pipes pivotally connected to said faucet connections so that said pipes can be swung horizontally across the conveyor mechanism or parallel to the rear wall of the sink, a bracket supported from said faucet connections, a motor mounted on said bracket, and gearing from the motor to the conveyor mechanism mounted on said faucet connections so that the conveyor mechanism can be set to operate in either direction from said motor without reversing it, said gearing comprising an upper gear casing carried by the armature shaft of the motor and rotatable about the same, a worm on said shaft within said casing, a worm wheel within the casing co-operating with said worm, a lower gear casing carried by said faucet connections and capable of adjustment by rotation through a small arc thereon, a worm and a co-operating worm wheel in said lower casing, and a shaft connecting said casings and secured to the worm wheel in the upper casing and to the worm in the lower casing, said worm wheel in the lower casing being operatively connected to said conveyor mechanism.

3. In a device of the class described, the combination with a sink, of conveyor mechanisms supported therein, faucet connections for said sink including a hot and cold water mixer, soapy and clear water spray pipes pivotally connected to said faucet connections so that said pipes can be swung horizontally across the conveyor mechanism or parallel to the rear wall of the sink, a bracket supported from said faucet connections, a motor mounted on said bracket, and gearing from the motor to the conveyor mechanism mounted on said faucet connections, said faucet connections including a pair of readily detachable connecting pipes of different lengths but otherwise of the same construction attached to the mixer and interchangeable so as to bring said soapy and clear water pipes on either side of the mixer, the shorter of the connecting pipes being connected in either adjustment to the clear-water pipes and the longer to the soapy-water pipes so that the soapy and clear water spray pipes will always be at the proper distance from the articles carried by the conveyor mechanism.

4. In a device of the class described, the combination with a sink, of conveyor mechanism supported therein, faucet connections for said sink including a hot and cold water mixer, soapy and clear water spray pipes

pivotally connected to said faucet connections so that said pipes can be swung horizontally across the conveyor mechanism or parallel to the rear wall of the sink, a bracket supported from said faucet connections, a motor mounted on said bracket, and gearing from the motor to the conveyor mechanism mounted on said faucet connections, which connections include a pair of readily-detachable connecting pipes of different lengths but otherwise the same construction attached to the mixer and interchangeable so as to bring said soapy and clear water pipes on either side of the mixer, the shorter of the connecting pipes being connected in either adjustment to the clear-water pipes and the longer to the soapy-water pipes so that the soapy and clear water spray pipes will always be at the proper distance from the articles carried by the conveyor mechanism, and said gearing comprising an upper gear casing carried by the armature shaft of the motor and rotatable about the same, a worm on said shaft within said casing, a worm wheel within the casing co-operating with said worm, a lower gear casing carried by said faucet connections and capable of adjustment by rotation through a small arc thereon, a worm and a co-operating worm wheel in said lower casing, and a shaft connecting said casings and secured to the worm wheel in the upper casing and to the worm in the lower casing, said worm wheel in the lower casing being operatively connected to said conveyor mechanism.

5. In a device of the class described, the combination with a sink, of hot and cold water supply pipes leading thereto, a mixer connected to said pipes and having therein a pair of cocks having horizontal stems and handles on the stems, a connecting member secured to the mixer between the cocks having outlet ports opening into a pair of pipes, said pair of pipes, a soapy-water spray member, a clear-water spray member, connections from one of said last-mentioned pipes to said soapy-water spray member and from the other to said clear-water spray member, said spray members being pivotally mounted by cocks on their ends having vertical axes so said spray members can be extended at right angles to or collapsed parallel to the rear wall of the sink, and removable conveying mechanism in said sink.

6. In a device of the class described, the combination with a sink, of hot and cold water supply pipes leading thereto, a mixer connected to said pipes and having therein a pair of cocks, a connecting member secured to the mixer between the cocks having outlet ports, a pair of pipes opening into said ports, said pipes being readily detachable and of different lengths but otherwise of the same construction and adapted to be interchanged, a soapy-water spray member, a clear-water spray member, connections from the longer of said last-mentioned pipes to said soapy-water spray member and from the shorter one to said clear-water spray member so as to bring said soapy and clear water spray members on either side of the mixer, the shorter of said connecting pipes being connected in either adjustment to the clear-water spray member and the longer to the soapy-water spray member so that the soapy and clear water spray members will always be at the proper distance from the articles carried by a conveying mechanism hereinafter specified, said spray members being pivotally mounted by cocks having vertical axes so that said spray members can be extended at right angles to or collapsed parallel with the rear wall of the sink, and removable conveying mechanism in said sink.

7. In a device of the class described, the combination with a sink, of hot and cold water supply pipes leading thereto, a mixer connected to said pipes and having therein a pair of cocks, a connecting member secured to the mixer between the cocks having outlet ports opening into a pair of pipes, said pair of pipes, which are readily detachable and of different lengths but otherwise of the same construction and adapted to be interchanged, a soapy-water spray member, a clear-water spray member, connections from the longer one of said last-mentioned pipes to said soapy-water spray member and from the shorter one to said clear-water spray member so as to bring said soapy and clear water spray members on either side of the mixer, the shorter of the connecting pipes being connected in either adjustment to the clear-water spray member and the longer to the soapy-water spray member so that the soapy and clear water spray members will always be at the proper distance from the articles carried by the conveying mechanism hereinafter specified, said spray members being pivotally mounted by cocks having vertical axes so that said spray members can be extended at right angles to or collapsed parallel with the rear wall of the sink, removable conveying mechanism in said sink, a non-reversible motor mounted on said sink, and driving connections from said motor to said conveying mechanism adapted to be set up so that the conveyor can be driven in either direction as desired.

8. In a device of the class described, the combination with a sink, of hot and cold water supply pipes leading thereto, a mixer connected to said pipes and having therein a pair of cocks, a connecting member secured to the mixer between the cocks having outlet ports opening into a pair of pipes, said pair of pipes, which are readily detachable and of different lengths but otherwise of the same construction and adapted to be interchanged, a soapy-water spray member, a clear-water

spray member, connections from the longer one of said last-mentioned pipes to said soapy-water spray member and from the shorter one to said clear-water spray member so as to bring said soapy and clear water spray members on either side of the mixer, the shorter of the connecting pipes being connected in either adjustment to the clear-water spray member and the longer to the soapy-water spray member so that the soapy and clear water spray members will always be at the proper distance from the articles carried by the conveying mechanism hereinafter specified, said spray members being pivotally mounted by cocks having vertical axes so that said spray members can be extended at right angles to or collapsed parallel with the rear wall of the sink, removable conveying mechanism in said sink, a non-reversible motor mounted on said sink, and driving connections from said motor to said conveying mechanism adapted to be set up so that the conveyor can be driven in either direction as desired, said driving connections comprising an upper gear casing carried by the armature shaft of the motor and rotatable about the same, a worm on said armature shaft within said casing, a worm wheel within the casing co-operating with said worm, a lower gear casing carried by said pair of pipes and capable of adjustment by rotation through a small arc thereon, a worm and a co-operating worm wheel in said lower casing, and a shaft connecting said casings and secured to the worm wheel in the upper casing and to the worm in the lower casing, said worm wheel in the lower casing being operatively connected to said conveyor mechanism.

In witness whereof, I have hereunto set my hand this 24th day of December, 1929.

WALDEMAR L. LINDGREN.