March 5, 1935. J. E. ELKINGTON 1,993,154

DISHWASHING MACHINE

Filed May 9, 1932 3 Sheets-Sheet 1

Fig. 1.

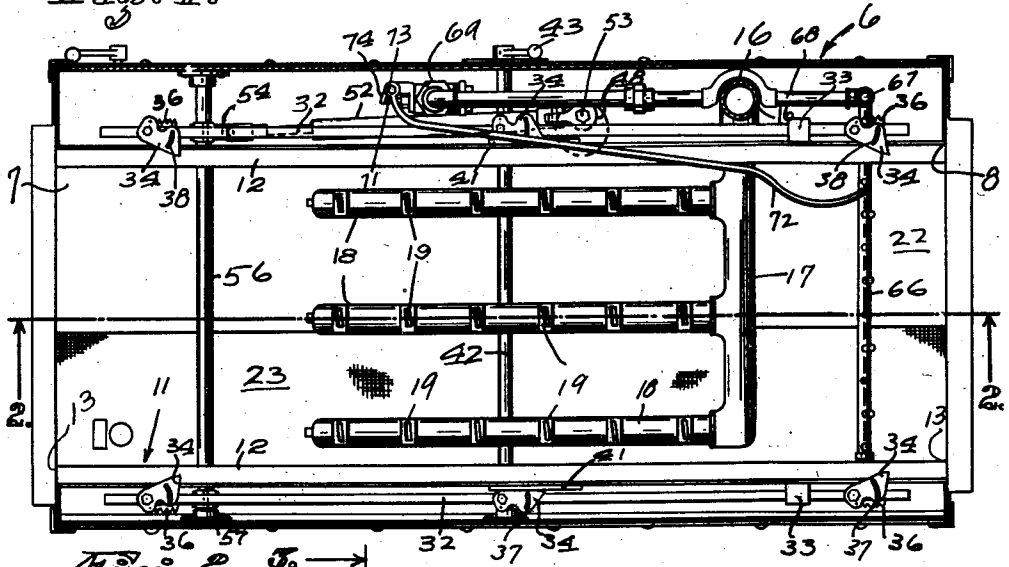
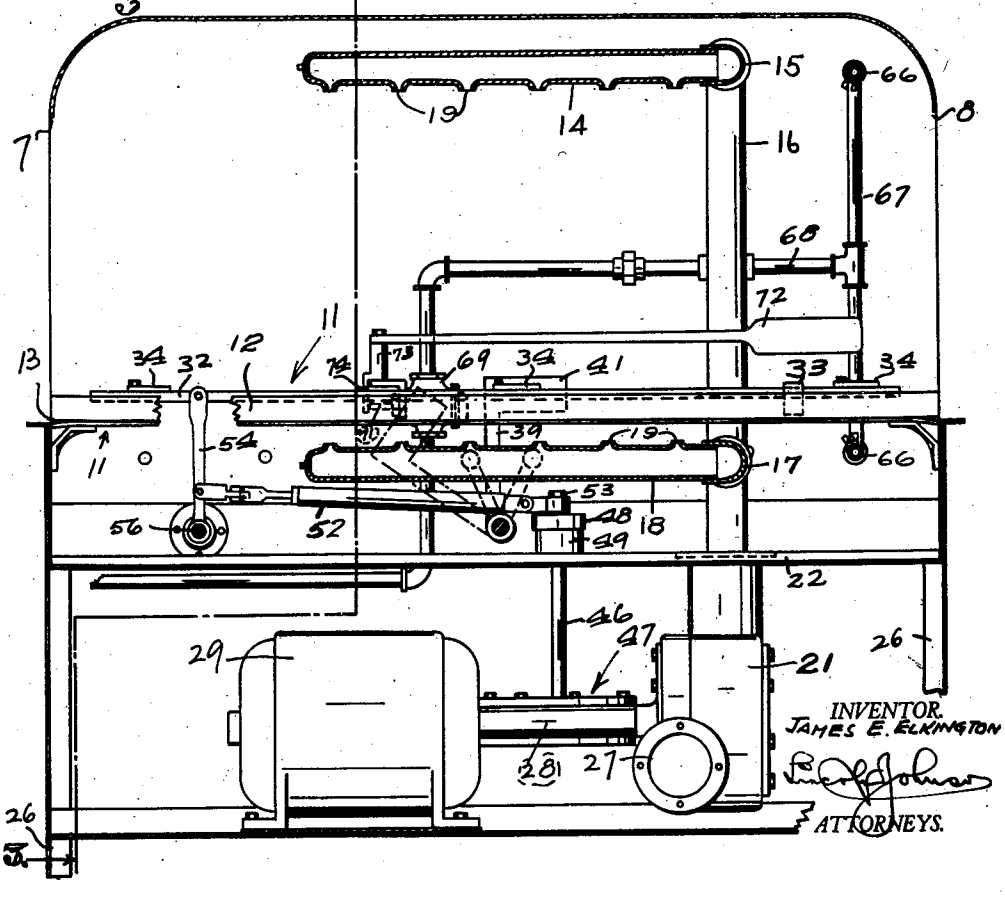


Fig. 2.



INVENTOR.
JAMES E. ELKINGTON
BY
ATTORNEYS.

March 5, 1935. J. E. ELKINGTON 1,993,154

DISHWASHING MACHINE

Filed May 9, 1932 3 Sheets-Sheet 2

Fig. 5.

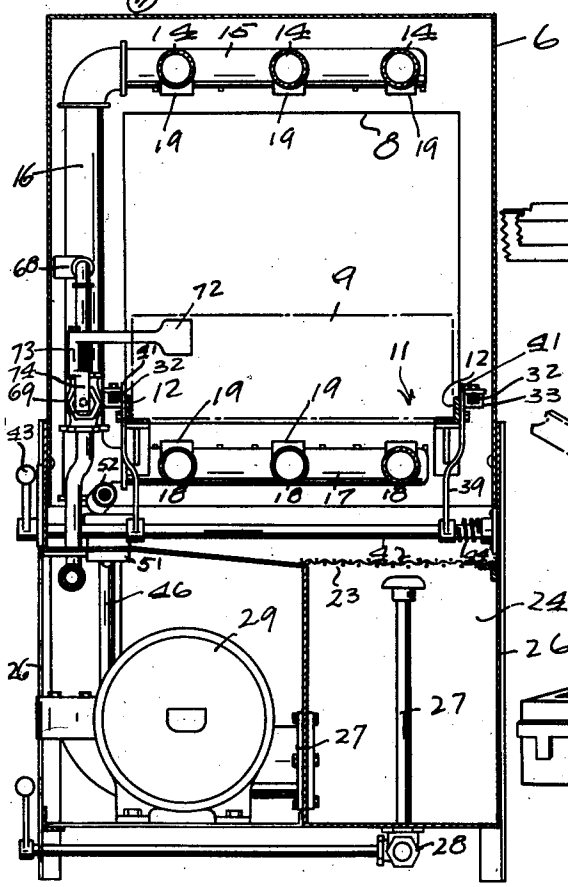


Fig. 4.

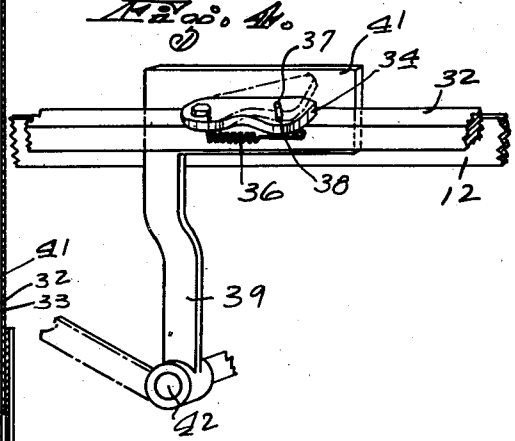
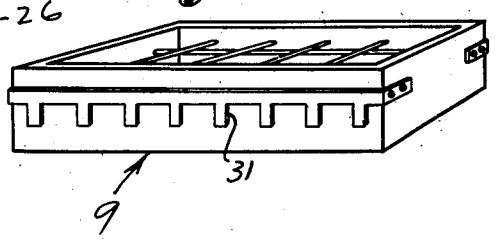


Fig. 5.



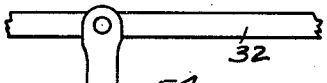


Fig. 6.

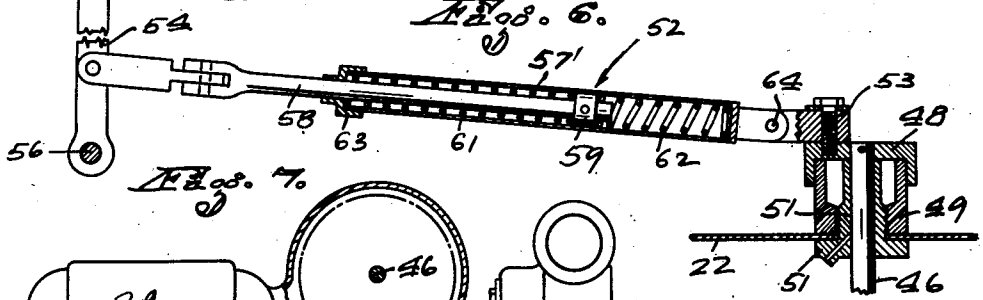
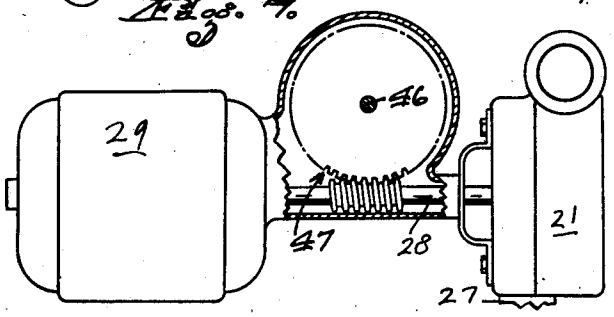


Fig. 7.



JAMES E. ELKINGTON INVENTOR.

BY

ATTORNEYS.

March 5, 1935. J. E. ELKINGTON 1,993,154

DISHWASHING MACHINE

Filed May 9, 1932 3 Sheets-Sheet 3

Fig. 8.

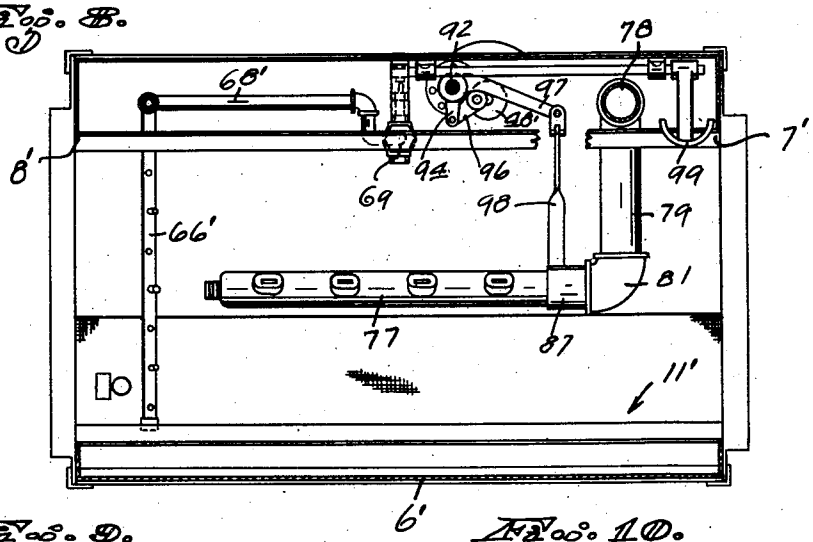


Fig. 9.

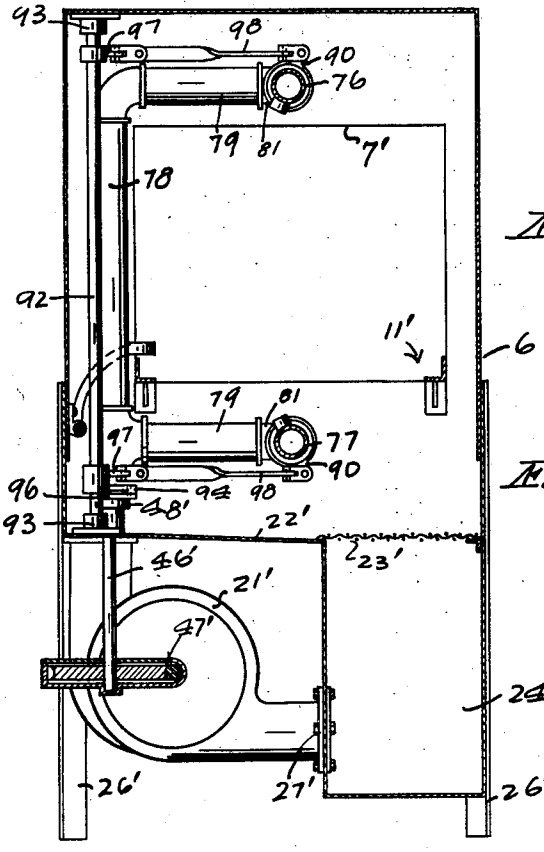


Fig. 10.

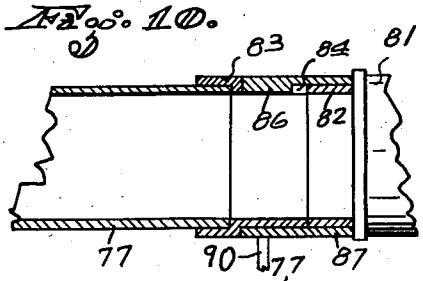


Fig. 11.

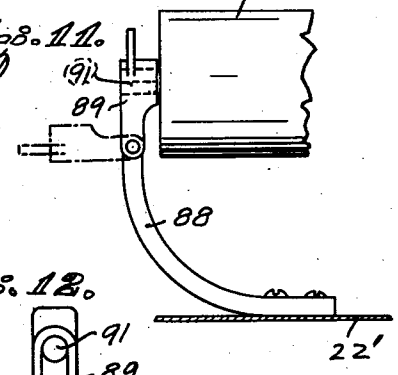
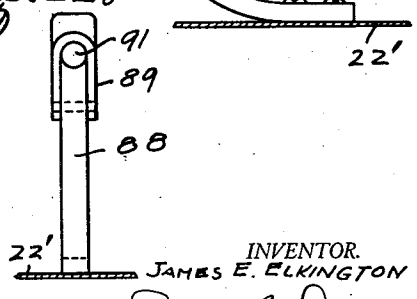


Fig. 12.



INVENTOR.
JAMES E. ELKINGTON
BY
ATTORNEYS.

Patented Mar. 5, 1935 1,993,154

UNITED STATES PATENT OFFICE

1,993,154

DISHWASHING MACHINE

James E. Elkington, San Francisco, Calif.

Application May 9, 1932, Serial No. 610,178

1 Claim. (Cl. 198—221)

This invention relates to dish washing machines.

The object of the invention is to provide machines for washing dishes or other articles, in which jets or streams of suds or clear water are forced into trays or baskets holding the articles to be washed, and in which the tray or basket, or other dish carrier, is intermittently advanced through the machine, and is stopped in the path of the spray, the advancing mechanism being of the reciprocating type, means being provided to control the tray advancement, and automatic means being provided to spray a rinsing fluid on the articles on the tray after the same is washed and before it is withdrawn from the machine.

Another object of the invention is to provide a dish washing machine with a novel and efficient and safe conveyor, and a compact motor, reduction gear and pumping unit to force the cleansing spray onto the dishes and also to drive the conveyor, water tight connecting means being provided to connect the motor to the conveyor to cause the travel of the dish carrier from an inlet to the outlet of the dish washing closure.

Other objects and advantages are to provide a dish washing machine that will be superior in point of simplicity, inexpensiveness of construction, positiveness of operation, and facility and convenience in use and general efficiency.

In this specification and the annexed drawings, the invention is illustrated in the form considered to be the best, but it is to be understood that the invention is not limited to such form, because it may be embodied in other forms; and it is also to be understood that in and by the claims following the description, it is desired to cover the invention in whatsoever form it may be embodied.

The invention is clearly illustrated in the accompanying drawings wherein:

Fig. 1 is a sectional plan view of the machine.

Fig. 2 is a vertical sectional view of the machine, the section being taken on the plane through the line 2—2 of Fig. 1.

Fig. 3 is a vertical cross sectional view of the machine, taken on the line 3—3 of Fig. 2.

Fig. 4 is a fragmental detail view of the conveyor mechanism of the machine.

Fig. 5 is a perspective detail view of a dish carrier or rack.

Fig. 6 is a sectional detail view of the connection between the driving mechanism and the conveyor.

Fig. 7 is a detail view of the reduction gear connection to the pump drive.

Fig. 8 is a sectional plan view of a dish washing machine with rocking or oscillating spray pipes.

Fig. 9 is a cross sectional view of the dish washing machine with the rocking spray pipes and the operating mechanism therefor.

Fig. 10 is a sectional detail view of the mounting of the rocking spray pipe.

Fig. 11 is a fragmental view of the end mounting of the rocking spray pipe.

Fig. 12 is an end view of the rocking spray pipe end mounting.

In carrying out my invention I make use of a cabinet 6 having an inlet opening 7 at one end and an outlet opening 8 at the other end thereof. The inlet 7 and the outlet 8 are opposite and aligned for the dish carrier 9 to allow the introduction and the withdrawal of the latter from the cabinet 6. Otherwise the cabinet 6 is entirely closed on its top, bottom and sides.

A trackway 11 is formed from the inlet 7 to the outlet 8, by a pair of angle bars 12 extending between the respective, opposed lower corners 13 of said inlet and outlet. The carrier 9 slides over the angle bars 12 so that it has a direct passage through the cabinet 6.

A horizontal row of three parallel sprayer pipes 14 are arranged near the top of the cabinet 6, connected to a cross head 15 which latter is connected through a vertical conduit 16, at one side of the cabinet 6, to a cross head 17 below the trackway 11, from which extend the three lower sprayer pipes 18 arranged parallel in a horizontal row opposite the upper pipes 14. Each of the pipes 14 and 18 have spray nozzles 19 longitudinally spaced on one side thereof. The nozzles 19 of each row of pipes are in alignment and are formed transversely at an acute angle to the axes of the respective pipes. The nozzles are also elongated to produce flat overlapping jets. The vertical pipe connection 16 extends to the lower compartment of the cabinet 6 to a pump 21 and is supported on a bottom partition 22 of said cabinet 6. The aforedescribed spraying device is arranged in the cabinet intermediate the said inlet 7 and outlet 8, the upper pipes 14 directing jets or streams of suds or water downwardly, and the lower pipes 18 directing jets upwardly into said carrier 9 and against the articles or dishes in said carrier 9.

The bottom partition 22 extends longitudinally from end to end of the cabinet 6 so as to cover half of the width of the cabinet thereat, and is inclined downwardly toward the center plane of the said cabinet. The other half of the bottom of the cabinet 6 is covered by a drainer screen

23 and below the latter is formed a reservoir or tank 24 to hold the suds or cleaning fluid used in the machine. Legs 26 extend downwardly from the bottom of the cabinet 6 on which the latter is supported. The tank 24 extends between said legs 26 and is inclosed all around except at its top screen 23. This arrangement leaves the other half of the space below the partition 22 free to accommodate the driving and pumping mechanism of the machine.

The pump 21 has its intake 27 on the side thereof adjacent its shaft 28, and the pump impeller is so arranged that leakage of the stuffing is prevented while the machine is in operation. The outlet of the pump 21 is suitably connected to the conduit 16. The intake 27 of the pump is suitably connected to the tank 24 to pump the fluid from the latter. The pump 21 is driven by an electric motor 29 through the shaft 28. This compact unit is arranged alongside the tank 24 and below the partition 22.

When the pump 21 is in operation it forces the fluid into and through the sprayer pipes 14 and 18 and out through the nozzles 19 onto the dish carrier tray 9. Fluid then flows down the partition 22 to and through the screen 23 and collects in the tank 24 from which it is pumped again up to the sprayer pipes.

In the tank is provided an overflow pipe 27 extended from the tank water level to the bottom of the tank, where a suitable drainage or overflow valve 28 is provided to conduct the overflow fluid from said pipe 27. The valve 28 is so constructed that it may be fully opened to drain the entire tank 24.

The carrier 9 is passed into the tank through the inlet 7 and withdrawn through the outlet 8. The conveying mechanism to advance the carrier 9, includes toothed reinforcing racks 31 on the opposite sides of the carrier 9, secured over the corners of said carrier. The racks 31 are disposed above the level of the angle bars 12. The inside of the carrier 9 is formed in the usual manner to hold dishes therein.

Alongside each angle bar 12 is disposed a reciprocating bar 32 slidably held in brackets 33 extending outwardly from the upper edge of the bar 12. On each bar 32 are pivoted three pawls or dogs 34. Each dog 34 is pivoted at its end nearer to the intake 7. A spring 36 secured at one end to the bar 32 and at its other end to a dog 34 outside of the dog pivot, urges the dog 34 toward the teeth of the rack 31. As the bars 32 are reciprocated the respective dogs 34 engage successive teeth of the respective racks 31 and advance the carrier 9 on the trackway 11 with intermittent movement. It is to be noted that when the bars 32 move toward the outlet 8, the dogs 34 operatively engage the respective racks 31. During the stroke of the bars 32 toward the inlet 7, the dogs 34 are moved against the action of the springs 36 and are forced out of engagement with the teeth of the rack 31. To align the dogs 34 during their swinging movement, a pin 37 is fixed in the bar 32. The pin 37 extends through an arcuate slot 38 in the dog 34, which slot 38 slides on the pin 37 to keep the dogs 34 aligned.

There are three dogs 34 on each bar 32, the middle dogs 34 being at about the middle of the cabinet 6. In order to automatically stop the carrier 9 at this point, I provide detent arms 39 having enlarged flat heads 41 and being fixed on a transverse rocking shaft 42. The shaft 42 is journaled in the cabinet 6 and an end thereof extends outside of said cabinet and has a handle 43 thereon whereby the shaft 42 can be manually rocked. Normally a torsion spring 44 around an end of the shaft 42 holds the latter in the position shown in Fig. 4, so that the heads 41 of the arms 39 engage the inner edges of the respective middle dogs 34, and hold the same in inoperative position. Thus after the carrier 9 is advanced to midway between the inlet 7 and the outlet 8, it remains at rest under the full effect and force of the jets or streams of fluid issuing from the nozzles 19. After the dishes are subjected to washing for a desirable period, the handle 43 is turned to turn the shaft 42 so as to move the arms 39 and heads 41 into an out of way position, as shown in broken lines in Fig. 2, thereby allowing the middle dogs 34 to engage the teeth of the respective racks 31 and advance the carrier 9 toward the outlet 8 in the afore-described manner. After the carrier 9 is in operative position relatively to the dogs 34 adjacent said outlet 8, the handle 43 may be released, and the spring 44 automatically returns the arms 39 and heads 41 into engagement with the middle dogs 34 to hold the latter in inoperative position.

The conveyor bars 32 are reciprocated by a driving mechanism which includes a vertical rotary shaft 46 extended through the partition wall 22 upwardly. The lower end of the shaft 46 is drivingly connected to the motor shaft 28 by a worm and gear connection 47. On the upper end of the shaft 46 is fastened a circular inverted cup head 48. A packing gland 49 disposed between the head 48 and the upper face of the wall 22 operates as a spacer on which the shaft 46 and the head 48 are rotatably supported. A bearing 51 is disposed around the shaft 46 and is threaded into the lower end of the gland 49. The bearing 51 extends through the partition wall 22 and has an enlarged lower end to engage the lower surface of the wall 22 and press the gland 49 against the said wall 22. Thus a water tight bearing and support is provided for the shaft 46. This is necessary because the compartment above the partition wall 22 is filled with moisture running from the sprayer pipes, and the compartment below the partition wall 22 must be kept dry to protect the motor 29.

A telescoping connecting rod 52 has an end thereof pivoted on an eccentric pivot 53 on the top of the head 48, and has its other end universally connected to a rocking arm 54. The arm 54 is fastened on a transverse rocking shaft 56 journaled in the cabinet 6. The shaft 56 has another arm 57 fastened thereon. The arms 54 and 57 are aligned with the ends of the respective bars 32 and are pivoted thereto so that as the shaft 56 is rocked the bars 32 are reciprocated to act on the carrier 9 as heretofore set forth. Thus the rotary movement of the shaft 46 is converted into reciprocating movement of the conveyor bars 32.

The telescoping connecting rod 52 consists of a cylinder section 57′ and plunger section 58 telescoped in the section 57′. A plunger 59 on the section 58 within the cylinder section 57′ is held in balanced position by springs 61 and 62, bearing against the opposite sides thereof. The spring 61 also bears against a cap 63 on the open end of the cylinder section 57′, and the other spring 62 is disposed between the plunger 59 and the closed end of the cylinder section 57′. It is to be noted that the end of section 57′ is also pivoted around a transverse pivot 64 to allow the swinging movement thereof while the arm 54 is oscil-

lated or rocked. The springs 61 and 62 are of sufficient strength to hold the telescoping rod 52 rigid during the normal operation of the machine, so that rocking force to effect the intermittent conveying movement of the dish carrier 9 is transmitted undiminished. But if, for any reason, the machine or the conveyor mechanism is jammed, then the driving force is applied to reciprocate the telescoping rod sections 57' and 58 relatively to each other and against the action of the springs 61 and 62, thereby automatically preventing breakage of the conveyor mechanism.

After the dishes or other articles are washed thoroughly at the sprayer pipes 14 and 18, the handle 43 is turned and the carrier 9 is advanced toward the outlet 8 in the manner heretofore set forth. Before the carrier 9 is withdrawn through said outlet 8, the dishes are rinsed. For this purpose rinsing spray pipes 66 are transversely arranged near the outlet 8. There is a pipe 66 below and another above the trackway 11, provided with opposed nozzles to direct streams of rinsing water respectively upwardly and downwardly into the dish carrier 9. The pipes 66 are connected to and supported on a vertical conduit 67 at one side of the trackway 11. To the conduit 67 is connected a main line 68 to conduct rinsing water thereto. A valve 69 is interconnected in the line 68. The valve 69 is operated by a resiliently held plunger button 71 so that the valve 69 is normally closed by water pressure therein and by the resilient action on the button 71.

In order to open the rinsing valve 69 automatically as the carrier 9 is passed from the sprayer pipes 14 and 18 and to the rinsing pipes 66, an abutment or trip lever 72 is extended in the path of the carrier 9 so that the carrier engages the free end of the lever 72 as it is advanced toward the outlet 8. The lever 72 is pivoted on a vertical pivot 73 on the rinsing valve 69. The pivoted end of the lever 72 has a fixed tripping finger 74 thereon extended over the end of the plunger button 71 at such an angle that when the lever 72 is turned in the general direction of the main line 68, the finger 74 is thereby pressed against the valve button 71 to push the same in valve opening position, thereby opening the valve 69, and causing the issuing of rinsing spray from the pipes 66.

After the dish carrier 9 reaches the outlet 8 and is withdrawn therefrom, the lever 72 is released and the spring action on the valve button 71 causes the automatic closing of the valve, and also the turning of the finger 74 and the return of the lever 72 over the path of the trackway 11. The lever 72 is above the said trackway 11 and the free end thereof is flattened and curved to facilitate its coaction with the carrier 9.

In the form of my machine shown in Figs. 8, 9, 10, 11 and 12, I show an oscillating sprayer pipe arrangement to continuously vary the direction of the water jets within a certain area. There is an upper sprayer pipe 76 provided with downwardly opening orifices, and a lower sprayer pipe 77 is disposed below the trackway 11' provided with upwardly directing orifices. The dish trays or carriers 9 are passed through the cabinet 6' manually.

A vertical conduit 78 extends upwardly on one side outside of the trackway 11' and is connected to the pump 21' in the manner shown in Fig. 2. An upper and lower horizontal branch 79 extends transversely above and below the trackway 11' respectively. The sprayer pipes 76 and 77 are mounted on the respective branch pipes 79 so as to be rockable or oscillatable around their respective longitudinal axes.

On the free end of each branch pipe 79 is an elbow 81 in which is threadedly secured a nipple 82, the outwardly projecting end of the latter forming a trunnion. The mounting of both sprayer pipes 76 and 77 being similar, it will suffice to describe the connection and mounting of the lower pipe 77. On the end of the sprayer pipe 77 is suitably fixed, such as pressed thereon, a bushing 83 of the same inner and outer diameter as those of the nipple 82. The bushing 83 has a keyway 84 cut in its free end, in which fits the key 86 of a cylindrical sleeve 87, which latter in turn slides over the protruding trunnion end of the nipple 82. Thus an end of the sprayer pipe 77 may be readily assembled on the trunnion nipple 82.

At the other end of each sprayer pipe 76 and 77 is a bracket 88 secured on the top and bottom of the cabinet respectively. The free end of the bracket 88 has a pivoted bearing 89 which in its upright position is in alignment with the axis of the adjacent sprayer pipe. The sprayer pipe 77 has a stub shaft 91 which is rockably supported in the bearing 89. After the pipe 77 is in place the bearing 89 is swung over the shaft 91. The bearing 89 is so formed that it requires a certain degree of force to swing the same out of engagement with the shaft 91.

Each sleeve 87 has an ear or lug 90 extended therefrom for engagement with a rocking mechanism. The rocking or oscillating mechanism includes the vertical drive shaft 46' and its head 48', as described in connection with the first form of my invention. A vertical rocking shaft 92 extends outside of the trackway 11' and is supported in bearings 93 in the cabinet. A fixed rocking arm 94 extends from the shaft 92 adjacent its lower end. The rocking arm is connected by a connecting rod 96 eccentrically to the driving head 48', so that the rotation of the shaft 46' and the head 48' are converted into back and forth rocking of the shaft 92.

A lever 97 is fixed on the shaft 92 at each end thereof opposite and outside of the branch pipes 79. The ends of the respective levers 97 are connected by links 98 to the respective ears 90 of the sleeves 87. Thus as the shaft 46' is rotated in the usual manner, it causes the rocking mechanism connected thereto to oscillate both pipes 76 and 77 simultaneously.

In the modified construction of my machine I show an abutment tripping device 99 at the inlet 7' of the cabinet 6'. The tripping lever and device 99 is connected to the control valve 69' of the rinsing conduit to open the rinsing spray pipes 66' when actuated by a carrier. Here the carriers 9 are introduced in the machine through the inlet 7' one after another, and when manually pushed on the trackway 11', each carrier pushes the preceding carrier toward the outlet 8'. Thus when a carrier 9 is at the outlet 8' another carrier is just introduced through the inlet 7' and abuts and actuates the tripping device 99, thereby setting into operation the rinsing pipes 66' over the first carrier 9 disposed at the outlet 8'. The aforedescribed operation of the rinsing sprays is economical and highly efficient, and entirely automatic, whether the carriers 9 are introduced and advanced in the machine manually or by the conveyor mechanism first set forth.

Having thus described this invention, what I claim and desire to secure by Letters Patent is:

In a dish washing machine, a conveyor mecha-

nism for moving a dish tray through said machine, comprising a trackway on which the dish tray is moved; toothed elements fixed on the opposite sides of the dish tray; a channel guide on each of the opposite sides of said trackway; a bar slidably confined in each of said channel guides, said bars being arranged parallel with and above the plane of the trackway; spaced engagement elements mounted to swing in a horizontal plane about a vertical axis on each bar and resiliently urged toward the respective toothed elements to engage the same when said members move in one direction, and to be inoperative when moved in the opposite direction; and means to reciprocate said bars in said guides.

JAMES E. ELKINGTON.