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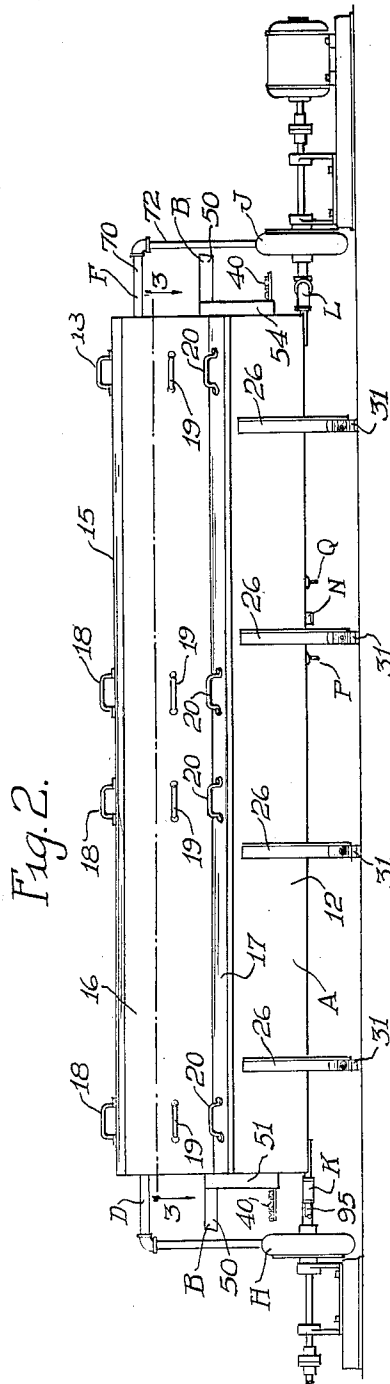
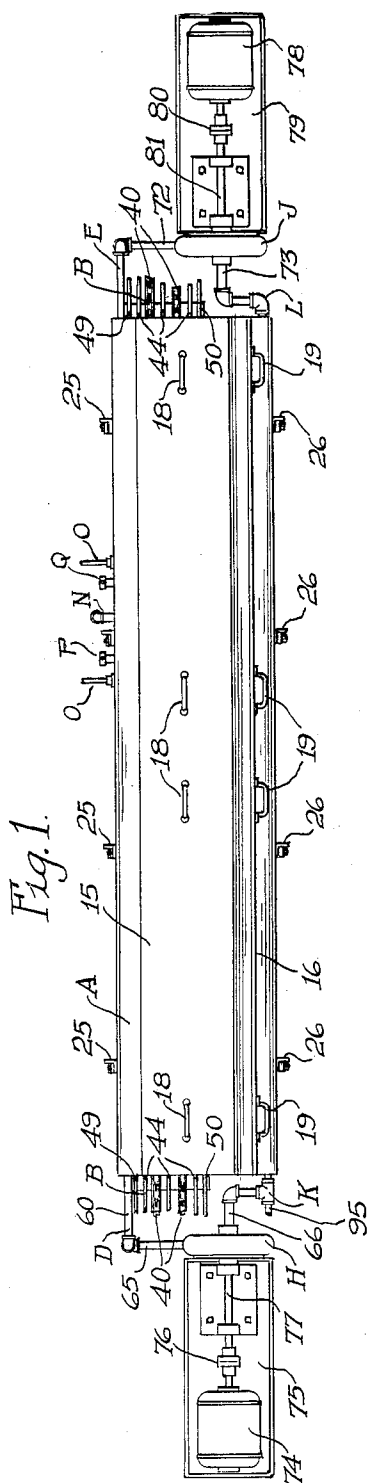
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1,946,805

WASHING APPARATUS

Filed Nov. 27, 1931

5 Sheets-Sheet 1



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WASHING APPARATUS

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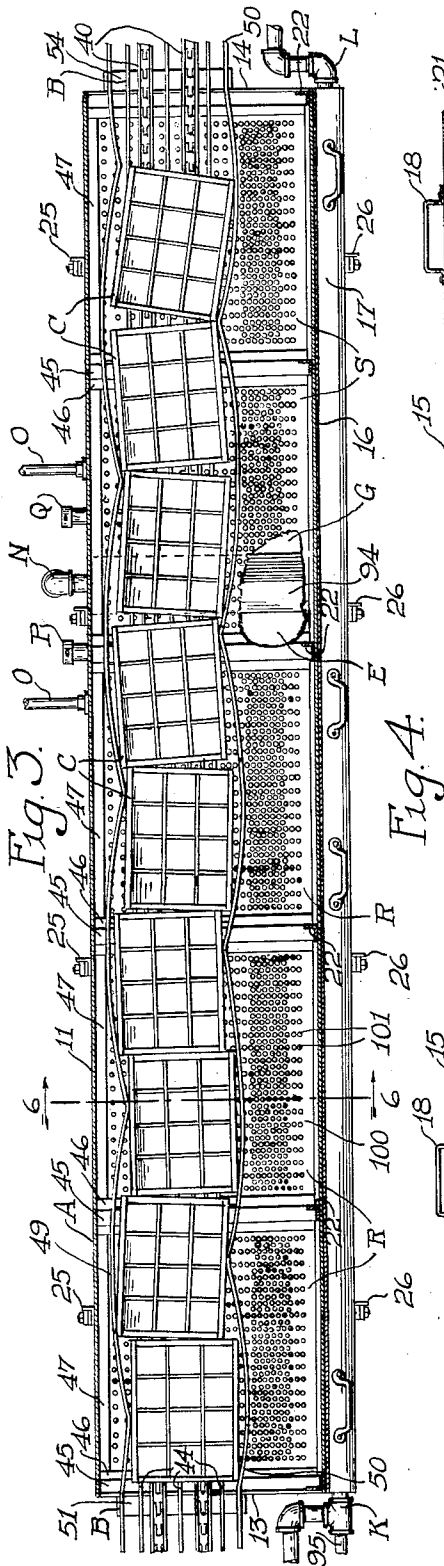
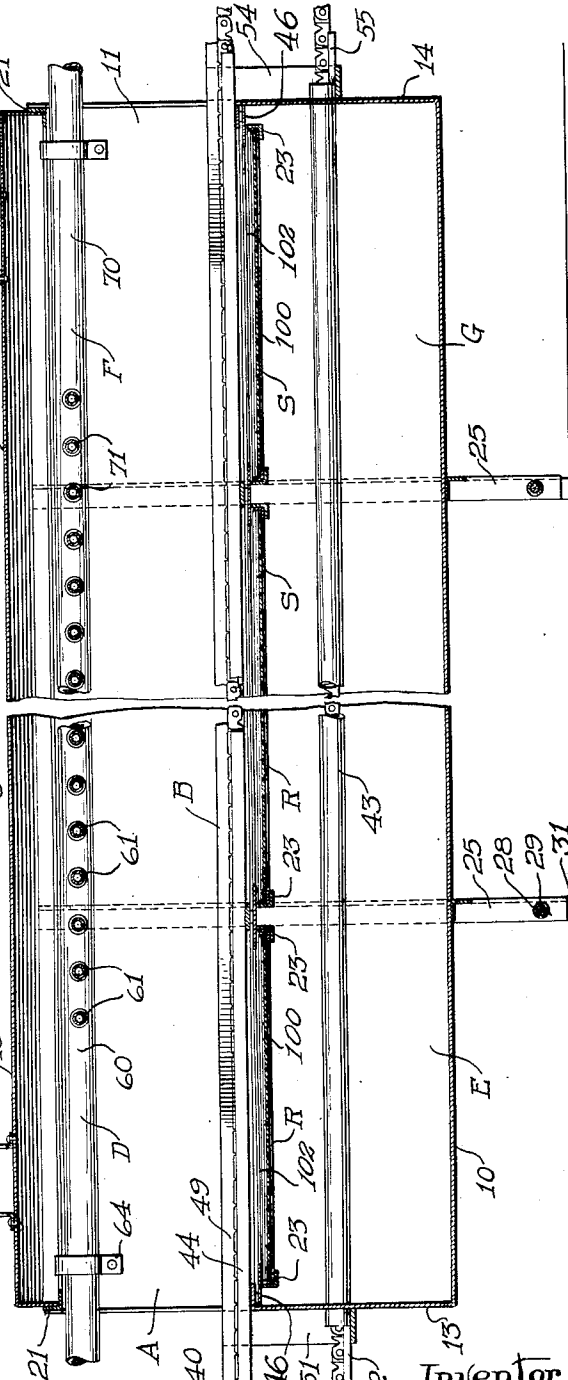


Fig. 4.



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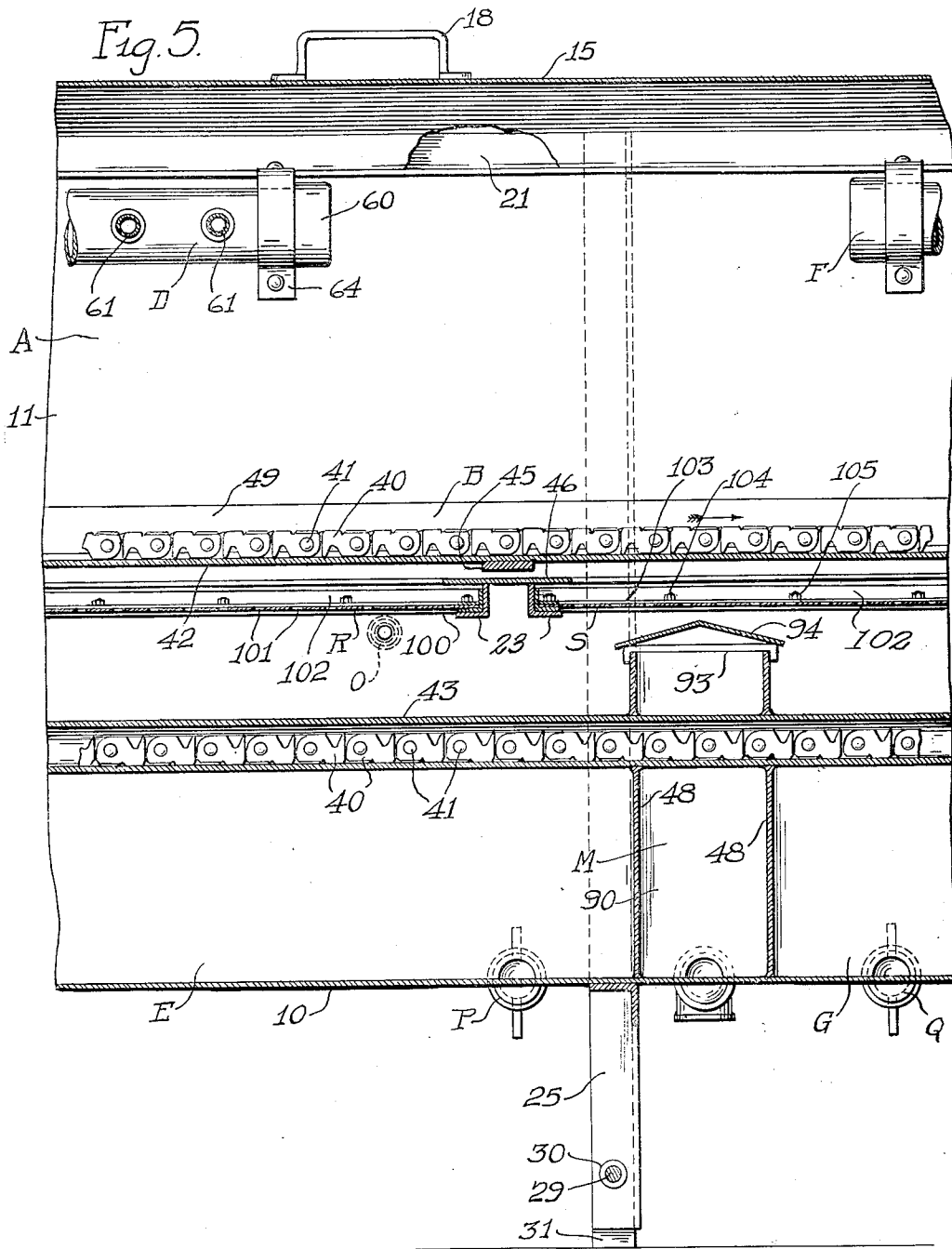
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WASHING APPARATUS

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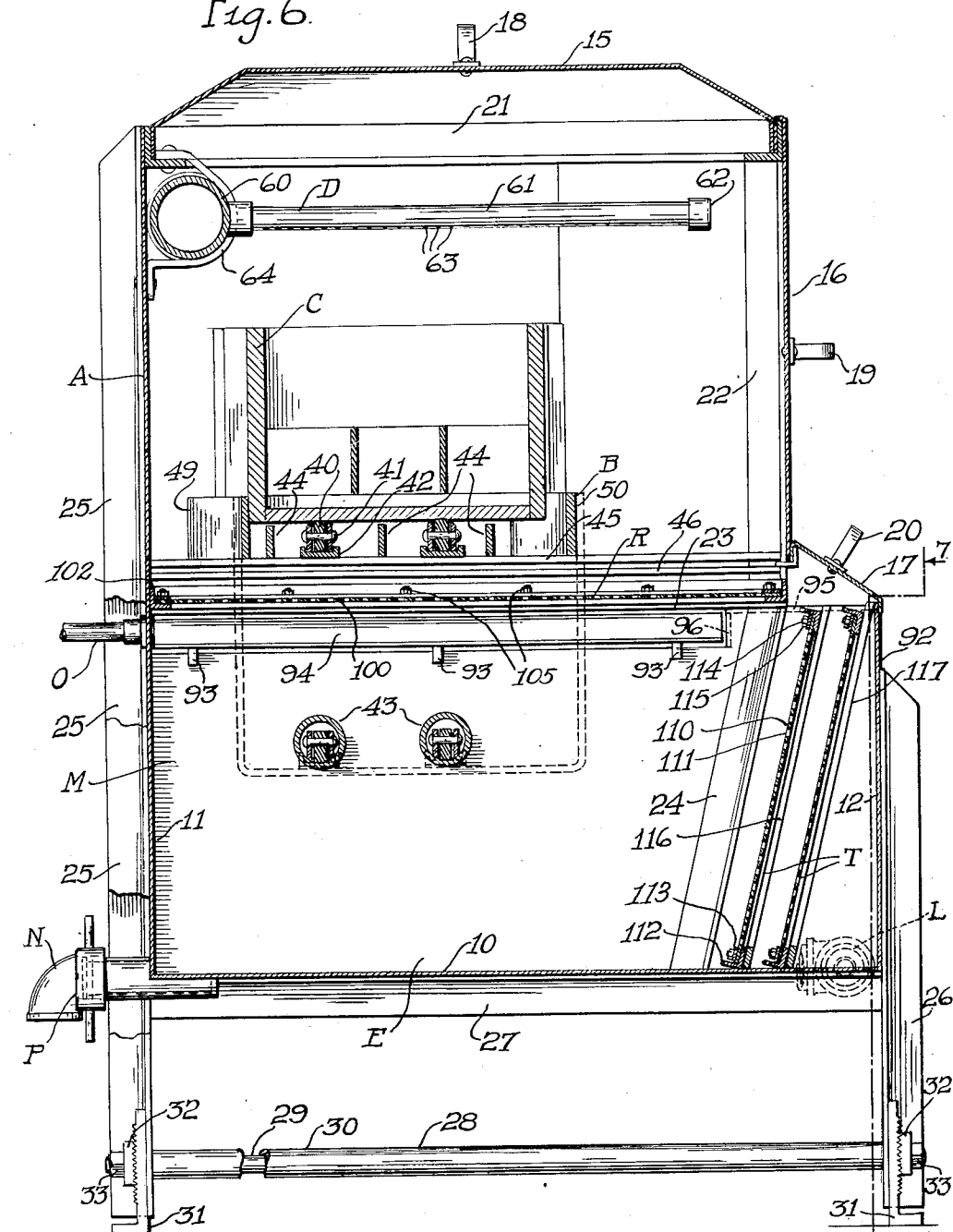
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WASHING APPARATUS

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Fig. 6.



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WASHING APPARATUS

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Fig. 7.

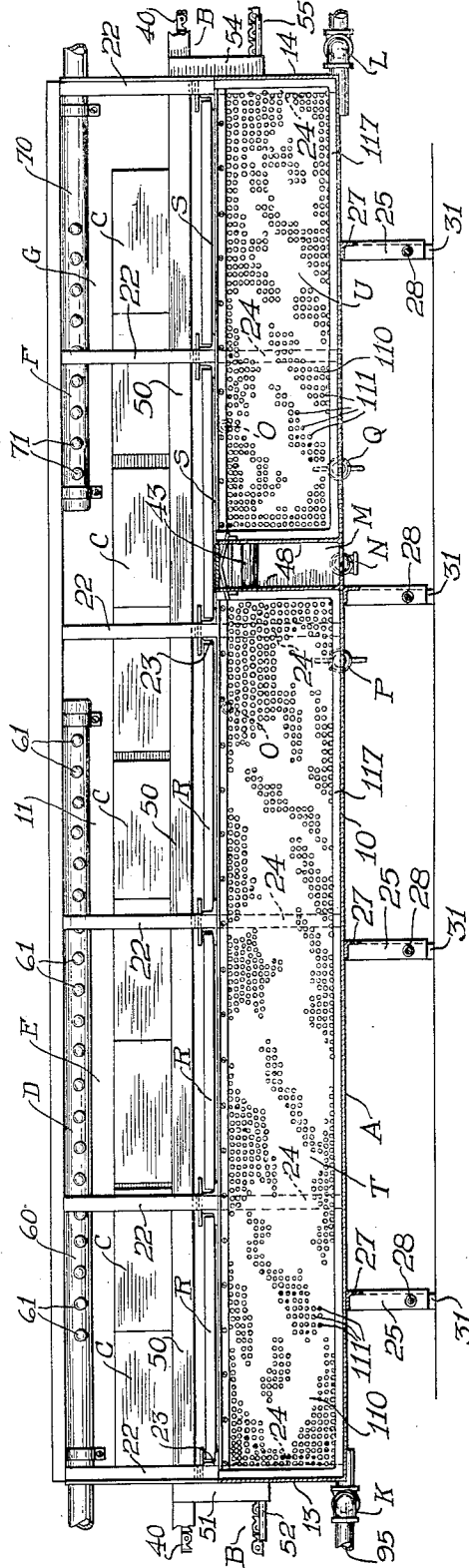
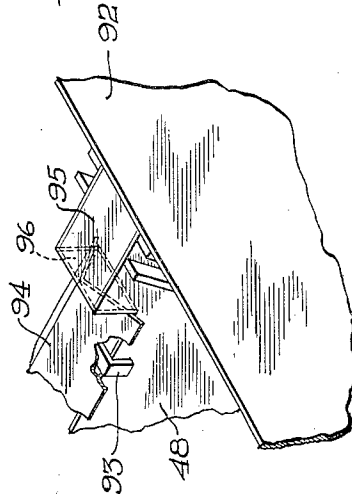


Fig. 8.



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UNITED STATES PATENT OFFICE

1,946,805

WASHING APPARATUS

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Application November 27, 1931
Serial No. 577,559

7 Claims. (Cl. 141—1)

The present invention relates to washing apparatus of the type wherein the articles being cleansed are carried along by a conveyor.

The invention has special value in the milk bottle case washing field and will be described more particularly in that connection.

One object of the invention is to provide washing apparatus of the class mentioned wherein the cases or other articles will be thoroughly cleansed on all surfaces and wherein the engagement of the articles with each other will not interfere with their being thoroughly cleansed.

To this end I preferably employ a chain conveyor of the drag type, such as disclosed in my prior United States Patent No. 1,804,701, dated May 12, 1931, and then zigzag the course of the articles while they pass through washing and rinsing sprays. The zigzagging separates the articles sufficiently to expose all of their surfaces to the sprays. The zigzag path is preferably provided by crooked guides which force the articles into different positions as they advance.

Another object of the invention is to provide an efficient spraying system by which both washing and rinsing fluids may be applied to the articles in their differently exposed positions. To this end I preferably provide the apparatus with a washing section and a rinsing section, and in both cases apply the fluid by forcing it down upon the articles on the conveyor in minute jets or sprays, the washing fluid being applied in one section and the rinsing fluid in the other section. The fluids are then preferably collected at points below the conveyor and pumped back again into the spraying pipes.

Other objects of the invention are to provide suitable screening arrangements, suitable inlet and outlet openings and other features which will contribute to the production of an efficient and satisfactory washer of articles of the kind in view.

Preferably a plurality of sets of screens is employed to strain the respective fluids after they leave the articles, and the screens are also preferably arranged so that they may be readily removed for cleaning and as readily replaced after being cleaned.

These and other objects and features and advantages of the invention, will be more fully understood upon reference to the following detailed description taken in connection with the accompanying drawings wherein I have respectively described and illustrated a preferred embodiment of my invention, while for a measure of the

scope of the invention reference should be had to the appended claims.

In said drawings, Fig. 1 is a plan view of a washing apparatus constructed in accordance with the present invention; Fig. 2 is a side elevation of the same; Fig. 3 is a horizontal sectional view taken on a plane indicated by the line 3—3 of Fig. 2, illustrating more particularly the positions which a number of cases on the conveyor may assume; Fig. 4 is a central longitudinal vertical section upon a somewhat enlarged scale illustrating particularly the end portions of the casing, the middle portion being broken away; Fig. 5 is a similar central vertical section illustrating the middle portion of the casing; Fig. 6 is a transverse vertical section taken on a plane indicated by the line 6—6 of Fig. 3; Fig. 7 is a front elevation of the structure, with parts cut away and removed to show the interior, the plane of the cut being indicated by the line 7—7 of Fig. 6; and Fig. 8 is a perspective view of a portion of the overflow or outlet structure by which the fluids flow from the washer. Throughout these views like characters refer to like parts.

Referring to the drawings in detail, A designates the casing of the apparatus; B, the conveyor which travels through the casing; C, the articles carried by the conveyor; D, the washing fluid spray pipes; E, the washing section of the machine; F, the rinsing fluid spray pipes; G, the rinsing section of the machine; H, the pump for supplying the washing fluid to the spray pipes D; J, the pump for supplying the rinsing fluid to the spray pipes F; K, the return connections from the washing section to the pump H; L, the return connections from the rinsing section to the pump J; M, the overflow compartment located between sections E and G; N, the outlet connection from the overflow compartment M; O, the connections for supplying clear water, P and Q, the drain connections for the washing and rinsing sections, respectively; R, the primary screens located in the washing section E; S, the primary screens located in the rinsing section G; T, the secondary screens associated with the washing section; and U, the secondary screens associated with the rinsing section.

In operation, the articles C are carried through the casing A by the conveyor B and as they travel along they are shifted about by the irregular guides of the conveyor so as to present all their surfaces to both washing and rinsing fluids. The fluids are pumped in circuits, the washing fluid circuit extending from the bottom of section E

through connection K and pump H to the spray pipes D and the rinsing fluid circuit extending in like manner from the bottom of section G through connection L and pump J to the spray pipes F. The primary screens R, S and the secondary screens T, U strain the fluids being withdrawn by the pumps H and J. When desired the screens may be removed and cleaned.

With this general view of the apparatus and its operations, we may now pass to a consideration of the different parts in detail.

The casing A forms an elongated chamber, or enclosing passage, through which the articles to be washed, such as the milk bottle cases shown, are advanced by the conveyor B. The casing A includes a bottom 10, a rear wall 11, a front wall 12, and ends 13, 14. These various walls are preferably composed of sheet metal and are secured together in any suitable way, as by welding. Besides these fixed inclosing walls, there is a top cover 15, a removable front panel 16 and an inclined cover 17. These are provided respectively with handles 18, 19 and 20 so that they can be placed upon and removed from the casing frame work.

The supporting frame work of the casing includes an upper frame 21, supporting posts 22, an intermediate frame 23 and supporting posts 24. These frames each have longitudinal and transverse frame members, preferably angle irons, fitted and secured together and properly connected to the posts and to the casing walls, by any suitable means, as by welding.

Thus, the rear edge of the frame 21 is secured to the back plate 11 while its forward edge is supported by the posts 22. Similarly, the rear edge of the frame 23 is secured to the back plate 11, its ends to the casing end walls 13, 14 by means of plates 46 hereinafter referred to, and its front supports posts 22 and in turn is supported by posts 24. Indeed, in the preferred construction the posts 22 and 24 are in each instance composed of a single piece, merely the vertical and inclined portions being separately designated.

The cover 15 has peripheral vertical flanges which fit within the vertical flanges of the upper frame 21. The fit of these flanges is free enough so that when the cover 15 is moved against the back member of the frame 21, there will be space enough at the front to receive a down-turned flange on the upper edge of the removable panel 16, all as clearly shown in Fig. 6. In setting the panel 16, it is positioned so that its lower edge passes behind the vertical flange of the forward member of the intermediate frame 23 at the same time its upper edge is being hooked over the corresponding flange of the forward member of the upper frame 21.

The inclined cover 17 is likewise flanged at its upper edge to fit over the vertical flange of the front member of the intermediate frame 23 in much the same manner as the panel 16 fits upon the front member of frame 21, but in this case the lower flanged edge extends over the top of the front casing plate 12 in order to complete the closure.

Thus, in order to obtain access to the interior of the casing, the covers 15 and 17 and the front panel 16 may be readily removed; and, when once removed, they can be as readily replaced to put the apparatus in shape for subsequent operation.

In addition to the frame members mentioned, there are the main supporting posts 25, 26 which elevate the casing above the floor level. The uprights 25 extend throughout the height of the

back plate 11 and the uprights 26 extend throughout a considerable portion of the height of the front plate 12. These plates are secured to these members in any suitable way, as by welding.

There are several of these uprights 25, 26 arranged in pairs, each pair being connected by a transverse member 27 upon which the lower plate 10 of the casing rests. These pairs of uprights 25 and 26 are also separated by spacers 28 which consist in each instance of a rod 29 extending through a spacing tube 30. The ends of the tube abut against the inner faces of the uprights and the rod extends through apertures in them and apertures in the associated feet 31. The feet 31 have shanks which are roughened on their outer faces to cooperate with similarly roughened washers 32 and by means of nuts 33 the bolt 29 is drawn up so as to firmly secure the parts together.

The end walls 13, 14 of the casing extend to about the level of the center frame 23. They are thus high enough to hold the fluids in the sections E and G and still leave room for the passage of the conveyor B and the articles C upon it. The conveyor B is of the drag type and in the present disclosure takes the form of the conveyor of prior United States Patent No. 1,804,701, dated May 12, 1931. In brief, it preferably comprises a pair of metal chains which travel along guide-ways and have associated with them other guides for engaging the bottoms of the articles being advanced by the chains. These latter guides are preferably in the form of narrow bars set on edge and positioned so as to terminate in a substantially horizontal plane a little below a like plane through the top surfaces of the chains. With this construction the chains exert a drag upon the articles being conveyed but in case any of the articles meet an obstruction or a number of them are jammed so as to prevent their advance, then the chains will pass along harmlessly underneath the various articles without causing damage either to the conveyor itself or the articles being conveyed.

The chain links 40 are connected together by transverse pivots 41 and, insofar as the chains are shown, each chain advances over a guide member in the form of a channel bar 42 and returns through a tubular member 43. In the present instance two chains are shown but in some cases one might suffice. With the two chain arrangement there are three guides 44, one between the chains and the other two outward of the same. These guides, as before noted, terminate in a plane slightly beneath the plane of the upper surfaces of the chains. This is clearly shown in Fig. 6. It is clear that in case the articles C tend to extend down below the level of the plane of the chain tops then the guides 44 come into play and engage the articles and limit their downward movement. The members 42 and 44 may be variously mounted. In the present instance they are carried by transverse bars 45 which are positioned at intervals and connected at their forward ends to the posts 24 and at their rear ends to the rear casing wall 11. As shown, the connections are welded.

Directly beneath the transverse bars 45 are plates 46 which are also secured in like manner to the rear wall 11 and the front posts 24. These plates like the bars 45 extend also along the end walls 13, 14 and by reason of their connections to them serve as end members of the intermediate frame 23. Rear plates 47, similar to the plates 46, extend along the rear wall 11 between the

plates 46 and are secured to the rear wall and so complete the frame 23.

The upper stretch of the conveyor chain travels, as indicated by the arrow in Fig. 5, at first through the washing section E and then through the rinsing section G. The return tube 43 extends throughout the length of the washer and forms water tight connections with the end walls 13, 14, and the walls 48, 48 of the overflow compartment M. With this construction, the washing fluid, in the compartment E, and rinsing fluid, in the compartment G, cannot contact with the conveyor chains. It will only be as these fluids are sprayed from the pipes D and F that they will engage the chains. But, obviously, such contact will not injure the chains nor interfere with their proper operation.

The special feature of novelty in that part of the invention involving the conveyor is found in the irregular side guides 49 and 50. These guides are preferably curved and, in the form of the invention shown, consist of a number of arcuate portions secured together end to end; and then the arcuate portions of the two guides are staggered in relation to each other. This means that the point at which two arcuate portions meet in the case of one guide is directly opposite the center of an arcuate portion of the other guide and vice versa. These guides 49 and 50 are suitably secured to the transverse members 46 or other frame parts, preferably by welding. Obviously, they may be variously connected to the frame structure. The guides 49 and 50 are far enough apart at all times to freely pass the milk bottle cases C or other articles which it is designed to handle. In any event these guides must be spaced apart just far enough to suit the dimensions of the particular articles to be handled. Although the cases C have a less transverse dimension than the distance between the guides 49 and 50 at any cross section, yet, because of their lateral curvatures, the cases cannot pass in a straight line through the washer but must move laterally and angularly from point to point as they advance. In this way the ends of the cases are all exposed at one time or another to the washing and rinsing action of the sprays. This zigzagging of the cases prevents any two cases from going through the washer with their adjacent ends abutting against each other at all times. In other words, if such be the condition at starting, the cases will be so shifted with reference to each other that the ends which have been abutting will be separated and thus brought under the action of the sprays both in the washing section and in the rinsing section of the machine.

The handling of the conveyor in its travel to and from the washer is not disclosed, as the same would be according to well known practice, such, for example, as that illustrated in part in my aforesaid Patent No. 1,894,701. Obviously, too, the type of conveyor might be modified without departing from the scope of the invention. These are matters which will be well understood by persons skilled in this art.

As illustrative of a connecting structure between the casing of the washer and the conveyor frame work outside of the casing, I have shown a hanger 51 which is secured to the casing in any suitable way. As shown, its ends are secured to extensions of the washer chain guides 49 and 50 which become rectilinear as they extend beyond the end wall 13. This hanger carries the end of the chain guide 52 of the exterior conveyor structure. At the opposite end of the washer, the cor-

responding parts are the hanger 54 and the chain guide 55.

The spraying system D, by which the washing fluid is supplied to the washing section E, may be variously constructed. In the present instance, it contains a main pipe 60 which extends lengthwise of the section E to a point more or less adjacent to the outlet compartment M. The extreme end of the pipe 60 is closed and from it there extend a number of branch pipes 61. The branch pipes are closed at their ends by caps 62 and the under side of each pipe is provided with a series of perforations 63 which preferably extend throughout the length of each branch pipe. The branch pipe is in communication with the main pipe 60, as will be obvious. Pipe 60 is preferably held in place against the rear wall 11 near the upper frame 21 by any suitable means, as, for example, the straps 64 which are riveted at the one end to the frame 21 and at the other end to the wall 11, as clearly illustrated in Fig. 6. Obviously, the pipe 60 might be otherwise secured. With the pipe 60 thus held, the branch pipes remain in position near the top of the casing and are in readiness for the delivery of the washing fluid through the spray apertures 63. The pipe 60 extends through the end wall 13 and is suitably connected by pipe 65 to the outlet of the pump H. The inlet of the pump is in turn connected by piping 66 to the outlet connection K which is located at the bottom of the washing compartment E near the end 13 of the casing. By this piping, a complete circuit for the flow of the washing fluid is provided. The pump withdraws the fluid from the section E by way of outlet K and piping 66 and forces it by way of piping 65 into the supply pipe 60 and thence through the apertures 63 of the branch pipes 61 down over the conveyor B and the articles upon it to the washing section E.

The rinsing end of the washer is similarly provided with a spraying system F which includes the supply pipe 70, apertured branch pipes 71, and supply pipe connection 72 leading from the outlet of the pump J. The latter is connected by piping 73 with the outlet L, located to drain the rinsing compartment G. When the pump is operated the rinsing fluid is conveyed from compartment G through the pump into the spraying system F and thence over the conveyor and the articles upon it, just as in the case of the spraying system D by which washing fluid was supplied to cleanse the articles being conveyed.

The pump H may be of any design, but is here shown as a rotary pump driven by an electric motor 74 located upon a base 75 and connected by a coupling 76 with the pump shaft 77. Similarly, pump J is driven by a motor 78 upon a base 79 connected by a coupling 80 with the pump shaft 81.

The washing section E and the rinsing section G are separated by the overflow structure M which comprises a chamber 90 provided by the walls 48 which, as previously noted, are welded or otherwise secured to the bottom 10 of the casing A. The walls forming this chamber extend from the rear wall 11 to the front wall 12 and are welded or otherwise secured to the same so as to produce a water-tight compartment between the sections E and G. As before noted, the conveyor tube 43 pierces these walls 47, 48 and is secured thereto by welding or otherwise to provide water-tight joints. The chamber 90 is open at the top and is there provided with a series of bridge members 93 which are

likewise fixed by welding or other suitable method. Resting upon, and secured to, these bridge members, by welding or otherwise, is a gable roof member 94 which tends to drain off fluid which may strike upon its top. The fluid thus drained passes into either section E or G. By reason of the spacing of the ridge members 93 it follows that there is a space between the tops of the walls 47, 48 and the roof member 94. Through this space liquid may flow into the chamber 90 from either or both sections E and G. The structure M thus provides an overflow chamber into which the washing or rinsing fluids may pass. The outlet pipe N extends from the lower end of the chamber 90 to a suitable outlet point. Since a portion of the chamber 90 extends beyond the forward end of the roof member 94, it is necessary to close off that portion by a plate 95 which extends from the forward end of the member 94 to the front wall 12 as indicated by dotted lines in Fig. 6 and more fully in the fragmentary perspective view of Fig. 8. To more fully close off the upper end of this portion of the chamber 90 so as to keep out the falling sprays and require the fluids to pass through the screens, I also provide an end wall 96, similarly shown in Figs. 6 and 8.

In the usual operation of the washer, the washing fluid is water supplied with soap, soda, or other cleansing ingredient, and the rinsing fluid is clear water. In order to supply the washing section E and the rinsing section G with water, I provide the pipe connections O which pass through the rear wall 11 of the casing at a suitable point, preferably slightly above the outlet provided by the overflow structure M. I also preferably heat the water in the washing section by admitting steam through the connection K. For this purpose I provide the steam pipe 95 which has an outlet within the connecting pipe which communicates directly with the washing section E. Since it will also be necessary to drain the compartments E and G while the pumps are idle, I also provide drains P and Q for the sections E and G respectively. The latter are located, as clearly shown in Fig. 6, at the bottom of the casing adjacent to the rear wall, and each drain opening is provided with a cap which may be screwed home to seal the opening or removed to allow the fluid to pass out.

In order to catch solids which may be washed or broken from the articles C or otherwise brought into the washing section E, and also to properly drain the fluid on its way to the pumps, I have provided a series of horizontal screens R and S, the former being associated with the washing section E, and the latter principally with the rinsing section G. Each screen R and S is composed of a plate 100 having a suitable number of apertures 101. The plate is preferably mounted in an angle iron frame 102 by means of a clamping plate 103 and suitable bolts 104 provided with nuts 105. Each screen plate 100 with its enclosing frame 102 is fitted to slide upon certain of the transverse frame members of the intermediate frame 23 of the casing structure. These transverse frame members are in the form of angle irons having inwardly extending flanges upon which the screen frame 102 rests and is adapted to slide.

The horizontal screens R and S are removable horizontally at the front of the casing A, the cover 17 being removed to provide access to these screens. When in set position, the screens lie near the under side of the upper stretch of

the conveyor chain and serve to catch and hold the larger particles of dirt or other substances which may be washed or broken from the cases, bottles or the like. When removed the screens may be readily washed and scrubbed in readiness for replacing and subsequent service.

In addition to the horizontal screens R and S, I preferably employ also two screens T and U associated respectively with the sections E and G. These screens are similar in construction to the screens R and S but much longer. They comprise plates 110 having apertures 111. These plates are secured to frames 112 by suitable clamping plates 113 and bolts and nuts 114 and 115. In this instance the screens are mounted at an inclination and rest against the flanges of guide frames 116, 117 which are secured at their lower ends to the casing bottom 10 and at their upper ends to portions of the frame structure, the frames 117 engaging at their upper ends with the front wall 12 adjacent to the cover 17. The latter will be removed whenever it is necessary to withdraw the screens T and U for cleaning. After they have been cleaned and replaced, the cover will again be put in closing position.

The frames 116, 117 extend not only downward in an inclined direction but also along the bottom 10 of the casing A so as to provide a suitable pocket for each screen. The shape of the entire frame 117, in the case of both screens T, U, is clearly shown particularly in Fig. 7.

From what has been said, it will be clear that both the washing and rinsing fluids will be properly strained as they pass from the cases or other articles on their way to the pumps.

It will be apparent that in carrying out my invention many alterations and modifications may be made in the structures illustrated without departing from the spirit and scope of the invention. I therefore do not wish to be limited to the details shown and described, but aim to cover by the terms of the appended claims all those alterations and modifications which rightly come within the purview of my invention.

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

1. A washer for cases and the like, comprising a zigzag conveyor passageway along which the cases are adapted to pass in a zigzag path, said passageway having bottom members lying substantially in a plane and laterally undulating side wall members providing a zigzag channel of substantially uniform width capable of shifting the cases passing therethrough into different positions to properly expose the same for cleansing, a friction drag conveyor movable longitudinally along the bottom of said passageway and adapted to engage the bottoms of said cases and carry them along said passageway, and means for spraying the cases as they travel along said passageway.

2. A washer for cases and the like, including an enclosing casing, a zigzag conveyor passageway extending through said casing and adapted to receive cases and guide them through a zigzag path, said passageway having bottom members lying substantially in a plane and laterally undulating side wall members providing a zigzag channel of substantially uniform width capable of shifting the cases passing therethrough into different positions to properly expose the same for cleansing, a friction drag conveyor movable longitudinally through said casing along the bottom of said passageway and adapted to engage the bottoms of said cases and carry them along

said passageway, and means within said casing for spraying the cases as they travel along said passageway.

3. A washer for cases and the like including
 5 an enclosing casing, the lower portion of said casing serving to hold a liquid, a conveyor passageway extending through said casing above the said lower liquid holding portion thereof, said passageway serving for the conveyance of cases
 10 therealong, a frictional drag conveyor movable along the bottom of said passageway and adapted to engage the bottoms of the cases and drag them along said passageway, means for spraying the
 15 cases as they travel along said passageway, horizontal removable screen trays beneath that portion of said conveyor which carries the cases being sprayed, upstanding removable screen trays positioned in said casing longitudinally of the same, the upper edges of said upstanding trays
 20 being adjacent to the forward edges of said horizontal trays, said casing having an opening along its front near said upper and forward edges to provide for the removal and replacement of said trays, covering means for said opening, and
 25 means for removing liquid from said casing forwardly of said upstanding screens.

4. A washer for cases and the like, including an enclosing casing adapted to hold liquid in its lower part, a conveyor passageway extending
 30 through said casing above the liquid holding part thereof along which passageway the cases are adapted to travel, a frictional drag conveyor movable along the bottom of said passageway and adapted to engage the bottoms of the cases and
 35 drag them along said passageway, means for spraying the cases as they travel along said passageway, horizontal removable screen trays beneath the case carrying portion of said conveyor and upstanding removable screen trays positioned
 40 in said casing longitudinally of the same, the upper edges of said upstanding trays being adjacent to the forward edges of said horizontal trays, said casing having an opening along its front near said upper and forward edges to provide for
 45 the removal and replacement of said trays, covering means for said opening, and means forward of said upstanding screens for conveying the liquid from said casing to said spraying means and applying it thereby to the cases being carried
 50 along by said conveyor.

5. A washer for cases and the like, comprising a conveyor passageway bottom along which the cases are adapted to travel, conveyor means movable along said passageway bottom and opera-

tive to move the cases therealong, case diverting guide members protruding alternately in staggered relation into the path of travel of the cases being advanced by said conveyor means and
 80 operative to laterally divert the cases back and forth laterally as they pass along said guide members, and means for spraying the cases while being thus diverted to and fro by said guide members.

6. In a washer, an enclosing casing having a
 85 lower front wall and an upper front wall or panel, said upper front wall being set back from the plane of said lower front wall and having its lower edge elevated to a height above that of the upper edge of said lower front wall, an opening
 90 being thus provided through which flat trays may be passed both vertically and horizontally, upstanding removable screen trays positioned in said casing near said lower front wall, horizontal removable screen trays positioned in said casing
 95 in horizontal alignment with said opening, means for supplying a cleansing liquid within said casing above the horizontally disposed trays, the lower part of said casing receiving the liquid coming down through said horizontally disclosed
 100 trays, and means for removing liquid from said casing forwardly of the lower part of said upstanding screens.

7. In a washer, an enclosing casing having a lower front wall and an upper front wall or panel,
 105 said upper front wall being set back from the plane of said lower front wall and having its lower edge elevated to a height above that of the upper edge of said lower front wall, an opening being thus provided through
 110 which flat trays may be passed both vertically and horizontally, upstanding removable screen trays positioned in said casing near said lower front wall, horizontal removable screen trays positioned in said casing in horizontal alignment
 115 with said opening, the adjacent edges of said sets of trays when properly positioned in said casing to avoid interference when either set of trays is passed through said opening while the other is
 120 in place, means for supplying a cleansing liquid within said casing above the horizontally disposed trays, the lower part of said casing receiving the liquid coming down through said horizontally disclosed trays, and means for re-
 125 moving liquid from said casing forwardly of the lower part of said upstanding screens.

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