April 26, 1955 J. L. PETTIT 2,706,991

CONVEYOR SYSTEMS

Filed March 4, 1953

2 Sheets-Sheet 1

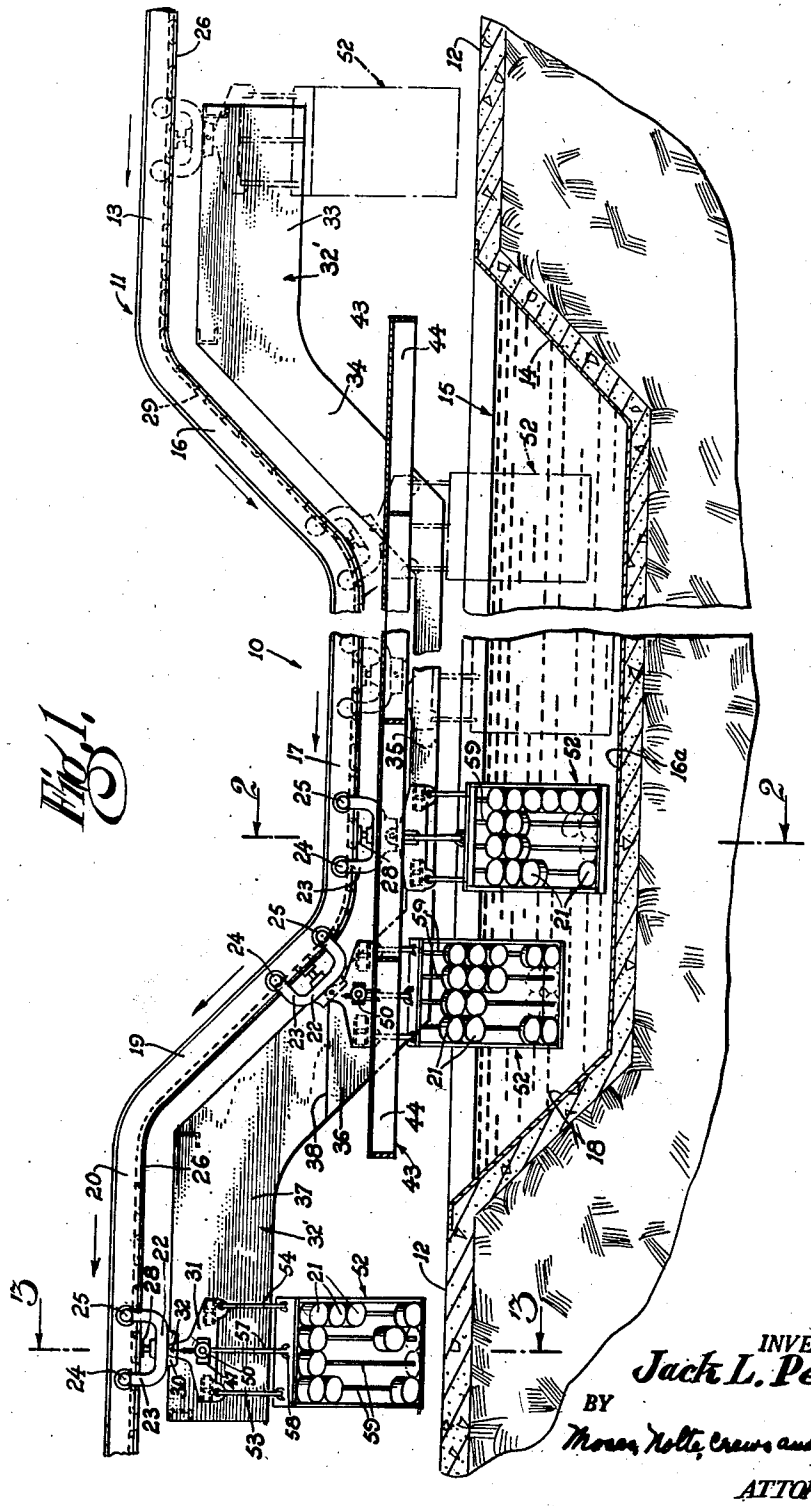


Fig. 1.

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Fig. 2.

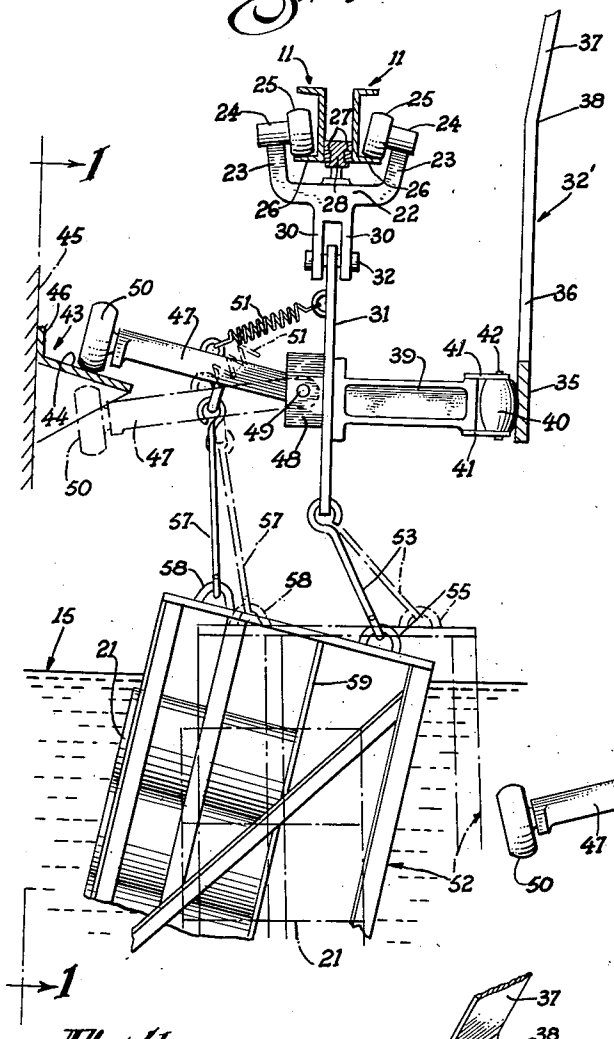



Fig. 5.

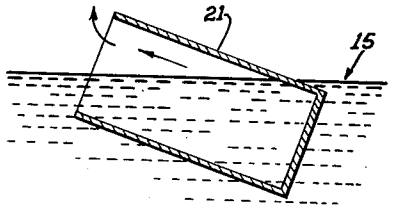



Fig. 3.

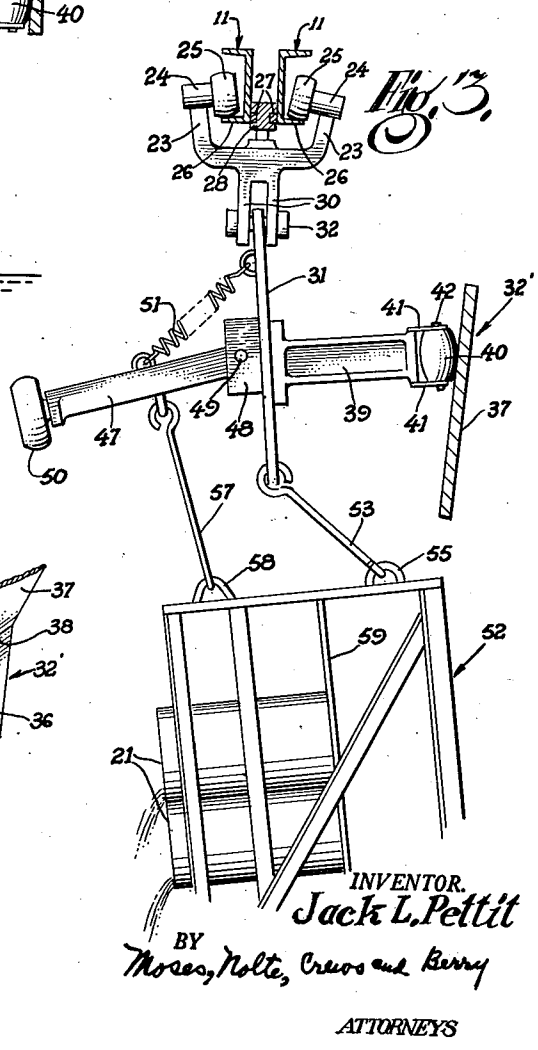
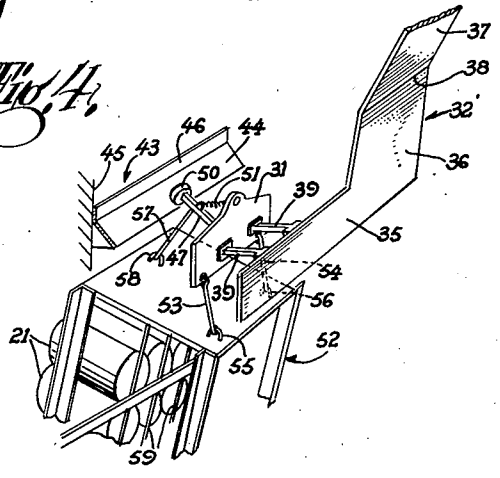



Fig. 4.




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2,706,991

# CONVEYOR SYSTEMS

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Application March 4, 1953, Serial No. 340,315

7 Claims. (Cl. 134—125)

This invention relates to conveyors and more particularly to a conveyor for immersing cartridge shells or other containers in a liquid bath.

It is an object of the present invention to provide a conveyor for immersing cartridge shells or other containers in a liquid bath wherein the cartridge shells or other containers will be automatically tilted when entering the bath to thereby eliminate air pockets within the empty cartridge shells or containers which would normally prevent the liquid bath from coming into contact with the entire interior surface of the shells or other containers.

It is another object of the present invention to provide a conveyor of the above type wherein the empty cartridge shells or other containers will be automatically tilted in the reverse direction just after leaving the bath to permit the liquid to drain off back into the bath.

Other objects of the present invention are to provide a conveyor for immersing cartridge shells or other containers in a liquid bath bearing the above objects in mind which is of simple construction, inexpensive to manufacture, has a minimum number of parts, is easy to use and efficient in operation.

For other objects and a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a side elevational view of a conveyor embodying the features of the present invention and taken on line 1—1 of Fig. 2;

Fig. 2 is a vertical sectional view taken along the line 2—2 of Fig. 1 and showing the moving parts of the present invention in end elevation;

Fig. 3 is a vertical sectional view taken along the line 3—3 of Fig. 1 and showing the moving parts of the present invention in end elevation;

Fig. 4 is a top perspective view of a portion of the present invention; and

Fig. 5 is a longitudinal sectional view of one of the cartridge shells during immersion with the escaping air indicated by arrows.

Referring now more in detail to the drawings, in which corresponding parts are designated by like reference numerals throughout the several views, there is shown a conveyor for immersing empty cartridge shells or other containers in a liquid bath, referred to collectively as **10**, and including a pair of central, overhead rails **11**, substantially as illustrated.

As shown in Fig. 1, the rails **11** extend parallel to the floor **12**, as at **13**, and slope downwardly above and parallel to the sides **14** of liquid bath **15**, as at **16**. The rails **11** continue parallel to the bottom **16***a* of the bath, as at **17**, continue upwardly substantially parallel to the sides **18** of the bath, as at **19**, and then continue parallel to the floor **12**, as at **20**.

The bath **15** is of the usual alkaline variety into which empty cartridge shells **21** are immersed, in a manner well known to those skilled in the art.

As shown in Fig. 2, a plate **22** is integrally formed at each corner with upwardly and outwardly extending arms **23**, these arms terminating in bearings **24**. Rollers **25** are rotatably mounted in suitable manner at the inner ends of bearings **24** and ride the bottom flanges **26** of rails **11**.

Vertical displacement of the plate **22** relative to the rails **11** is prevented by a pair of inner rails **27** which slidably receive a T-shaped member **28** fixedly carried at the top of plate **22**, as shown in Fig. 2.

A conveyor belt **29** moves between the rails **11** in the direction of arrows shown in Fig. 1 and serves to move the plate **22** in the same direction.



The bottom of plate **22** along its central portion is integrally formed with a pair of laterally spaced, downwardly extending arms **30** which pivotally mount a plate **31** by means of a pin **32**.

The rear vertical wall **32'** is suitably mounted at one side of rails **11**, substantially as shown in Fig. 1. It will be noted that this rear wall extends parallel to the portion **13** of rails **11**, as at **33**, continuing downwardly below and parallel to the portion **16** of rails **11**, as at **34**, continuing across the top of the bath **15** below and parallel to the portion **17** of rails **11**, as at **35**. The portion **35** of wall **32'**, it will be noted, is of less height than the portions **34** and **33** thereof. The other end of the portion **35** continues upwardly below and parallel to portion **19** of rails **11**, as at **36**. However, the wall **32'** continues upwardly from the portion **36** in a rearwardly bent portion **37**, shown best in Fig. 2. This rearwardly bent portion **37** joins the vertical portion **36** along a horizontal line **38**, the latter being disposed above the side **18** of bath **15**, as shown in Fig. 1.

The plate **31** on the side adjacent wall **32'** fixedly carries a pair of outwardly extending arms **39**, the arms **39** being disposed at substantially right angles to the plate **31**. The vertical rollers **40** are rotatably mounted at the ends of arms **39** by means of plates **41** and shaft **42**, as shown in Fig. 2. The rollers **40** ride along the wall **32'** at all times.

A shelf **43** having a downwardly inclined surface **44** is mounted on the front side of rails **11**, slightly below and parallel to the latter, as shown in Figs. 1 and 2. The shelf **43** is suitably mounted upon wall **45** by means of vertical portion **46** (see Fig. 2).

It will be noted by an inspection of Fig. 1 that the shelf **43** begins and ends within the limits of bath **15** for a purpose to be hereinafter described.

An arm **47** is pivotally mounted at one end on the front face of plate **31** by means of longitudinally spaced brackets **48** and a pin **49**, as shown in Figs. 2 and 3. A roller **50** is rotatably mounted at the forward end of arm **47** in suitable manner and along the longitudinal axis of the arm **47**, this roller riding the inclined surface **44** of shelf **43**. A contraction spring **51** connects the midpoint of arm **47** to plate **31**, Fig. 2, limiting the downward displacement of arm **47** in a manner to be hereinafter described.

A rectangular frame **52** of the type commonly employed to immerse a plurality of cartridge shells **21** in bath **15**, is supported along its rear edge at the top thereof by means of hooks **53** and **54** pivotally connected at their upper ends to opposite ends of plate **31** and engaging loops **55** and **56** fixedly carried by the top of frame **52**. The frame **52** is supported at its forward end by means of a hook **57** pivotally connected at its upper end to the midpoint of arm **47** and engaging a loop **58** at its lower end, the loop **58** being fixedly carried by the top of frame **52** at the front central portion thereof, as shown best in Fig. 4.

As shown in Figs. 2, 3 and 4, the empty shells **21** are stacked upon one another with the open ends disposed toward the shelf **43**, rearward displacement of the shells being prevented by longitudinally spaced, vertical wires **59**.

As the plate **22** moves along the tracks or rails **11** towards the bath, both the rear rollers **40** and the forward roller **50** are freely suspended and the frame **52** is carried in a substantially vertical position shown in dotted outline in Fig. 2, due to the action of spring **51** in limiting the downwardly displacement of the freely suspended arm **47**. Thus, the cartridges **21** are disposed with their longitudinal axes in a substantially horizontal direction as they move towards the bath **15**.

As the frame **52** approaches the edge of bath **15**, the rear rollers **40** come into contact with and ride the portion **33** of rear wall **32'**. As the rear rollers **40** pass downwardly onto the portion **34** of rear wall **32'**, the front roller **50** comes into contact with and rides the inclined surface **44** of shelf **43**, as shown in full lines in Fig. 2. This raises the arm **47** upwardly and raises thereby the forward edge of frame **52** by means of hook **57**. Simultaneously, the rails **11** dip downwardly and the frame

52 is immersed in bath 15, as shown in dotted outline in Fig. 1. Thus, as the shells 21 are immersed in the bath, they are automatically tilted upward to the position shown in Fig. 5 with their open ends uppermost and permitting air to escape and preventing the formation of air pockets. Such air pockets would prevent the alkaline liquid from coming into contact with the entire interior surface of the shells and are automactially eliminated due to the upward tilting of the frame 52 occasioned by shelf 43 and roller 50. As the plate 22 and rollers 25 thereof move onto the lowermost portion 17 of the rails 11, the frame 52 is submerged to its greatest depth and is retained in the tilted position of Fig. 2 by the continuation of shelf 43 across the bath. It will be noted that the rearmost rollers 40 during this time continue to ride the wall 32' along portion 35 thereof.

The inclined position will be retained until the plate 22 moves upwardly away from the bath along portion 36 of wall 32'. At this time the roller 50 will move out of contact and above the inclined surface 44 of shelf 43, lowering the frame 52 to the dotted line position of Fig. 2. However, as the plate 22 continues upwardly along portion 19 of rails 11, the rear rollers 40 come into contact with rearwardly inclined portion of wall 32', as shown in Fig. 3, rotating plate 31 rearwardly and effectively lowering the forward edge of frame 52. Thus, as soon as the frame 52 leaves the other end of the bath 15, the forward end thereof is lowered, as shown in Fig. 3, permitting the liquid to drain from the open end of shells 21. It will be noted that this draining occurs prior to the passing of the frame 52 beyond the side 18 of the bath. This drainage will continue until the end of portion 37 of wall 32' is reached. It will be readily apparent that the major portion of the drainage will escape while the conveyor is still over the bath. Thus, an economy of bath liquid is effected and the possibility of excess amounts being transferred to the floor 12 is thereby prevented.

Thus, as the frame 52 moves away from the bath 15 the shells 21 are once more disposed as shown in dotted outline in Fig. 2 and have been drained free of bath liquid.

It will be noted that the downwardly extending arms 30 are each freely spaced from the plate 31 pivotally mounted therebetween, thus permitting the rearward rotation of the plate 31 when rollers 40 contact portion 37 of wall 32'.

The spring 51 will be such as to exert sufficient tension upwardly on the arm 47 so as to retain the frame 52 in a substantially vertical position when the arm 47 is freely suspended.

It should now be apparent that there has been provided a conveyor for cartridge shells or other containers for immersing the same in a liquid bath wherein the cartridge shells or other containers will automatically be tilted so as to prevent the formation of air pockets when submerged in the bath, thus permitting the liquid to come into contact with the entire interior surface of the shells. It should also be apparent that there has been provided a conveyor of the above type wherein means are also provided for automatically tilting the cartridge shells or other containers in the reverse direction permitting the liquid to drain off prior to passing from the bath area, thereby effecting an economy in bath liquid and preventing the same from being transferred excessively to the floor surrounding the bath.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

I claim:

1. A conveyor for immersing containers in a bath comprising a frame housing a plurality of empty containers with the open ends thereof disposed to one side, overhead tracks, said tracks dipping downwardly at one end of the bath and dipping upwardly at the other end, carriage means movable along and suspended from said tracks, means for moving said carriage means along said tracks, a substantially vertical plate pivotally mounted at the bottom of said carriage means, said frame being suspended from the bottom of said vertical plate, a substantially vertical wall extending across the bath at one side of said tracks, said vertical wall extending below said tracks and following the contour thereof, arms



fixedly carried by the adjacent face of said vertical plate and extending towards said vertical wall, said arms being disposed at substantially right angles to said vertical plate, rollers rotatably mounted at the ends of said arms and adapted to ride said vertical wall, a substantially horizontal shelf extending across the bath at the other side and below said tracks, said shelf being downwardly inclined toward said vertical wall, said shelf terminating at both ends above the bath, at least one arm pivotally mounted on the side of said vertical plate adjacent said shelf, said arm extending to and terminating above the inclined surface of said shelf, a roller carried by the outer end of said arm and adapted to ride said inclined surface, spring means for limiting the downward displacement of said arm, said frame near its side adjacent said vertical wall being pivotally supported from the bottom of said vertical plate, said frame along its side adjacent said shelf being pivotally supported from said arm extending to said shelf, said shelf being adapted to raise said rollers and arm as said frame and containers are immersed in the bath whereby to raise the side of said frame adjacent said shelf and to tilt the open ends of the containers upwardly during immersion whereby to prevent the formation of air pockets in the containers, and means for tilting the open ends of the containers downwardly as they leave the bath whereby to permit the draining off of bath liquid after immersion has been completed.

2. A conveyor according to claim 1, said means for tilting the open ends of the containers downwardly as they leave the bath comprising a part of said vertical wall which is inclined upwardly and away from said tracks below the portion thereof which dips upwardly and continues away from the bath whereby to raise said rollers and arms riding said vertical wall and to tilt said vertical plate towards said vertical wall.

3. A conveyor for immersing empty containers in a bath comprising a frame housing a plurality of empty containers with the open ends thereof disposed to one side, overhead tracks, said tracks dipping downwardly at one end of the bath and dipping upwardly at the other end, carriage means movable along and suspended from said tracks, means for moving said carriage means along said tracks, a substantially vertical plate pivotally mounted at the bottom of said carriage means, said frame being suspended from the bottom of said vertical plate, means for tilting the open ends of the containers upwardly as they are immersed in the bath whereby to prevent formation of air pockets in the containers, and means for tilting the open ends of the containers downwardly as they leave the bath whereby to permit the draining off of bath liquid after immersion has been completed, said carriage means comprising a substantially horizontal plate, upwardly extending arms fixedly carried at the longitudinal sides of said plate, said arms straddling said tracks from below, said tracks including bottom horizontally extending flanges extending toward said upwardly extending arms, rollers carried at the upper ends of said upwardly extending arms and adapted to ride said flanges, means for limiting the upward displacement of said plate relative to said tracks, a pair of laterally spaced downwardly extending arms fixedly carried by the bottom of said plate, said vertical plate being received between said downwardly extending arms in freely spaced relation thereto, and a pin piercing said downwardly extending arms and said vertical plate.

4. A conveyor according to claim 3, said means for limiting the upward displacement of said plate relative to said tracks comprising a pair of inner rails carried by adjacent faces of said tracks at the lower edges thereof, and a substantially T-shaped member slidable between said rails, said T-shaped member at the bottom thereof at each side having laterally extending flanges slidably engaging the bottom of said rails, said T-shaped member being fixedly connected to the top of said plate.

5. A conveyor for immersing containers in a bath, comprising a frame housing at least one container disposed transversely of the bath with the open end thereof disposed to one side, overhead track means, said track means dipping downwardly at one end of the bath and dipping upwardly at the other end, carriage means moving along and suspended from said track means, means for moving said carriage means along said tracks, means for suspending said frame from the bottom of said carriage means, first cam follower means carried by said

suspension means, a first cam surface extending across the bath at the one side of said track means and adapted to raise said cam follower means to tilt the open end of the container upwardly whereby to prevent the formation of air pockets as the container is immersed, said frame being pivotally supported from the bottom of said suspension means, second cam follower means on the other side of said suspension means and a second cam surface cooperating with said second cam follower means, said second cam surface being adapted to raise said second cam follower means after said first cam follower means moves out of contact with said first cam surface whereby to tilt the open end of the container downwardly as it leaves the bath to permit the draining off of bath liquid after immersion has been completed.

6. A conveyor according to claim 5, said first cam follower means being pivotally connected to said suspension means, spring means connected to said suspension means and limiting the downward displacement of said first cam follower means, a substantially vertical guide surface disposed opposite said first cam surface, said second cam follower means being adapted to ride said guide surface, said frame near its side adjacent said guide surface being pivotally supported from the bottom of said suspension means, said frame near its side adjacent said first cam surface being pivotally supported from said first cam follower means.

7. A conveyor for immersing empty containers in a liquid bath comprising a pair of overhead tracks passing over the bath, said tracks dipping downwardly at the entry side of the bath and dipping upwardly at the exit side of the bath, a carriage suspended from and movable along said tracks, means for moving said carriage along said tracks, a substantially vertical plate pivotally suspended from the bottom of said carriage, said plate being suspended at its top central portion, a substantially vertical wall extending across the top of the bath, said wall being disposed to one side and substantially parallel to said tracks, said wall extending below said tracks and following the contour thereof, arms fixedly carried on one side of said plate and extending outwardly at substantially right angles thereto toward said vertical wall,



vertical rollers at the outer ends of said arms adapted to ride said vertical wall, said vertical wall beginning just before the entry of the tank and continuing to a point just beyond the exit of the tank, said vertical wall being rearwardly and upwardly inclined away from said tracks at the exit side of the tank, said inclined portion of said vertical wall beginning just before the said vertical wall extends beyond the bath area, a horizontal shelf extending across the top of the bath and disposed vertically sligthly above the lowermost portion of said vertical wall, said shelf being disposed on the other side of said tracks and vertical plate, the ends of said shelf being aligned substantially with the ends of the tank, said shelf having a downwardly inclined surface extending toward said vertical plate, a central arm pivotally mounted on the other side of said vertical plate, the outer end of said central arm being adapted to extend beyond said downwardly inclined surface of said shelf, a roller rotatably mounted at the outer end of said central arm and adapted to ride the downwardly inclined surface of said shelf, a contraction spring connected at its lower end to the top of said central arm and at its other end to the top of said vertical plate below said carriage, a frame having a plurality of empty containers stacked therein with their open ends to one side, and a pair of downwardly extending hooks pivotally carried at each end of said vertical plate at the bottom thereof, said frame at the top near the side adjacent said vertical wall having a pair of loops receiving said hooks, a second hook pivotally connected to the bottom of said central arm near the middle thereof, and a loop fixedly carried by the top of said frame below said central arm near the side thereof adjacent said shelf, said loop receiving said second hook.

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