Sept. 11, 1962 L. E. ERIE 3,053,265

SHRINK TANK

Filed Feb. 10, 1959

Fig. 1.

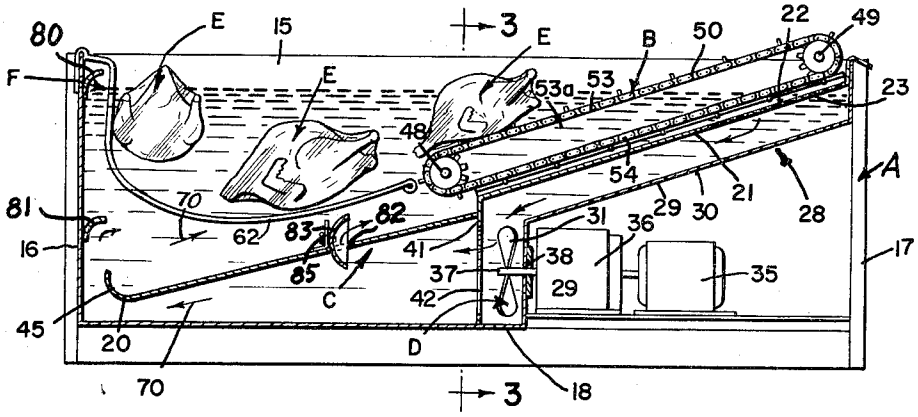


Fig. 2.

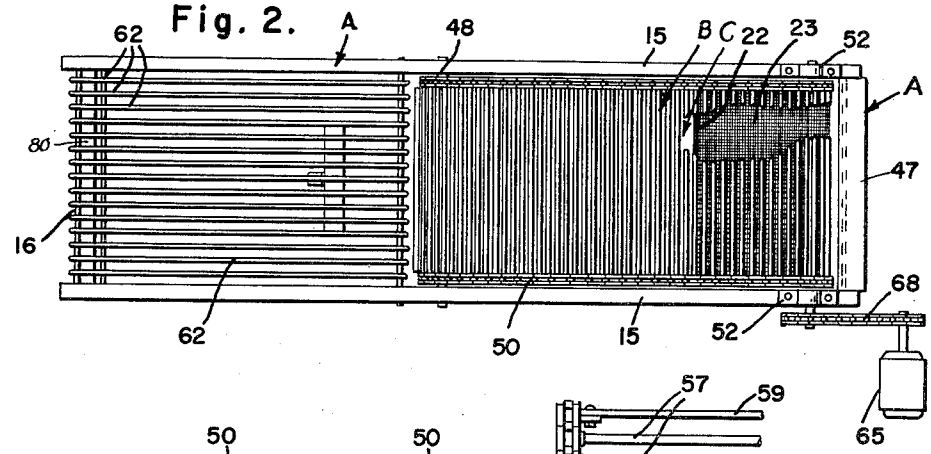
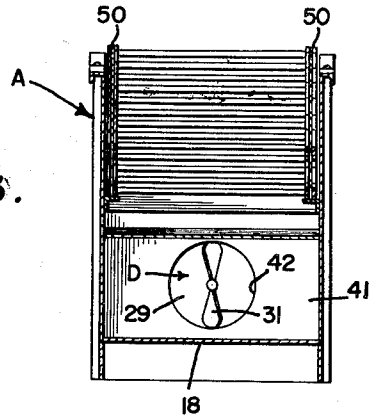


Fig. 3.



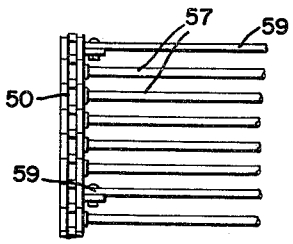


Fig. 4.

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SHRINK TANK

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This invention relates to a new and improved tank for use in shrinking the wrappings of pre-packaged products.

Fowl such as turkeys and chickens and other poultry and meat products are frequently packaged in a polyethylene or other semi-transparent film of sheet material and thereafter subjected to sufficient moisture to cause the packaging material to shrink thus creating a package for the product with a skin tight covering for protection of the product from contact with air.

Previously the products have been wrapped in the bag or package and then sealed whereafter they are either placed in tanks of hot water and then removed by hand or are placed on a conveyor line where they are sprayed with steam or hot water. Where the pre-packaged products are placed on conveyor lines through a steam or hot water spray or shower there are problems of uneven shrinkage due either to an uneven absorption of liquid by the wrapping or to an uneven cooling because of the evaporation of the liquid on the surface of the wrapping. In addition the cost and the apparatus necessary to effect steam or hot water shrinkage is costly to operate and difficult to maintain.

In previous bag shrinking apparatus employing a tank in which the product is submerged in hot water there are attendant difficulties in removing the product from the water without rupturing the package, particularly in view of the fact that the best results are obtained if the product is submerged in the hot water for only a very limited time in the order of seconds.

A principal object of this invention is to provide a shrink tank into which a pre-packaged product may be dropped and thereafter a novel mechanism lifts the product from the tank rapidly and without creating a bag rupture hazard.

Another object of this invention is to provide a shrink tank employing means to create water currents which are directed to carry products placed within the shrink tank toward engagement with a conveyor mechanism for lifting the products from the tank.

A further object of this invention is to provide a conveyor mechanism having a continuously upwardly moving stretch moving in an angular direction from a point substantially below the water level of the tank to a position substantially above the side wall of the tank so as to carry products from a position below the water level of the tank upwardly to a point for dropping the products exterior of the side wall of the tank.

A feature and advantage of the mechanism is the provision of spaced stop or pusher members which are arranged to gently carry submerged products along the upwardly moving stretch.

A still further object of this invention is to provide a shrink tank having an impeller and baffle system so as to cause a circulation of water in a direction along the bottom portion of the tank and thence upwardly in an angular direction towards one end of the tank and thence downwardly to the impeller and again along the bottom of the tank and in which the functional portion of the tank utilized for shrinking of product carrying bags is at the portion of the tank in which the water is moving in an upward direction.

Still a further object of this invention is to provide in such a device guides and stops which prevent all contact between the impeller and the products being processed by the device.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a sectional view of the shrink tank of the invention.

FIG. 2 is a top plan view of the shrink tank.

FIG. 3 is a cross-sectional view of FIG. 1 taken at line 3—3.

FIG. 4 is an enlarged fragmentary view of a portion of the conveyor belt mechanism for the shrink tank.

Referring now to the drawings there is provided a shrink tank A having a conveyor mechanism B, a baffle system C and an impeller D. The impeller is arranged to create water flow under baffle system C and thence upwardly in a direction generally paralleling the conveyor system.

Packaged products such as turkeys E are placed into the water of the tank and thence directed by the moving current towards conveyor mechanism B and thence carried upwardly out of the tank and deposited on some suitable depository exterior of the end wall of tank A.

Tank A comprises two side walls **15**, a front end wall **16**, a rear end or discharge wall **17** and a bottom wall **18**.

Baffle system C is arranged to extend between side walls **15** from a point adjacent front end wall **16** but spaced a short distance therefrom and adjacent and spaced a short distance from bottom wall **18** as at **20**. Baffle system C thence slants upwardly to the top of rear wall **17**.

Baffle C is formed of solid material so as to complete a water seal between side walls **15** from the lower end as at **20** to a point below the normal water level within the tank as at **21** and spaced considerably from the top end of the baffle to form a water return opening **22** between end **21** and end wall **17**. The opening is screened by a screen **23** so as to prevent solid matter from returning to a position below the baffle.

An impeller mechanism is located on wall **18** in a water tight housing **28** having a top wall **29** generally paralleling the wall of baffle C and extending to each of the walls **15**. Housing **28** has a vertical wall **29** which is on the forward end of top wall **30** and which also extends to both of the tank side walls **15**. Walls **20, 30** and the walls of tank A form a completely water tight seal.

Motor **35** is mounted on wall **18** within housing **28** and is arranged to drive a gear transmission **36** which in turn drives a shaft **37** passing through a bearing **38** in side wall **31** to drive and rotatably move impeller **31**.

A vertical baffle member **41** is arranged to depend from baffle C vertically forward of impeller D to bottom wall **18** and in spaced parallel relation to wall **29**. Vertical baffle **41** is provided with an aperture **42** having a diameter substantially equalling impeller **31** and aligned in alignment therewith. A water impelling chamber is thus defined between housing **28**, baffle C and the vertical baffle **41** which directs a substantially high velocity water current from screen **23** and out through aperture **42**.

Front end **20** of baffle C is curved upwardly as at **45** so as to deflect the water flowing along the bottom of the tank upwardly along wall **16**.

Conveyor mechanism B comprises a pair of sprockets **48** and **49** carrying a conveyor belt **50**. Sprocket **49** is supported sightly above the top level of tank A by a bearing **52** mounted on the top of side walls **15**. The lower sprocket **48** is mounted substantially below the top of the water level of water within tank A and is mounted

midway between front and rear ends 16 and 17 respectively and substantially below the water level of water within the tank.

Belt 50 is arranged in an upwardly moving stretch 53 and a downwardly moving stretch 54. The downwardly moving stretch is spaced only slightly above the top surface of baffle C and the upwardly moving stretch is arranged at an angle inclining from sprocket 48 upwardly to sprocket 49 as indicated by arrow 53a.

Belt 50 comprises a plurality of rods 55 extending transverse of the moving axis of the belt and a plurality of spaced pusher members 59. The pusher members extend upwardly slightly above the plane of the conveyor so as to provide a pusher or stop which will engage turkey E and carry the turkey from below the water level upwardly to the point of discharge adjacent sprocket 49.

A turkey receiving pocket is formed between front wall 16 and sprocket 48 by a plurality of wire rods 62 which form a basket into which turkeys E dropped into tank A may be nested completely submerged below the water level between the conveyor belt and the end wall 16 without making contact with baffle C.

The conveyor mechanism is driven by a motor 65 through a pulley and belt mechanism 68.

In operation hot water is inserted within tank A to a level generally indicated at F which is substantially above the top of sprocket 48 and the lowest portion of conveyor stretch 53 and of sufficient depth so as to allow turkeys E of the largest size to be completely submerged in water when placed in the basket portion defined by rods 62.

Motors 65 and 35 are both placed in operation so that impeller mechanism D is operated to force water to flow in a path generally indicated by arrows 70 under baffle C toward front end 16 and thence upwardly through the space between rods 62 to the upper portion of the tank adjacent the rear end 17 thence through screen 23 and thereafter under baffle C to impeller D and thence through aperture 42. At the same time motor 65 causes conveyor mechanism B to operate so that stretch 53 is moved in an upward direction as indicated by arrow 53a.

Turkeys E are then placed in tank A at the product loading station adjacent front end 16 where the turkeys are immediately taken by the water current upwardly towards product removing station at conveyor mechanism B. In the conveyor mechanism the pusher members 59 grip the turkey and carry the turkey upwardly out of the water to a point of discharge adjacent end 17.

An additional baffle 80 is placed on the upper level of tank A on wall 16 and a somewhat lower baffle 81 is placed below baffle 80 on the same wall so as to cause a deflection of water passing from under baffle member C and upwardly against wall 16 to be directed towards the discharge end of the tank. This provides a more direct water current flow.

An additional regulated water flow is also created by an aperture at 82 in the middle portion of baffle C. A deflector element 83 is positioned on the downstream edge of the aperture 82 (with reference to the bottom surface of the baffle C) shown with a concave face extending partially below baffle C and partially above baffle C so as to cause water flow under baffle C to partially travel against deflector 83 through aperture 82 and thence upwardly towards the discharge end of the tank. This control water flow eliminates eddy currents from forming within the tank and assists in creating water flow to deposit turkey products E on discharge belt B.

Deflecting element 83 is mounted on a bracket 85 mounted on the top face of baffle C so as to be adjustably movable in elevation so as to control the relative amount of eddy current eliminating flow through aperture 82.

The turkeys in this mechanism can be kept for as short a time as three seconds within the water and carried immediately out of the water by the combined force of the water current and the conveyor mechanism. Thus the turkeys may be rapidly dumped into the tank and immediately discharged therefrom without the necessity of draining of the water from the tank, holding the turkeys within the tank for a prolonged period of time or submerging a lifting device to lift the turkeys from the tank.

It can be seen that the turkeys are very gently handled by the mechanism and the possibility of rupturing the bags in which the turkeys are contained is minimized.

Although the foregoing invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be practiced within the spirit of the invention as limited only by the scope of the appended claims.

What is claimed is:

1. In a shrink tank for liquid treatment of packaged products the combination of: a tank adapted to be filled with water; a baffle member within said tank extending from a position adjacent the bottom of one end of the tank to a position adjacent the top of the opposite end of the tank; fluid communicating openings adjacent the high and low ends of said baffle member to establish fluid communication in the tank between the area over and under the baffle member; the area of said tank adjacent the low end of said baffle defining a product loading station and the area closer to the high end of said baffle defining a product removing station; and impeller means under said baffle directed to cause water flow under the baffle towards the low end and thence through the fluid communication opening upwardly over the baffle to the high end and thence returning downwardly from the high end of the baffle member through the fluid communication opening; lifting means mounted in said tank over said baffle member; said lifting means including a conveyor mechanism having a continuously moving stretch moving from the product removing station upwardly to a terminal position above and immediately adjacent one end of said tank; the low end of said conveyor mechanism being sufficiently below the water level of said tank to allow products within said tank to be carried by the water flow created by said impeller means onto the lower end of said conveyor mechanism.

2. A device according to claim 1 and wherein the upwardly moving stretch of said conveyor mechanism comprises a plurality of upwardly projecting spaced apart members; each said upwardly projecting member spaced approximately the distance of the width of products to be processed in the tank.

3. In a shrink tank for dunking packaged products the combination of: a water tank; baffle means within said water tank in part extending from a position adjacent the bottom of the tank to a position adjacent the top of the tank but substantially below the top water level thereof, and in part affixed to one side of said tank to establish a circulating path for water flow extending upwardly from the bottom end of the baffle means and downwardly from the top end of the baffle means; impeller means within said tank to create water flow along said path; and conveyor means within said tank above said baffle means and extending upwardly to a point above the water level of said tank in a direction substantially paralleling the baffle means; said conveyor means being adaptable to carry packaged products deposited thereon upwardly out of said tank and said water flow being arranged to carry the product inserted in said tank into engagement with said conveyor means.

4. In a shrink tank for dunking packaged products the combination of: a water tank; baffle means within said water tank extending from a position adjacent the bottom of the tank to a position adjacent the top of the tank but substantially below the top water level thereof; impeller means within said tank to create water flow in said tank in a path extending upwardly from the bottom

end of the baffle means and downwardly from the top end of the baffle means in a circulating path; conveyor means within said tank above said baffle means and extending upwardly to a point above the water level of said tank in a direction substantially paralleling the baffle means; said conveyor means being adaptable to carry packaged products deposited thereon upwardly out of said tank and said water flow being arranged to carry the product inserted in said tank into engagement with said conveyor means; said baffle formed with an aperture midway between said conveyor and the end adjacent the bottom portion of the tank; and deflector means mounted adjacent said aperture extending partially above and partially below said baffle and facing said impeller means on the underside of said baffle to direct water flow from the underside of said baffle upwardly toward said conveyor means.

5. In apparatus for shrinking product packaging including a water tank, impeller means for imparting velocity to the water in the tank and conveyor means for transporting the packaged products out of the tank, means for controlling the path of the water flow comprising, in combination, a baffle plate extending from a position adjacent the bottom of the tank at one side thereof to a position adjacent the top of the tank at the opposite side thereof, a first deflector plate affixed to the side of the tank adjacent the lower end of said baffle plate and a second curvilinear deflector plate attached to said baffle plate whereby the water moved by said impeller means is caused to flow from under said baffle plate around the low end thereof toward the high end with said first deflector plate acting to guide the water flow as it passes around the lower end of said baffle plate and said second deflector plate acting to divert a small portion of water flowing under said baffle plate to the upper side of said baffle plate intermediate the lower and upper ends of said baffle plate to reduce eddy currents that interfere with the flow of water along the upper side of the baffle plate.

6. In a shrink tank for liquid treatment of packaged products the combination of: a tank adapted to be filled with water; a baffle member within said tank extending from a position adjacent the bottom of one end of the tank to a position adjacent the top of the opposite end of the tank; fluid communication openings adjacent the high and low ends of said baffle member to establish fluid communication in the tank between the area over and under the baffle member; the area of said tank adjacent the low end of said baffle defining a product loading station and the area closer to the high end of said baffle defining a product removing station; and impeller means under said baffle directed to cause water flow under the baffle towards the low end and thence through the low end fluid communication opening upwardly over the baffle to the high end and thence returning downwardly from the high end of the baffle member through the high end fluid communication opening; said water flow from the low end of said baffle to the high end acting to move the packaged products from the loading station to the removing station; said product loading station comprising a water submerged guide member curved downwardly from adjacent the top end of the loading end of the tank toward the product removing station, the said guide member limiting the maximum level to which a product being loaded can sink into the tank, said guide member comprising a substantially open web to permit substantially unimpeded flow of water therethrough.

7. The combination in accordance with claim 6 wherein said open web comprises a plurality of spaced apart rods pointing generally in the direction of water flow toward said product removing station.

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