Nov. 23, 1948. F. J. McMICHAEL 2,454,706

METHOD AND APPARATUS FOR COOLING PRODUCE BY ALTERNATE DIPPING AND DRAINING

Filed Nov. 9, 1944

2 Sheets-Sheet 1

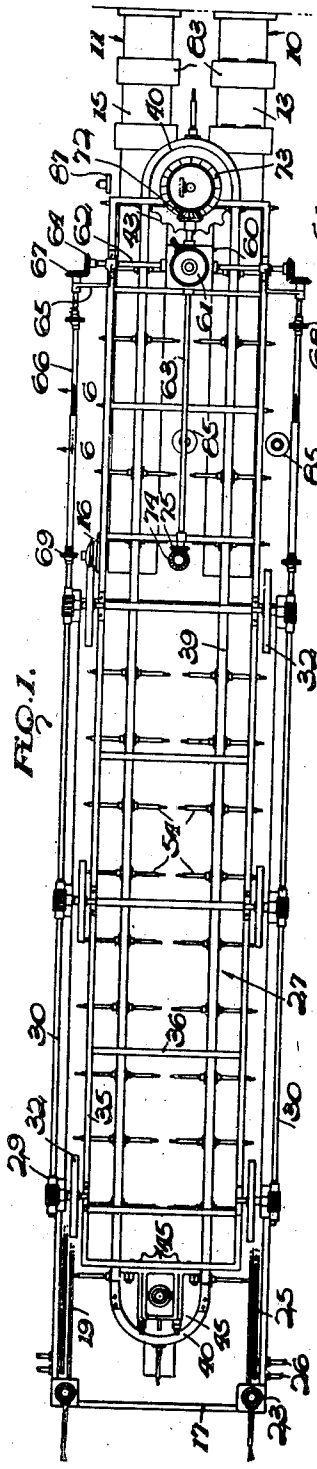


FIG. 1.

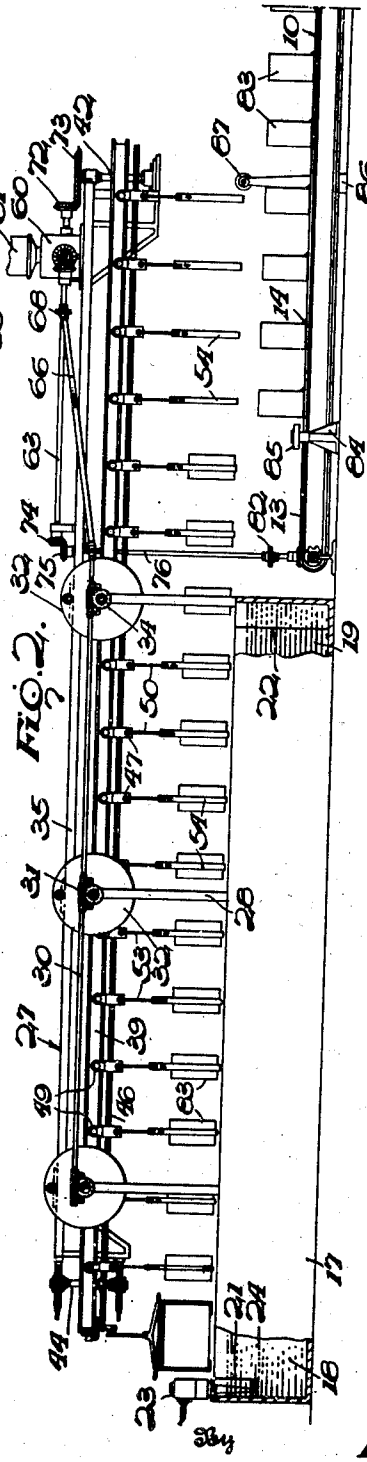


FIG. 2.

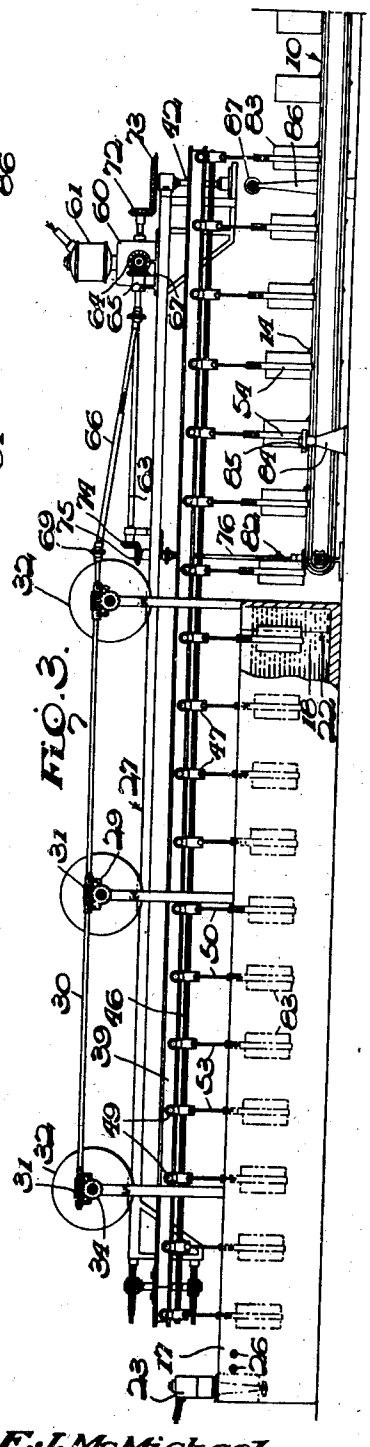


FIG. 3.

F. J. McMichael
Thos. N. Johnston Attorney

Nov. 23, 1948. F. J. McMICHAEL 2,454,706

METHOD AND APPARATUS FOR COOLING PRODUCE BY ALTERNATE DIPPING AND DRAINING

Filed Nov. 9, 1944

2 Sheets-Sheet 2

FIG. 4.

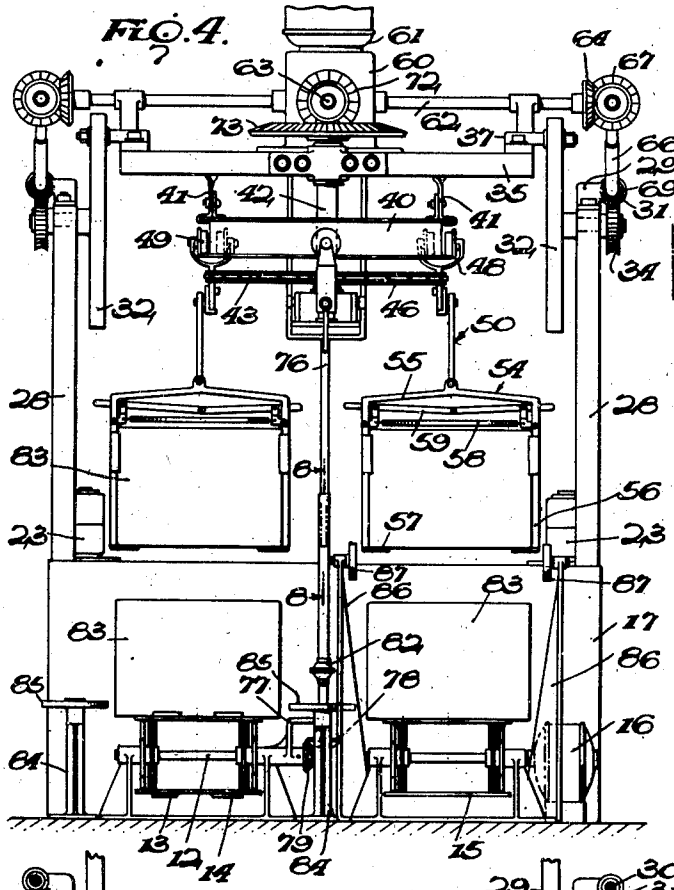


FIG. 6.

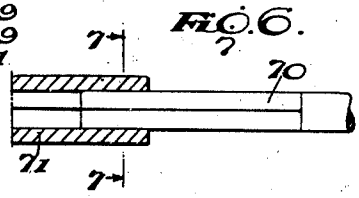


FIG. 7.

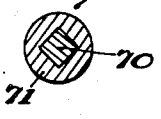


FIG. 8.

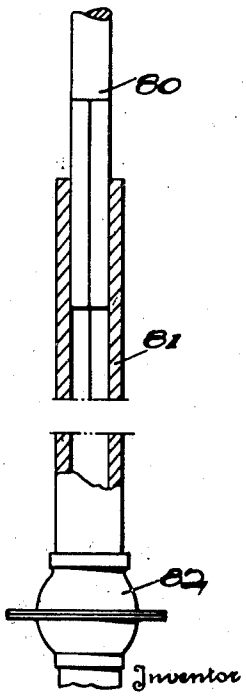
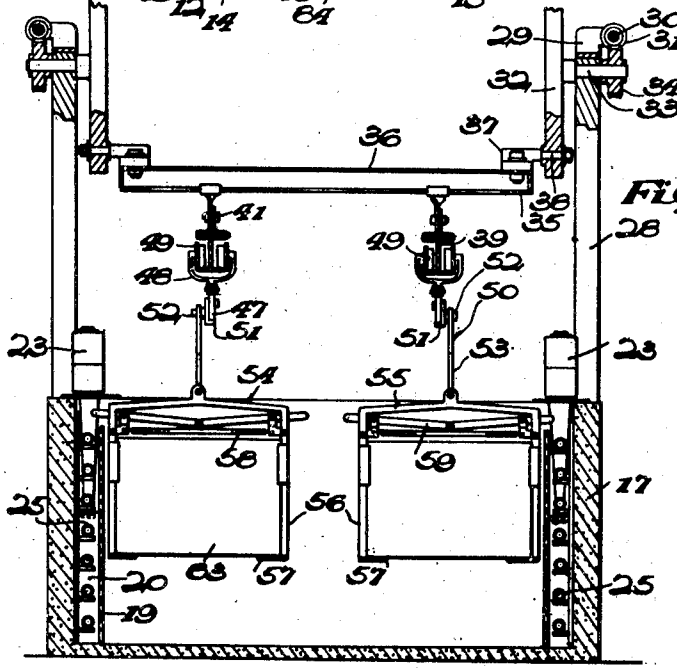


FIG. 5.



Inventor

F. J. McMichael

Thos. H. Johnston

Attorney

Patented Nov. 23, 1948

2,454,706

UNITED STATES PATENT OFFICE

2,454,706

METHOD AND APPARATUS FOR COOLING PRODUCE BY ALTERNATE DIPPING AND DRAINING

Floyd J. McMichael, Orlando, Fla.

Application November 9, 1944, Serial No. 562,637

7 Claims. (Cl. 62—104)

1

This invention relates to an improved method and apparatus for processing produce, being a variation of the invention disclosed in my co-pending application filed October 2, 1944, Serial No. 556,843.

In accordance with the invention disclosed in my co-pending application mentioned, packages of produce are fed to a conveyor which functions to alternately raise and lower the packages for repeatedly dipping the packages into a refrigerant and intermediately draining the packages, the object being to cause the refrigerant to repetitiously flow into and out of the packages so that the volume of liquid more or less trapped by the produce in the central portion of each package and thus, for such reason, subjected to a pronounced warming by the produce, will be positively replaced many times by fresh, cold refrigerant, to the end that the produce at the central portion of the package will be chilled with equal efficiency and effectiveness as the outer courses of produce of the package with resultant thorough and uniform chilling of the produce throughout the package.

An object of the present invention is to attain the same result, as foregoing, but instead of raising and lowering the packages individually, the packages are raised simultaneously and likewise lowered simultaneously to effect the repeated dipping and draining thereof.

A further object of the invention is to provide a method and apparatus wherein a dipping and draining conveyor will carry the packages forwardly on a floating frame, wherein the forward movement of the packages relative to the frame will occur in substantially a level path parallel to the frame, and wherein the frame will be raised and lowered to cause the repeated dipping and draining of the packages.

Another object of the invention is to provide a method and apparatus wherein the floating frame of the dipping and draining conveyor will be caused to travel in a circular path to effect the repeated dipping and draining of the packages.

And a still further object of the invention is to provide a method and apparatus wherein the packages of produce will be fed to the dipping and draining conveyor to be automatically picked up thereby and carried forwardly to be subjected to the dipping and draining operations, when the packages will be automatically released and carried off.

Other and incidental objects of the invention will appear during the course of the following description, and in the drawings:

2

Figure 1 is a diagrammatic plan view of the dipping and draining conveyor and associated parts.

Figure 2 is a side elevation of the structure seen in Figure 1, and showing the packages raised.

Figure 3 is a side elevation similar to Figure 2, and showing the packages lowered.

Figure 4 is a transverse vertical section looking toward the driven end of the dipping and draining conveyor.

Figure 5 is a transverse vertical section particularly showing the refrigerating tank.

Figure 6 is a detail section on the line 6—6 of Figure 1.

Figure 7 is a transverse section on the line 7—7 of Figure 6.

Figure 8 is a detail section on the line 8—8 of Figure 4.

Referring now more particularly to the drawings, I employ a feed conveyor, indicated as a whole at 10, and a discharge conveyor, indicated as a whole at 11, these conveyors corresponding to like feed and discharge conveyors disclosed in my prior application previously identified. As best seen in Figure 4 of the drawings, the conveyor 10 is provided at its forward end with a drive shaft 12 for the belt 13 of said conveyor, and fixed to the belt at regularly spaced intervals are pairs of lugs 14. The construction of the conveyor is otherwise unimportant. The conveyor 11 may be conventional and the belt 15 thereof is driven by a suitable motor 16.

Arranged at the adjacent ends of the conveyors 10 and 11 is a refrigerating unit identical with the refrigerating unit disclosed in my prior application noted. This unit includes a tank 17 adapted to contain a refrigerant 18, preferably water, and mounted in the tank near the side walls thereof are partitions 19 defining channels 20, the partitions being formed at corresponding ends thereof, as seen in Figure 2, with notches 21 providing inlets for said channels and, at their opposite corresponding ends, terminating short of the adjacent end wall of the tank to provide outlets 22 for said channels.

Mounted upon the tank 17 at the notches 21 of the partitions 19 are suitable motor-driven agitators 23 having blades 24 for circulating the refrigerant 18 through the channels 20, and mounted in said channels are refrigerating coils 25 to which are connected, as seen in Figure 1, suitable supply and return pipes 26 so that an appropriate refrigerating medium may be circulated through the coils by a suitable compressor, not shown. However, it should be noted that the compressor will be of a capacity to chill the coils, as desired,

so that when the agitators 23 are in operation, the refrigerant 18 will be circulated over the coils and thus maintained at the desired low temperature.

Associated with the conveyors 10 and 11 as well as with the tank 17 is a dipping and draining conveyor, indicated as a whole at 27. This conveyor is identical in many respects with the dipping and draining conveyor disclosed in my prior application mentioned and, accordingly, only such description is required in the present instance as will bring out the differences between the two.

Mounted at opposite sides of the tank 17 are posts 28 provided at their upper ends, as perhaps best seen in Figures 1 and 5 of the drawings, with bearing yokes 29, and journaled through said yokes are parallel worm shafts 30 upon which are fixed worms 31 disposed between the side portions of the yokes. Arranged upon the posts near the upper ends thereof are frame-carrying wheels 32 disposed at the inner sides of the posts. In the present instance, I have shown a group of three aligned wheels at each side of the tank thereabove but, of course, the number of wheels in each group may be varied. The wheels 32 are provided, as best seen in Figure 5, with shafts 33 which are journaled through the posts, and fixed to the outer ends of said shafts are worm gears 34 meshing with the worms 31. Thus, when the shafts 30 are rotated, the wheels 32 will be revolved.

Supported by the wheels 32 above the tank 17 is an oblong, floating frame 35 having parallel side and end bars respectively, and bracing the frame are spaced cross bars 36. Bolted or otherwise fixed to the side bars of the frame are brackets 37 and, as particularly seen in Figure 5 of the drawings, these brackets are formed with pins 38 which are journaled through the wheels 32 eccentrically thereof. Thus, when the wheels are revolved, the frame will be caused to travel in a circular path and, as shall presently appear, the frame will accordingly provide a floating carriage for the parts mounted thereon.

As will be observed, the frame 35 is of a length to extend over the adjacent end portions of the conveyors 10 and 11, and suspended below the frame is a chain track 39 preferably I-shaped in cross section. This track is provided with parallel side portions connected, as best seen in Figure 1, by arcuate end portions 40, and engaged with the cross bars 36 of the frame 35 are hangers 41 supporting the track.

Mounted at the forward end of the frame 35 is a vertical drive shaft 42 to the lower end portion of which is fixed a drive sprocket 43, and mounted at the rear end of the frame is a like aligned vertical shaft 44 to the lower end portion of which is fixed an idler sprocket 45 on a level with the drive sprocket. The shafts 42 and 44 are respectively disposed centrally of the corresponding arcuate end portion 40 of the chain track 39, and trained about said sprockets is a drive chain 46. This chain is identical with the like drive chain disclosed in my prior application mentioned and includes spaced carrier links 47 from which rise yokes 48 straddling the chain track, and journaled upon said yokes are rollers 49 mounted to travel upon the side portions of the bottom flange of the track for supporting the drive chain.

Associated with the drive chain 46 is a number of package carriers, indicated as a whole at 50. Each of these carriers includes an angle plate 51 which is bolted or otherwise detachably fixed to one of the carrier links 47 of the chain, and

projecting from said plate is a stud 52. Pivoted upon said stud is a rod 53, and pivotally connected to the lower end of said rod is a package holder, indicated as a whole at 54.

The package holders 54 are identical with the package holders disclosed in my prior application previously identified and operate in like manner. A lengthy description of said holders herein is therefore unnecessary. However, it may be noted that each of said holders includes a head 55 upon which is pivoted a pair of coacting jaws 56 having bottom plates 57 to engage beneath the ends of a package, and normally holding the jaws open is a spring 58. Pivotally connected with the upper ends of the jaws 56 are coacting toggle bars 59, the inner ends of which are adapted to gravitate downwardly as the jaws are closed for locking the jaws in closed position. Thus, when inward pressure is exerted on the lower ends of the jaws to swing the jaws toward each other about the ends of a package, the toggle bars will serve to automatically lock the jaws closed in engagement with the package. The package may then be picked up and carried by the holder. The outer ends of the toggle bars 59 project laterally beyond the head 55 and, as will be perceived, downward pressure upon said ends of the bars will serve to swing the inner ends thereof upwardly and release the jaws 56, when the spring 58 will swing the jaws to open position and release the package.

Mounted upon the forward end portion of the frame 35 is a gear box 60 containing conventional reduction gears, and mounted upon the box, or otherwise suitably located, is a motor 61. Projecting from the box is a transverse shaft 62, and extending at a right angle to the shaft 62 is a longitudinal shaft 63, both of said shafts being driven by the motor 61 but at a reduced speed as compared with the speed of the drive shaft of the motor. Fixed to the ends of the shaft 62 are gears 64, and fixed to the side bars of the frame 35 are brackets 65 which journal telescopic shafts 66 having gears 67 thereon to mesh with the gears 64. Interposed in the shafts 66 near the brackets 65 are conventional universal joints 68, and connecting said shafts with the worm shafts 30 are like conventional universal joints 69. As brought out in Figures 6 and 7 of the drawings, the shafts 66 are each formed of slidably mating sections 70 and 71 respectively so that, as will be seen, the shafts may lengthen and shorten in conjunction with the movement of the universal joints 68 and 69 to accommodate the circular travel of the frame 35. Accordingly, as will also be seen, an operative connection between the shaft 62 and the worm shafts 30 is provided so that when the motor 61 is in operation, the worm shafts will be driven to impart circular travel to the frame 35, as previously described.

Mounted upon the rear end of the shaft 63 is a gear 72 meshing with a gear 73 upon the upper end of the sprocket shaft 42 for driving the chain 46, and mounted upon the forward end of the shaft 63 is a gear 74 meshing with a gear 75 upon the upper end of a vertical, telescopic shaft 76, the lower end portion of which, as seen in Figure 4 of the drawings, is journaled by a bracket 77 associated with the shaft 12 of the feed conveyor 16. Fixed to the lower end of the shaft 76 is a gear 78 meshing with a gear 79 on the adjacent end of said conveyor shaft. As brought out in Figure 8, the shaft 76 is formed of slidably mating sections 80 and 81 respectively,

and interposed in the shaft near the lower end thereof is a conventional universal joint 82 so that, as will be seen, the shaft may lengthen and shorten in conjunction with the movement of the universal joint 82 to accommodate the circular travel of the frame 35. Accordingly, as will also be seen, an operative connection between the shaft 63 and the conveyor shaft 12 is provided so that when the motor 61 is in operation, the conveyor belt 13 will be driven.

Assuming now that the motor 61 is in operation, it will be seen that the chain 46 will be driven for moving the package holders 54 around the track 39 in substantially a level path parallel to the track while, at the same time, circular travel will be imparted to the frame 35 for raising and lowering said holders. Coincidentally, the belt 13 of the feed conveyor 10 will also be actuated so that all of the parts will be driven in synchronized unison. As it is unnecessary that the discharge conveyor 11 be driven exactly in time with the other parts mentioned, the motor 16 is provided therefor.

As is well known, vegetables and other produce are packaged in boxes, crates, bags, and the like and, accordingly, the term "package" as used herein shall be construed to cover any such container. In the drawings, I have typically shown the packages at 83.

In practice, the packages 83 are manually placed upon the conveyor 10 each in front of and abutting a pair of the lugs 14 so that the packages will be carried forwardly in definite and uniform spaced relation corresponding to the spacing of the package holders 54 along the drive chain 46 so that as each of said holders arrives at a position to travel over the forward end portion of said conveyor, a package will also arrive at a proper position to be picked up thereby. As set forth in my prior application mentioned, I provide means for automatically engaging the package holders 54 with the packages as well as means for automatically releasing the holders from said packages. Both of said means are duplicated herein and the operation thereof is the same as described in said prior application, as will now be outlined.

Upstanding at opposite sides of the conveyor 10 near the forward end thereof, as particularly seen in Figures 1, 2 and 3 of the drawings, are posts 84, and mounted on said posts are horizontal rollers 85. These rollers are disposed opposite the bottom point of the circular travel of the package holders 54 and are spaced such distance apart that as the jaws 56 of said holders pass therebetween, the rollers will close the jaws in engagement with the ends of the packages 83, as previously outlined. Thus, as will be seen, the packages 83 will, as they are brought forwardly by the conveyor 10, be picked up and carried along by the dipping and draining conveyor 27.

Upstanding at opposite sides of the conveyor 11 in spaced relation to the forward end thereof are posts 86 upon which are mounted vertical rollers 87. These rollers, like the rollers 85, are also disposed opposite the bottom point of the circular travel of the package holders 54 and are arranged at such a height that, as the jaws 56 of the package holders pass therebetween, the rollers will engage the outer ends of the toggle bars 59 and swing said ends of the bars downwardly, with the result that the inner ends of the bars will be swung upwardly to effect release of the jaws from the packages 83, as previously described. Thus, the packages will be automatically deposited upon the discharge conveyor 11 to be carried off thereby.

As will now be seen, the packages 83 will be fed forwardly by the conveyor 10 when, upon passing between the rollers 85, said packages will be picked up by the package holders 54 of the dipping and draining conveyor 27. The packages will then be conveyed forwardly with their weight suspended from the frame 35 of the dipping and draining conveyor, coincident with which movement of the packages, said packages will be raised and lowered in continuing sequence by said frame to alternately dip the packages into the refrigerant 18, as shown in Figure 3, and intermediately raise the packages out of the refrigerant, as shown in Figure 2, to drain.

As will be perceived, the foregoing cycle of dipping and draining operations will be repeated many times as the packages 83 are carried forwardly by the dipping and draining conveyor 27 so that the refrigerant will be caused to repeatedly flow into and out of the packages, each time replacing with fresh, cold liquid the volume of liquid within the packages partially heated by the produce. Accordingly, any refrigerant more or less trapped by the produce within the central portions of the packages will sooner or later be supplanted a number of times by fresh refrigerant, with the result that the produce at the central portions of the packages will be chilled equally with the outer courses of produce of the packages. The produce of the packages will thus be uniformly and thoroughly chilled throughout.

After being chilled, the packages 83 will then pass between the rollers 87 when, as previously described, said rollers will function to release the package holders 54 from the packages so that the packages will be deposited upon the conveyor 11 to be carried off thereby. It is also to be noted that since the rise and fall of the frame 35 of the dipping and draining conveyor is synchronized with the forward travel of the packages 83, the packages will straddle the forward end wall of the tank 17, incident to the upward and downward movement of the packages, so that the tank will not interfere with the forward travel of the packages nor will the packages collide with said wall of the tank.

Having thus described my invention, what I claim is:

1. The method of treating comestibles which comprises introducing said comestibles into a cooling zone including a pool of liquid refrigerant while suspended from above at points substantially in a plane common to all of said points, maintaining all of said suspension points in said plane, and moving said comestibles through said zone and, while they are moving therethrough, alternately raising and lowering said points and thereby dipping said comestibles in said pool and raising them sufficiently from the lowest points of dipping to permit drainage of refrigerant therefrom.

2. The method of treating packaged comestibles which comprises introducing into a cooling zone including a pool of liquid refrigerant a group of packages of said comestibles each package hung from an individual suspension point, maintaining all of said suspension points in substantially the same plane with each other, and moving said group of packages through said cooling zone and, while they are in transit therethrough, alternately raising and lowering said points and thereby dipping said packages in said pool and raising them sufficiently from the

lowest points of dipping to permit drainage of refrigerant therefrom.

3. The method of treating packaged comestibles which comprises introducing into a cooling zone including a pool of liquid refrigerant a group of packages of said comestibles each package hung from an individual suspension point, maintaining all of said suspension points in substantially the same plane with each other, and moving said group of packages through said cooling zone and, while they are moving therethrough, alternately raising and lowering said points in continuous sequence and thereby dipping said packages in said pool and raising them sufficiently from the lowest points of dipping to permit drainage of refrigerant therefrom.

4. The method of treating packaged comestibles which comprises introducing into a cooling zone including a pool of liquid refrigerant a group of packages of said comestibles each package hung from an individual suspension point, maintaining all of said suspension points in substantially the same plane with each other, and moving said group of packages through said cooling zone and, while they are in transit therethrough, moving said points in circular paths to alternately raise and lower said points and thereby dip said packages in said pool and raise them sufficiently from the lowest points of dipping to permit drainage of refrigerant therefrom.

5. Apparatus for processing comestibles including a tank adapted to contain a liquid refrigerant, a conveyor extending over the tank spaced thereabove and including a track, means for suspending a package of comestibles from said track, means for progressing said suspending means with a package thereon along the track, and means for raising and lowering the track to alternately lower and dip said package into the refrigerant and raise the package to drain as said suspending means is progressed along the track.

6. Apparatus for processing comestibles including a tank adapted to contain a liquid refrigerant, a conveyor extending over the tank spaced thereabove and including a track, means for suspending a package of comestibles from said track, means for progressing said suspending means with a package thereon along the track, and means for moving the track in a circular path to alternately lower and dip said package into the refrigerant and raise the package to drain as said suspending means is progressed along the track.

7. Apparatus for processing comestibles including a tank adapted to contain a liquid refrigerant, a conveyor extending over the tank spaced thereabove and including a frame, a track carried by said frame, supporting wheels for the frame having the frame connected thereto eccentrically of said wheels, means for suspending a package of comestibles from said track, means for progressing said suspending means with a package thereon along the track, and means for rotating said wheels and moving the frame and track in a circular path to alternately lower and dip said package into the refrigerant and raise the package to drain as said suspending means is progressed along the track.

FLOYD J. McMICHAEL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,940,192	Sorber	Dec. 19, 1933
2,319,474	Price	May 18, 1943