June 4, 1963 A. H. KINSEY 3,092,125

CONTAINER COOLING APPARATUS

Filed April 16, 1958 3 Sheets-Sheet 1

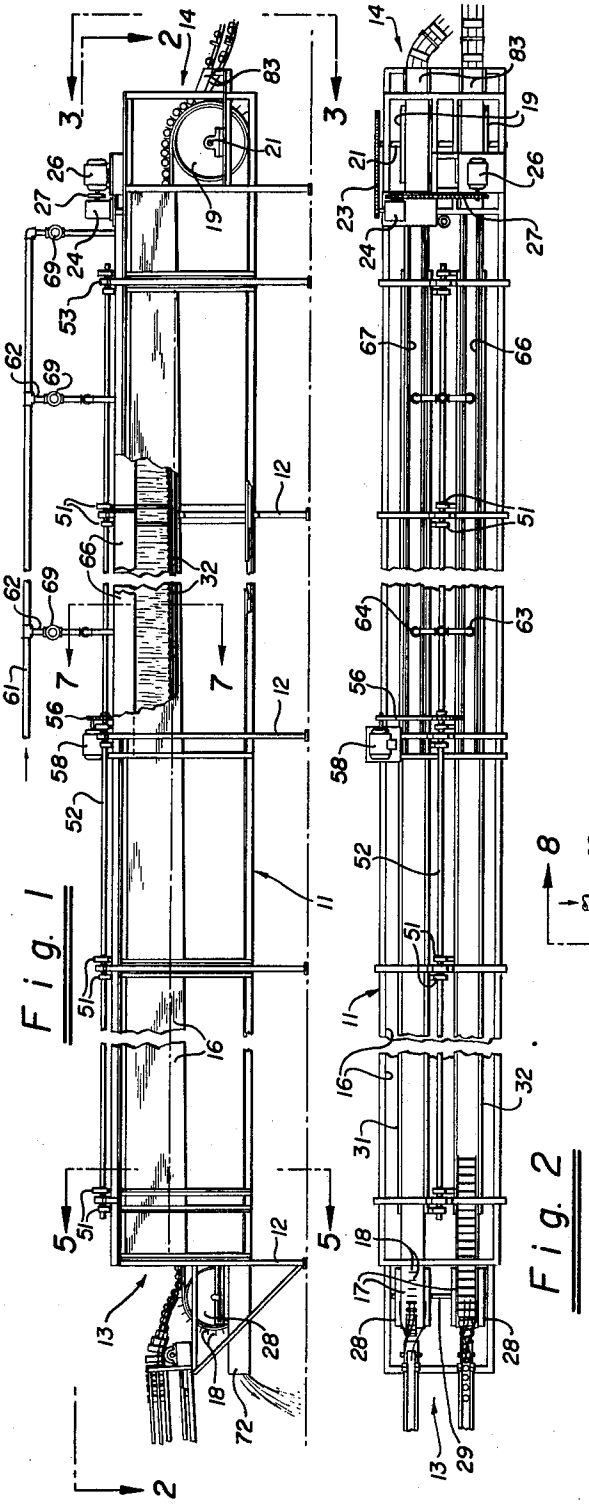


Fig. 1

Fig. 2

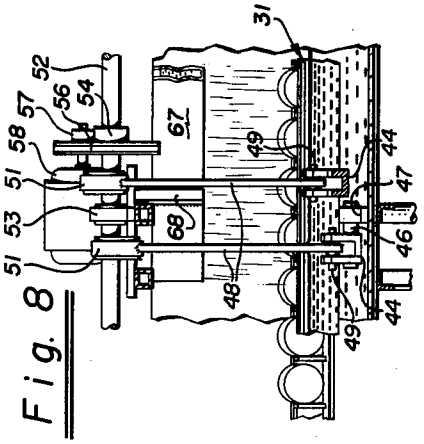


Fig. 8

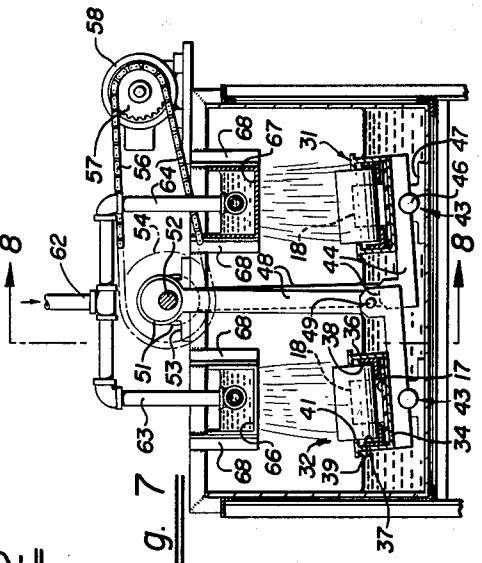


Fig. 7

INVENTOR.
Andrew H. Kinsey
BY Flehr and Swain
Attorneys

June 4, 1963 A. H. KINSEY 3,092,125

CONTAINER COOLING APPARATUS

Filed April 16, 1958 3 Sheets-Sheet 2

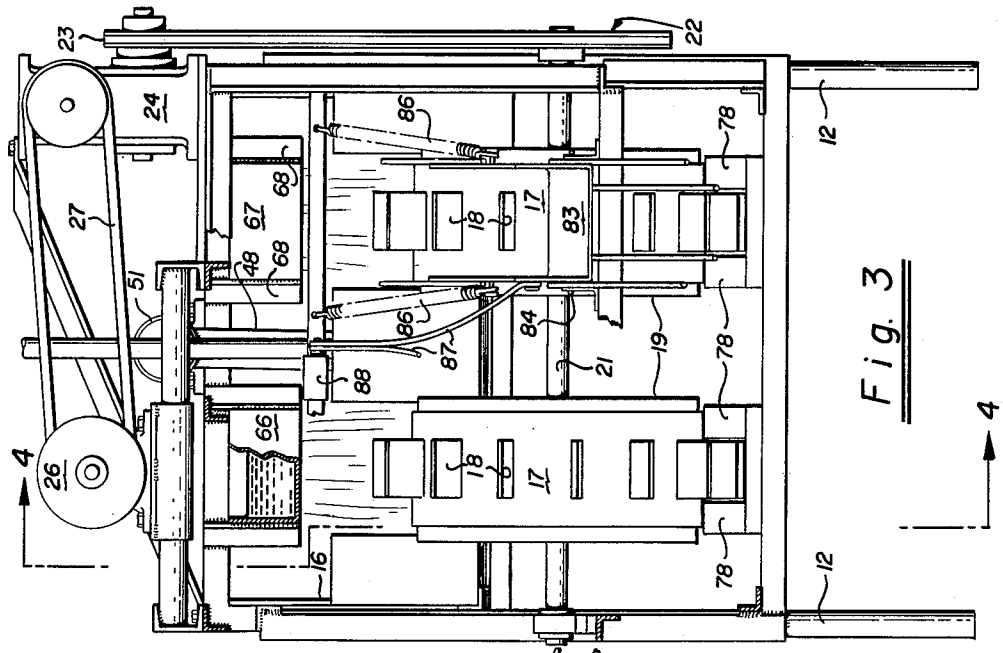


Fig. 3

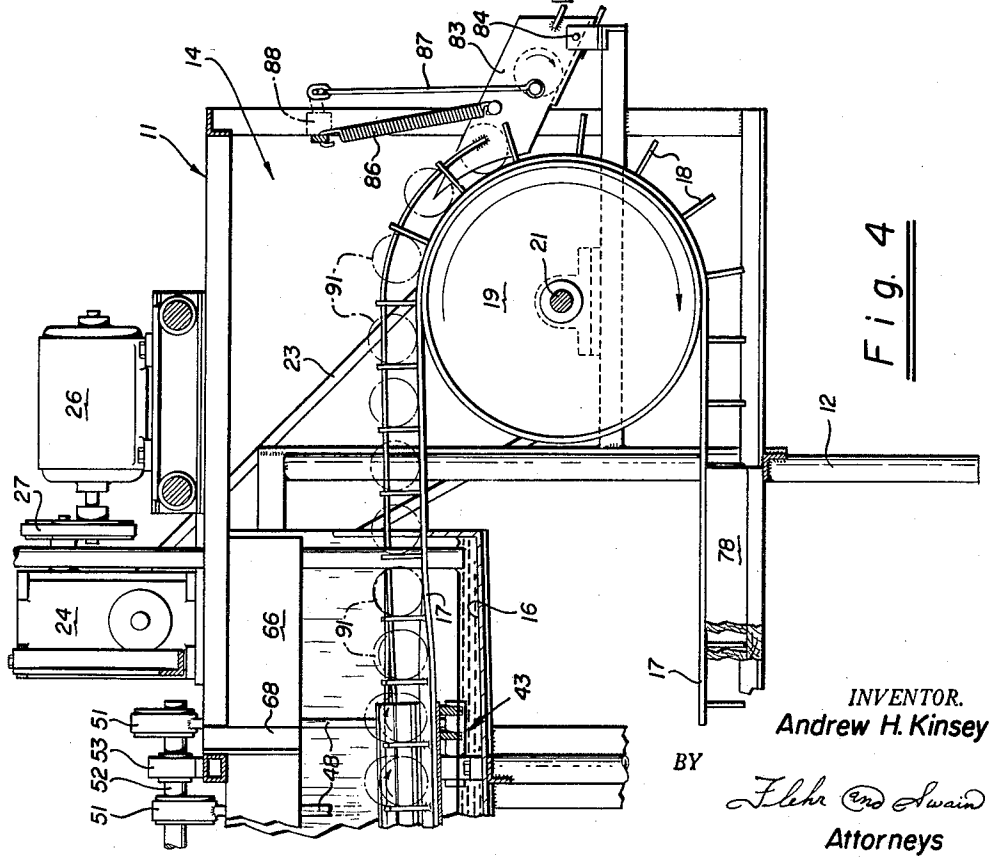


Fig. 4

INVENTOR.
Andrew H. Kinsey

BY

Flehr and Swain

Attorneys

June 4, 1963 A. H. KINSEY 3,092,125

CONTAINER COOLING APPARATUS

Filed April 16, 1958 3 Sheets-Sheet 3

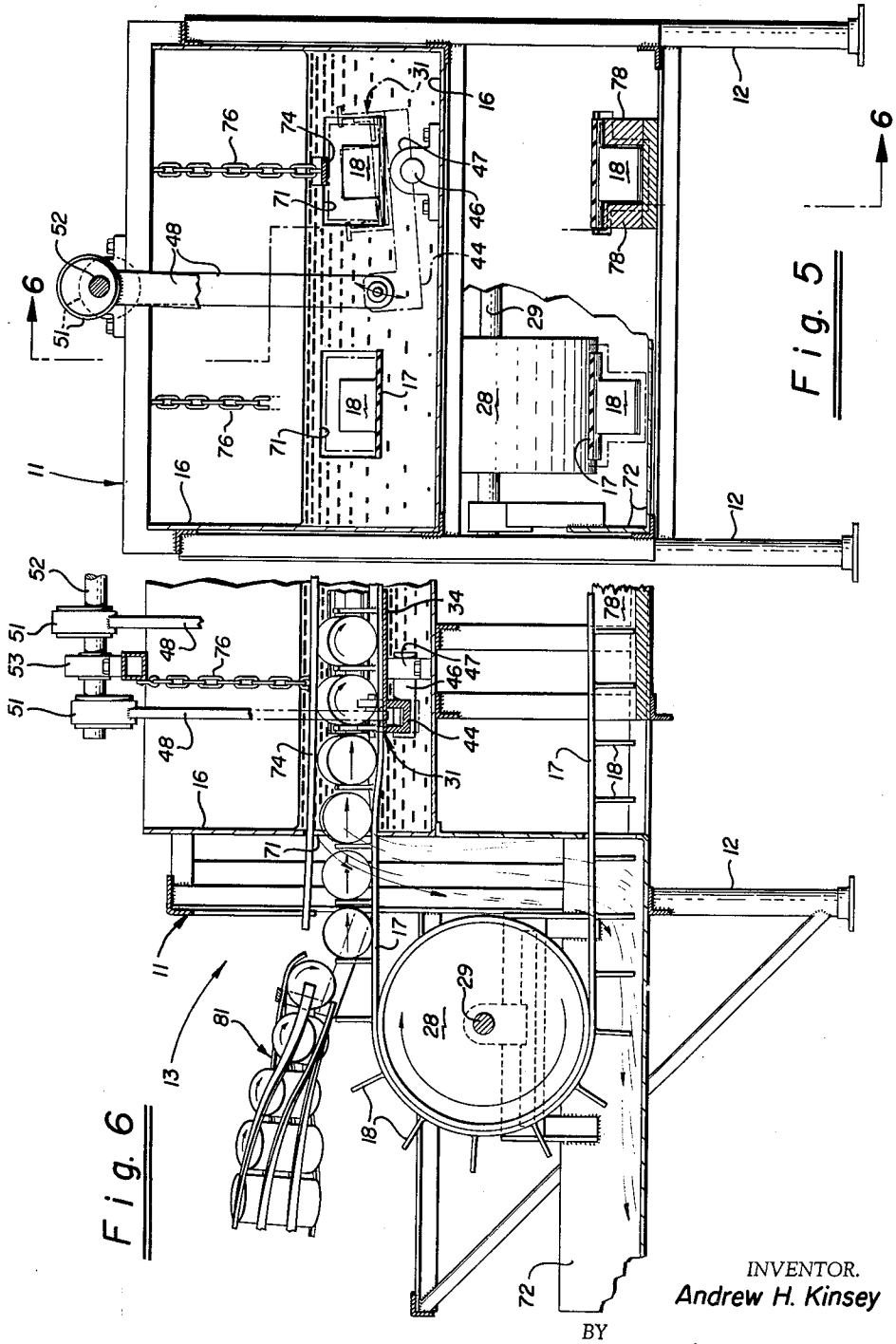


Fig. 5

Fig. 6

INVENTOR.
Andrew H. Kinsey

BY

Flehr and Swain
Attorneys

United States Patent Office 3,092,125 Patented June 4, 1963

3,092,125

CONTAINER COOLING APPARATUS

Andrew H. Kinsey, P.O. Box 780, Winterhaven, Fla.

Filed Apr. 16, 1958, Ser. No. 728,926
7 Claims. (Cl. 134—125)

This invention relates generally to a container cooling apparatus, and more particularly to a container cooling apparatus suitable for use with containers which have been filled with a product and then heated.

This application is a continuation-in-part of application Serial No. 555,396, filed December 27, 1955 now abandoned.

In the canning of perishable products such as fruits, fruit juices, vegetables and the like, it is necessary that fermentation-promoting growths and organisms be destroyed or that their action be inhibited by suitable heat treatment. This heat treatment is customarily carried out after the products have been sealed in the can or container in order to prevent possible atmospheric contamination. To prevent or avoid bottlenecks in the canning operation, it is customary in the packing art to positively cool the hot cans, ordinarily with cold water rather than allowing them to cool by standing. In the past, various types of apparatus have been provided for accomplishing such cooling. However, for the most part, such apparatus heretofore provided has been too complicated, making continuous operation and maintenance difficult. It also has been found that such apparatus often loses control of the containers being cooled, making it impossible to perform rapid and uniform cooling on each container.

In general, it is an object of the present invention to provide a container cooling apparatus which will overcome the above-named disadvantages.

Another object of the invention is to provide an apparatus of the above character in which the containers are buoyed or substantially supported by the cooling water.

Another object of the invention is to provide an apparatus of the above character in which the containers are rocked about their transverse axes and rotated about their longitudinal axes to bring the product in the container in substantially continuous wiping contact with the side walls of the container to thereby facilitate heat transfer from the product to the side walls of the container.

Another object of the invention is to provide an apparatus of the above character in which the period of time required for cooling the containers is substantially reduced.

Another object of the invention is to provide an apparatus of the above character in which the cooling water flows by force of gravity and in which no re-circulation of the cooling water is required.

Another object of the invention is to provide an apparatus of the above character in which the conveyor belt passes through the cooling water and serves to advance the containers through the cooling water.

Another object of the invention is to provide an apparatus of the above character in which the conveyor belt is rocked about its longitudinal axis.

Another object of the invention is to provide an apparatus of the above character in which the conveyor belt does not carry the full weight of the containers or the cooling water.

Another object of the invention is to provide an apparatus of the above character which requires less space than conventional apparatus and has lower power requirements.

Additional objects and features of the invention will appear from the following description in which the preferred embodiment has been set forth in detail in conjunction with the accompanying drawing.

Referring to the drawing:

FIGURE 1 is a side elevational view showing apparatus embodying my invention and which can be utilized for practicing my method;

FIGURE 2 is a plan view of the apparatus shown in FIGURE 1 as viewed along the line 2—2 of FIGURE 1;

FIGURE 3 is an elevational view of the discharge end of the apparatus as viewed along the line 3—3 of FIGURE 1;

FIGURE 4 is a cross-sectional view taken along the line 4—4 of FIGURE 3;

FIGURE 5 is a cross-sectional view taken along the line 5—5 of FIGURE 1;

FIGURE 6 is a cross-sectional view taken along the line 6—6 of FIGURE 5;

FIGURE 7 is a cross-sectional view taken along the line 7—7 of FIGURE 1; and

FIGURE 8 is a cross-sectional view taken along the line 8—8 of FIGURE 7.

In general, the present invention comprises apparatus for advancing the container to be cooled through cooling water, and while the containers are being advanced, applying a rocking motion about the transverse axes of the containers and a rotating motion about the longitudinal axes of the containers. The construction of the apparatus is such that the conveyor belt for advancing the cans does not carry the load. The conveyor belt actually travels through the cooling water and the cooling water serves to buoy up the containers during their travel through the cooling water.

As shown in the drawing, the container cooling apparatus consists of a framework 11 formed of suitable material such as angle iron members to provide an elongate box-like framework which is supported by vertical legs 12. The framework is provided with intake end 13 and discharge end 14.

A trough or tank 16 is monuted within the framework and serves to carry cooling water as hereinafter described. A pair of conveyor or carrier belts 17 of the endless type have upper runs which pass through the trough or tank 16. The conveyor belt can be formed of any suitable flexible material such as rubber and fabric and is provided with a plurality of spaced cleats 18 which extend at right angles to the belt. The conveyor belts are driven by drive drums 19 mounted on the discharge end of the framework 11. The drive drums are mounted on a common shaft 21 which is rotatably mounted in the framework. A pulley 22 is mounted on the shaft 21 and is driven by a belt 23. The belt 23 is driven by a speed reducer 24 and the speed reducer 24 is driven by a motor 26 through a belt 27.

The other ends of the conveyor belts 27 are disposed on take-up drums 28 which are mounted on a common shaft 29. The shaft 29 is rotatably mounted in the framework at the discharge end thereof. A pair of tracks 31 and 32 is mounted within the trough or tank 16 and serves to carry the upper runs of the conveyor belts 17. The tracks extend parallel to each other the length of the trough 16 and consist of base members 34 which serve as the bed for the conveyor belt. They also consist of side members 36 and 37 disposed at right angles to the base members to provide U-shaped track-like structures. Right angle members 38 and 39 are mounted on the side members 36 and 37 and are spaced a distance above the base member 34 so that the belt can be accommodated between the angle members 38 and 39 and the base member 34.

As can be seen from FIGURE 7, the cleats 18 of the belt ride between the right angle members 38 and 39. The right angle members 38 and 39 serve as tracks for the containers as hereinafter described. Guide rails 41

for the containers are mounted on the side members 36 and 37.

The tracks 31 and 32 are mounted within the tank or trough 16 upon a plurality of spaced rocker assemblies 43. Each of the rocker assemblies consists of a rocker arm 44 which is connected to a stub shaft 46 that is rotatably mounted in a bearing 47 affixed to the bottom of the trough or tank 16. As shown, each track is mounted on the end of its respective rocker arm adjacent the stub shaft 46 in such a manner that the center of the track overlies the axis of rotation of the stub shaft 46.

The other ends of the rocker arms are pivotally connected to connecting rods 48 by wrist pins 49. The connecting rods are driven by eccentrics 51 mounted on a shaft 52. As can be seen from FIGURE 2, the shaft 52 extends longitudinally of the framework 11 and serves to drive a plurality of rocker assemblies 43 spaced longitudinally of the framework 11. The shaft 52 is rotatably mounted on the framework 11 by bearings 53. A spur gear 54 is fixed to the shaft 52 and is driven by a drive chain 56 which, in turn, is driven by the spur gear 57. The spur gear 57 is driven by a motor 58 mounted on the framework 11.

As can be seen from FIGURES 7 and 8, the eccentrics are so timed that the track on one side will be rocked in one direction, and the track on the opposite side of the tank or trough 16 will be rocked in the opposite direction. In this way, the load on the drive motor 58 is more evenly distributed.

The trough or tank 16 is so disposed in the framework 11 that the trough is inclined upwardly from the intake end to the discharge end of the apparatus so that cooling water flows from the discharge end towards the intake end. Cooling water is supplied through inlet piping 61 and passes through T connections 62 which feed supply pipes 63 and 64 that empty into drip pans 66 and 67. The drip pans 66 and 67 are generally U-shaped and are supported by suitable means such as brackets 68 which are affixed to the framework 11. The pans are positioned in such a manner that they generally overlie the tracks 31 and 32. As will be noted from FIGURE 1, the drip pans extend from the discharge end of the apparatus to approximately the mid-point of the apparatus. The bottom walls of the drip pans are provided with a plurality of openings (not shown) which serve to rain down cooling water upon the containers as they are advanced through the apparatus as hereinafter described. Control of flow water into the drip pans is controlled by the valves 69. The water from the drip pans flows into the trough 16 and eventually passes through openings 71 in the inlet end of the apparatus and flows over the conveyor belt into a discharge trough 72.

Since the containers even when filled are often buoyant in water, hold-down bars 74 are provided adjacent the inlet end of the apparatus to maintain the containers submerged below the level of the cooling water. The hold-down bars are suspended by chains 76 which are fastened to the framework. As will be noted, particularly in FIGURE 6, the hold down bars are spaced a slight distance above the upper edges of the cleats 18 and lie generally between the side edges of the rocking tracks 31 and 32. The hold-down bars only extend from the inlet end to approximately one-third of the length of the apparatus for a purpose hereinafter described.

Guide means 77 is provided in the lower part of the framework 11 for guiding the return of the conveyor belts 17. As shown, particularly in FIGURE 5, such means consists of a pair of vertical members 78 which are mounted on the framework 11 and the upper edges of which accommodate the side margins of the conveyor belt. The vertical members are spaced apart a suitable distance to accommodate the return of the cleats 18 carried by the belt.

Suitable means is provided at the inlet end of the apparatus for handling the containers to be cooled by the apparatus and to place the containers upon the conveyor belt. As shown, particularly in FIGURE 6, such means can consist of runways 81 which rotate the containers from a vertical position to a horizontal position and place the containers between the spaced cleats 18 of the conveyor belt. Preferably, a runway 81 is provided for each of the conveyor belts and the discharge therefrom is such that a container is placed into each space between the cleats.

Suitable means is also provided on the discharge end for receiving the containers as they are discharged from the apparatus. As shown, such means can consist of a chute 83 for each conveyor belt which has one end pivoted at 84 and the other end supported by springs 86. Each time a container is discharged from a conveyor belt, it strikes the chute 83 and stresses the springs 86 to cause movement of the operating rod 87 and operation of a counting mechanism 88.

Operation of my apparatus in practicing my method may now be described as follows: Let it be assumed that a plurality of containers such as the cans 91 shown in the drawing have been filled with a hot product, sealed, divided into two lines and delivered to the intake end of the apparatus by the runways 81 which rotate the cans through 90° to a horizontal position and place them between the cleats of the conveyor belts 17. The conveyor belts 17, as shown in FIGURE 1 of the drawing, are rotated in a clockwise direction and serve to move the cans as they are discharged from the runways 81 through openings 71 at the end of the trough. As the cans enter the openings, they are flooded with a downward flow of cooling water which is discharging from the trough through the openings 71. The openings 71, however, are dimensioned so that they are only slightly larger than that required for movement of the cans or containers and the belt through the openings so that only a limited quantity of water passes through the openings 71.

As soon as the cans or containers are advanced through the openings 71, they are engaged by the hold-down bars 74 which prevent the cans or containers from floating out of the recesses between the cleats 18. As will be noted from FIGURE 6, the level of the water within the tank or trough 16 is such that it is substantially above the upper surfaces of the cans at the intake end of the apparatus. As the cans are moved inwardly of the apparatus, the cans mount the right angle members 38 and 39 provided in the tracks 31 and 32 in such a manner that the beads of the cans engage the same to thereby lift the cans from the belt.

The tracks 31 and 32 are continuously rocked by the rocker assemblies 43 hereinbefore described to cause rocking motion of the tracks about axes parallel to the longitudinal axes of the tracks. This rocking to and fro of the tracks is continuous and is imparted to the cans as soon as the cans enter the tracks. Thus, first one end of the can will be lifted and the other end lowered, and then the other end is raised and the first named end is lowered to rock the cans about transverse axes between the ends of the cans.

At the same time, the cans are rotated in a clockwise direction as viewed in FIGURE 6 about their longitudinal axes as they are advanced by the cleats because of the engagement of the beads of the cans with the right angle members 38 and 39 in each of the tracks. Thus, in addition to the rocking motion imparted to the cans, a rotating motion is also imparted to the cans, with the rocking motion being about one axis and the rotating motion at another axis at right angles to the first named axis. This continuous motion of the can serves to keep the product within the can in substantially continuous wiping contact with the side walls of the container to facilitate heat transfer from the product through the side walls of the container and into the cooling water. The rocking motion

serves to create a turbulence in the product and breaks any surface film which might form if only rolling action were imparted to the product.

As the cans or containers are advanced through the trough **16**, they begin to emerge from the cooling water because of the incline of the trough. When the cans reach the mid-point of the apparatus, a substantial portion of the can is above the surface of the cooling water in the trough. At this point, the cans pass under the drip pans which rain cooling water down upon the cans. This water which rains down upon the cans is caught by the trough and is finally discharged through the openings **71** at the end of the trough.

The cans continue to be advanced through the apparatus under the drip troughs which rain down water and continue to cool the cans as they are rocked to and fro and rotated. When the cans or containers reach the discharge end of the apparatus, they have been completely lifted from the cooling water in the trough as shown particularly in FIGURE 4 and are discharged through the chutes **83**, after which they may be packed for shipment.

By way of example, in one embodiment of our invention, the apparatus was approximately 63 ft. in length. The intake end of the trough **16** was 15 inches lower than the discharge end of the trough. In cooling 46 oz. cans in this apparatus, it was found that approximately 200 gallons of water per minute were required. The cans were cooled from 189° F. to 96–99° F. in 2 minutes and 20 seconds—the time required to pass one of the cans through the apparatus. Thus, it can be seen that the temperature of the product in the cans was reduced over 90° in 2 min. and 20 sec. in my apparatus. It was found that the temperature of the cooling water was raised from 78° to 100–103° from the inlet to the discharge. Thus, the temperature of the water was raised approximately 25° by passing through my apparatus.

Although the temperature of the cans is reduced to approximately 96–99°, there is still sufficient residual heat within the cans to cause drying of the cans. This prevents rusting of the cans.

It is apparent from the foregoing that I have provided a new and improved apparatus and method for cooling containers which are filled with a hot product or which have been heated after filled with a product. The load placed on the conveyor belt for advancing the containers through the cooling water is very light because the cooling water is supported by the stationary trough, and the cooling water serves to buoy up the cans and remove the weight of the cans or containers from the conveyor belt. The rocking track also serves to remove the weight of the cans from the conveyor belt. Cooling of the cans and the product therein is rapid because of the rotating and rocking motion of the cans which causes the product within the cans to continuously wipe the side walls of the container or can to facilitate heat transfer from the product to the cooling water.

I claim:

1. In apparatus for cooling containers, a trough adapted to contain cooling water therein, an endless conveyor having container engaging means mounted thereon, the upper run of said conveyor having a path of travel through the cooling water in said trough, means for delivering containers sequentially to the upper run of said conveyor, track means mounted within said trough having a substantial portion thereof below the surface of said cooling water, said track means serving to support said conveyor as it travels through said trough, and means for rocking said track means about an axis parallel to the longitudinal axis of the track means to thereby impart a rocking motion to the containers carried by the conveyor.

2. Apparatus as in claim 1 together with means mounted within said track means and rockable therewith for engaging the ends of said containers which as the containers are advanced along the track means serve to raise the containers above the surface of the conveyor and to cause rotation of the containers about their longitudinal axes.

3. In a container cooling apparatus having intake and discharge ends, an inclined trough adapted to contain cooling water therein, the trough being inclined upwardly from the intake end towards the discharge end, an endless conveyor having container engaging means mounted thereon, an inclined track mounted within said trough having one portion substantially below the surface of the water and another portion above the surface of the water, the upper run of said conveyor travelling within said track means and being supported by said track means, means for sequentially delivering containers to the upper run of said conveyor so that the containers enter the cooling water at a point below the surface of the water, means for raining down cooling water upon the containers as they emerge from the cooling water, means for rocking said track means about an axis parallel to the longitudinal axis of the track means, said means including a pivotally mounted arm having one end secured to said track means, and means for periodically raising and lowering the other end of said arm to thereby rock said track means.

4. Apparatus as in claim 3 wherein said track means, includes members rocked with the track means and engageable by the side edges of the containers to cause rotation of the containers about their longitudinal axes as they are advanced by the conveyor, said members also serving to support said containers above the surface of said conveyor.

5. In a container cooling apparatus having intake and discharge ends, a trough adapted to contain cooling water therein extending from the intake to the discharge end, an endless conveyor having container engaging means mounted thereon, the upper run of the conveyor entering the trough at a point below the surface of the water and having a path of travel through the trough from the intake end to the discharge end, track means mounted in the trough and supporting the upper run of the conveyor as it travels through the trough, means for rocking said track means about an axis parallel to the longitudinal axis of the track means, and means for delivering containers sequentially to the upper run of the conveyor before it enters the cooling water.

6. In apparatus for cooling containers, an endless conveyor having container engaging means mounted thereon, means for raining down cooling water, the upper end of said conveyor having a path of travel through the cooling water, means for delivering containers sequentially to the upper run of said conveyor, track means for supporting said conveyor as it travels through the cooling water and means for rocking said track means about an axis parallel to the longitudinal axis of the track means to thereby impart a rocking motion to the containers carried by the conveyor.

7. In apparatus for cooling containers, an endless conveyor having container conveying means mounted thereon, means for raining down cooling water, the upper run of said conveyor having a path of travel through the cooling water, means for delivering containers sequentially to the upper run of said conveyor, track means supporting said conveyor as it travels through the cooling water, means for rocking said track means about an axis parallel to the longitudinal axis of the track means to thereby impart a rocking motion to the containers carried by the conveyor, means mounted within the track means and rockable therewith for engaging the ends of said containers which as the containers are advanced along the track means serves to raise the containers above the surface of the conveyor to cause rotation of the containers about their longitudinal axes.

(References on following page)

References Cited in the file of this patent

UNITED STATES PATENTS

657,354	Muller	Sept. 4, 1900
802,254	Baker	Oct. 17, 1905
1,026,381	Cleveland	May 14, 1912
1,055,843	Warren	Mar. 11, 1913
1,178,166	McCue	Apr. 4, 1916
1,206,120	McCue et al.	Nov. 28, 1916
1,411,288	McGowan	Apr. 4, 1922
1,532,931	Ottesen	Apr. 7, 1925
1,534,207	Foster	Apr. 21, 1925
1,617,630	Gay	Feb. 15, 1927
2,072,865	Bryant	Mar. 9, 1937
2,329,226	Stafford	Sept. 14, 1943
2,477,992	Leonard	Aug. 2, 1949
2,597,223	Burgess	May 20, 1952
2,609,826	Marvin	Sept. 9, 1952
2,677,248	Rexford	May 4, 1954

FOREIGN PATENTS

581,369	Great Britain	Oct. 10, 1946