

Aug. 19, 1941.

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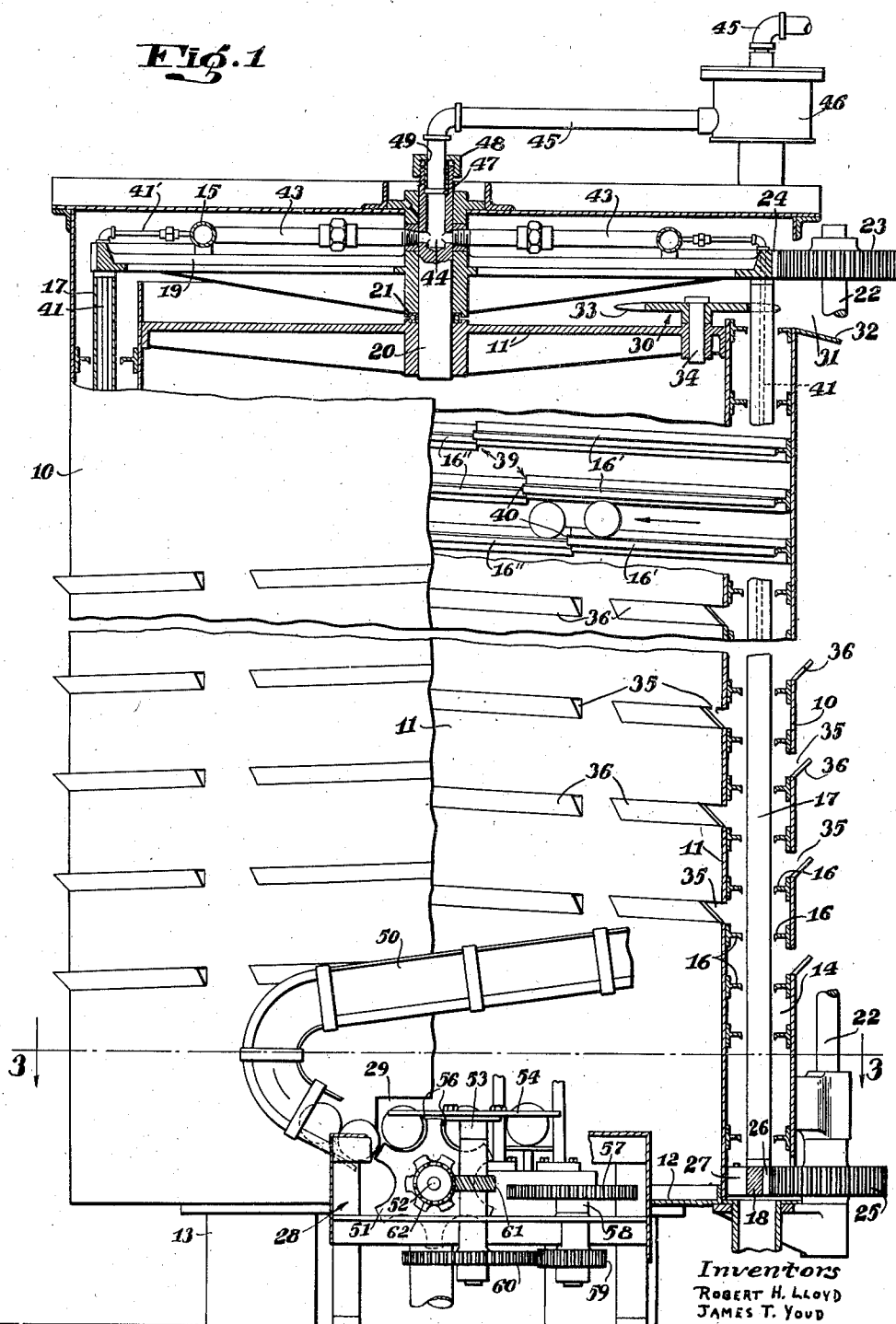
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APPARATUS FOR COOLING CANS

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3 Sheets-Sheet 1

Fig. 1



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Fig. 2

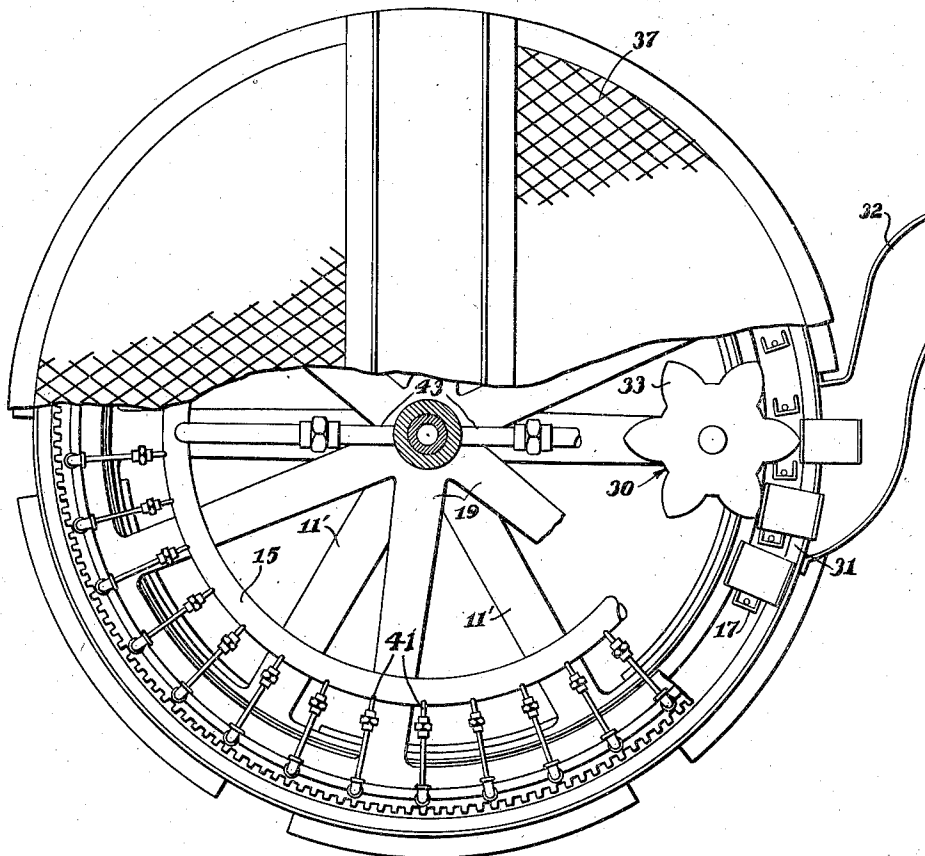
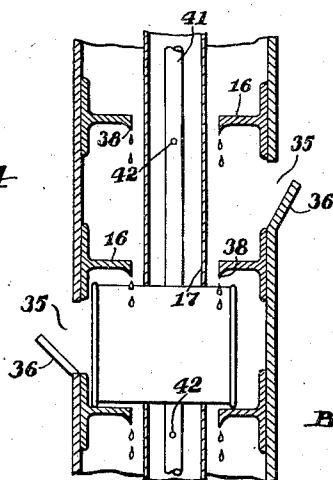


Fig. 4



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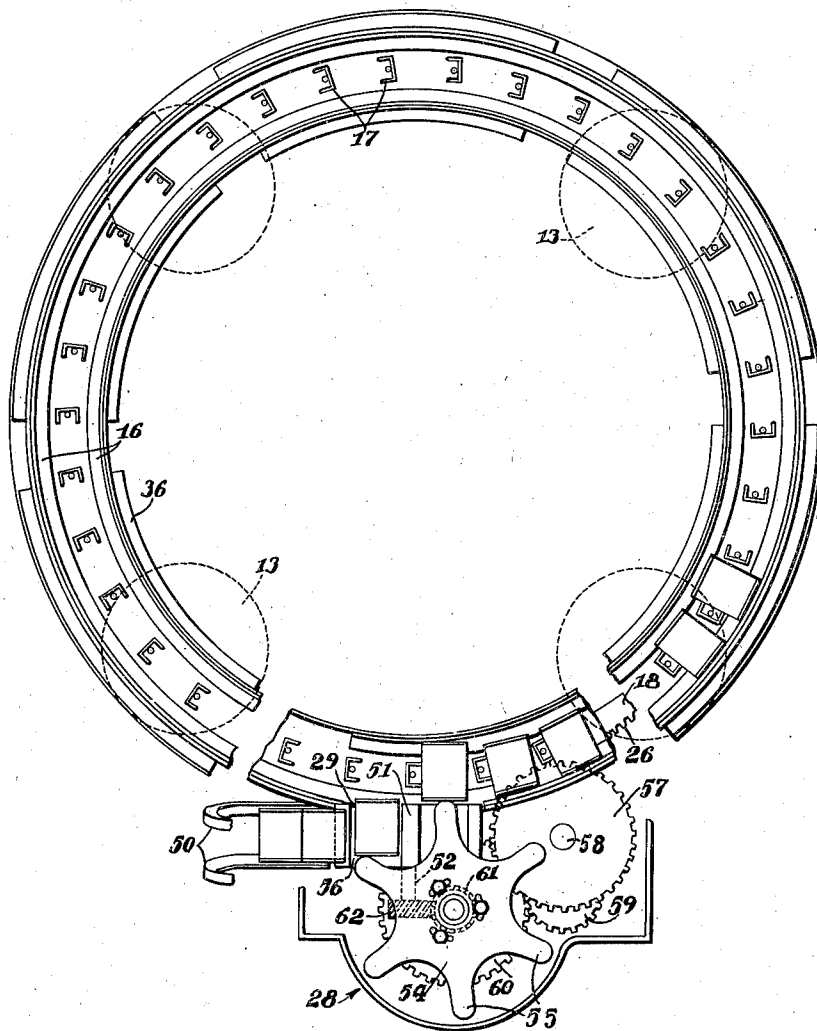
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Fig. 3



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APPARATUS FOR COOLING CANS

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The present invention relates to the canning art and more particularly to apparatus for cooling canned goods after they have been cooked.

The cooling apparatus to which the invention primarily relates is of the type wherein the cans are cooled by passing them through a chamber in which they are subjected to a spray of cooling liquid. One common type of such apparatus comprises in general concentric vertically disposed cylindrical shells providing therebetween an annular enclosed passage into the top of which the cooling medium is sprayed and through which the cans are propelled in a gradually ascending helical path by means of a reel having a plurality of pusher bars vertically disposed centrally in said annular passage and revolved therethrough, and co-operating helical tracks on the side walls of said passage at the sides of the pusher bars.

Objects of the present invention are to provide improvements in the construction of such cooling apparatus, particularly of the above mentioned common type which greatly enhance its cooling efficiency, without increase in operating costs and with appreciable decrease in quantity of cooling medium required for any given cooling capacity. Other advantages made possible by those improvements in construction are more rapid cooling to the same degree and consequently increased capacity, and/or cooling to a greater extent in the same or shorter time and/or reduction in size of the apparatus without impairment of cooling effectiveness, resulting in savings in construction and operating costs of the apparatus and in floor space. These and other objects and advantages of the invention will be apparent from the ensuing more particular description in conjunction with the appended drawings wherein:

Fig. 1 is a partial elevation, partial vertical section with parts broken away of cooling apparatus constructed in accordance with the present invention;

Fig. 2 is a top plan view of the apparatus of Fig. 1 with parts broken away;

Fig. 3 is a horizontal section on the line 3—3 of Fig. 1 looking in the direction of the arrows; and

Fig. 4 is a broken vertical section through the cooling chamber, showing construction of the reel bars and spray pipes.

As best shown in Fig. 1, the body of the apparatus comprises an outer shell 10 and an inner concentric shell 11, vertically disposed and secured at their lower ends to a base 12 supported on legs 13. The shells 10 and 11 form the outer

and inner walls of the annular passage 14 which constitutes the cooling chamber of the apparatus into which the cooling medium is sprayed through an annular head 15 at the top of the apparatus, being collected and returned to the system through a suitable drain (not shown) located in the base of the passage 14. On the inner surfaces of the shells 10 and 11 are secured opposed spaced helical rails 16 forming together a helical can track having a central aperture through which the vertically disposed pusher bars 17 extend from top to bottom of the passage. The lower ends of the bars 17 are secured to an annular ring 18 and their upper ends are secured to a spider 19, the hub of which is fixed to a vertical shaft 20 rotatably mounted in the hub of a spider 11' fixed to the top of the shell 11, there being a suitable thrust bearing 21 interposed between the hubs of the spiders 19 and 11'. The bars 17, ring 18, spider 19, and shaft 20 constitute the can propelling reel of the apparatus.

In the embodiment illustrated, the reel is rotated by means of a drive shaft 22 external to the shell 10 having an upper driving gear 23 meshing with gear teeth 24 on the outer rim of the spider 19 and a lower driving gear 25 meshing with gear teeth 26 on the ring 18, the shaft 22 being connected to a suitable motor (not shown). Idler rollers 27 on the outer wall of the shell 11 bear against the inner surface of the ring 18 to maintain the reel in proper vertical position.

Feed mechanism designated generally at 28 automatically positions the cans as they are received from the cooker horizontally with an end on each of the rails 16 between the successive rotating bars 17 of the reel through an aperture 29 in the base of the shell 10 at the lower ends of the rails 16. The cans are then propelled along the successive convolutions of the rails or track 16 by the pusher bars 17 of the reel until they reach ejector mechanism 30 which pushes the cans endwise from between the bars 17 through an aperture 31 in the top of the shell 10 and on to a slide 32. The ejector mechanism shown comprises a star wheel 33 horizontally rotatably journaled on a stub shaft 34 secured to one of the arms of the fixed spider 11' adjacent the aperture 31 in such position that the teeth at one side of the star wheel project between the bars 17 of the reel. The bars 17 rotate the wheel 33 by engagement with the teeth thereof which in turn engage the ends of cans between the bars to force them endwise through the aperture 29.

In prior apparatus of the general type thus

far described, the walls of the cooling chamber have been made solid forming, with a solid base and top, an all-enclosed chamber except for the inlet and outlet openings for the cans. The hot vapors from the cans, particularly those from the lowermost cans, having no means for escape, have heated the chamber, counteracting to a considerable extent the cooling effect of the cooling medium and consequently lowering the efficiency of the apparatus.

A feature of the present invention consists in providing the shells 10 and 11 with means to permit escape of these heated vapors and circulation of cooler outside air through the chamber 14, these means being shown in Fig. 1 as constituting annular helically directed apertures 35 in the inner and outer shells and flanges 36 directed upwardly and outwardly from the bases of the apertures. The apertures 35 and flanges 36 form upwardly directed passages through which the hot vapors from the cans may rise and thus escape from between the walls 10 and 11 being replaced by cooler outside air entering through the passages. The flanges 36 act to catch the cooling medium that splashes off the cans and to return it between the walls 10 and 11, thus preventing loss of cooling medium that would occur if the passages opened laterally or downwardly. The apertures 35 in each of the shells 10 and 11 are spaced apart peripherally of the shells and are disposed alternately in the shell 10 and the shell 11 adjacent successive convolutions of the track 16 on any vertical section thereby avoiding undue weakening of the shell structure while providing a venting passage at one side or the other of the track 16 throughout substantially its whole length. Heated vapors passing into the inner shell 11 and also any heated vapors that by-pass the apertures 35 to reach the top of the passage 14 are permitted to escape through openings at the top of the apparatus provided by the expanded metal grating 37 (Fig. 2) with which we have replaced the solid sealing cover heretofore employed.

The cylindrical shells 10 and 11 will generally be formed of sheet metal and they may readily be provided with air circulation passages of the invention by cutting through the shells on lines corresponding to the top and side edges of the apertures 35 and pressing the shell portion between them rearwardly sufficiently to form the inclined flange 36, as by stamping the shells with a suitably shaped die. Consequently, provision of suitable air circulation passages need not increase the construction cost of the apparatus to any significant extent. Tests have shown, however, that their presence enhances very substantially the cooling efficiency of the apparatus, materially increasing the amount of temperature reduction attained in a given time without increase in the amount of cooling medium employed.

Referring to Figs. 1 and 4, it will be seen that the opposed rails 16 forming the can track are of generally T-shaped cross section but are provided at their inner opposed ends with downwardly projecting beads or ledges 38. In prior apparatus of the type in question the laterally projecting portion of each rail forming the can track has comprised a flat strip of metal. With such construction the cooling medium impinging on the inner surface of the shell and the upper surface of this portion of the rail tends to flow around the inner end of the rail back along its under surface and so on down to the base of

the shell. Thus a considerable portion of the cooling medium sprayed into the passage has been prevented from impinging upon the cans and any cooling effect therefrom has consequently been lost. We have found that this difficulty can be substantially completely remedied by providing the ledges 38 at the inner ends of the rails. The cooling medium flowing outwardly on the upper surface of the several convolutions of each rail is unable to negotiate the inner vertical surfaces of the ledges to flow back to the shell along the under surface of the rail and consequently drips down from the lower edge of the ledges to impinge upon the cans in the next lower convolution. The ledges 38 therefore materially increase the cooling efficiency of a given quantity of cooling spray.

As the cans are propelled along the helical track by the reel they rotate about their own axes. This rolling of the cans produces a certain amount of agitation of the contents which contributes materially to the uniformity and rapidity of the cooling. In accordance with the present invention we further enhance this beneficial agitation by providing the track rails with slight irregularities at intervals in their track surface which subject the cans to shocks as they are propelled thereover by the reel, and also cause them to rotate more rapidly. Suitable irregularities for this purpose may readily be provided by forming the rails 16 in successive longitudinal sections, such as the sections 16' and 16'' shown in Fig. 1, and offsetting the abutting ends of the sections slightly as at 39 in Fig. 1, with the end of the forward section 16'' in the direction of can travel slightly below the abutting end of the rearward section 16'. In dropping from the section 16' to the section 16'' the cans are jarred sufficiently to agitate the contents and at the same time the rotary motion of the can is increased by engagement with the end edge 40 of the section 16'.

In prior apparatus of the type in question, the cooling spray has been supplied to the cooling passage by a fixed series of spray jets, such as apertures in an annular pipe fixed to one of the cylindrical walls of the passage, above the uppermost convolution of the can track, the spray from these jets impinging first on the uppermost convolution of cans in the cooler and dripping down over the lower cans to the bottom of the passage. In the apparatus of the present invention we have provided means for emitting spray into the passage 14 below, as well as above, the uppermost convolution of the rail, said means comprising a plurality of spray pipes 41 (see Fig. 4) vertically disposed within the cooling passage 14 and extending from above the uppermost convolution of the rails 16 downwardly past several succeeding lower convolutions, the pipes 41 being provided with vertically spaced spray ejecting nozzles or apertures 42 which are adapted to emit spray into the passage 14 above the uppermost convolution of the track and also below it and adjacent several of the succeeding lower convolutions, the lowermost apertures 42 being located about midway the depth of the passage. Preferably, as shown in Fig. 4, the spray pipes 41 are disposed centrally of the passage 14, being housed within the forward open ends of the angle irons forming the pusher bars 17 of the reel and having the spray ejecting nozzles 42 directed forwardly in the direction of rotation of the reel. The upper ends of the spray pipes 41 are con-

nected to the annular header 15 by connecting pipes 41'.

As shown in Fig. 1, the annular header 15 is secured to the spider 19 and is connected by a plurality of pipes 43 with the lower end of a hollow vertical passage or pipe 44 in the upper end of the shaft 20. Cooling medium is supplied to the passage 44 and thence by the pipes 43 to the header 15 and pipes 41' and 41, through a feed pipe 45 opening into the top of the pipe 44 and provided with a suitable strainer such as the basket type strainer 46 shown in Fig. 1. To enable the structure comprising the pipes 41 and 41', header 15, pipes 43 and pipe 44 to rotate with the reel about the axis of the cooling passage 14, a water-tight bearing connection is provided between the feed pipe 45 and the vertical pipe 44. As shown, this connection comprises a bearing ring 47 on the lower end of the feed pipe 45 seated at the base of the enlarged upper end of the aperture 44, a sealing ring or cap 48 rotatably mounted on the pipe 45 above the ring 47 and screw-threaded on the upper end of the shaft 20, and a packing 49 surrounding the pipe 45 between the bearing ring 47 and the sealing ring 48.

We have found that the above described spray supply means of the present invention enhances the cooling efficiency of the apparatus without increase in the amount of cooling medium and we attribute this improvement to at least two factors. In the first place, with the spray means of the present invention, the spray is ejected in the center of the passage instead of at the side as in prior apparatus, and this results in more even distribution of the cooling medium over the cans. In the second place, this even distribution of cooling medium is accomplished at lower levels in the cooling apparatus with advantages accruing from increased area of wetted can surfaces at these levels. In prior apparatus, wetted can surface at lower levels is limited by the path of the cooling medium as it falls through the annular space between the shells of the cooling apparatus.

The hot cans may be transferred from the cooker to the cooler by any convenient means such as the inclined chute 50 indicated in the drawings, along which the cans roll on their sides, the chute having at the end adjacent the cooler suitable means 28 for automatically inserting the cans through the aperture 29 horizontally upon the rails 16 between the successive rotating bars 17. While the reference numeral 28 is intended to designate any suitable feeding mechanism, we preferably employ the improved form shown in Figs. 1 and 3 comprising a continuously rotating turret 51 mounted on a horizontal shaft 52 located between the end of the chute 50 and a vertically disposed rotatably mounted stub shaft 53, the upper end of shaft 53 having fixed thereto a horizontally disposed star wheel 54 having pusher fingers 55 arranged to pass successively over the top of the turret and into the aperture 29, the turret 51 being provided with open-ended pockets 56 which receive the cans from the chute 50 and raise them into alignment with the aperture 29 in the plane of the fingers 55 of the star wheel 54 which push them endwise through the aperture 29 on to the rails 16. The pockets 56 are, as shown, shallower than the diameter of the cans so that a portion of the cans protrudes beyond the outer periphery of the turret to be raised into engagement with the fingers 55 of the star wheel 54

which closely approach the outer periphery of the turret.

Turret 51 and star wheel 54 are operated in timed relation with the movement of the bars 17 of the reel so that each can remains substantially centered between successive bars 17 while it is being pushed endwise of the turret through the aperture 29 by the star wheel 54. The mechanism shown for this purpose comprises a gear 57 mounted on a vertical shaft 58 and meshing at its inner end with the gear teeth 26 on the lower end of the reel, the shaft 58 operating a second gear 59 meshing with a gear 60 on the lower end of the shaft 53 to operate the star wheel 54, and a worm 61 on the shaft 53 meshing with a corresponding worm 62 on the shaft 52 to operate the turret 51.

While we have shown and described herein one specific form of cooling apparatus constructed in accordance with the novel principles and embodying the novel features of the invention, it will be apparent that the scope and advantages of the invention are not limited thereto nor to the particular form and arrangement of parts shown and described.

We claim:

1. In apparatus for cooling cans, spaced walls forming a cooling passage, means for spraying cooling liquid into said passage, means at opposite ends of said passage for feeding cans therein and discharging cans therefrom, means for conveying cans through said passage from said feeding means to said discharging means, and means to provide free circulation of air into and venting of heated vapors from said passage adjacent the path of travel of the cans therein for substantially the full length of said path.

2. In apparatus for cooling cans, a substantially cylindrical shell, means at opposite ends of said shell for feeding cans therein and discharging cans therefrom, means within said shell for conveying cans from said feeding means to said discharging means helically about the axis of said shell, means for spraying cooling liquid onto cans in said shell, and means to provide free circulation of air into and venting of heated vapors from said shell adjacent the path of travel of the cans therein for substantially the full length of said path.

3. In apparatus for cooling cans, spaced walls forming a cooling passage, means for spraying cooling liquid into said passage, means at opposite ends of said passage for feeding cans therein and discharging cans therefrom, means for conveying cans through said passage from said feeding means to said discharging means, and means to provide free circulation of air into and venting of heated vapors from said passage adjacent the path of travel of the cans therein for substantially the full length of said path, said means comprising a plurality of openings in at least one of said walls arranged along said path.

4. In apparatus for cooling cans, a pair of spaced walls defining the sides of a cooling passage, means for spraying cooling liquid into said passage, means at opposite ends of said passage for feeding cans therein and discharging cans therefrom, means for conveying cans through said passage from said feeding means to said discharging means, and means to provide free circulation of air into and venting of heated vapors from said passage adjacent the path of travel of the cans therein for substantially the full length of said path, said means comprising

a plurality of openings in each of said walls arranged along said path.

5. In apparatus for cooling cans, a substantially cylindrical vertically disposed shell, means at opposite ends of said shell for feeding cans therein and discharging cans therefrom, means within said shell for conveying cans from said feeding means to said discharging means helically about the axis of said shell, and means for spraying cooling liquid onto cans in said shell, said shell having a plurality of openings therethrough adjacent the path of travel of the cans within said shell and spaced along said path for substantially its full length, said apertures adapted to provide free circulation of air into and venting of heated vapors from said shell.

6. In apparatus for cooling cans, spaced substantially cylindrical and concentric vertically disposed shells forming an annular cooling passage therebetween, a helical track in said passage, means for feeding cans into said passage onto said track adjacent an end thereof, means for discharging cans from said passage adjacent the opposite end of said track, means for propelling cans along said track from said feeding means to said discharging means, and means for spraying cooling liquid into the upper end of said passage, at least one of said shells having openings therethrough adapted to permit free circulation of air into and venting of heated vapors from said passage adjacent the path of travel of the cans therein for substantially the full length of said path.

7. In apparatus for cooling cans, spaced substantially cylindrical and concentric vertically disposed shells forming an annular cooling passage therebetween, a helical track in said passage, means for feeding cans into said passage onto said track adjacent an end thereof, means for discharging cans from said passage adjacent the opposite end of said track, means for propelling cans along said track from said feeding means to said discharging means, and means for spraying cooling liquid into the upper end of said passage, at least one of said shells being provided with apertures therethrough arranged in closely adjacent relation about the axis of said shell and along a plurality of convolutions of said track therein, said apertures being adapted to permit free circulation of air into and venting of heated vapors from said passage adjacent the path of travel of the cans therein.

8. In apparatus for cooling cans, spaced substantially cylindrical and concentric vertically disposed shells forming an annular cooling passage therebetween, a helical track in said passage, means for feeding cans into said passage onto said track adjacent an end thereof, means for discharging cans from said passage adjacent the opposite end of said track, means for propelling cans along said track from said feeding means to said discharging means, and means for spraying cooling liquid into the upper end of said passage, each of said shells being provided with apertures therethrough arranged in closely adjacent relation about the axis of said shells and along a plurality of convolutions of said track therebetween, said apertures being adapted to permit free circulation of air into and venting of heated vapors from said passage adjacent the path of travel of the cans therein.

9. In apparatus for cooling cans, a substantially cylindrical vertically disposed shell, means at opposite ends of said shell for feeding cans therein and discharging cans therefrom, means

within said shell for conveying cans from said feeding means to said discharging means helically about the axis of said shell, means for spraying cooling liquid onto cans in the upper end of said shell, said shell, intermediate said can receiving and can discharging means, being provided with a plurality of apertures adapted to vent heated vapors therethrough and flange means cooperating with said apertures to prevent escape of cooling medium therethrough from within said shell.

10. In apparatus for cooling cans, spaced substantially cylindrical and concentric vertically disposed shells forming an annular cooling passage therebetween, a helical track in said passage, means for feeding cans into said passage onto said track adjacent an end thereof, means for discharging cans from said passage adjacent the opposite end of said track, means for propelling cans along said track from said feeding means to said discharging means, and means for spraying cooling liquid into the upper end of said passage, at least one of said shells having a plurality of circumferentially extending apertures therein spaced along said track and adapted to permit circulation of air therethrough and flange means arranged adjacent said apertures to prevent escape of cooling liquid through said apertures.

11. In apparatus for cooling cans, spaced substantially cylindrical and concentric vertically disposed shells forming an annular cooling passage therebetween, a helical track in said passage, means for feeding cans into said passage onto said track adjacent an end thereof, means for discharging cans from said passage adjacent the opposite end of said track, means for propelling cans along said track from said feeding means to said discharging means, and means for spraying cooling liquid into the upper end of said passage, at least one of said shells having a plurality of air vents therein intermediate the ends of said track, said vents having an outer wall inclined upwardly from the base thereof and adapted to prevent escape of cooling liquid from said passage through said vents.

12. In apparatus for cooling cans, a vertically disposed helical rail having a laterally projecting flange, means for propelling cans along the upper surface of said flange, means for spraying cooling liquid over the cans on said flange, and means comprising a narrow bead projecting downwardly from the under surface of said flange, longitudinally thereof, adapted to cause liquid collecting on said flange to drip therefrom onto cans on a lower convolution of said rail.

13. In apparatus for cooling cans, a substantially cylindrical vertically disposed shell, a helical rail on said shell having a flange projecting laterally therefrom, means for propelling cans along the upper surface of said flange, means for spraying cooling liquid over the cans on said flange, said flange at its inner edge extended downwardly below the adjacent under surface of said flange to form a ledge adapted to drip liquid therefrom.

14. In apparatus for cooling cans, a helical can track, means for propelling cans along said track, and means for spraying cooling liquid onto the cans on said track, said track, longitudinally thereof, divided into a plurality of sections, the abutting ends of said sections being offset whereby the cans are jarred as they are propelled from

one section to the next to agitate their contents and speed the cooling thereof.

15. In apparatus for cooling cans, a substantially cylindrical vertically disposed shell, a helical can track having a plurality of convolutions within said shell, means for feeding cans onto said track adjacent an end thereof, means for discharging cans from said track adjacent the opposite end thereof, means for propelling cans along said track from said feeding means to said discharging means and means for spraying cooling liquid onto the cans on said track, said last named means having spray ejecting openings above and below several of the upper convolutions of said track.

16. In apparatus for cooling cans, a substantially cylindrical vertically disposed shell, a helical can track having a plurality of convolutions within said shell, means for feeding cans onto said track adjacent an end thereof, means for discharging cans from said track adjacent the opposite end thereof, a rotatable reel having a plurality of spaced substantially vertical pusher bars within said shell adapted to propel the cans along said track from said feeding means to said discharging means, and means housed in said pusher bars for spraying cooling liquid onto the cans on upper convolutions of said track.

17. In apparatus for cooling cans, a substantially cylindrical vertically disposed shell, a helical can track having a plurality of convolutions within said shell, means for feeding cans onto said track adjacent an end thereof, means for

discharging cans from said track adjacent the opposite end thereof, a rotatable reel having a plurality of spaced substantially vertical pusher bars within said shell adapted to propel the cans along said track from said feeding means to said discharging means, a plurality of substantially vertically disposed spray pipes within said shell each secured to one of said pusher bars, a plurality of vertically spaced spray ejecting apertures in each of said pipes and means to supply cooling liquid to said pipes while rotating with said reel.

18. In apparatus for cooling cans, a substantially cylindrical vertically disposed shell, a helical can track having a plurality of convolutions within said shell, means for feeding cans onto said track adjacent an end thereof, means for discharging cans from said track adjacent the opposite end thereof, a rotatable reel having a plurality of spaced substantially vertical pusher bars within said shell adapted to propel the cans along said track from said feeding means to said discharging means, a plurality of substantially vertically disposed spray pipes within said shell each secured to one of said pusher bars, a plurality of vertically spaced spray ejecting apertures in each of said pipes, a feed pipe connected to a source of cooling liquid and an annular header having fixed connection with said spray pipes and reel and rotatable connection with said feed pipe.

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