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CAN COOLING APPARATUS

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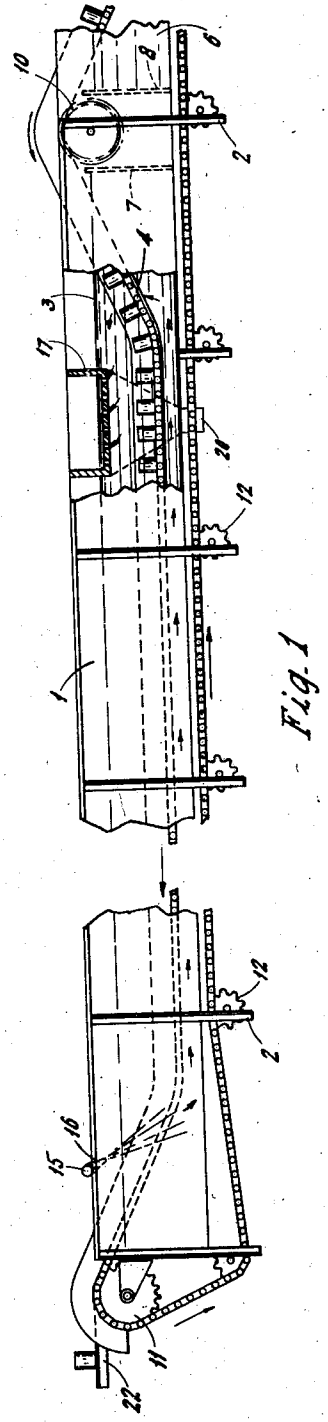


Fig. 1

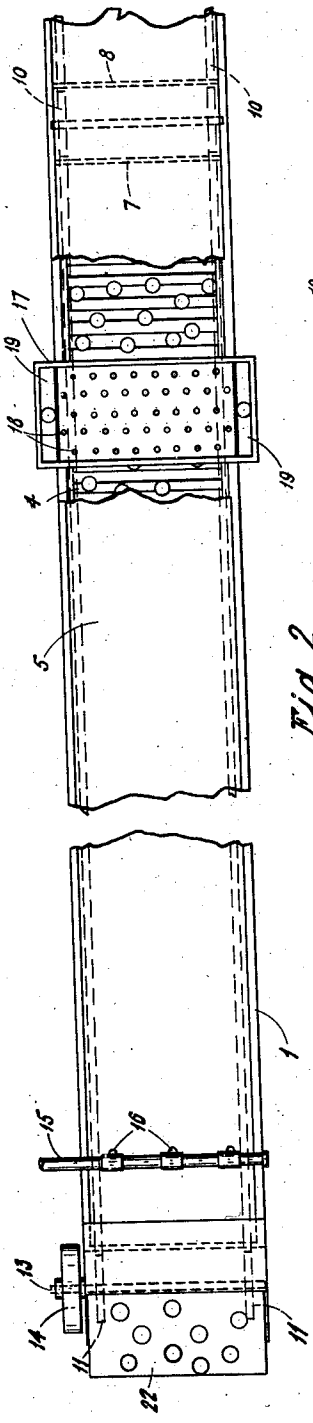


Fig. 2

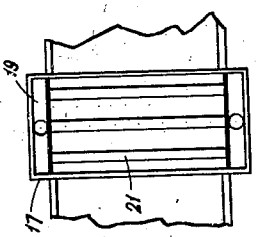


Fig. 4.

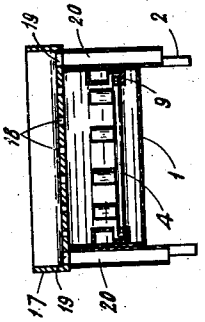


Fig. 3.

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CAN COOLING APPARATUS

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5 Claims. (Cl. 62—104)

This invention relates to improvements in can cooling apparatus and is primarily concerned with the provision of novel means for increasing the cooling efficiency of such apparatus.

As is the well-known practice in the canning industry, the sealed, product-filled cans, after being subjected to heat treatment in a suitable sterilizing or cooking apparatus, are cooled by introducing them into a cooling apparatus through which the cans are passed and submerged in a bath of cooling liquid for a sufficient length of time to reduce their temperature to the desired degree. Inasmuch as the passage of the hot cans through the cooling liquid raises the temperature of the liquid it is necessary, in order to maintain its cooling efficiency, to continuously change the cooling liquid, and this is ordinarily done by continuously introducing fresh cooling liquid into the cooler at the discharge end thereof and discharging the same at the receiving end of the cooler, so that the flow of cooling liquid through the cooler is counter to the direction of travel of the cans whereby the cans are subjected to progressively cooler liquid as they pass from the receiving end of the cooler to the discharge end.

I have found that the absorption of heat from the cans by the cooling liquid causes the heated liquid to rise to the surface, and this upper stratum of heated liquid tends to circulate back toward the point of introduction of the fresh cooling liquid thereby increasing the temperature of the cooling liquid at the discharge end of the cooler and, further, that by the provision of suitable means for retarding this circulation and for removing from the tank the heated liquid at a point between the point of entry of the cans into the cooler and their point of discharge therefrom the circulation of heated liquid from the receiving end of the cooler tank to the discharge end may be greatly reduced, thereby enabling me to effect a more rapid and complete cooling of the cans by the use of a cooler of shorter length than heretofore required, and less cooling liquid is required to maintain the cooling efficiency of the liquid bath in the cooler.

It will be appreciated that it is desirable to cool the cans as rapidly and completely as possible, since the retention of heat in the cans after they have been sterilized causes their contents to continue to cook and this frequently results in over-cooking of the contents, which breaks down and deteriorates the product and, in some instances, results in undesirable discoloration thereof. Also, unless the cans are cooled to the desired point before they leave the cooler the retention of heat in the cans when they are stacked also causes continued cooking of the product with a similar deteriorating effect thereon, known to the trade as "stack burn".

It is an object of this invention to provide a cooler with suitable means for retarding the circulation of cooling liquid toward the discharge end of the cooler and causing the upper stratum of the liquid to be discharged from the tank at a point between the point of entry of the cans into the cooling liquid and the point of their discharge therefrom, whereby a substantial portion of the heated liquid is removed from the tank and prevented from passing to the discharge end of the tank and thereby raising the temperature at that point, which slows down the cooling effect and hinders satisfactory cooling of the cans.

Various other objects and advantages not enumerated will be apparent as the description proceeds in connection with the accompanying drawing, in which I have disclosed one form of my invention.

Referring to the drawing:

Figure 1 is a side elevation, partially broken away, of a cooling apparatus embodying the features of my invention.

Figure 2 is a plan view of the apparatus illustrated in Figure 1 with a portion of the cover broken away to better illustrate certain features of construction.

Figure 3 is a sectional view taken along the line 3—3 of Figure 2.

Figure 4 is a plan view of a modified form of baffle.

The drawing illustrates my invention as applied to a cooling apparatus which is illustrated as being associated with a cooker, both the cooker and cooler being of the open type through which the cans are conveyed by means of an endless traveling conveyer such as used for the processing of certain products which do not require the application of temperatures above 212 degrees F. to sterilize them, and which preferably should not be agitated during processing.

The cooler comprises a rectangular shaped tank 1 supported by suitable legs 2 and containing a body of cooling liquid 3, through which the cans are conveyed by means of an endless conveyer 4 of any suitable construction, the one shown being of the slatted type. A cover 5 is provided over the top of the tank 1. The cooler is shown as being integral with a cooker 6 which is an extension of the tank 1, suitable dividing walls 7 and 8 being provided to separate the cooker from the cooler. Inasmuch as the cooker

forms no part of the present invention only a portion of the same is illustrated.

The endless conveyer 4 extends through both the cooker and the cooler and is supported and guided by suitable channel members 9 arranged longitudinally of the cooler at either side thereof. The mid-portion of the conveyer is supported by idler sprockets 10 arranged to elevate the same so that the conveyer is inclined upwardly out of the cooker and over the dividing walls 7 and 8 and then descends downwardly into the bath of cooling liquid 3 in the cooler. At the discharge end of the cooler the conveyer 4 is inclined upwardly out of the cooler and passes over drive sprockets 11, and the return run of the conveyer is supported beneath the apparatus upon a series of idler sprockets 12.

The drive sprockets 11 are secured to a drive shaft 13 which may be driven from any suitable source of power applied to the drive pulley 14 whereby to drive the conveyer in the direction indicated by the arrows.

The tank 1 is continuously supplied with cooling liquid from a supply pipe 15 provided with a plurality of discharge nozzles 16 preferably disposed at an angle to the vertical, as shown, so as to assist the flow of cooling liquid along the bottom of the tank in a direction counter to the travel of the conveyer and toward the receiving end of the tank.

As will be understood, the heating of the liquid by the hot cans as they enter the cooling liquid causes the heated liquid to rise to the surface, and there is a tendency for this upper stratum of heated liquid to reverse its direction of flow and travel back toward the point where the cooling liquid is delivered to the tank by the nozzles 16. This movement of the heated liquid back towards the discharge end of the cooler, if permitted, would cause a considerable rise in temperature of the cooling liquid at the discharge end of the cooler, and in order to prevent such circulation I have provided means for retarding such circulation and for causing liquid to overflow from the tank at a point between the point of entry of the cans into the cooling liquid and their point of discharge, thereby preventing the flow of any considerable amount of heated liquid to the discharge end of the cooler. This is accomplished, as illustrated in Figures 1 to 3, inclusive, by means of a box-like baffle 17 which extends across the upper portion of the tank and projects downwardly into the cooling liquid a short distance.

That portion of the bottom of the baffle 17 within the cooling tank is provided with a plurality of perforations or passages 18 to permit the passage of liquid from the tank 1 into the baffle. The outer ends of the baffle overhang the sides of the tank 1 and are provided with a discharge opening 19 extending across the width of the baffle through which liquid overflowing from the tank 1 into the hopper-like discharge spout 20 may be delivered to any suitable point.

By the provision of perforations in the bottom of the baffle across the entire width of the tank it will be seen that the cooling liquid may overflow from the tank into the baffle through the passages 18 across substantially the entire width of the tank, so that little or none of the heated upper stratum of liquid on the surface of the body of cooling liquid 3 will pass beneath the baffle and travel toward the discharge end of the cooler, as this portion of the liquid will pass upwardly through the passages 18 into the baffle and will be discharged therefrom through the discharge pipes 20.

It will be understood that other forms of baffle than that shown in Figures 1 to 3 may be used with satisfactory results within the scope of the present invention, for example in Figure 4 there is shown in plan view a baffle similar in construction to that shown in Figures 1 to 3 except that the bottom is provided with a series of slots 21 extending across the width of the cooler tank in place of the perforations 18 illustrated in the other figures. It will be understood, also, that passages may be provided, if desired, in the vertical walls of the baffle, within the spirit of the invention as disclosed and claimed herein.

In the operation of the apparatus described the endless conveyer 4 is driven in the direction of the arrows so as to convey the cans through the heated liquid in the cooker, from which they are lifted by the conveyer and carried into the cooling liquid in the cooler tank 1, and are finally discharged from the conveyer to any receiving means as, for example, the table 22.

As the cans travel through the cooling liquid they are cooled, and the cooling liquid is continuously replaced by fresh cooling liquid delivered to the tank by way of the nozzles 16, this cooling liquid being caused to flow through the cooler toward the receiving end of the tank where it overflows through the baffle 17, so that as the cans pass through the cooler they encounter progressively cooler liquid.

The tendency of the heated liquid rising from the cans to travel back toward the point of liquid supply is prevented by the provision of the baffle 17 which projects below the surface of the liquid a short distance in advance of the point of entry of the cans into the cooling liquid where the heat given up by the cans to the liquid is the greatest. The baffle 17 retards the flow of liquid toward the point of liquid supply, and the hottest part of the liquid which rises to the surface passes upwardly through the passages 18 and into the baffle 17, from which it is discharged.

I have found that in actual operation the provision of the overflow baffle 17 at a point between the point of entry of the cans into the cooling liquid and the discharge end of the cooler very materially reduces the temperature of the cooling liquid between the baffle and the discharge end of the cooler; and have found that this decrease in temperature amounts to as much as 15 degrees F. or more over prior constructions, thus making it possible to cool the cans more rapidly and completely than heretofore, as well as permitting the use of a shorter cooler and requiring the use of less cooling liquid.

Having now described my invention and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. A can cooling apparatus comprising a tank for containing a cooling liquid, a conveyor for conveying cans through the tank beneath the surface of the liquid, a baffle disposed across the upper portion of the tank between the point of entry of the cans into the cooling liquid and the point of their discharge therefrom, the lower edge of said baffle extending below the liquid level to retard circulation of the cooling liquid, means for delivering cooling liquid to the tank at a point between the baffle and the discharge end of the tank, and a liquid outlet adjacent said baffle through which liquid may overflow from the tank.

2. A cam cooling apparatus comprising a tank for containing a cooling liquid, a conveyor for

conveying cans through the tank beneath the surface of the liquid, means providing for overflow of liquid from the tank comprising a box-like baffle extending across the upper portion of the tank between the point of entry of the cans into the cooling liquid and the point of their discharge therefrom, the bottom of said baffle being disposed beneath the liquid level to retard circulation of the cooling liquid and being provided with a liquid outlet passage for overflow of liquid from the tank for draining liquid from the baffle, and means for delivering cooling liquid to the tank at a point between the baffle and the discharge end of the tank.

3. A can cooling apparatus comprising a tank for containing a cooling liquid, a conveyor for conveying cans through the tank beneath the surface of the liquid, means providing for overflow of liquid from the tank comprising a box-like baffle extending across the upper portion of the tank between the point of entry of the cans into the cooling liquid and the point of their discharge therefrom, said baffle being disposed to project downwardly into the cooling liquid to retard circulation thereof and being provided with a discharge passage through which liquid may overflow from the tank, means for draining liquid from the baffle, and means for delivering cooling liquid to the tank at a point between the baffle and the discharge end of the tank.

4. A can cooling apparatus comprising a tank for containing a cooling liquid, a conveyor for conveying cans through the tank beneath the surface of the liquid, means providing for overflow of liquid from the tank comprising a box-like baffle extending across the upper portion of the tank between the point of entry of the cans into the cooling liquid and the point of their discharge therefrom, said baffle being disposed to project downwardly into the cooling liquid to retard circulation thereof and being provided with means through which liquid may flow from the tank into the baffle across substantially the entire width of the tank, means for draining liquid from the baffle, and means for delivering cooling liquid to the tank at a point between the baffle and the discharge end of the tank.

5. A can cooling apparatus comprising a tank for containing a cooling liquid, a conveyer for conveying cans through the tank beneath the surface of the liquid, a baffle disposed across the width of the upper portion of the tank between the point of entry of the cans into the cooling liquid and the point of their discharge therefrom, the lower portion of said baffle extending below the liquid level to retard circulation of the surface stratum of said cooling liquid, means for delivering cooling liquid to the tank at a point between the baffle and the discharge end of the tank, and a liquid outlet adjacent an end of said baffle through which moving surface liquid obstructed by said baffle may overflow from the tank.

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