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BOTTLE COOLING UNIT

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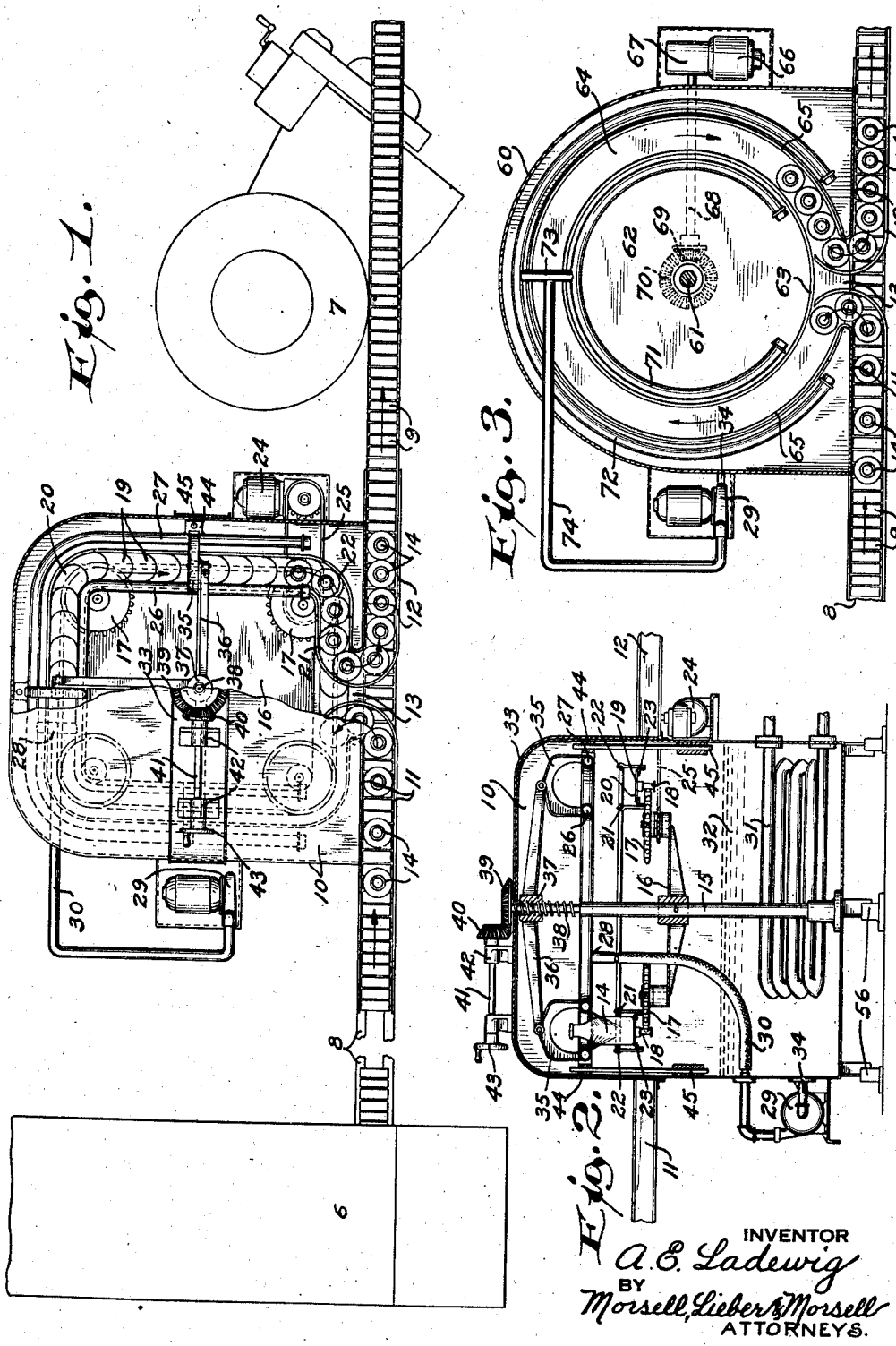


Fig. 1.

Fig. 3.

Fig. 2.

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BOTTLE COOLING UNIT

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4 Claims. (Cl. 62—104)

The present invention relates in general to improvements in equipment especially adapted for use in bottling milk, fruit juices, or the like, and relates more specifically to improvements in the construction and operation of apparatus for cooling or heating bottles or the like.

An object of the invention is to provide an improved bottle cooling or heating unit which is simple in construction and efficient in operation.

When receptacles such as milk bottles are delivered in succession from an automatic bottle washing machine, they are usually considerably above the milk temperature, and if the bottles are sent directly to the filler and cold milk is deposited therein, the sudden contacting of the cold milk with the warmer bottles has an extremely detrimental effect on the cream line, and some bottles are apt to break and thus result in waste of materials. The filler is ordinarily located relatively close to the washer in order to conserve space, and the discharge end of the latter is usually connected to the inlet of the former by means of a slatted horizontally movable bottle conveyor which is adapted to rapidly transport the successive clean bottles from the washer outlet to the filler inlet. While the bottle supporting surfaces of the conveyor slats may be clean and will not objectionably muss the clean bottles, the drum sprockets and other portions of such conveyors are relatively dirty and difficult to maintain free from grease and other filth. In order to cool the cleaned bottles after washing thereof, it has heretofore been attempted to spray the successive bottles in the discharge end zone of the washer housing, but this procedure has been found impractical because these washer casings are usually filled with hot vapors and warm air, so that proper cooling cannot be effected. In order to properly cool the bottles, they should be sprayed with clean refrigerated water, and in order to reduce the cost of cooling it should be possible to recirculate the clean artificially cooled water through the sprays for use on subsequent bottles. Although it has heretofore also been attempted to cool the bottles while being transported by the ordinary slatted conveyor directly from the washer to the filler, this mode of cooling with artificially refrigerated liquid was too expensive since the cooling water would become polluted whenever it contacted the conveyor parts, and could not be reused as it would mess up the subsequent clean bottles. Since there are numerous bottle washing and filling installations utilizing the slatted and other standard bottle conveyors, now in use, any practical type of cooling assemblage should be adapted for convenient and efficient cooperation with these existing systems, and should also be capable of automatically cooling the bottles to any desired low temperature, without dirtying the bottles and at negligible cost. While it is especially desirable to cool the bottles for the reception of milk, it is sometimes desirable to heat the clean bottles, as when the receptacles are to be filled with hot fruit juices or the like; and a commercial cooling unit should also be convertible into a heating unit.

It is therefore a more specific object of the present invention, to provide a new and useful bottle cooling or heating assemblage adapted to cooperate as a unit with a standard bottle conveyor and which is capable of rapidly and effectively cooling or heating the successive bottles to any desired extent without destroying their cleanliness.

Another specific object of my invention is to provide an artificially refrigerated or heated bottle cooling or heating unit which is operable at low cost to quickly and effectively cool or heat a succession of moving receptacles such as glass bottles, without danger of damaging the bottles.

A further specific object of this invention is to provide an extremely compact, durable and sanitary bottle cooling assemblage which is applicable as a unit to, but which may also be readily removed from, a standard bottle conveyor of either the slatted or any other type.

Still another specific object of the invention is to provide simplified and relatively inexpensive cooling or heating mechanism for bottles or the like, which is entirely automatic in action, and which may also be conveniently adjusted to cooperate with receptacles of different sizes and shapes.

These and other objects and advantages of the invention will be apparent from the following detailed description.

A clear conception of the several features constituting my present improvement, and of the construction and operation of several types of bottle cooling units embodying the invention, may be had by referring to the drawing accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a part top and part sectional view of one of my improved bottle cooling units, showing the same applied to a standard straight-line

slatted bottle conveyor connecting a bottle washer and filler;

Fig. 2 is an irregular vertical section through the casing of the washing unit of Fig. 1, showing some of the internal structure; and

Fig. 3 is a horizontal section through the housing of a modified type of bottle cooling unit, showing a top view of internal structure and also showing a fragment of the main conveyor.

While the invention has been shown herein as being embodied in artificially refrigerated motor driven cooling units which are especially adapted for cooperation with straight-line slatted conveyors, it is not my desire or intent to thereby unnecessarily restrict the scope or utility of the improved features.

Referring to the drawing, the system to which the several embodiments of my invention, shown and specifically described herein, are especially applicable, is shown more or less diagrammatically in Fig. 1, and consists of a bottle washer 6, a bottle filler 7, and a straight line conveyor 8 connecting the outlet of the washer 6 with the inlet of the filler 7 and having a continuous series of slats 9 the upper run of which is normally movable in the direction of the arrows in Figs. 1 and 3.

The improved bottle cooling unit shown in Figs. 1 and 2, comprises in general a main casing or housing 10 having bottle inlet and discharge guides 11, 12 respectively secured to one wall thereof adjacent an opening 13, and adapted to coact with the slats 9 of the main conveyor 8 to deliver successive upright bottles 14 to and from the housing 10; a shaft or column 15 fixedly mounted centrally within the rectangular housing 10 and having a support 16 secured to the medial portion thereof; a series of four sprockets 17 rotatably journalled at the corners of the fixed support 16 and having driving coaction with pins 18 secured to the successive slats 19 of an endless auxiliary conveyor 20 disposed in the same horizontal plane as the main conveyor 8; fixed inner and outer guide rails 21, 22 respectively, secured to the fixed slat supports 23 of the conveyor 20 and cooperating with the guides 11, 12 to conduct the bottles 14 along a loop path within the housing 10; a propelling motor 24 coacting with one of the sprockets 17 through a chain drive 25 or the like, to positively propel the auxiliary conveyor 20 at the proper linear speed relative to the main conveyor 8; inner and outer spray pipes 26, 27 disposed above the guide rails 21, 22 respectively and being connected to each other by a pipe 28, and to the outlet of a circulating pump 29 by means of a flexible connection 30; mechanism for effecting simultaneous vertical adjustment of the spray pipes 26, 27 to accommodate bottles 14 of different heights and shapes; and a cooling coil 31 located within the clean liquid 32 in the lower portion of the housing 10.

The main casing or housing 10 may be formed of sheet metal or the like with a readily removable top closure or cover 33, and the cooling coil 31 which is immersed in the clean water 32 at the bottom of the casing, may be supplied with suitable refrigerant which is preferably controllable to vary the degree of cooling. The cold water circulating pump 29 may be motor driven as shown, and has its inlet 34 connected directly to the liquid basin in the lower portion of the casing. The pump discharge pipe 30 is made flexible so as to permit vertical adjustment of the spray pipes 26, 27, and these pipes may be suspended by means of yokes 35 from a spider 36 the hub 37 of which is threaded to receive an adjusting screw 38. The screw 38 has its lower end journalled in a socket at the upper end of the column 15, while its upper end is provided with a bevel gear 39 which meshes with a bevel pinion 40 secured to an adjusting shaft 41. The shaft 41 is mounted in bearings 42 carried by the housing cover 33, and is provided with a hand wheel 43 rotation of which in either direction will cause the spray pipes 26, 27 to move either up or down. The outer spray pipe 27 may also be provided with guide lugs 44 coacting with fixed vertical guide rods 45 so as to prevent the pipes 26, 27 from tilting out of horizontal position. The cooling unit may be mounted upon vertically adjustable supports or legs 56 so as to permit the conveyor 20 to be readily horizontally alined with the main conveyor 8.

During normal operation of the improved bottle cooling unit shown in Figs. 1 and 2, and assuming the apparatus to have been properly associated with the main conveyor 8, the motor 24 and the circulating pump 29 should be placed in operation whenever the bottle washer 6 and filler 7 are operating. The clean but relatively hot bottles 14 which are delivered in succession from the washing machine 6 onto the conveyor 8, will be carried in succession between the inlet guides 11 and will be deposited upon the auxiliary conveyor 20 within the housing 10 as shown in Fig. 1. The conveyor 20 will then transport the successive upright clean bottles beneath and between the fixed spray pipes 26, 27 whereupon cold liquid spray of clean water 32 will be deposited upon the exterior surfaces only of the bottles, by the circulating pump 29. These cold liquid sprays will quickly and effectively cool the bottles 14 to the desired low temperature, without permitting liquid to enter the bottles, and the cooling liquid 32 after performing its cooling function will flow into the basin at the bottom of the housing for recooling and recirculation by the pump 29. The cooled bottles 14 will eventually be removed from the auxiliary conveyor 20 and again deposited upon the main conveyor 10 by the discharge guide 12 as illustrated in Fig. 1, and will be promptly delivered in succession to the filler 7 at the proper temperature. The spray pipes 26, 27 of this assemblage may be readily vertically adjusted at any time so as to properly cooperate with bottles 14 of different sizes and heights, by merely manipulating the hand wheel 43.

Referring to Fig. 3, the modified bottle cooling unit shown therein is of simplified construction, but is likewise adapted to cooperate with a standard straight line slatted conveyor 8 having a succession of slats 9. The modified unit comprises in general a main casing or circular housing 60 provided with inlet and discharge guides 11, 12 respectively, adapted for cooperation with the conveyor 8, and having an opening 13 therein; a shaft 61 journalled for rotation centrally of the housing 60 about a vertical axis; a transporting disk 62 secured to the medial portion of the shaft 61 and having an inner guide rail 63 secured thereto and rotatable therewith to define an annular peripheral bottle receiving area 64 on the disk 62 lying in the same horizontal plane as the upper slats 9 of the main conveyor 8; an outer fixed guide rail 65 cooperating with the revolving rail 63 to confine the movement of the bottles 14 to an annular path; a driving motor 66 for the disk 62 coacting with the shaft 61 through worm gearing 67, a countershaft 68

and bevel gears 69, 70; inner and outer spray pipes 71, 72 respectively fixedly suspended within the housing 60 above the guide rails 63, 65 and being interconnected by a pipe 73 and connected to the pump 29 by a flexible pipe or tube 74; and a cooling coil 31 not shown, located in the liquid basin beneath the disk 62.

During normal operation of the modified bottle cooling assemblage shown in Fig. 3, and assuming the various parts to have been properly constructed and associated with the main conveyor 8, the bottle washing machine 6 will again be delivering clean bottles in heated condition to the main straight line conveyor 8 from which they will be removed by the guides 11 and will be deposited upon the annular revolving peripheral portion 64 of the disk 62. The revolving disk 62 will then transport the successive bottles 14 in upright position around the axis of the shaft 61 and between the spray pipes 71, 72. While passing between and beneath these spray pipes 71, 72, the successive bottles 14 will again be subjected to sprays of cold liquid delivered to the spray pipes by the pump 29, and will be quickly cooled without permitting spray liquid to enter the interiors of the bottles. The cooled bottles are eventually delivered from the peripheral portion 64 of the revolving disk 62 by the discharge guide 12 which deposits the cool bottles upon the main conveyor 8 from whence they are quickly delivered into the filler 7 at the desired low temperature. While the modified assemblage is not provided with means for effecting vertical adjustment of the nozzles 26, 27, such adjusting mechanism may obviously be readily provided.

From the foregoing detailed description it will be apparent that my present invention provides a simple, yet highly efficient bottle cooling unit which may be readily applied to a standard straight line slatted conveyor 8 and which is entirely automatic in operation. Both of the improved cooling units shown and described herein are adapted to automatically withdraw the clean but heated bottles from one portion of the conveyor 8, and to return the bottles in cooled condition to another portion of this conveyor, and the liquid 32 which is recirculated through the cooling pipes, can be utilized over and over for a long period of time without pollution thereof, by virtue of the fact that all of the mechanism contained within the cooling unit housing may be maintained in clean and sanitary condition. The cooling action is effected rapidly and continuously and by virtue of the fact that the same cooling water can be used over and over, the mechanism may be operated with maximum efficiency and at minimum cost. By providing means for effecting vertical adjustment of the spray pipes, the improved cooling unit may be utilized to cool bottles of different sizes, shapes and heights, and the unit may be readily attached to or detached from the conveyor 8, and occupies very little space. The improved assemblage is so constructed that all parts thereof are readily accessible for inspection and adjustment, and that it may be applied to most standard systems having a straight line slatted conveyor interposed between the bottle washer and filling machine. When it becomes desirable to utilize the improved bottle handling units for the purpose of heating instead of cooling the bottles 14 which are being transported from the washer 6 to the filler 7 by the conveyor 8, it is only necessary to supply the coil 31 with heating medium such as steam or hot water, instead of refrigerant. When bottling or packing fruit juices, it is sometimes desirable to raise the temperature of the receptacles 14 from approximately room temperature to 180° F. or higher, and this can readily be done with my improved unit. The term "heat exchange" as used in the claims should therefore be given an interpretation sufficiently broad to cover any change of temperature which may be effected by the improved unit.

It should be understood that it is not desired to limit this invention to the exact details of construction, or to the precise mode of operation, herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

I claim:

1. A bottle cooling unit comprising, a casing having therein a liquid basin and being provided with adjoining inlet and outlet guides associated with a common opening, a conveyor continuously operable within said casing to transport successive bottles in upright position from said inlet to said outlet guide, spray pipes disposed above said conveyor for spraying cooling liquid against the exteriors of the bottles, a pump for circulating liquid from said basin through said pipes, and a refrigerating coil for cooling the liquid in said basin.

2. A bottle cooling unit comprising, a casing having therein a liquid basin and being provided with adjoining inlet and outlet guides associated with a common opening, a conveyor continuously operable within said casing to transport successive bottles in upright position from said inlet to said outlet guide, spray pipes disposed above said conveyor for spraying cooling liquid against the exteriors of the bottles, means for effecting adjustment of said pipes to cooperate with bottles of different sizes, and a pump for circulating liquid from said basin through said pipes.

3. In combination with a receptacle washer and filler connected by a continuous main receptacle conveyor, a housing detachably associated with but laterally removed from said conveyor, said housing being provided with adjoining inlet and outlet guides associated with a common opening and with the main conveyor, an auxiliary conveyor continuously operable within said housing for temporarily removing and subsequently returning receptacles from and to said main conveyor, and means within said housing for effecting change in temperature of the receptacles while on the auxiliary conveyor within the housing.

4. In combination with a receptacle washer and filler connected by a continuous main receptacle conveyor, a housing detachably associated with but laterally removed from said conveyor, said housing being provided with adjoining inlet and outlet guides associated with a common opening and with the main conveyor, an auxiliary conveyor continuously operable within said housing for temporarily removing and subsequently returning receptacles from and to closely adjacent points on said main conveyor, and means within said housing for effecting change in temperature of the receptacles while on the auxiliary conveyor within the housing.

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