Dec. 4, 1928.

1,693,995

H. B. WILLIAMS

BOTTLE COOLER

Filed Sept. 2, 1925

2 Sheets-Sheet 1

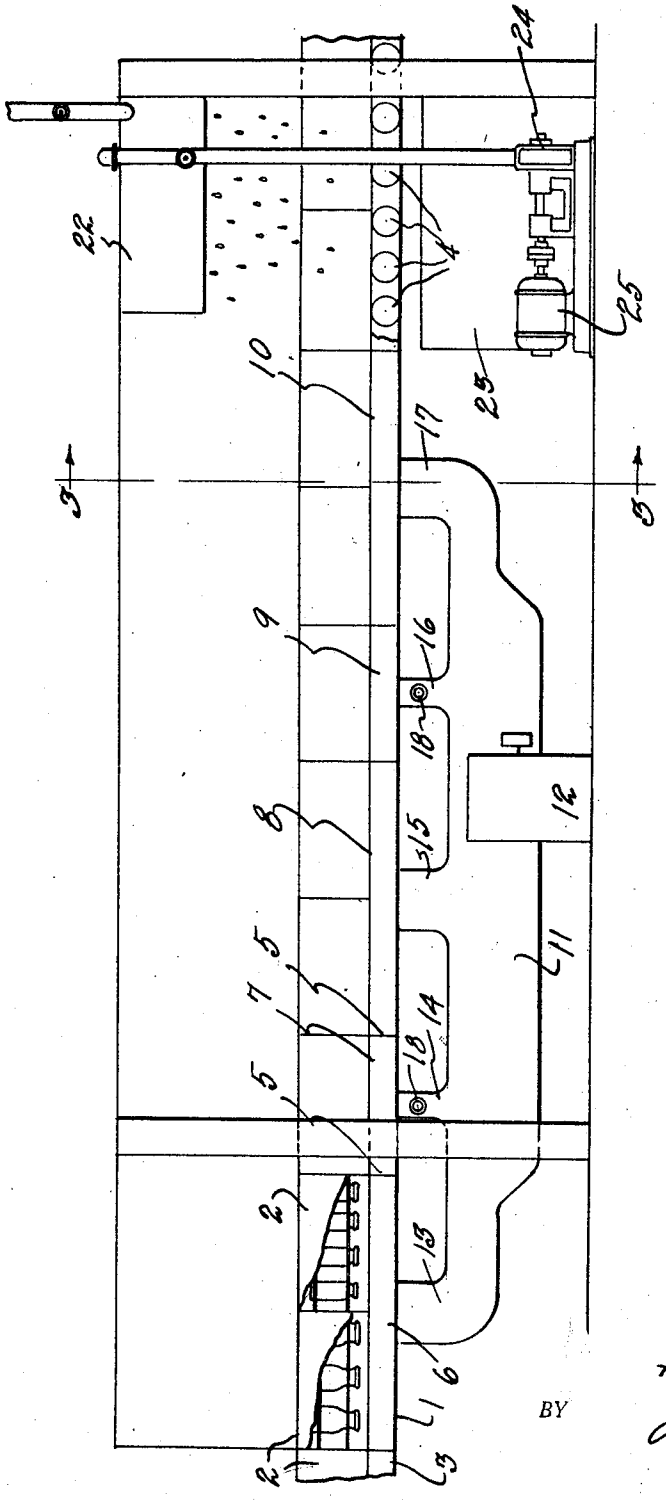


Fig. 1

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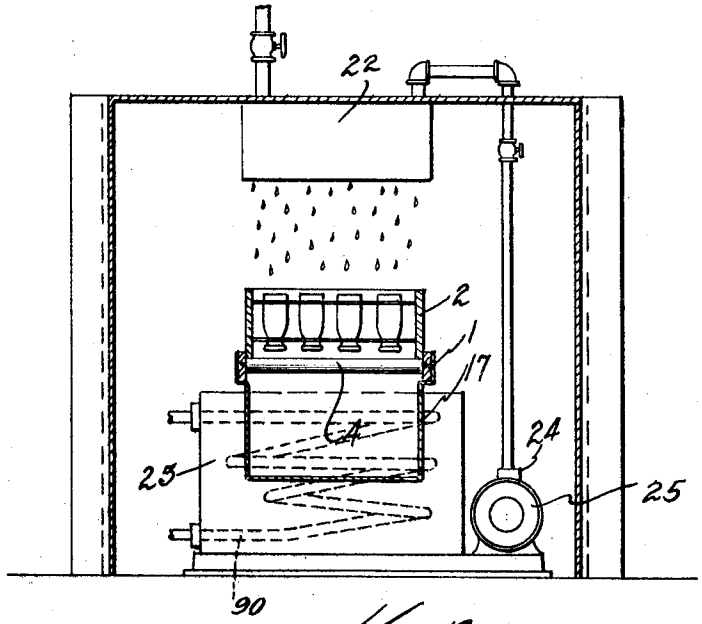


Fig. 3

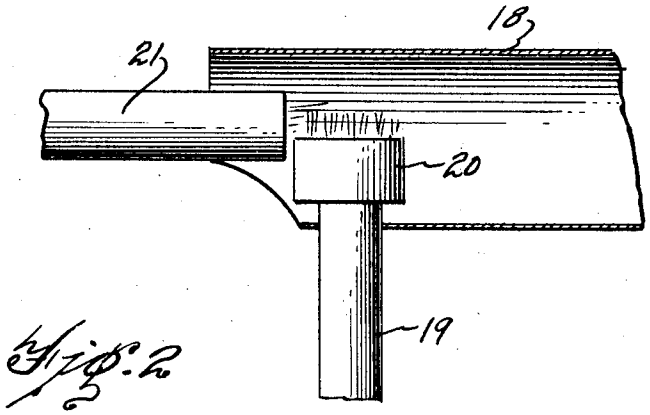


Fig. 2

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Patented Dec. 4, 1928. 1,693,995

UNITED STATES PATENT OFFICE.

HENRY B. WILLIAMS, OF DETROIT, MICHIGAN, ASSIGNOR TO JOHN W. LADD CO., OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

BOTTLE COOLER.

Application filed September 2, 1925. Serial No. 54,104.

This invention relates to method of and means for automatically cooling bottles and the like as they are discharged from a bottle washing machine. Heretofore, with milk bottles for instance, the crates or boxes containing the bottles are passed through the bottle washing machine where the bottles are thoroughly washed by the discharge of steam at high temperature and heretofore considerable time has been required to allow the bottles to cool previous to being refilled with cold milk.

The purpose of this invention is to provide a rapid and efficient means and method whereby the bottles may be rapidly reduced in temperature and immediately returned to the filling machine for refilling.

The novel features of the invention are involved in the means of and method by which the bottles are reduced in temperature to approximately at or below the temperature of the milk with which they are to be filled and consists in successively coating the bottles inside and out with vapor or with water at a temperature above that which would cause breakage of the bottles and applying moisture absorbing air or gas to cause a rapid evaporation of the moisture and consequent reduction in temperature of the bottles. When the temperature of the bottles has been reduced sufficiently they are submitted to a final spray of cold water, the purpose being to reduce the temperature of the bottles to such point that the milk with which they are to be filled is not caused to rise in temperature.

These objects and the several novel features of the invention are hereinafter more fully described and claimed, and the preferred form of an apparatus for the performance of the method is shown by the accompanying drawings in which—

Fig. 1 is a side view diagrammatic in form showing the apparatus and relationship of parts for the rapid cooling of the bottles.

Fig. 2 is a detail partly in section showing the method of discharging a vapor of steam and water into and around the bottles.

Fig. 3 is a cross section of the device taken on lines 3—3 of Fig. 1.

In the preferred form of apparatus there is a conveyor 1 for the cases or boxes 2 which provides a continuation of a conveyor 3 from the washing machine (not here shown). These cases, as will be understood from Fig. 3, are open at the top and bottom and as shown at the left side of Fig. 1, the bottles are supported with the open ends downward. The crates ride on rollers 4 provided between the side members of the conveyor as will be understood from the right hand side of Fig. 1 and are therefore readily movable through the machine in end to end contact and preferably by the power supplied in moving the cases through the washing machine. Preferably the cooler is provided with a sheet metal housing which houses the conveyor and cases as indicated more particularly in Fig. 3 and sufficient opening is provided at the front and rear ends of the housing to permit unobstructed passage of the boxes into and out of the cooling device.

Within the housing the conveyor is divided into sections by sheet metal division walls 5, 5 etc., so that there are provided sections 6, 7, 8, 9 and 10, some of which are the length of a single case or box and some of which are the length of two crates. Beneath the conveyor I have provided a sheet metal duct 11 which is supplied by a fan indicated diagrammatically at 12 which may be of any desired type as for instance the blower type which takes air from the room or any desired source and discharges it through the outlet ducts 13, 14, 15, 16 and 17. In the ducts 14 and 16 I have provided what I have termed a vaporizer shown more clearly in Fig. 2. This vaporizer comprises a conduit 18 having a water inlet 19 provided with a spray head 20 and a steam conduit 21 blows across the top of the spray head 20 to produce a heated vapor. There are two vaporizers 18 provided one opening into the conduit 14 and the other opening into the conduit 16 and the heated vapor passing from the vaporizer is mixed with the air flowing through the respective conduit 14 or 16 as will be understood from Fig. 1. In the vaporizer 18 which opens into the conduit 16 the quantity of steam utilized is less than that passing into the conduit 14 so that the resultant vapor and air mixture from the conduit 16 is cooler than the vapor and air mixture passing from the conduit 14. A tank 22 is provided at the discharge end of the housing as shown in Fig. 1 and is adapted to spray cold water over the bottles in the open cases and a reservoir tank 23 is provided directly beneath the spray tank 22 and is adapted to receive the water passing from the spray tank. This reservoir tank 23 is

preferably equipped with brine coils 90 to cool the water therein and a pump 24 is provided driven by an electric motor 25 and is adapted to pump the cooled water from the reservoir tank to the spray tank 22.

The cases contain both pint and quart bottles and are fed from the washing machine over the conveyor 3. These bottles are very hot as they come from the washing machine and as the bottles pass over the section 6 dry air is blown over the bottles from the duct 13. This dry air partially cools the bottles and by the continuous movement of the cases the bottles are next moved over the section 7 where a mixture of heated vapor and air is blown about the bottles from the duct 14. The bottles are next moved into the section 8 where dry air is blown over them from the duct 15 which further cools the bottles after which they are subjected to a warm vapor and air mixture from the duct 16 which is cooler than that blown through the duct 14. The bottles then pass into the section 10 where dry air is blown through and about the bottles from the duct 16 to further cool the bottles and by the continuous movement of the cases the bottles are next subjected to a spray of cold water from the spray tank 22 and the cases with the bottles pass from the machine over the roller 4 of the conveyor in a completely cooled condition and the bottles may be then filled with cold milk without danger of breakage.

While I have described a means of supplying a vapor to the bottles it is to be understood that heated water may be discharged to both the interior and exterior of the bottle in any approved manner. The bottles on passing from the washing machine have a temperature of about 190 degrees F., and it has been found that with glass at present in use if water or vapor is discharged onto the bottles it must have a temperature within eighty degrees of the temperature of the bottle or breakage will result. Therefore, in the beginning a water spray having a temperature of about 115 degrees F., will be sufficient for this purpose and subsequent to the coating of the bottle with moisture a moisture absorbing air having a very much lower temperature may be employed as I have found the temperature of air may be very much lower than the temperature of the bottle without causing breakage. The number of steps in this cooling process is not material as it would only affect the rapidity with which the bottles may be passed through the machine. In the drawings I have illustrated four steps in which the bottles are twice subjected to the moistening step and twice to the dry air step. This is about the least number of steps that may be employed with the usual washing and filling machines but additional steps may be provided if it is desired to handle the bottles more rapidly.

The dry air mentioned is to be understood as being air sufficiently dry to still absorb moisture, and I have found in my experiments that atmospheric air under most normal conditions is well adapted for this purpose.

From this description it is believed that the operation of the apparatus will be readily understood and that it is evident the apparatus is simple and inexpensive in form and provides a device adapted to accomplish the objects described.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. A machine for cooling previously washed and heated bottles comprising a conveyor to which heated bottles are supplied, and a series of ducts arranged to discharge upwardly through the conveyor and about the bottles, means for passing moisture absorbing air through the ducts, means for adding heated vapor to the air passing through some of the said ducts, the arrangement providing that the bottles are successively submitted to a bath of moisture absorbing air and a bath of heated vapor in succession, a spray tank positioned over the discharge end of the conveyor and adapted to supply cold water over the bottles therein as they pass therebeneath, a reservoir beneath the conveyor and spray tank adapted to receive water discharged from the tank, means for cooling the water in the reservoir, and a pump for returning the cooled water to the tank.

2. A machine for cooling heated glass bottles comprising a housing, a conveyor for bottles extending longitudinally therethrough, a series of ducts over the open ends on which the bottles are passed, means for discharging moisture absorbing air through the said ducts, and means for supplying heated vapor of several of the ducts so that the bottles are subjected to a bath of air and heated vapor and then to a bath of moisture absorbing air successively as they progress through the machine, a reservoir beneath the conveyor at the discharge end of the housing, a spray tank in the housing above the conveyor and reservoir adapted to discharge cold water over the bottles into the reservoir, means for cooling the water in the reservoir, and a pump for transferring the water from the reservoir to the spray tank.

3. A machine for cooling heated and cleansed bottles, comprising a conveyor to which the bottles are supplied, a blower, a series of ducts having the discharge ends in alignment beneath the conveyor, means for discharging moisture absorbing air through the ducts, means for adding heated vapor to air passing through part of the ducts only whereby the heated bottles are submitted to

a moisture depositing bath and then to a moisture absorbing bath of air to increase the rapidity of evaporation and thereby decrease the temperature of the bottles, and means for spraying the bottles with cold water subsequent to passing the discharge ends of the air ducts.

4. A machine for the rapid and continuous cooling of heated receptacles of fragile material comprising a housing, a conveyor therein for transferring the bottles through the housing, a blower, a series of ducts to which air is discharged by the blower, the said ducts having openings beneath the conveyor whereby the air is discharged through the conveyor and into and about the receptacles, means for supplying heated vapor to some of the ducts so that the bottles are covered with a moisture caused to vaporize rapidly through subsequent submission of the bottles to a flow of air thereabout, and means for spraying the bottles with cold water subsequent to submission to the air and moisture baths.

5. In a machine for cooling heated articles formed of fragile material, means providing a bath of moisture laden air, means providing a bath of moisture absorbing air, and means for submitting the articles to the said baths in succession whereby rapid evaporation on the surface of the articles and consequent cooling thereof is produced.

6. The method of cooling heated fragile articles consisting in submitting the same successively to a bath of moisture absorbing air of a temperature below the temperature of the articles, then to a bath of moisture laden air to cause deposition of moisture thereon, then to a second bath of moisture absorbing air, and then to a second bath of moisture laden air of lower temperature than the first moisture laden bath, and then to a third bath of moisture absorbing air, and finally spraying the bottles with water having a temperature sufficient to reduce the temperature of the articles to the desired final extent.

7. The method of cooling heated articles of fragile material consisting in submitting the same successively to a bath of moisture absorbing air and of heated vapor alternately having a temperature below that of the articles being treated, and then spraying the articles with cold water to finally cool them.

8. The method of cooling heated receptacles of fragile material preparatory to filling with cold fluid which consists in first coating the receptacles inside and out with a vaporizable liquid having a temperature below that of the receptacles and above that which would cause breakage thereof, and then submitting the moisture coated receptacles to a bath of moisture absorbing air having a temperature not in excess of that of receptacles submitted thereto and repeating the steps until the temperature of the receptacles is reduced to an extent to permit subjection without breakage to the final step, viz, submitting the receptacles to a bath of cold water to reduce the temperature thereof to approximately that of the fluid with which they are to be filled.

9. The method of cooling heated receptacles of fragile material preparatory to filling with a cold liquid which involves the subjection of the heated receptacles to a bath of vaporizable liquid, and then to a bath of moisture absorbing air having a temperature below that of the receptacles submitted thereto and repeating said steps to cause successive periods of rapid evaporation at the surface of the receptacles until the temperature thereof is reduced to a point permitting subjection without breakage to liquid of a temperature approximately that of the liquid with which the articles are to be filled.

In testimony whereof I sign this specification.

HENRY B. WILLIAMS.