Aug. 23, 1949. A. K. SCRIVEN 2,479,871

CONTINUOUS FREEZING UNIT

Filed Aug. 10, 1945 2 Sheets-Sheet 1

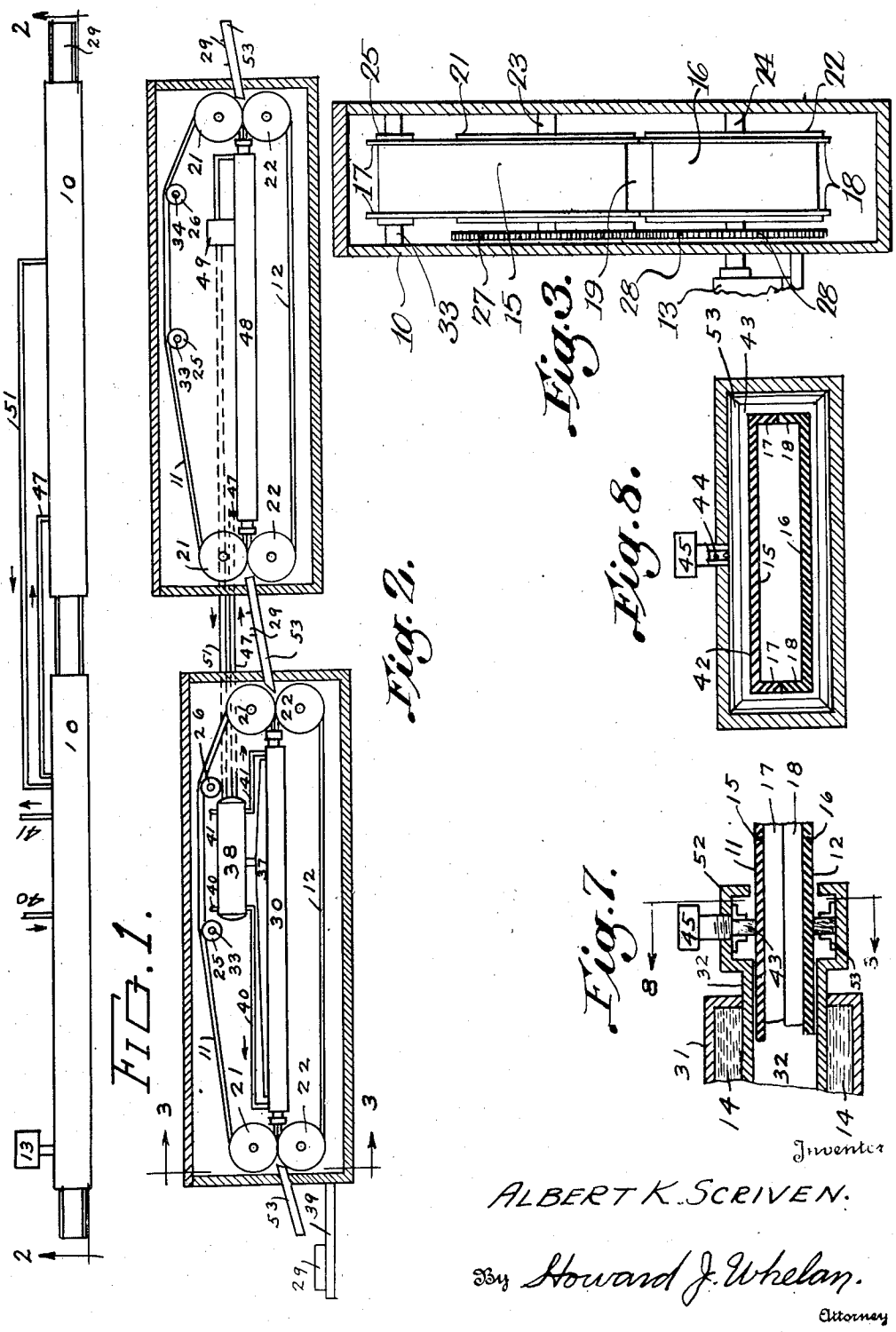


FIG. 1.

Fig. 2.

Fig. 3.

Fig. 8.

Fig. 7.

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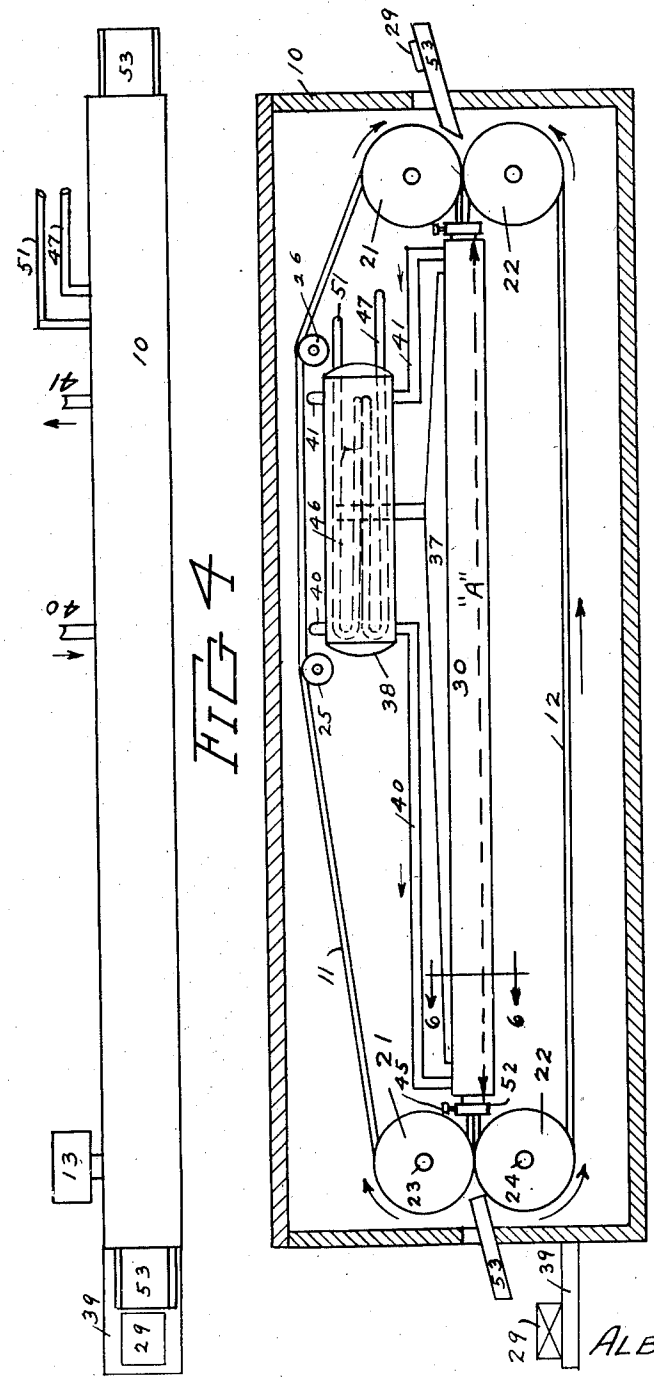


FIG. 4

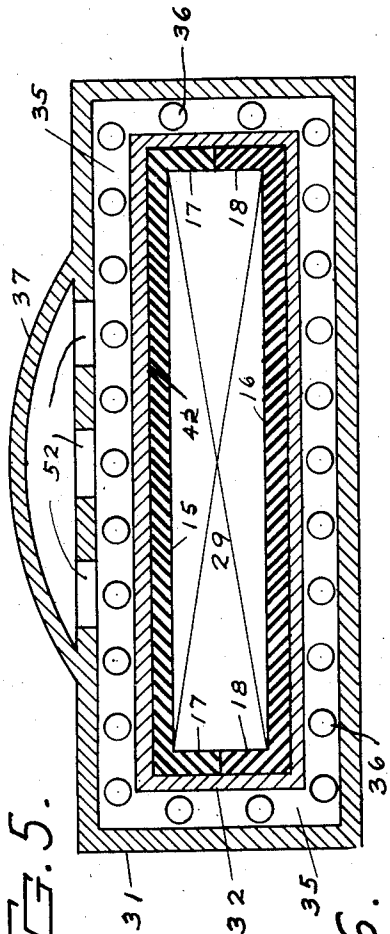


FIG. 5.

FIG. 6.

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CONTINUOUS FREEZING UNIT

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Application August 10, 1945, Serial No. 610,072

3 Claims. (Cl. 62—104)

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This invention relates to refrigerating equipment and more particularly to a machine for the continuous freezing of food.

In a particular form in the prior art a refrigerating machine freezes food without use of a secondary coolant such as brine, but does same directly with the primary coolant, on two sides of the article of food to be cooled. The food is kept under a slight pressure by the coolant ducts so as to get a quicker and more effective response to the action of the coolant. The disadvantages of this form are that pressure is needed, only two sides or a limited area of the periphery is encountered by the refrigerant action; and the articles are cooled in an intermittent manner, and is known as the "batch" method.

It is a general object of this invention to provide a new and improved refrigerating machine that will avoid one or more of the disadvantages and limitations of the prior art.

An additional object of the present invention is to provide a new and improved refrigerating machine that can cool packages of food in a continuous manner in a very effective manner.

Another object of this invention is to provide a new and improved refrigerating machine that can employ a primary coolant directly on the housing containing the packages to be cooled and over all peripheral sides of the same.

Other objects of the present invention will become apparent as the invention is more fully set forth.

In order that the invention may be more clearly understood attention is hereby directed to the appended drawings, forming part of this application and illustrating one embodiment of the invention.

Referring to the drawings:

Figure 1 is a plan view of the continuous freezing unit including the precooling unit embodying the invention;

Figure 2 is a side elevation partly in section, taken along line 2—2 of Figure 1;

Figure 3 is an end elevation partly in section, taken along line 3—3 of Figure 2;

Figure 4 is an enlarged plan view of the continuous freezing unit shown in Figure 1;

Figure 5 is a side elevation of Figure 4 partly in section;

Figure 6 is an enlarged view taken along line 6—6 of Figure 5;

Figure 7 is a typical section taken through the belt anti-freeze lubricator used in this device, and

Figure 8 is a sectional view taken along lines 8—8 of Figure 7.

Similar reference characters refer to similar parts throughout the drawings.

In the structure indicated 10 represents the housing and base of a preferred form of refrigerating machine, in which the upper and lower conveyors 11 and 12 respectively operate in the directions shown by the arrows. They are enclosed in this housing, and are actuated appropriately by the motor 13 and suitable transmission.

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Each conveyor is formed with a continuous carrier 15 and 16 respectively of channel cross-section with the flanges 17 and 18 extending outwardly so as to contact each other to form a rectangular boxing 19 along the freezing travel distance. The conveyors 11 and 12 are arranged one above the other in a vertical plane, and run on the drums 21 and 22 respectively. The shafts 23 and 24 supporting the drums run in bearings mounted in the side of the housing. The shafts 23 and 24 have gears 27 and 28 attached to them and driven by the motor 13 in the proper direction. The shafts 33 and 34 run free and their drums 25 and 26 follow like idlers. The carriers 15 and 16, are made of flexible material, preferably synthetic rubber or its equivalent, which has a reasonably high heat conductivity.

The freezing travel distance A is that portion of the boxing of the carrier that carries the packages 29, and during that period passes through a primary coolant jacket 30, which surrounds the joined carriers in this travel distance. The jacket 30, consists of a casing having an outer wall 31 of rectangular cross-section, and an inner wall 32 of similar cross-section but spaced interiorly therefrom by spacers 35. The spacers have holes 36 to allow the coolant to circulate. The whole casing is closed in and contains a primary coolant, such as ammonia 14, suitably cooled and circulated by a feedline 40 and return line 41, in a conventional manner, the details of which are all known to those skilled in the art. Since the coolant is a primary one, that is one used in the machine directly without brine or other secondary coolants, an auxiliary pipe or hood 37 is connected by holes 52 to the jacket as shown and an escape tank 38 is provided at a suitable high point to take up the vaporized gas derived during the heat exchange occurring as the packages are cooled. The packages 29 fit within the channels of the carriers neatly so that pressure is exerted on their top, bottom and side surfaces, resulting in a very effective cooling reaction. The cold coolant cools the material of the carrier in the distance A, which in turn cools the packages therethrough. The packages are readily emplaced in the open channels at the right hand side of Figures 1 and 5 by chutes 53 and caught and carried as the flanges come together. They are carried by the boxed channels until they reach the opposite side of the machine and fall on to a shelf 39, and removed as arranged.

In order to reduce the friction during travel

of the carriers against the inner surface 42 of the internal wall 32, and at the same time avoid difficulty with moisture or condensation thereon, a felt lining 43 attached to the extruded end 52 of inner wall 32 by angles 53 soaked in an anti-freeze lubricant such as glycerine 44 by the feeder 45 is used in between. This lubricates the surfaces and reduces friction, at the same time preventing any trouble from water. As the packages are impressed on all sides by the freezing surfaces, the heat flow occurs thoroughly therein, and causes them to be cooled very evenly, which is not possible when only two surfaces are cooled.

The movement of the carrier increases the rate of effective heat exchange, more so than if the coolant reaction was applied to the stationary package.

The machine offers a method of freezing which is time and labor saving and is economical in the use of power. This is due to the continuous and even travel of its conveyors; the easy manner in which the packages are introduced and emptied automatically and the avoidance of packing; pressure operations and additional operations required in conventional arrangements.

The carriers can carry the packages in a single line or in such numbers abreast as may be required, depending on the size of the packages or the width of the channels. If the temperature drop is to be considerable, the use of several of the machines in tandem can be arranged to take care of the situation.

When used in tandem the preceding machines are termed precoolers and are placed in the production line ahead of the finished freezer, this allows the temperature of the product to be reduced in rapid steps in an automatic and continuous travel. The cooling medium used in the precoolers may be brine or one of the antifreeze liquids 50 which can be cooled through a coiled pipe 46 inserted in the escape tank 38 and carried through a pipe 47 to the jacket 48 which surrounds the conveyor and cools the product carried therein in a similar manner to that performed by the coolant jacket 30, the cooling medium is drawn from the jacket 48 by a pump 49 and returned through piping 51 to the coiled pipe 46 for recooling in tank 38.

While but one general form of the invention is shown in the drawings and described in the specifications, it is not desired to limit this application for patent to this particular form or in any other way otherwise than limited by the scope thereof, as it is appreciated that other forms of construction could be made that would use the same principles and come within the scope of the appended claims.

Having thus described the invention, what is claimed is:

1. A continuous cooling machine comprising, a housing, a plurality of carriers of flexible material of flanged form operating within the housing, drums for guiding the carriers in different planes and inducing an arcuate returning travel therein in an endless manner, said carriers being arranged whereby their flanged form will provide for a coordinated engagement with each for a predetermined travel distance, said engagement providing a boxed-in arrangement for packages to be inserted, carried and delivered therefrom in said distance, a primary coolant means mounted in the casing and adapted for the carriers to pass therethrough and in surface contact therewith and to keep the carriers in said engagement and the carriers against the packages

in a continuous line, and means for lubricating the casing and carriers with a low temperature non-toxic fluid to facilitate the travel through said distance said carriers being arranged in pairs running in different planes whereby the flanges thereof will be opposite each other and contact along their flange edges to form a hollow rectangular structure for said distance and opening up to travel around their respective drums in arcuate V-like directions for travel outside of said distance.

2. A refrigerating machine of the class described comprising an enclosing housing for maintaining a predetermined temperature range therein, a pair of superposed carriers operating in said housing of flexible material having channel-like forms with the outward flanges of one of said carriers facing and contacting the outward flanges of the other carrier during a predetermined portion of their travel in said housing to provide a box-like structure for the enclosing and carrying of packages to be refrigerated therein, means for operating said carriers in belt-like manner about rotating members included therein, said carriers separating from each other as their respective portions travel around said members and endlessly continuing in another plane until they reach said predetermined portion of their travel to again contact each other in the box-like structure means as aforesaid, means for delivering said packages to the carriers as they begin to form said structure and other means for arranging the removal of said packages when the carriers begin to separate from each other.

3. A refrigerating machine of the class described comprising an enclosing housing for maintaining a predetermined temperature range therein, a pair of superposed carriers operating in said housing of flexible material having channel-like form with the outward flanges of one of said carriers facing and contacting the outward flanges of the other carrier during a predetermined portion of their travel in said housing to provide a box-like structure for the enclosing and carrying of packages to be refrigerated therein, means for operating said carriers in belt-like manner about rotating members included therein, said carriers separating from each other as their respective portions travel around said members and endlessly continuing in another plane until they reach said predetermined portion of their travel to again contact each other in the box-like structure means as aforesaid, means for delivering said packages to the carriers as they begin to form said structure and other means for arranging the removal of said packages when the carriers begin to separate from each other, and a coolant enclosing structure disposed in said housing about the carriers where the predetermined portion of the travel is arranged for refrigerating said packages while being carried in the box-like structure formed by said carriers.

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