Dec. 18, 1956 M. KASSER 2,774,230

COOLING METHOD AND DEVICE

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Fig. 1

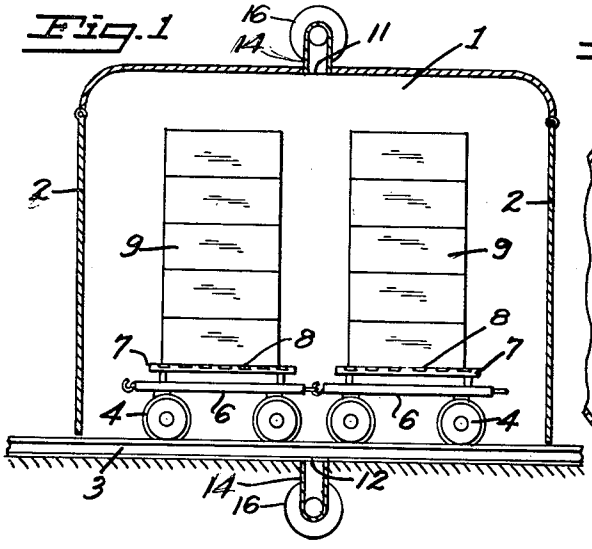


Fig. 2.

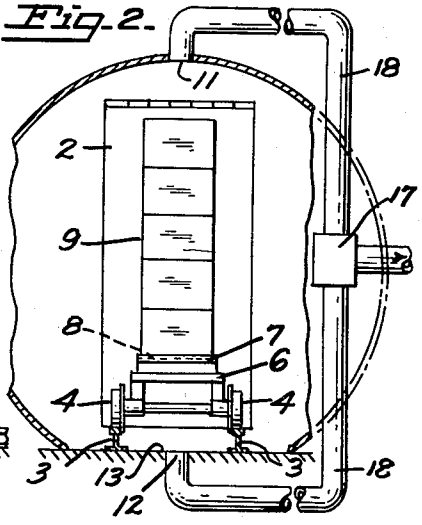


Fig. 3.

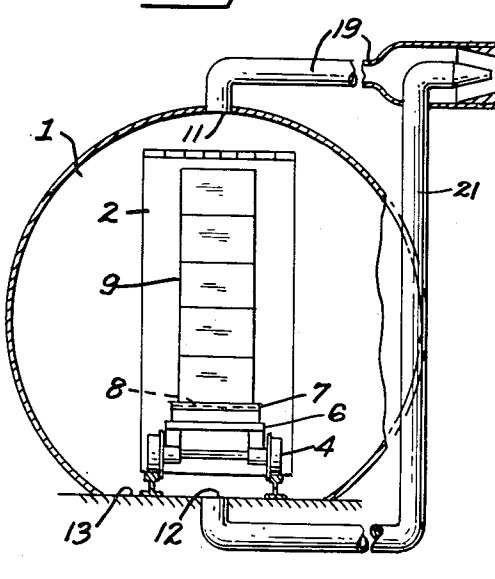
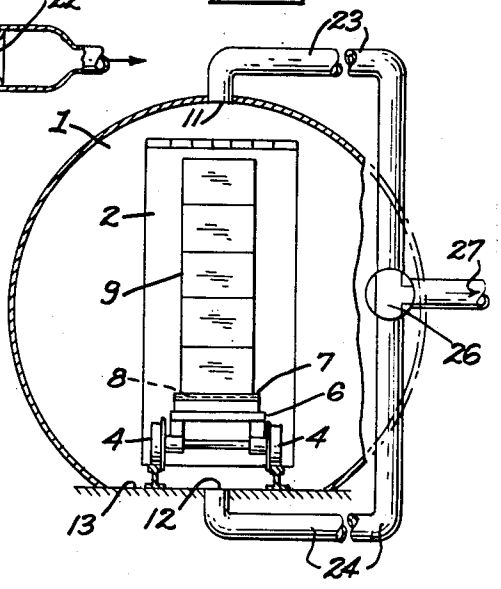


Fig. 4.



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Fig. 5.

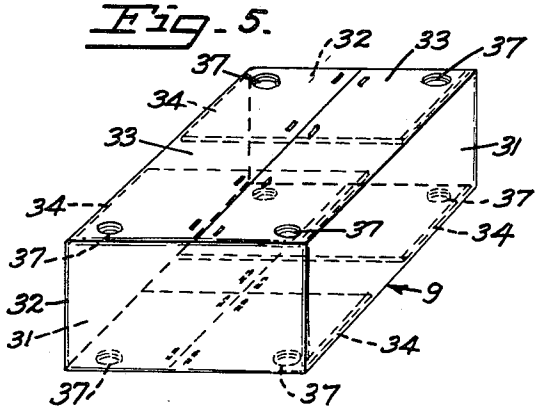


Fig. 6.

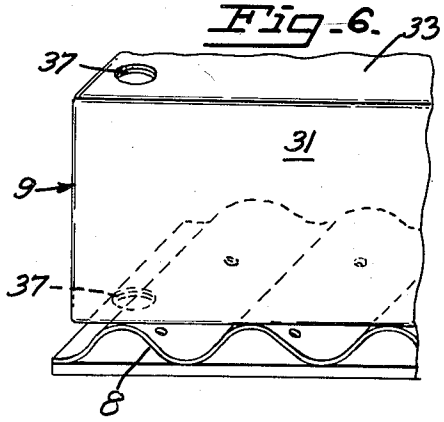


Fig. 7.

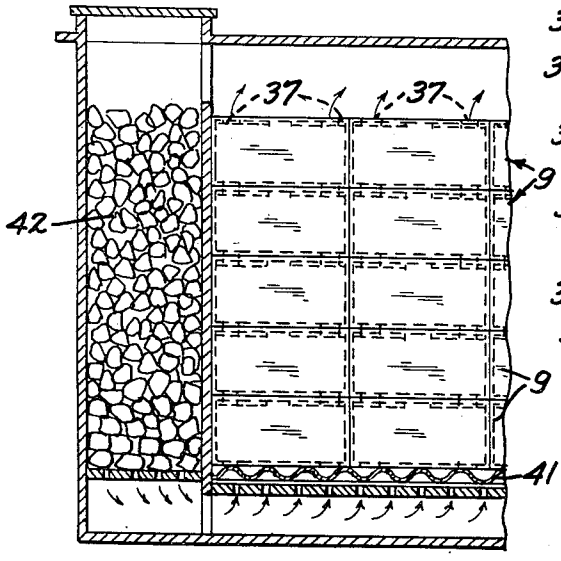
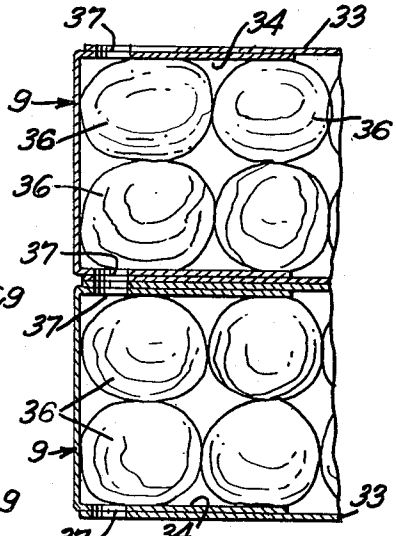


Fig. 8.



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COOLING METHOD AND DEVICE

Morris Kasser, Roseville, Calif.

Application April 17, 1952, Serial No. 284,836

3 Claims. (Cl. 62—169)

This invention relates to a cooling method and device.

The primary object of the invention is to provide a method and device whereby larger quantities of material, such as stacked boxes or crates of produce or the like, can be cooled rapidly and efficiently and uniformly throughout the entire mass or stack.

Another object of the invention is to provide a method and device utilizing a suction device or vacuum device for creating a low temperature in a chamber, wherein the suction is applied at several suitably located parts of the chamber to cause cooling at various portions of the stacked material to be cooled uniformly in said chamber.

Another object of the invention is to provide boxes or cartons for containing the produce and material which permit rapid drawing of air from between the produce or articles packed in said boxes or cartons and to cooperate with the vacuum drawing devices of a chamber for rapid cooling of the produce uniformly throughout stacks of such filled boxes.

Another object of this invention is to provide a method and devices whereby produce packed in stacked boxes can be effectively precooled by rapid vacuum removal of some of the moisture from said produce and then during shipping it can be kept fresh and cool by drafts of cooling moist air so as to replace some of said removed moisture on said produce.

I am aware that some changes may be made in the general arrangements and combinations of the several devices and parts, as well as in the details of the construction thereof without departing from the scope of the present invention as set forth in the following specification, and as defined in the following claims; hence I do not limit my invention to the exact arrangements and combinations of the said device and parts as described in the said specification nor do I confine myself to the exact details of the construction of the said parts as illustrated in the accompanying drawings.

With the foregoing and other objects in view, which will be made manifest in the following detailed description, reference is had to the accompanying drawings for the illustrative embodiment of the invention, wherein:

Fig. 1 is a diagrammatic view partly in section of a vacuum chamber with the articles to be precooled stacked therein.

Fig. 2 is a diagrammatic view partly in section of said vacuum chamber with another type of vacuum drawing arrangement.

Fig. 3 is a diagrammatic view partly in section of another modified form of vacuum drawing arrangement.

Fig. 4 is a diagrammatic view partly in section of another modified embodiment for drawing vacuum in the chamber.

Fig. 5 is a perspective view of a box used in my method and device.

Fig. 6 is a fragmental perspective view of a box in my method and device on a corrugated pallet.

Fig. 7 is a fragmental diagrammatic sectional view of

the cooling compartment of a carrier with my boxes stacked therein, and

Fig. 8 is a fragmental sectional view of aligned stacked boxes containing lettuce.

In carrying out my method, the produce, such as lettuce or leafy vegetables, is packed in suitable boxes with unobstructed vents in the boxes; then the packed boxes are suitably stacked and moved or carried into a closed chamber; then vacuum producing suction is applied to spaced portions of the chamber, preferably at the top and at the bottom of said chamber so as to draw the air from between the leaves and from around said packed produce and evaporate part of the free moisture contained on the leaves of such produce thereby to cool the produce, and then removing said stacked boxes of produce for shipping or storage. The boxes as herein mentioned may be made of corrugated or solid fibreboard or other suitable airproof material. During shipping said stacked boxes, by means of vertically aligned holes through the boxes, are subjected to generally vertical flow of cooled moist air for replacing some of said evaporated moisture and keeping said produce in the boxes fresh.

In detail in my method the free and easy removal of the moisture usually present in leafy vegetables is utilized in combination with vacuum for the cooling of the vegetables, so as to avoid the weakening of boxes in which the produce is packed. The flash cooling of the produce in the boxes is aided by means in the boxes to aid refrigeration when a vacuum is drawn through the boxes. For instance such aid is the evaporation of moisture on the produce in the boxes, and the provision of holes on the boxes unobstructed by the produce therein so that a cross draft of air is created through each box and between contents of said box to produce such refrigerant evaporation. The evaporation of moisture under such conditions is very rapid.

The drawing of vacuum both through the top and through the bottom of the chamber equalizes the draft and renders said evaporation and the resultant cooling uniform throughout the entire stack, and thereby obviates any uneven cooling of the produce or the unsufficient cooling of the produce in boxes at the bottom of the stack. Then the stack of boxes sealed except at said bottom and top holes is placed in the usual compartment of a shipping conveyance such as a refrigerated truck or railroad car, so that the bottom holes of the lowermost box are exposed to the usual refrigerated moist air circulation in the compartment. The said aligned holes form generally vertical airflow columns through said boxes for intimately contacting said refrigerated moist air with the produce in the stack of boxes to replace some of said moisture lost during the precooling step, and also to keep the produce cool and fresh in the top boxes of the stack as well as in the lower boxes thereof.

In my device the drawing of vacuum for various points of the cooling chamber may be accomplished by several variations of arrangements.

In all of the embodiments of my invention I provide a suitable vacuum chamber **1**, with suitable closures **2** at one end or at both ends, and tracks **3** on the floor of the chamber **1** for the wheels **4** of flat carriers **6** so that the carriers **6** can be rolled into and out of or through the chamber **1**.

On each carrier **6** is a suitable pallet **7** provided with suitable vent ribs or corrugations **8** to permit venting through the bottoms of the lowermost tier of boxes **9** of the stacked boxes on the pallet **7**. The boxes **9** at present are stacked to the height of five boxes or five tiers on each pallet, when cartons are used.

A suction port **11** is provided at the top of the chamber **1** and another suction port **12** is provided through

the bottom or floor 13 of the chamber 1. Vacuum is drawn through these ports 11 and 12 by means of suitable suction device, not shown, such as the injector type suction device shown in my Patent No. 2,344,151, issued March 14, 1944, for method and apparatus for treating perishable articles.

The connection from the ports 11 and 12 in the form shown in Fig. 1 include separate conduits 14 each leading to a separate pumping device 16, indicated diagrammatically.

In the form shown in Fig. 2 a vacuum chest 17 is suitably connected to a vacuum pump, not shown, and equal distance conduits 18 extend from the chest 17 to each port 11 and 12.

In the form shown in Fig. 3, a conduit 19 leads from the top port 11 to a suitable pumping device not shown, and another conduit 21 leads from the bottom port 12 to said first conduit 19 and terminates therein in a venturi tube 22 so that the suction through the first conduit 19 draws the vacuum also through said venturi tube 22 and conduit 21 also out through the bottom port 12.

In the form shown in Fig. 4, a conduit 23 leads from the top port 11 and another conduit 24 leads from the bottom port 12. Both conduits 23 and 24 lead to a two way valve 26 indicated diagrammatically, which latter is connected by a conduit 27 to a suitable vacuum pumping device not shown. In this form the vacuum is first drawn through the top port 11 and then the valve 26 is switched over to shut off the conduit to the top port 11 and to open the other conduit leading from the bottom port 12 so as to alternately draw vacuum through the top and through the bottom of the chamber 1.

The preferred form of the box 9 includes sides 31, ends 32, longitudinal flaps 33 folded from the longitudinal edges of the sides 31 respectively over the outside of the top and bottom openings, and end flaps 34 folded from the top and bottom edges of the ends 32 so as to be under the longitudinal flaps 33. The flaps 33 and 34 are suitable stapled or otherwise secured together to inclose the produce, such as lettuce 36 packed in the box 9. The superimposed flaps 33 and 34 have aligned vent holes 37 therethrough.

In the illustrative embodiment herein there are four such holes 37 on the top and four holes on the bottom of each box 9, preferably also in vertical registry. The holes 37 are offset with respect to the produce, such as the head of lettuce 36 so as to be unobstructed by said lettuce. For instance the location near the corners, as shown, keeps the holes unobstructed. The suction action creates a draft through each box 9 which draft draws through the aligned holes vertically, and also diagonally through holes at diagonally opposite corners. In this manner the draft thoroughly contacts all the articles, such as lettuce in the box and accomplishes rapid uniform cooling. This action is enhanced by the drawing of vacuum through the bottom as well as through the top of the chamber, or by the reversal of direction of draft.

The holes in the tops and bottoms of all the boxes or cartons are located symmetrically so that as the boxes are stacked vertically, the respective holes of the adjacent stacked boxes are in registry. In other words in the stack of boxes the respective holes are in vertical registry throughout the stack. The holes on the bottom of the lowermost box of each stack are kept open by said ribs or corrugations on said pallet or by suitable spacers on any supporting surface such as the floors of storage spaces or shipping conveyances, so as to permit free vertical columnar flow of the air through said stack of boxes. This not only facilitates the cooling process, but it also permits such columnar circulation of air through the stacked boxes during shipping and storage.

As an example, of such added function of these boxes, in Fig. 7, is shown a diagrammatic view of a part of a railroad car with a perforated corrugated bottom insert 41 on which the packed sealed boxes 9 are stacked usually five box height in case of cartons. The holes 37 are aligned in vertical columns in each stack so that the cold moist air from the ice bunker 42 will travel upward through the entire stack and in addition to its cooling function, it will also replace some of the moisture removed from the produce during the aforedescribed precooling operation, and thus will keep the produce fresh.

I claim:

1. In a cooling device, in combination, a stack of closed boxes containing a produce to be cooled and having vent openings arranged on opposite walls of said boxes for directing cross draft in said boxes, a vacuum chamber, a carriage to carry said stack or boxes into and out of said vacuum chamber, means on said carriage to permit access to the bottom of said stack of boxes, said vacuum chamber having ports at opposite walls thereof, and suction means to draw a vacuum in said chamber through said ports so as to produce a draft through said boxes and said produce for evaporating moisture present on said produce.

2. In a cooling device, in combination, a stack of closed boxes containing a produce to be cooled and having vent openings arranged on opposite walls of said boxes for directing cross draft in said boxes, a vacuum chamber, a carriage to carry said stack of boxes into and out of said vacuum chamber, means on said carriage to permit access to the bottom of said stack of boxes, said vacuum chamber having ports at opposite walls thereof, and suction means to draw a vacuum in said chamber alternately through said ports so as to produce a draft through said boxes and said produce for evaporating moisture present on said produce.

3. In a method of packing and shipping produce, the steps of packing the produce in sealed boxes with registering holes through the tops and bottoms of said boxes, stacking the said boxes so as to form said registering holes into generally vertical airflow columns for conveying airflow through said boxes, subjecting said stack of boxes to vacuum for evaporating some of the free moisture on the produce on said boxes and thereby cooling said produce, the placing of said precooled stack of boxes in a compartment for transportation and circulating moist laden cooled air through said vertical flow columns in said stack so as to replace on said produce some of the moisture removed during said precooling and to keep said produce fresh.

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