Nov. 11, 1969 A. C. SCHROEDER ET AL 3,477,243

REFRIGERATING SYSTEM

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Fig. 1

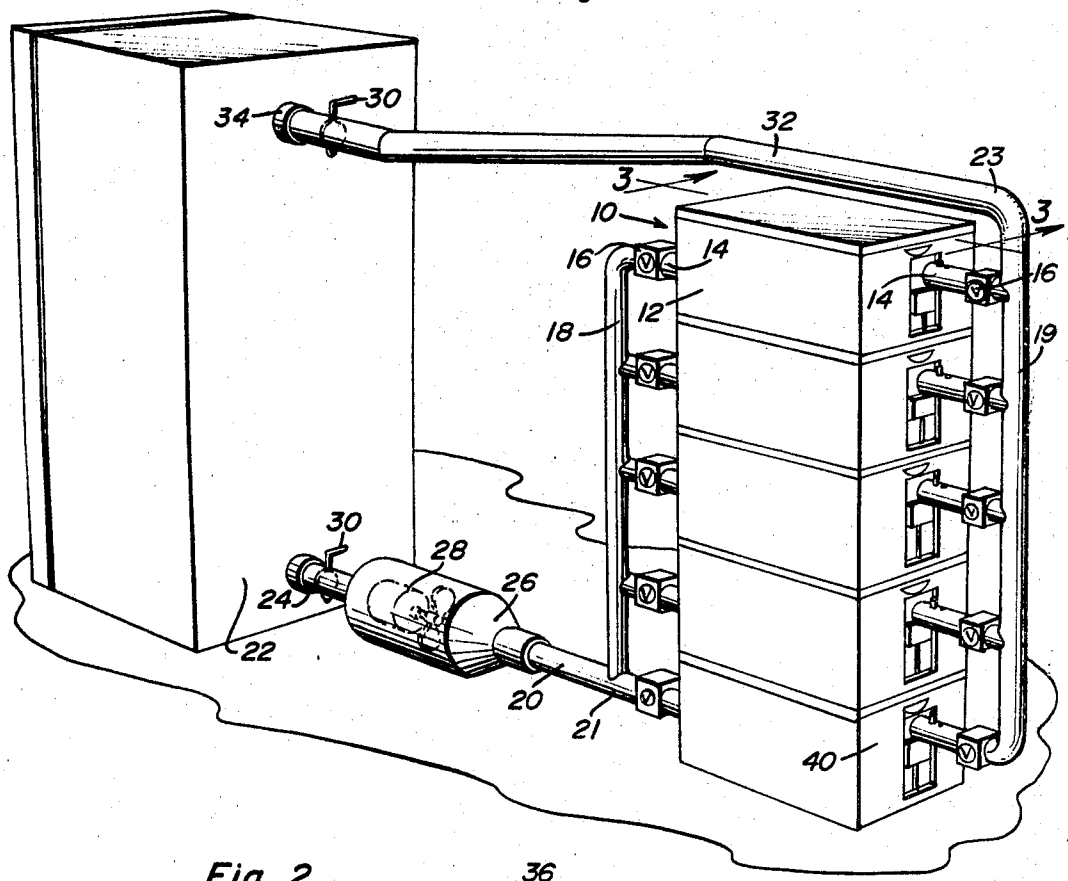
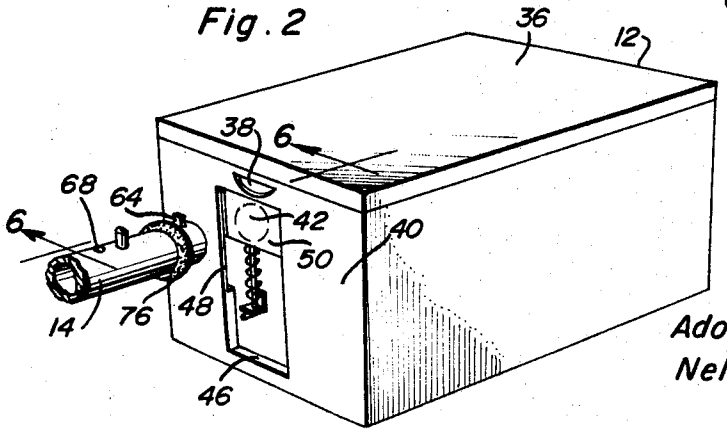


Fig. 2



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Fig. 3

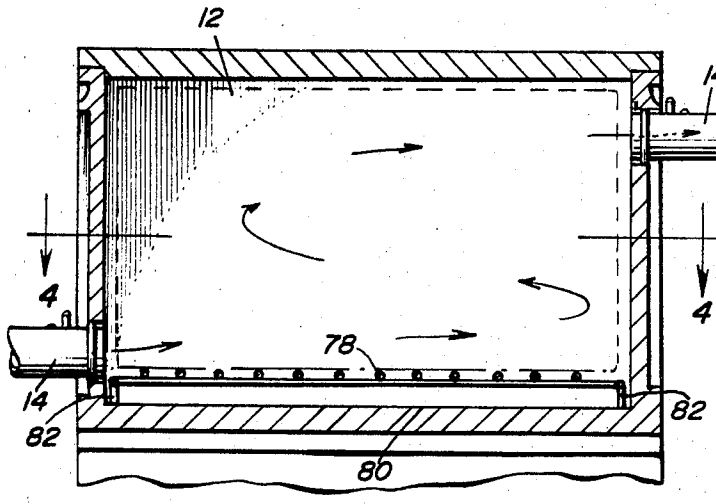


Fig. 6

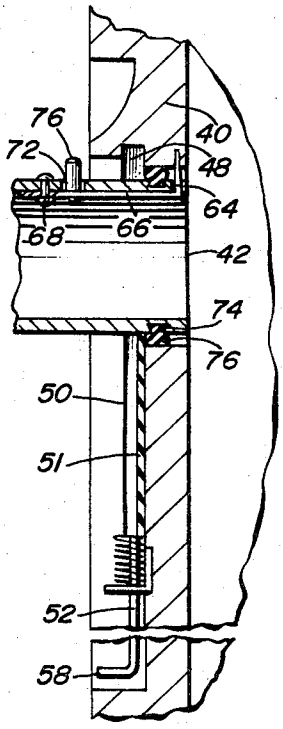


Fig. 4

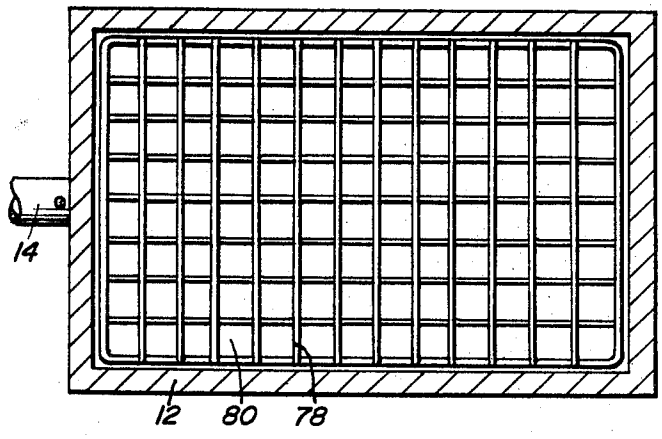
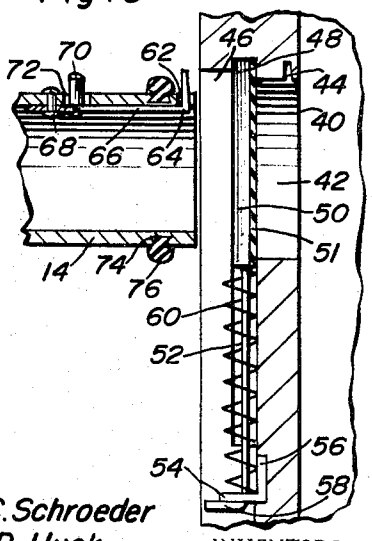


Fig. 5



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REFRIGERATING SYSTEM

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U.S. Cl. 62—298 7 Claims

ABSTRACT OF THE DISCLOSURE

A number of insulated containers are stacked upon one another, each container including an inlet port and an outlet port. A parallel branch pipe system conducting refrigerated air therethrough is connected to the inlet ports of the containers. Likewise, a parallel branch pipe system is connected to the outlet ports of the containers thereby providing an air return from the containers to the source of refrigeration. The pipe system is fabricated from flexible hose for expediting disconnection of any container from the stack.

The present invention relates to refrigerating systems and more porticularly to a portable container stack and associated pipe system for conducting refrigerated air therethrough.

In the past, refrigeration of food products prior to shipping has been accomplished by the storage of a large quantity of the same in a single refrigerated unit. In order to remove a quantity of the stored products, it is necessary to open the entire unit. This results in an inefficient operation of the refrigeration unit due to the constant exposure of the unit to ambient heat conditions. Certain prior art devices have provided portability of refrigerated food products by means of adapting an entire refrigerating unit to vehicular transportation. Further, the prior art has developed portable food containers maintained at a refrigerated temperature by virtue of Dry Ice or the like. This latter method requires the storage and handling of Dry Ice which is both time consuming and economically disadvantageous.

In summary of the present invention, a number of insulated containers are stacked one upon the other. Each container includes an inlet port of the container to the other container inlet ports. A common pipe supplies each branch with refrigerated air. Likewise, outlet ports are provided on each of the containers, these ports being mutually connected thereby providing a common air return from the containers. In actual operation of the present apparatus, refrigerated air is forced through the parallel connected inlet ports and returned in a parallel manner from the outlet ports of the containers back to the source of refrigeration. Utilization of a central refrigerating unit obviates the necessity of utilizing Dry Ice or the like. Further, the aforementioned pipe branches may be removed from their respective ports thereby permitting the removal of any number of containers from the stack. Removal of a container from the stack in no way disrupts the continued refrigeration of the remaining containers. Accordingly, among the more salient objects of the present invention are to provide:

Portable food containers;

A stack of containers refrigerated from a common refrigeration source, each container being removable from the stack;

A refrigerating pipe system for conducting refrigerated air through a preselected number of stacked containers;

A refrigerated food container including selectively closable inlet and outlet ports, and

A delivery pipe section which may be easily attached

or removed from the inlet and outlet ports of a refrigerated container.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a plan group view in perspective of the present refrigerated system.

FIGURE 2 is a perspective view illustrating the coupling between a delivery pipe section and the food container.

FIGURE 3 is a transverse sectional view of the food container with the delivery pipes coupled thereto.

FIGURE 4 is a transverse view taken along a plane passing through section line 4—4 of FIGURE 3.

FIGURE 5 is a fragmentary transverse detailed view illustrating the delivery pipe section prior to insertion into a mating portion of a refrigerating container.

FIGURE 6 is a fragmentary transverse view of the delivery pipe inserted within the food container, the view taken along a plane passing through section line 6—6 of FIGURE 2.

Referring specifically to the drawings, a preferred embodiment of the present invention includes a stack **10** of insulated food containers **12**, the containers are fabricated from a suitable insulating material such as styrofoam or the like and are shown in FIGURE 1 of the drawings. Each of these containers includes an inlet port on the left side thereof to which is attached a branch pipe section **14** communicating with a delivery pipe section **18** through a suitable airflow valve **16**. A refrigerated air supply pipe **20** supplies the delivery pipe section **18** with refrigerated air at a nodal point of connection denoted by reference numeral **21** which is then distributed to the individual containers in the stack via the branch pipe sections **14**. The refrigerated air supply is derived from a refrigeration source **22** of sufficient capacity to accommodate the number of the containers to be refrigerated. The refrigerated airflow enters the pipe system from a source outlet connector **24** which conducts the airflow to a cylinder **26** disposed along an intermediate length of the supply pipe **20**. An electically driven fan **28** is disposed within the cylinder thereby increasing the flow of refrigerated air from the source **22**.

As will be seen by viewing FIGURE 1, the right end of each container includes an outlet port to which is connected a branch pipe section **14** connecting each outlet port through a valve **16** to a return pipe section **19** which collects the air flowing through the outlet ports of each container. The return pipe section **19** is connected to a main return pipe **32** at a nodal point of connection denoted by reference numeral **23** in FIGURE 1. This latter return pipe is connected to the refrigerating unit **22** at an inlet connector **34** therein. Thus, a delivery and return pipe system is provided for the aforementioned containers. Manual airflow valves **30** are positioned outwardly of the inlet and outlet connectors **34** and **24** of the refrigerating unit **22**.

As seen in FIGURE 2, each container **12** includes a top lid **36** and recessed hand grips **38** formed within the end walls **40** of the container. The hand grip **38** is generally characterized by a V-shaped recess formed below the lid **36** of the container.

The connection of the pipe system to each container may be appreciated by referring to FIGURES 4 and 5 of the drawings. Referring to FIGURE 5 in particular, where the connection in the wall portion **40** is illustrated. This wall portion includes a cylindrical port **42** extending perpendicularly of the wall **40** and extending to the inte-

rior of the container **12**. A notch or latch keeper **44** is formed radially outward of the port wall. A rectangular recess **46** is formed outwardly of the port **42** and is perpendicular thereto. One end portion of the recess communicates with the port **42**. This end portion is characterized by a generally U-shaped groove **48** formed within the wall portions of the recess end portion. This groove provides a means for guiding the sliding motion of a sealing plate **50** which is disposed within the recess and which may be selectively moved within the recess to occlude the port **42**. The sealing qualities of the plate **50** are enhanced by utilizing an elastomeric backing **51** cemented to the plate **50**. A rod **52** is suitably affixed to the centrally disposed edge of the plate **50**. The outwardly disposed end of the rod **52** passes through an aperture **54** formed within an L-shaped guide bracket **56**, one leg of the bracket including the aperture **54** and the other leg being secured within the recess **48**. A compression spring **60** is disposed concentrically about the rod **52**, one end of the spring bearing against the centrally disposed edge of the plate **50** while the opposite end of the spring bears against the apertured leg of the bracket **56**. As shown in FIGURE 5, the spring **60** is normally expanded thereby forcing the plate **50** in sealing overlying relation with the port **42**. The free end of the rod **52** is provided with a right angle hook section **58** which provides a means for manually displacing the plate **50** from its sealing position with respect to port **42**.

As further seen in FIGURE 5 of the drawings, the pipe end section **14** includes an aperture **62** formed within the wall of the pipe section, the aperture extending radially therein. A latch member **64** is attached to a cantilevered member **66**, the latter being disposed along the interior wall of pipe section **14**. The opposite end of the cantilevered link **66** is fixed to the pipe section wall by means of a rivet **68** or other suitable fastener. A button **70** is affixed to an intermediate length of the cantilevered link **66**. An aperture **72** is formed within the pipe section **14** to allow the button **70** to protrude from the interior pipe section **14**. Thus, it will be appreciated that depression of the button **70** causes the latch member **64** to retract through the corresponding aperture **66** into the interior of the pipe section **14**. In this position, the pipe section may be inserted within or removed from the port **42** as illustrated in FIGURE 6 of the drawings. From a study of the latter figure, it will be appreciated that a release of the button permits the latch member **64** to protrude radially outward from the interior of the pipe section **14** and engage the latch keeper **44** formed within the port wall **42**. A dovetail groove **74** is formed along the periphery of the exterior pipe section surface thereby permitting the insertion of an O-ring seal **76**. The O-ring seal effectuates an air tight connection between the pipe section **14** and the port **42**.

FIGURES 3 and 4 illustrate the interior structure of each container **12**. As illustrated by the figures, a screen or grate **78** is disposed above the base wall **80** of the container **12** and in spaced relation thereto. The screen is supported by downwardly turned end portions **82** of the screen. The purpose of the screen is to permit positioning of produce thereupon instead of the base wall **80** of the container **12** which after repeated use may be covered with a harmful residue. The screen **78** may be removed from the container and cleaned periodically thereby retaining the food produce such as eggs, vegetables or the like placed within the container in a sanitary condition.

In operation of the device, the stack of containers may be connected with a refrigerating unit to maintain the stored products in a refrigerated state. At such time when one or more of the containers is needed for shipment, the inlet and outlet pipe branches may be easily disconnected from the container by depressing the lever button located on the pipe branch. A gentle outward pull on these branches will release the engagement between the pipe branch and the associated port. Upon removal of a pipe branch from the port, the spring loaded sealing plate will snap into sealing overlying relation with the exposed port. Thus, the refrigerated state is maintained within the container during a period of shipment of the same. Further, each pipe branch includes a valve therein which may be closed thereby redirecting the refrigerated airflow to other containers linked to the refrigerated pipe system.

The source of refrigeration **22** may be a conventional refrigerator or freezer such as found in many homes. Thus, persons who produce fruit, eggs or other types of food that need protection from heat to retain such foods at a lowered temperature until they can be marketed without resorting to the purchase of a large walk-in type refrigerator.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A frigerated container system comprising means for providing refrigerated air flow, a plurality of vertically stacked insulated containers being exposed to ambient conditions, means for mutually connecting a first end of each said containers at a first nodal point, means for mutually connecting a second end of each said containers at a second nodal point, first means for conducting said refrigerated air flow to said first nodal point, second means for returning said refrigerated air flow from said second nodal point to said refrigerating means, and individual valve means for controlling the flow of air at each said first and second ends of said containers, each container serving as an article refrigerator when connected in the stack, said containers further being removable from the stack without disturbing the circulation of air flow to the remaining stack, each container being adapted to function as an article carrier when so removed.

2. The apparatus set forth in claim **1** wherein said means for mutually connecting said first end of each said containers comprises a delivery pipe section, a plurality of pipe branches, each one of said pipe branches connecting said delivery pipe section to one of said first container ends.

3. The apparatus as set forth in claim **2** wherein said first means for conducting said refrigerated air flow to said first nodal point includes a supply pipe, means for forcing the flow of refrigerated air through said supply pipe, and a valve for controlling the flow therethrough.

4. The apparatus as set forth in claim **3** wherein said means for mutually connecting a second end of each said containers comprises a return pipe section, and a plurality of pipe branches, each one of said pipe branches connecting said return pipe section and one of said second container ends.

5. The apparatus as set forth in claim **4** wherein said second means for conducting said refrigerated air flow from said second nodal point includes a return pipe, and a valve for controlling the flow therethrough.

6. An insulated container adapted for conduction of refrigerated air therethrough, said container including first and second ports, said ports being formed within opposing walls of said container, each said wall including a notched latch keeper therein, said notch appending perpendicularly of and in communication with said port, a wall portion disposed outwardly of said port including an elongated recess communicating with and perpendicularly of said port, a manually operable compression spring loaded sealing plate disposed within said recess, said plate adapted for selectable sliding movement therein, said plate further adapted to seal the outward end of said port upon expansion of said spring.

7. The apparatus set forth in claim **6** together with

a flexible pipe end section adapted for removable retention within said port, said pipe section including a first aperture therein, said first aperture being disposed radially of said section wall, a cantilevered latch yieldingly protruding from said aperture, said latch adapted to be received by said notched keeper after insertion of said pipe section into said port, a cantilevered link of said latch being disposed interiorly of said pipe section, a first end of said cantilevered link being fastened to the interior wall of said pipe section, the second end of said cantilevered link including said latch affixed thereto and extending perpendicularly outwardly therefrom through said first aperture, and an intermediate point of said cantilevered link including a button fastened thereto, a second aperture formed within said pipe section and disposed radially outward of said button thereby permitting said button to protrude therefrom, whereby depression of said button retracts said latch within said pipe section, said pipe section further including a fixed O-ring seal disposed therearound, said seal adapted to circumscribe the outward periphery of said port.

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WILLIAM J. WYE, Primary Examiner

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