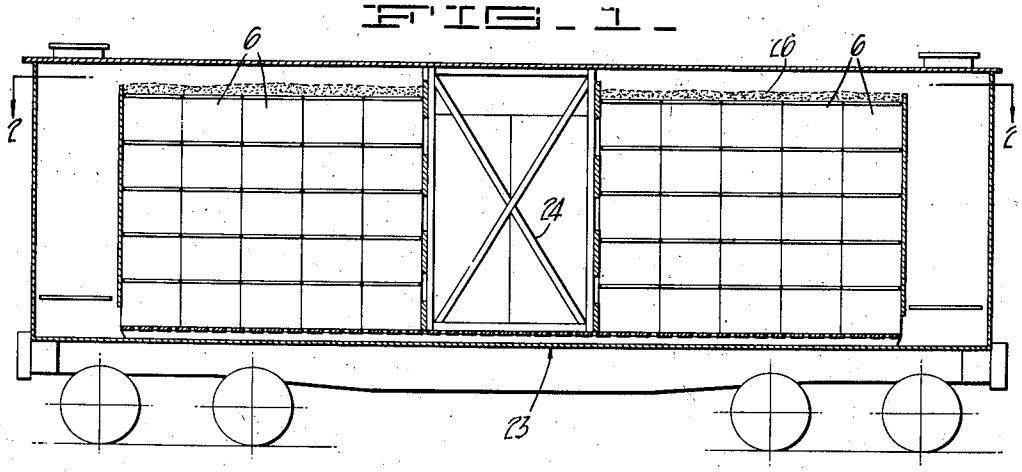
June 4, 1940. E. H. SPIEGL 2,203,033

LETTUCE PACK AND METHOD OF PACKING LETTUCE

Filed Dec. 19, 1938

FIG. 1



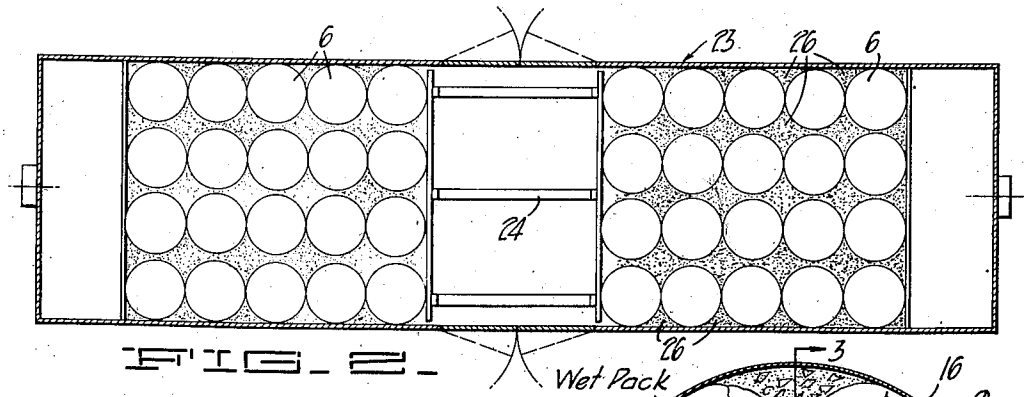


FIG. 2

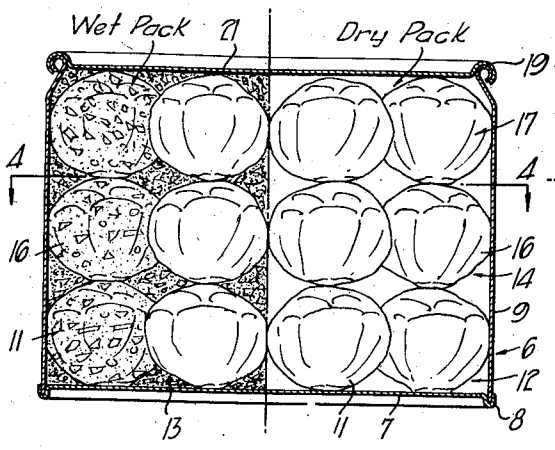


FIG. 3

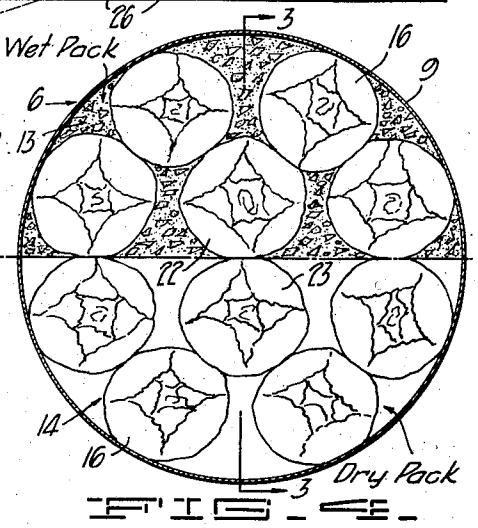


FIG. 4

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LETTUCE PACK AND METHOD OF PACKING LETTUCE

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Application December 19, 1938, Serial No. 246,661

5 Claims. (Cl. 99—193)

My invention relates to a lettuce pack for use principally in large scale packaging for shipment of commercially grown heads of lettuce and also to a method of packing heads of lettuce which still contain field heat and which are destined for long-distance transportation.

In the present large scale commercial packaging of lettuce for shipment, all of the steps are very carefully controlled so that the lettuce harvested from the field will be presented to the market in the best possible condition, not only insofar as its inherent value is concerned but also insofar as its appearance is concerned since lettuce heads which can be made to arrive on the market in good physical condition, and especially with a highly attractive, fresh appearance, command a considerable premium over the usual market price. It is therefore of immediate commercial value in any wise to improve upon the technique or apparatus involved in the handling of lettuce between the growing field and ultimate presentation on the market. This usually involves a great deal of care between the actual removal of the lettuce from the growing field up to the time it is packaged and shipped—which time is usually within a very few hours of the same day. The shipment time, however, often extends over a number of days since the lettuce customarily is shipped the majority of the way or entirely across the continent, so that often, despite extra care exerted by the picker and the packer of the produce, the conditions of transit are such as to negative the otherwise beneficial results to be obtained. The universal practice at the present time, so far as I am aware, is to pack the lettuce heads, after stripping the outside leaves and trimming the stem, into rectangular shipping crates made up of a number of spaced wooden slats secured together. Into the container so formed, a lining of paraffined paper is placed and the heads of lettuce are then introduced along with a quantity of crushed ice. After the maximum number of lettuce heads have been placed in the crate, a final charge of crushed ice is heaped upon the top, the ends of the waxed paper are folded over on top of the heaped crushed ice, and a springy, resilient, slatted wooden lid is by pressure finally nailed in position. The bulged crate, along with many others like it, is put into a refrigerator car until the car is approximately three-quarters full, crushed ice is then blown into the car on top of the entire load, and the car is sealed and sent to its destination. Hundreds of thousands of cars of lettuce are shipped in this way each year. Upon arrival at destination it is found that a certain number of the packages of lettuce are not in good order, for the reason that some of the heads have been mechanically squeezed against the sharp edges of the crate slats, due to the initial pressure of the resilient lid exerted through the crushed ice, and the heads have been squeezed into or against the slatted sides of the crates and into the corners thereof, so that material mechanical injury follows. This mechanical injury is particularly apparent upon the heads which have been forced into the crate corners and against the sharp edges of the crate slats. The pressure when the crates are initially packed is large since, to compensate at least partially for ice meltage within the crate during shipment, the crate is customarily greatly overbuilt with ice so that when the lid is nailed on deformation and bruising of the heads ensue. Bruising of the leaves is followed by a milky exudation which oxidizes red and ruins the appearance of the produce. For resale, therefore, all the outer bruised leaves must be stripped off, thus reducing the head size so much as greatly to lower the retail price, or to make the head unsalably small. This retail loss is of the nature of 25% of the crate but heretofore has not been overcome.

There is also mechanical injury to the crates themselves amounting to about 2% to 5%, important in that recoopering is required and damage claims against the carrier arise. This condition is aggravated by the soaking the crate wood gets from the ice melt so that repair is difficult or impossible and further use of the crate is impossible.

But the chief economic loss probably arises from the inability to display or keep the lettuce for very long after its arrival on the retail market. That which is not immediately sold may keep for another day's display or it may have deteriorated so badly that it must be discarded. The addition of each day's keeping time is of tremendous value. But the keeping time depends largely upon how soon after picking the field heat in the lettuce head can be extracted. Even with ice in the crate, the lettuce in the customary paper-lined wooden crate requires from twenty-four to forty-eight hours before its temperature is reduced to 34° Fahrenheit.

It is therefore an object of my invention to provide an improved lettuce pack and method of packing lettuce, to the end that mechanical

injury to the lettuce in packing and in shipment will be materially reduced.

Another object of my invention is to improve the thermal characteristics of a lettuce pack and of a method of packing lettuce, so that the field heat will be more readily dissipated and so that refrigeration during transit and after arrival will be considerably improved.

Another object of my invention is to provide an improved lettuce pack and method of packing lettuce which, while possessing the foregoing advantages, will not require serious changes in present packing routines and arrangements in the packing houses or in the refrigeration cars.

A further object of my invention is to provide an improved lettuce pack which can be shipped with greater facility and with at least equal ease of handling from the standpoint of size, contour and weight, as compared with the present package.

A further object of my invention is in general to improve a lettuce pack and the method of packing lettuce.

The foregoing and other objects are attained in the embodiment of the invention illustrated in the drawing, in which—

Fig. 1 is a longitudinal cross-section on a vertical plane, of a diagrammatically illustrated refrigerator car packed in accordance with my invention;

Fig. 2 is a cross-section the plane of which is indicated by the line 2—2 of Fig. 1;

Fig. 3 is a cross-section on a diametral, vertical plane, of a lettuce pack in accordance with my invention; and

Fig. 4 is a cross-section the plane of which is indicated by the line 4—4 of Fig. 3.

In its preferred form, the lettuce pack of my invention includes a circular cylindrical container, substantially air- and water-tight and fabricated of material having high thermal conductivity, within which are symmetrically arranged a plurality of heads of lettuce, the majority of the heads being in immediate contact with the material of the container and under some circumstances being interspersed with crushed water-ice, there being a closure means for maintaining the heads of lettuce in position within the container. The method includes arranging the heads of lettuce in a predetermined form, confining them to such form sometimes in the presence of a refrigerant and in the substantial absence of air by a means having a high thermal conductivity, and finally extracting the field heat from the lettuce rapidly through a confining means.

In following out the conduct of my invention, from which both the new pack and the method will appear, I shall describe the particular manner of practicing it which has resulted in securing a premium over the market price. In this instance I have taken a container 6 which is fabricated preferably of a material having a relatively high thermal conductivity, such as sheet iron or steel, coated with a suitable material inside and outside to preclude deterioration or undesired chemical action in connection with the contents. The precise thermal conductivity of the material is not critical, but I have found that metal has a relatively high conductivity with respect to the field heat within the lettuce, as contrasting with the relatively low thermal conductivity of the wooden containers at present universally used, particularly when such containers are lined with one or more layers of waxed paper, in which event it is very difficult for field heat within the lettuce to be transferred to a refrigerant which surrounds the package as a whole.

In the present instance, the container 6 is preferably a right circular cylinder having in one embodiment a diameter of substantially eighteen and one-quarter inches and a height of approximately twelve and one-half inches. The container has a similar metal bottom 7 which is secured by any suitable inter-folding 8 with the side walls 9, so that the container is water-tight. A container 6 of about the indicated size and proportions is readily handled by an operator since its weight is not far different from that of the present wooden crate and since it can readily be put on a present packing stand.

When a container is so positioned, lettuce heads which have been trimmed are arranged on the bottom 7 in a predetermined and preferably symmetrical geometrical order, as clearly disclosed in Figs. 3 and 4. In this way each of the lettuce heads 11 is in direct and immediate thermal conducting relationship with the walls 7 and 9, yet there are no sharp edges or corners to groove or bruise the produce. Since the container is round and the lettuce head is of similar curvature, whatever pressure there is between them is exerted over a large area of contact, so that the unit pressure is so low as to obviate bruising or other damage. The large area of contact is also very favorable for thermal transfer. This condition is further assisted since the metal walls 6 of the container are quite thin and are somewhat deformable so that when a layer of lettuce is packed, the container cross-section can depart from circular into a partially polygonal form so that the container wall yields to provide uniform pressure instead of locally pressing upon and bruising the lettuce. In the arrangement shown especially in Fig. 4, most of the ten heads of lettuce in the bottom layer are in immediate thermal contact with the sides 9 as well as with the bottom 7, and the remaining central heads are in good thermal contact with the bottom 7, so that a majority of the heads of lettuce in the lower layer are in direct and immediate thermal contact with the container. Of course, the number of heads of lettuce in a particular layer, and the arrangement of the layer, will vary not only with the size of the heads of lettuce but with the diameter of the container; but the arrangement shown is calculated to result in a standard number of heads of lettuce in my new container.

The plurality of lettuce heads 11 in immediate contact with the bottom 7 constitute the lower layer, generally designated 12. At this point two alternatives are possible. The pack may be inclusive of water-ice, termed a "wet" pack, or ice may be omitted, resulting in a "dry" pack. To make the wet pack, upon finishing the lower layer 12, the packer introduces a charge of crushed water-ice into the container. The water-ice spreads itself over the heads of lettuce and fills the interstices therebetween, so that an adequate bed is made for the reception of a superposed, intermediate layer 14 constituting another plurality of lettuce heads 16 which are arranged either in the same geometrical pattern as was the layer 11 or in a variation thereof, depending somewhat upon the fancy of the packer, but in any case a majority of the heads are in immediate contact with the wall 9. The layer 14 is in turn subjected to a charge of crushed water-ice and upon it is superposed a top layer

17 on which an ice charge is placed, substantially filling the container.

This procedure may be varied, if desired, by first completely filling the container with layers of heads of lettuce and finally charging the container with crushed water-ice in a quantity sufficient to fill all of the interstices and also the container. In this instance the heads of lettuce will be in immediate contact with each other rather than spaced by layers of water-ice. In either event the top layer 17 of heads of lettuce is just below the rim 19 of the container 6, and a final charge of refrigerant in the form of crushed water-ice is introduced.

To follow the dry pack alternative, the heads of lettuce are arranged as described but no ice is added to the container. For a given size container preferably larger heads are used with the dry pack so that a reasonably firmly filled package results.

With either the wet pack or the dry pack, when the container is full, a closure 21, preferably of metal comparable to that of the sides 9, is engaged with the rim 19 and is effective to retain the contents in position. The closure 21 can be frictionally retained, can be lightly crimped in place, as shown in Fig. 3, can be tack welded in position, or can be otherwise secured. The metal closure is put on the container at substantially room temperature and before the interior ice, if used, has had much opportunity to reduce the temperature. But subsequently, as the temperature of the closed package and contents is reduced, the metal is contracted, as is the contained air, so that the closure is subsequently removable only with some difficulty. I have found that practically the package is substantially water-tight and, although not hermetically sealed, is nearly air-tight. Of course, the package can be sealed and evacuated of air, or can be charged with an inert gas, but this refinement is not ordinarily necessary.

The practical exclusion of air or air circulation is commercially effective greatly to reduce or prevent redness of the lettuce, which redness is very undesirable. What oxygen is trapped in the container is converted into carbon-dioxide by a slight reaction with the lettuce, after which oxidation practically ceases. Whenever a lettuce leaf is bruised and where the lettuce butt is cut there is an exudation of a milky liquid which oxidizes to a reddish-brown stain the unattractiveness of which reduces the value of the lettuce head. But by reducing the incidence of bruising, and, further, by greatly reducing the availability of oxygen, I have with my package substantially eliminated the deleterious oxidation.

Immediately the packer has finished loading the container and the closure 21 is put on, either by hand or by machine, the container 6 is placed within its shipping compartment, such as the load compartment of a refrigerator car 23. The arrangement of the container 6 and a plurality of its fellows within the car will vary somewhat with the size of the container and the interior dimensions of the car. A typical arrangement is illustrated, in which the containers are disposed in rows and files and in superposed layers virtually to the capacity of the car, following which interior bridging or bracing 24 is utilized to retain the containers in position, and the interior of the car is charged with crushed water-ice 26 which not only fills the interstices between the adjacent containers 6 but is introduced in suffiicent quantity to form a blanket over the top of the load. This refrigerant is introduced with the customary ice-slingers now utilized to blow crushed ice into the interior of cars.

The car so iced is then ready for shipment, but the result ensuing is materially different from that following the use of standard wooden crates with waxed paper lining. In accordance with my invention, the field heat of the lettuce heads 11 which are in intimate thermal contact with the highly conductive walls of the container 6 is dissipated from the heads of lettuce directly through the walls of the container to the surrounding crushed ice 26. Hence extraction of the field heat results in a large melt of the external crushed ice 26 which virtually surrounds each container and can be replaced if necessary, rather than in a rapid melt of interior ice as occurs with wooden crates. Otherwise stated, whereas with wooden crates the crushed ice contained within the package melts very rapidly in extracting the field heat from the lettuce and discharges indiscriminately from the package during shipment and even after unloading, in the disclosed dry pack arrangement there is no interior melt, with the wet pack the melt within the package is relatively slow, and with both of my packs the melt of ice in the car is relatively rapid. Under comparable practical conditions the ice melt within a crate is at least fifty percent, giving rise to large initial overbuilding in an endeavor to compensate for it in advance, whereas with my arrangement the internal melt, where interior ice is used, is not over ten to fifteen percent. While the external, car melt is much greater, the ice can, if necessary, be easily replenished. When the containers 6 are finally taken from the car at the end of the journey, the contained lettuce is in good condition, and with the wet pack there is considerable crushed ice remaining for further refrigeration and preservation of the lettuce heads when the package is placed on display in a retail store. Whatever melt occurs from the contained ice 13 does not escape from the package but remains as cold water in contact with the lettuce, helping to prevent access of air thereto even though the closure is not completely air-tight or has been removed, and preventing desiccation of the lettuce heads. With the dry pack the heads are cold, dry, fresh in appearance and ready for immediate sale.

When the container contents are to be inspected either within the car or at a market, removal of the closure 21 is reasonably easy and exposes immediately one-third of the lettuce heads, while removal of the center heads 22 and 23 exposes all of the remaining heads in the container. Replacement of those heads removed, if any, and of the closure leaves the package in substantially its original condition before inspection. This contrasts with the crate, the wood of which becomes water-soaked during several days' subjection to ice melt and if opened for inspection cannot be repacked and recoopered to be accepted as anything but rehandled merchandise of greatly lowered value.

This inspection feature is valuable to the retailer, since he may place the opened but water-tight container directly upon his display stand and expose the produce while it is still in contact with the the remaining refrigerant, if any, the melt from which is confined to the container

and does not run all over the display as would be the case with a crate. There is a further display advantage to the small retailer in that each of my containers holds about as much as one-half of a crate. It is therefore possible, where space is at a premium, to display the original package instead of unpacking part of the contents from time to time. Half-crates are not feasible since there are twice as many corners as with a whole crate and hence twice as many opportunities for bruised and damaged heads so that the percentage of first-grade heads is uneconomically reduced.

Finally, after the lettuce heads have been removed from the container, the container either is reusable under the same circumstances or has a salvage value for other purposes. The weight of the package and the ability to handle it are substantially comparable with the present wooden crate, but the ability to retain the melted ice, if any, but especially to conduct the field heat of the lettuce rapidly through the material of the container, among other attributes, has resulted in making the dry pack feasible and in reducing the interior icing so that the heads of lettuce arrive at the market in so much better than usual state that a premium is obtainable.

The example described herein has illustrated the use of water-ice as the internal and the external refrigerant, but other refrigerants, such as solid carbon-dioxide, are usuable. If precooling facilities are available, it is entirely feasible to pack the lettuce heads "dry" and then to precool the containers and contents prior to loading them into cars. The car cooling utilized after loading may involve placing ice around and on the loaded containers or may involve simply the circulation of chilled air.

Furthermore, while the example speaks particularly of lettuce and is peculiarly adapted to meet the problems involved in the marketing of lettuce, it is also usable and beneficial in connection with carrots, peas, artichokes, cauliflower, broccoli and comparable produce.

I claim:

1. A lettuce pack comprising a circular-cylindrical watertight container fabricated of material having a high thermal conductivity, a plurality of heads of lettuce packed in layers within said container with a majority of said heads in thermal contact with said container, crushed water-ice filling the interstices within said container between said heads of lettuce, and a closure for maintaining said heads of lettuce in packed relationship within said container.

2. A method of packing heads of lettuce containing field heat, comprising arranging a plurality of heads of lettuce in immediate juxtaposition, confining said heads of lettuce in said arrangement with material having a high thermal conductivity, introducing ice into confinement with said heads of lettuce, and then subjecting said heads of lettuce and said ice to a rapid extraction of field heat from said heads of lettuce through said material.

3. A lettuce pack comprising a substantially watertight container fabricated of material having a high thermal conductivity, a plurality of heads of lettuce packed in layers within and in thermal contact with said container, crushed water-ice within said container in heat-transferring relationship with said lettuce heads, and a removable closure for said container.

4. A lettuce pack comprising a metal container capable of retaining water, a plurality of heads of lettuce packed in layers within and in thermal contact with said container, and crushed water-ice within said container in heat-transferring relationship with said lettuce heads.

5. A lettuce pack comprising a metal container, a plurality of heads of lettuce packed in layers within and in thermal contact with said container, and crushed water-ice exteriorly of and in heat-transferring relationship with said container.

ELLIS H. SPIEGL.