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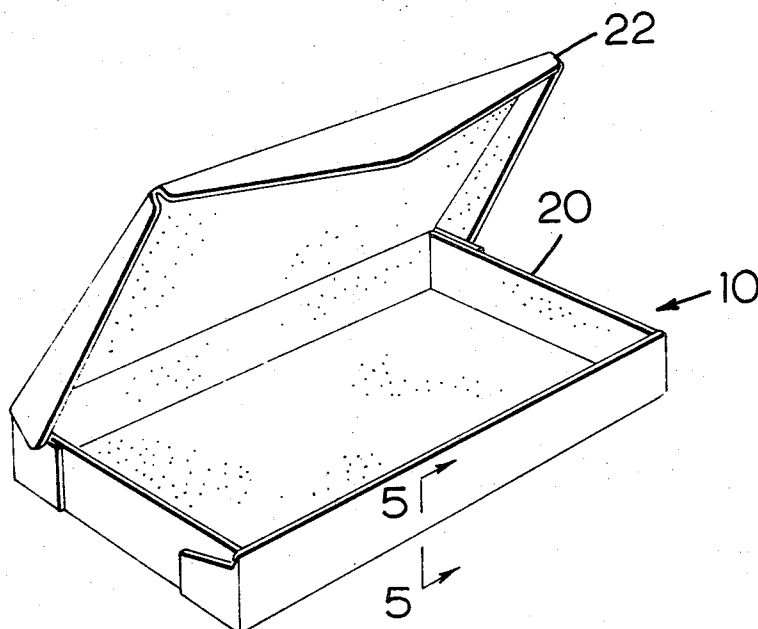
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[54] **FROZEN FOOD CARTON**
1 Claim, 6 Drawing Figs.

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2.5; 99/174, 171; 206/467

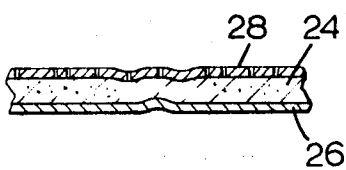
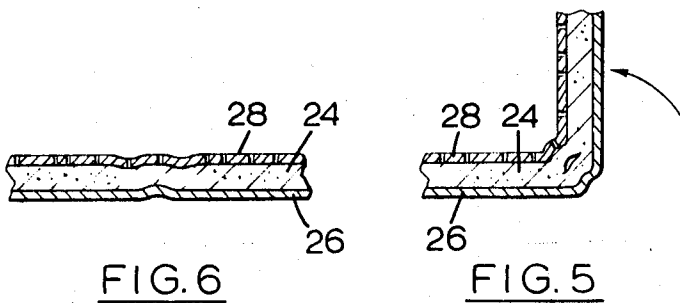
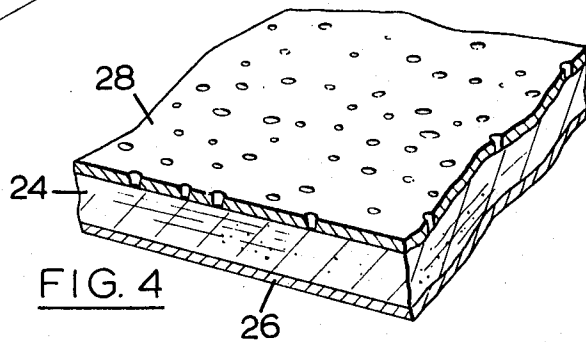
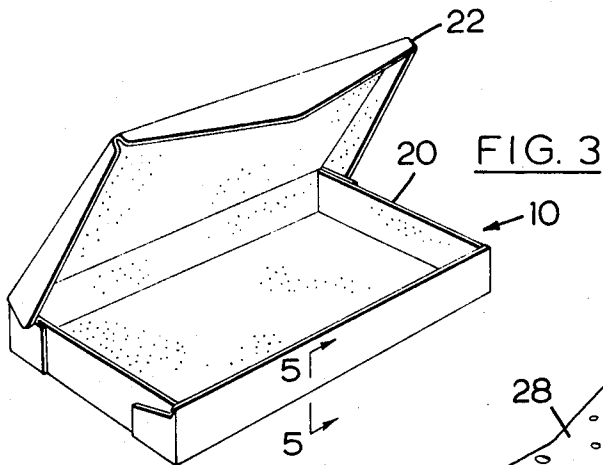
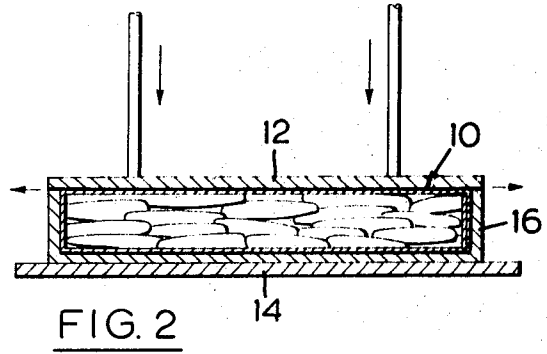
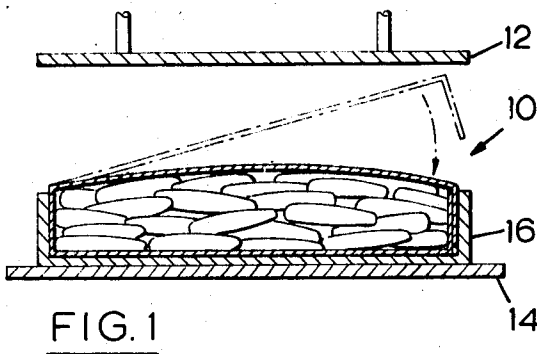
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ABSTRACT: This invention is concerned with a package for frozen food that is compressed as it is packed. The package is designed to permit air driven from the food in the compression to escape from the package and to seal the food of the package against the harmful effects of dehydration in use. The novelty of the invention consists of the type of board from which the package is made. The board has an outer air impervious layer, a center air pervious layer and an inner moisture-resistant layer that is perforated to permit the passage of air. In use the inner layer is against the food product. As the food product is compressed, air passes through the perforations in the inner layer and is driven along the center air pervious layer to and out the edge of the package. The outer air impervious layer prevents air from damaging the food product under conditions of storage.



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FROZEN FOOD CARTON

This invention relates to food packaging and is particularly concerned with the packaging of fish and other like food products and an improved package therefor.

The packaging method and improved package of the invention are particularly useful in the packaging of fish and other like products for freezing. Accordingly, the invention is described herein in relation to the packaging of fish for freezing but it should be understood that the method and improved package are useful in the packaging of other food products as well.

The current practice in the packaging of fish is to press large blocks of fish into a paperboard package held in an open top metal pan. This is done by filling the package with fish, closing the package and then placing the metal pan between the platens of a plate freezer and lowering the top platen of the freezer to compress the fish. The filled package is then left in the freezer until the fish has been frozen and then it is removed for storage or shipment.

A difficulty with the above method of pressing and freezing fish is that air is entrapped during the pressing step and forms voids so that when a large block of frozen fish is later cut into smaller blocks for sale to consumers, many of the smaller pieces must be discarded as being imperfect due to air voids. Accordingly, various techniques for avoiding the entrapment of air have been tried but the known techniques usually create new problems. For example, providing the package with perforations so that the air can escape during the compression step also leaves certain portions of the fish block exposed so that the product becomes dehydrated during storage. Another technique previously tried has been to provide depressions or ridges on the inside of the package wall with the object being to produce channelways for the air compressed out of the fish to be dispersed around the side margins of the package. However, it was found that the depth of depressions necessary to get rid of the entrapped air so weakened the paperboard that air could pass through the board during storage and effect unacceptable dehydration.

It is, therefore, an object of this invention to provide a method of packaging fish and other like products for freezing which permits escape of entrapped air when the food product is compressed but which will also prevent reentry of air into the package during storage resulting in unacceptable dehydration of the food product.

It is a further and related object of the invention to provide an improved package for frozen fish and like products, which package is characterized by a construction permitting the escape of air which might otherwise be entrapped in the product as it is compressed prior to the freezing step and which prevents reentry of air into the package during storage of the frozen product.

With the above and other objects of the invention in mind, an improved folding frozen food carton for a compressible food product to be frozen after compression, in accordance with the invention, consists of a carton of which the principal walls are formed of board comprising a center layer of an air permeable material, an outer facing of an air barrier material adapted to prevent dehydration of food products in the carton due to passage of air thereover in use, an inner facing of a moisture resistant air pervious material adapted to protect said center layer against moisture from contact with a moist food product and to admit air into said center layer as said carton is compressed with an air containing product therein, said board from which said carton is made terminating in free edges, said center layer having a permeability adapted to pass air admitted thereto through said inner facing as it is compressed against a food product in use to and out the free edges of said board.

The invention will be more thoroughly understood from the following description thereof as read in conjunction with the accompanying drawings.

In the drawings:

FIG. 1 is a vertical cross-sectional view through a container of fish in position between the platens of a plate freezer prior to the lowering of the top platen to compress the fish;

FIG. 2 is a view similar to FIG. 1 but showing the top platen lowered to compress the fish in the container;

FIG. 3 is a perspective view of a preferred embodiment of the carton for frozen food in accordance with this invention;

FIG. 4 is a perspective view, partly broken away and enlarged, of a portion of the carton shown in FIG. 3;

FIG. 5 is an enlarged cross-sectional view taken along the line 5-5 of FIG. 3; and

FIG. 6 is a similar view to FIG. 5 but showing the corner portion involved before it is folded.

FIG. 1 shows a carton 10 of the type to which the invention relates being filled with a food product such as frozen fish. The carton is placed between the platens 12 and 14 of a plate freezer as shown. A pan 16 contains the sides of the carton. In use, the carton is filled. As shown in FIG. 1, the cover is closed and the platens are brought together to compress the wet unfrozen fish and to freeze it. Variations of the restraining pan are possible. One known variation is merely a rectangular frame to restrain the package laterally between the press platens. The process is known as pan-block freezing and is of a well-known nature and, therefore, not described in detail here.

The invention relates to the carton and more particularly to the material from which the carton is made. As the product is compressed by the platens 12 and 14, air is driven from it. Escape means for this air must be provided. Otherwise it becomes entrapped with the fish product and forms an air void in the frozen product. This is undesirable from a product marketing point of view.

The requirement, therefore, is for a carton that will permit the air to escape as the product is compressed but which will also effectively protect the product against the dehydration effects of air after it has been compressed and frozen.

The package or carton is formed from a type of paperboard that will permit air to evacuate from the interior of the package as the product is compressed in the freezing operation but which will also protect the product against dehydration during storage.

Referring now to FIG. 3, the frozen food package of the invention is preferably formed of paperboard and consists of a shallow panlike body portion 20 and a folding top closure 22 having slats adapted to overlie the outside of the body portion.

The paperboard of which the package is made consists of a lamination including a center layer 24 of an air permeable material, an outer facing 26 of an air barrier material and an inner facing 28 of a material that is moisture resistant to act as a release surface but also air pervious to admit air to the center layer.

The board consists of a low density long-fiber cellulose paperboard which is coated on both sides with polyethylene plastic, the facing being intended for the inside surface of the package then being perforated to permit the passage of air therethrough. To be even more specific, a sample board has a board caliper of 0.0295 inches and a weight of 239 pounds per 3000 square feet and a point density (weight/caliper) of 8.1. This paperboard is coated with polyethylene plastic to a thickness of 6.5 pounds per 3000 square feet on the side to be perforated and to 8.3 pounds per 3000 square feet on the side not to be perforated.

Perforation of the inner facing can be done in any suitable manner. One method employed satisfactorily is to pass the coated paperboard through a pair of nip rolls, one cylinder of which is covered with a coarse grip No. 36 sandpaper.

In the foregoing example, the center layer is a paperboard but it should be understood that other materials of sufficient strength to accept coatings and to support the product to be packaged could be used provided, of course, they permit the lateral transmission of air to their side edges. Thus, certain types of plastics and fiber glass could meet these requirements. Further, while in the specific example given above the inner and outer coatings are of polyethylene plastic, other

types of air barrier materials could be used such as finely woven plastic meshes, or wax or wax plastic blends capable of being perforated in the case of the coating intended for the inside of the package.

In all cases, the desirable effect is that when the food product, particularly fish, is compressed prior to the freezing operation, contained air is expelled through the air pervious inside surface of the package and the air-permeable center layer to the outer barrier coating. The latter coating has substantially greater resistance to air than the air permeable center layer. Thus, the air takes the course of least resistance and filters through the air-permeable center layer and out the uncoated exposed raw edges of the center layer. In this latter regard, it is to be noted that it is essential the outer free edges of the board material be left free and uncoated. It should also be noted that the normal creasing technique for providing fold lines, as shown in FIGS. 5 and 6, avoids blockage of the air passageways through the center layer by virtue of the usual internal voids that occur at the folds.

In using the package of the invention, it is first placed in the restraining pan 18 which has a depth slightly less than the depth of the package. The package is then filled with the food product involved, probably, although not necessarily, fish fillets. Following filling of the package, the top closure is folded down over the sides of the body portion and the pan with the package is placed between the platens of the plate freezer. The quantity of the food product placed in the package is sufficient to fill it when compressed and as the package is slightly deeper than the pan, the platens compress the product within the package to force it into all corners thereof as the package yields this limited amount. As the food product is compressed, any contained air is exhausted substantially through the inner facing, the center layer and the edges of the package as explained above.

The air pervious center layer 24 must have an air permeability sufficient to permit the passage of air admitted thereto through the inner facing 28, to and out of the free edges of the paperboard under the pressures encountered in the compressing operation of the platens. The inner facing 28 must be sufficiently air pervious to permit the passage of the air that is expelled from the food product to pass therethrough under the pressures of the platens but it must also be generally moisture resistant so that it will not bond to the food product as the food product is frozen. It must act as a release layer so that the package can be conveniently removed from the frozen food product when it is desired to remove the product from the package. It is probably inevitable that some moisture will pass through the pores of the inner facing with the air and will enter

the center layer. This amount of moisture, however, will not be a material amount and will not prevent the passage of the air.

It will be appreciated that the moisture in the food package is essentially water but other liquids from the food product will be incorporated.

It is the function of the outer facing 26 to prevent dehydration of the food product during later storage and/or shipment of the package. In this regard, it must be appreciated that while air that might normally be entrapped in the food product when it is compressed passes out the side edges of the paperboard, the reverse movement of air, i.e. in the side edges, and leading to dehydration of the packaged food does not occur to any serious extent. The reason for this is that when the air is being forced out of the food product during packaging, considerable pressure is being exerted by the platens of the plate freezer whereas there is no substantial pressure differential between the inside of the package and atmospheric air during later storage and/or shipment of the package.

It should also be appreciated that while in this specification and the appended claims reference is made to the expelling of "air" from the food product, the term "air" is meant to include other gases and any other substance that is mixed with the air.

It will be understood that the objects of the invention would be gained by any laminated paperboard material having the characteristics above described and the specific paperboard defined above by way of example.

What I claim as my invention is:

1. A folding frozen food carton for a compressible food product to be frozen after compression, the principal walls of which are board, said board comprising a center layer of air permeable material, an outer facing of an air barrier material adapted to prevent dehydration of a food product in the carton due to passage of air thereover in use, an inner facing of a moisture resistant, and substantially liquid impermeable air-pervious material adapted to protect said center layer against moisture from contact with a moist food product and to admit air into said center layer as said carton is compressed with an air-containing product therein, said board from which said carton is made terminating in free edges, said center layer having a permeability adapted to pass air admitted thereto through said inner facing as it is compressed against a food product in use to and out said free edges of said board, said inner and outer facings being plastic, said inner facing being perforated to make it moisture resistant, air pervious and substantially liquid impermeable as aforesaid.

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