Oct. 25, 1932. D. H. KILLEFFER 1,883,938

PACKAGE AND CONTAINER

Filed Sept. 24, 1929

Fig. 1.

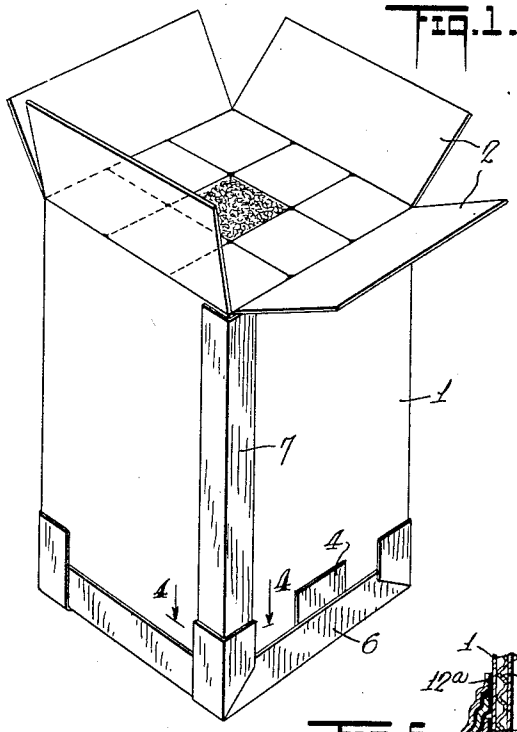


Fig. 2.

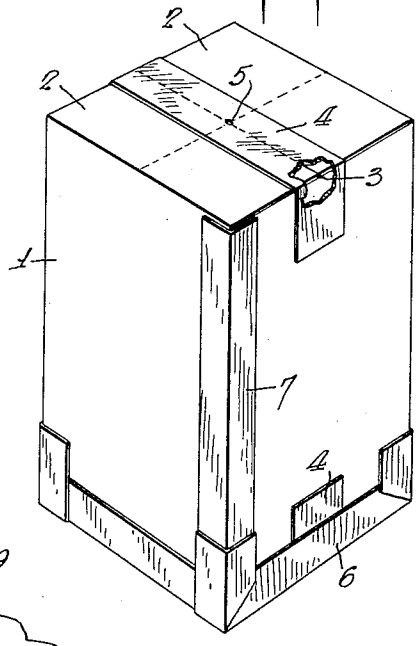


Fig. 5.

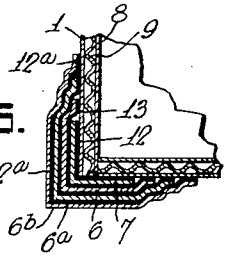


Fig. 3.

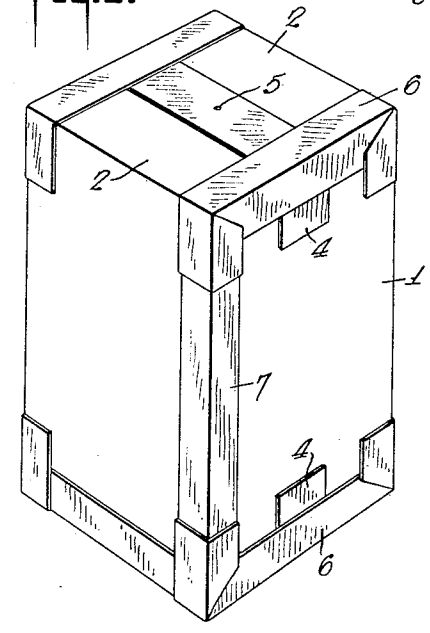
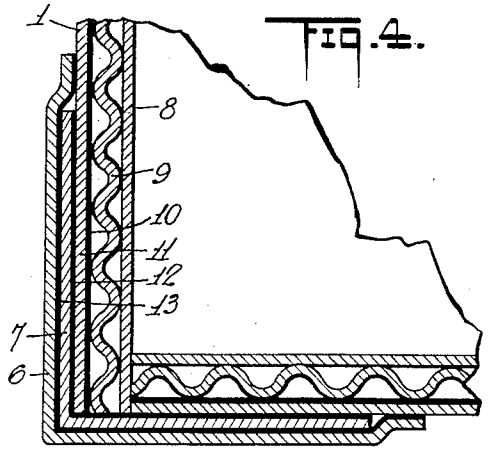


Fig. 4.



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UNITED STATES PATENT OFFICE

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PACKAGE AND CONTAINER

Application filed September 24, 1929. Serial No. 394,814.

This invention relates to containers, more particularly to the paper or cardboard container commonly known as "single-service" containers in which solid carbon dioxide (CO_2) is used as a refrigerant.

The object of this invention is to provide simple and effective means whereby the seams of such containers are rendered waterproof and substantially gasproof.

For the economical use of solid CO_2 as a refrigerant, it is desirable to have the container waterproof and substantially gasproof.

The ordinary single-service container is usually made of corrugated cardboard. The side seams and those at the ends, made by the overlapping of the flaps, are neither waterproof nor gasproof and such seams are structurally weak in comparison to the remainder of the carton. Moreover, the corrugated cardboard or paper of which the container is made is itself permeable to CO_2 gas.

The seams of such a container are ordinarily sealed with paper or fabric coated on one side with animal or vegetable glue. Such seams are not watertight since when moisture is present, the seal is loosened, the tape is weakened, and in turn the structural strength of the container is decreased, if not destroyed. In the shipping of packages they are often brought in contact with water and, in the use of solid CO_2 as a refrigerant, the package is much colder than the atmosphere, consequently moisture is condensed on the exterior of the package and unless the seams are waterproof, their utility is greatly impaired.

I have found that such seams are not gasproof to CO_2 gas even when well made. Obviously, if the seal is loosened by moisture there is no gasproofness. Even in a good seal, so made, not only does the CO_2 gas pass outward from the container, but air passes inward either by diffusion or through minute openings, with the result that the percentage of CO_2 in the air-gas mixture within the container is greatly decreased. This lowering of the CO_2 concentration results in increased sublimation of the solid CO_2 and is consequently uneconomical. In cases where the lower part of the container is not gasproof, this condition is aggravated, the heavy gas tending to leak out by gravity, at the lower levels, thus drawing in air at the higher levels.

I have discovered simple and effective means for overcoming these disadvantages, as will be seen by reference to the following description taken in connection with the accompanying drawing, in which

Fig. 1 shows a container with the seams of one end and a side seam sealed in accordance with my invention;

Fig. 2 shows the container after the flaps of the other end have been closed and the first sealing strip applied;

Fig. 3 shows the container after all seams have been sealed;

Fig. 4 is a sectional view taken on line 4—4 of Fig. 1, showing in detail the construction at one of the corners; and

Fig. 5 is a fragmentary section of a modified form.

The numeral 1 indicates a container. This container may be made of paper, plain cardboard, corrugated cardboard or the like, but I prefer a container made of material that is substantially impervious to CO_2 gas. Corrugated cardboard having a lining of asphalt is reasonably impervious to CO_2 gas. The container is usually, but not invariably, of the foldable or collapsible type.

2 are the flaps at the open ends and in the instance of these ends being square, the flaps will meet at the center, forming a narrow crevice 3. The numeral 4 indicates the backing or sealing strip of paper, fabric or any other suitable material. To one surface of this strip I apply a thin coating or layer 12 of latex or any stable rubber emulsion. The ordinary solutions of rubber give a good bond, but not as satisfactory as that of latex. Latex appears in the commercial market as a milk-like liquid, consisting of an emulsion of rubber in water with ammonia or the like added as a preservative. The water of the emulsion acts as a vehicle to the rubber phase, facilitating its penetration of the surfaces to be joined. It is preferable, though not necessary, to add vulcanizing ingredients to

the latex so that it will yield, on drying, a film of vulcanized rubber.

The emulsion may be applied to the surface of the container instead of to the strip or to both as they are brought together. When but a single coating of the emulsion is used, the best results are obtained if the strip is applied at the same time as the emulsion or very soon thereafter, but if one coat be applied to the strip and another to the surface, they may be allowed to stand for a time before being applied one to the other.

I have found that the film of rubber, produced as above will permit a slow out-flow of the CO_2 gas, but will not permit inward flow of the air, thus bringing about the very desirable condition of preventing the intake of air while at the same time very material resistance is offered to the egress of CO_2 gas. The reason for this uni-directional flow is that the CO_2 gas concentration or partial pressure inside is greater than that outside the package; and CO_2 gas flows through rubber films toward lower partial pressures regardless of total pressures.

When the package is not handled to a great extent, the seal is quite effective with the use of the emulsion by itself, without the backing strip of paper, cloth or the like. If the first pair of flaps be turned to closed position, a coating of the emulsion applied to the top side thereof, and the other pair of flaps turned down over the first pair, in the usual manner, there will be a strong bond formed, and the only way the gas can escape is to travel edgewise through a long rubber path, consequently the leakage will be very slow.

The numeral 5 indicates a vent which is placed in a predetermined position, preferably in the uppermost part of the container. It is desirable, although not essential to provide such a vent in order that from it may be discharged the excess CO_2 gas generated by the sublimation of the solid CO_2 and thus that no pressure may be built up within the container. Even were no special vent provided and should any such pressure built up, a vent would break through at the weakest point of the container. However, since it is desirable that the vent be in the upper part of the container and that no vents or leaks be broken through the lower part, it is preferable to provide the vent 5.

The numeral 6 indicates a second sealing strip for the top and bottom edges and corners, the ends extending slightly beyond the seams for the purpose of giving added strength to the bond. 7 is the seal for one of the side seams when containers are used that have such seams, the structure of which is shown very plainly in Fig. 4, in which 8 is the inside paper of a corrugated board, 9 the corrugated filler, 10 a piece of asphalt or other gasproof material secured to the filler 9 and outer paper section 11. 12 is a thin layer of latex or other stable rubber emulsion, securing the sealing or backing strip 7 over the side seam and 13 is another layer of the emulsion forming a bond with the strip 6.

In Fig. 5 is shown a plurality of layers of emulsion 12*a*, 12*b* and sealing strips, 6*a*, 6*b*, this figure in other respects being the same as Fig. 4.

The seal made as herein described has unusual structural strength, while at the same time it is flexible enough so that a great amount of distortion can be absorbed and the seal still remain intact. It is a well known fact that the handling to which packages are commonly subjected in shipping them by the various modes of transportation is quite severe, to say the least. The seals on the containers used at present are very rigid, primarily very brittle and when exposed to moisture become softened, weak and loosened. Hence, under comparatively slight strains, they will separate, rents or tears appearing in them. In the use of solid CO_2 as a refrigerant, this condition would materially lessen its efficiency and in extreme cases might render it almost useless. I have determined through experiments that even where a relatively strong paper is used as tape or backing for my bonding material, the paper itself will tear before the bonding material separates from the carton. But with the seals having mucilage or the like, as the bonding material, the paper tears or is ruptured more easily, and in such case the seal is ruined, because the bonding agent will separate with the backing.

Throughout the claims I have used the word "seam" in a broad sense to cover the jointed or adjacent edges of parts of a container where leakage is apt to occur and where a sealing strip is advisable or necessary when the container is used in connection with a refrigerant or other gas generating material. I have also used the word "strip" in a broad sense, not meaning to be restricted to a particular size or shaped backing, or reinforcing piece.

I claim:—

1. A sealing strip for the seams of a refrigerated container, with solid carbon dioxide used as the refrigerant, said container being comprised of walls of corrugated paper made gasproof, a restricted vent for the release of the carbon dioxide gas generated by the solid carbon dioxide, said sealing strips comprising strips of paper fabric or the like and a layer of rubber latex.

2. A sealing strip for the seams of a refrigerant container, with solid carbon dioxide used as the refrigerant, said container being comprised of walls of corrugated paper made gasproof, a restricted vent for the release of the carbon dioxide gas generated by the

solid carbon dioxide, said sealing strip being arranged over a seam in the container and a layer of a stable rubber emulsion uniting said sealing strip to said container.

3. A sealing strip for the seams of a refrigerant container, with solid carbon dioxide used as the refrigerant, said container being comprised of walls of corrugated paper made gasproof, a restricted vent for the release of the carbon dioxide gas generated by the solid carbon dioxide, said sealing strip being arranged over a seam in the container and a layer of a stable rubber emulsion with vulcanizing ingredients uniting said sealing strip to said container.

4. A sealing strip for the seams of a refrigerant container, with solid carbon dioxide used as the refrigerant, said container being comprised of walls of corrugated paper made gasproof, a restricted vent for the release of the carbon dioxide gas generated by the solid carbon dioxide, said sealing strip being arranged over a seam in the container and a layer of rubber latex uniting said sealing strip to said container.

5. A sealing strip for the seams of a refrigerated container comprising, in combination, a strip arranged over a seam in the container and a layer of a stable rubber emulsion uniting said sealing strip to said container which encloses solid carbon dioxide, said container being of insulating material and having a movable closure through which the solid carbon dioxide may be inserted.

6. A sealing strip for the seams of a refrigerated container comprising, in combination, a strip arranged over a seam in the container and a layer of a stable rubber emulsion with vulcanizing ingredients uniting said sealing strip to said container which encloses solid carbon dioxide, said container being of insulating material and having a movable closure through which the solid carbon dioxide may be inserted.

7. A sealing strip for the seams of a refrigerated container comprising, in combination, a strip arranged over a seam in the container and a layer of rubber latex uniting said sealing strip to said container which encloses solid carbon dioxide, said container being of insulating material and having a movable closure through which the solid carbon dioxide may be inserted.

8. A sealing strip for the seams of a refrigerated container comprising, in combination, a plurality of layers of a stable rubber emulsion interposed between the container and a plurality of backing strips, each strip and each layer of said emulsion being arranged in overlapping relationship to the layer and strip below it, said container enclosing solid carbon dioxide and being made of insulating material and having a movable closure through which the solid carbon dioxide may be inserted.

9. A sealing strip for the seams of a refrigerated container comprising, in combination, a plurality of layers of a stable rubber emulsion with vulcanizing ingredients interposed between the container and a plurality of backing strips, each strip and each layer of said emulsion being arranged in overlapping relationship to the layer and strip below it, said container enclosing solid carbon dioxide and being made of insulating material and having a movable closure through which the solid carbon dioxide may be inserted.

10. A sealing strip for the seams of a refrigerated container comprising, in combination, a plurality of layers of rubber latex interposed between the container and a plurality of backing strips, each strip and each layer of said rubber latex being arranged in overlapping relationship to the layer and strip below it, said container enclosing solid carbon dioxide and being made of insulating material and having a movable closure through which the solid carbon dioxide may be inserted.

Signed at New York in the county of New York, and State of New York, this 21st day of September, A. D. 1929.

DAVID H. KILLEFFER.