June 19 1945. A. H. WARTH ET AL 2,378,521

CONTAINER

Filed April 9, 1942

Fig. 1.

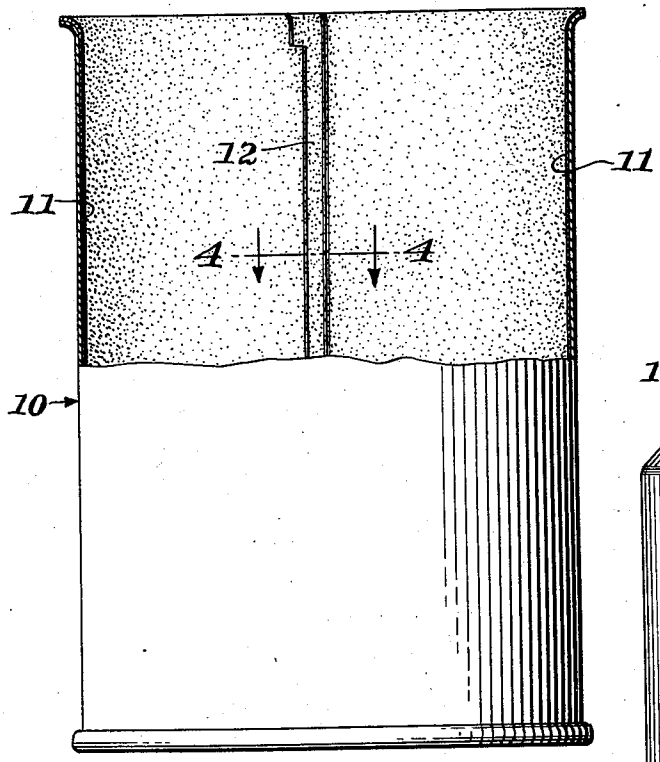


Fig. 2.

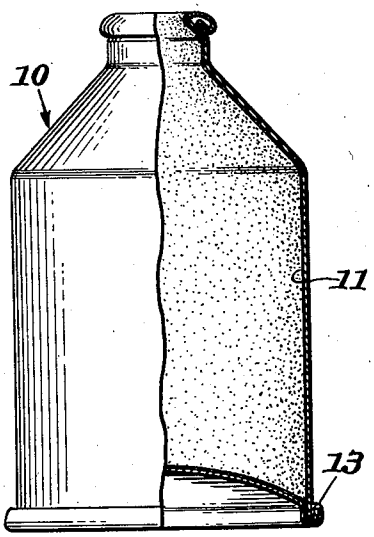


Fig. 3.

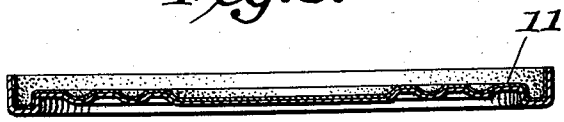
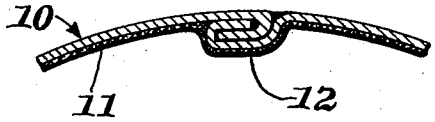


Fig. 4.



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UNITED STATES PATENT OFFICE

2,378,521

CONTAINER

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Application April 9, 1942, Serial No. 438,340

1 Claim. (Cl. 220—64)

This invention relates to containers made of metal, paper and plastics, as represented by receptacles for beverages, cartons for ice cream, cheese, fresh milk and other products, and also drinking cups. The invention has particular value in the packaging of pressure beverages, such as beer, where the delicate flavor, aroma and appearance must be preserved.

The principal object of the invention is to provide a container or other receptacle with an improved continuous wax lining which includes mica powder in the form of microscopic plates or lamínae and in an amount effective to increase the viscosity without increasing the dry melting point of the wax. As well understood in the art, wax liners of beeswax, paraffine and petroleum waxes are used to prevent injury to the contents through contact with the wall of the container. A liner made up of waxes of the types mentioned having included therein powdered mica in accordance with this invention, is chemically inactive, is an excellent insulator and galvanic action in the case of metal cans, such as beverage containers, cannot penetrate any portion of the wax film.

A most significant object of the invention is to provide a wax liner of suitable protective thickness, free from furrows, on both rounded and flat surfaces and particularly at the side, bottom and top container seams. We have discovered that if the viscosity of presently used and available liner waxes is increased and if this increase in viscosity is accompished by including an inert material, preferably mica powder, the flow of the molten wax becomes somewhat sluggish, with the result that thinly coated areas which are ordinarily found at the seams, notably the side seam, are eliminated. Heretofore, the wax, when heated to any degree beyond its melting point, became rather free flowing and tended to thin out along the seams of the can interior because of the greater heat retentivity in these areas occasioned by the overlapping of the metal parts. By adding mica powder to the wax in effective amount, this addition agent so retards the flow of the wax after the can has been flushed, as by spraying, with the wax composition and allowed to drain in the oven, that the resulting coating on the side seam, for example, has the same desirable uniform protective thickness as the coating on the wall adjacent the seam area. Moreover, not only is better protection afforded at the seams as well as over the whole interior wall of the can, but equally important, when the lining is subjected to heat and pressure, such as is involved in pasteurizing the contents, e. g., canned beer, there is far less tendency for the wax to flow than there is with the same wax without the mica added, the improved composition permitting temperatures of as much as 5 to 10 percent greater than with the usual waxes.

Another object of the invention is to provide a wax lining which is effective to provide a protective coating directly over black iron or steel or tin coat, and also over lacquered or varnished black iron, steel or tin plate, especially in those areas where the metal is bare due to faults in the lacquer or tin film.

A further object of the invention is to provide a mica wax mixture which will not run down the cans of the cone type or the walls of cylindrical containers as they emerge from the draining oven and are allowed to stand uprighted. This is due to the improved viscosity characteristic heretofore related and which is imparted by the presence of an effective amount of the mica powder.

Another object of the invention is to provide a mica-wax composition in which the mica powder fills in or bridges over the pores in the wax film and renders it impervious, i. e., the mica powder appears to leaf out or disribute itself desirably in the wax coating.

An equally important object is to provide a mica-wax composition which may be applied to containers by existing spraying or other machinery, and in which the inclusion of a substantial amount of mica powder has the further advantage of materially decreasing the amount and cost of the wax.

In this connection, another object of the invention is to make it unnecessary to add an imported wax of high melting point to the usual wax for the purpose of raising the flow or softening point of the composition so as to prevent any parts of the wax being taken up by the contents during the pasteurization. The use of mica powder raises the softening point sufficiently to dispense with these imported high melting point waxes and thereby further decreases the cost of providing a satisfactory wax lining.

The improved lining is prepared by adding the mica powder in the form of microscopic flakes to the melted wax. The powder has a size of substantially 100 to 200 mesh to the inch. Mica powder is preferred because of its inertness and further because it remains permanently in suspension in the molten wax, especially in the proportion of 1 part mica powder to 2 or 3 parts wax, and thereby reliably controls the viscosity

of the molten composition to produce the desirable increased viscosity. Materials such as magnesium, chalk, etc., might possibly be used, but since they possess the disadvantage that they cannot be employed with an acidulated liquor or contents, the mica powder is more advantageous as it is satisfactory under all conditions.

The use of mica flakes in varnish or lacquer coatings for containers is well known, the purpose of the mica being to provide a leafed out film to additionally protect the varnish or lacquer and to raise the softening point. However, such coatings are quite different from wax compositions, not only because the varnish requires a solvent and is hard, while the wax is applied molten and is soft, but particularly, because the wax coating creates the problem above explained of providing a lining of suitable thickness over the entire interior wall of the container and particularly at the seams or joints where ordinary methods and waxes have resulted in a characteristically thin unsatisfactory protective coating. This difficulty in coating with wax composition is overcome in accordance with this invention by using an amount of mica powder effective to increase the viscosity of the wax. By an effective amount of mica, we mean such an amount of mica is included in the wax that under the operating conditions of forming the lining on the container, the natural flow of the wax is reduced without raising its dry melting point whereby the wax composition is sluggish flowing and a suitably thick protective film is formed at the seams, as well as continuously over the interior container wall. For example, the usual wax has a melting point of about 150° F. to 180° F. and a softening point of about 118° F. to 160° F. The wax is liquefied and at a temperature of about 30° above the melting point, is sprayed into a can having a temperature of about 175° F. or 190° F. The viscosity of the wax under these conditions is increased proportionately with the amount of mica powder added, and satisfactory results have been obtained by using substantially 25 percent mica powder and 75 percent wax. A wax of 166° F. melting point and 140° F. softening point in 100 percent concentration has a viscosity of 12.7 seconds, A. S. T. M. $\frac{1}{16}$'' orifice, but in a proportion of 75 percent of this wax and 25 percent of mica powder of 125 mesh, a viscosity of 22.5 seconds is obtained. In other cases, 2 to 30 percent of mica powder may be added. The softening point of wax—mica composition—is increased by the addition of the mica powder, e. g., from 140° F. to 146° F., but this is relatively unimportant since the wax usually has a sufficiently high softening point.

In the drawing I have illustrated a sanitary container and a seamless cone top container, but the invention is applicable to containers of all types and the improved viscosity characteristic enables a uniform thickness of film to be provided not only over the entire surface of the container wall, whether it be flat or rounded, but particularly at the side seam or top and bottom seams of containers where great difficulty has been experienced due to thinning out of the wax coating.

Referring to the drawing:

Figure 1 is an elevational view partly in section of a container having a side seam coated with the mica wax composition.

Figure 2 is an elevational view partly in section of a seamless cone top container provided with a similar coating.

Figure 3 is an elevation partly in section of an end useful in connection with either of the containers and likewise provided with the mica-wax coating of this invention, and

Figure 4 is an enlarged fragmentary sectional view through the side seams of Figure 1, taken on the line 4—4 thereof.

In the drawing the containers shown in Figures 1 and 2 are indicated at 10, and the improved mica wax lining is indicated at 11. The composition is prepared by mixing the mica powder in the molten wax so as to permanently disperse and suspend the same therein. The side seam 12 in the container shown in Figure 1 and the bottom seam 13 of the container shown in Figure 2 disclose that the wax coating is suitably thick, and that the coating throughout the interior wall of the container likewise is continuous and of suitable thickness, i. e., the container wall and particularly the seam portions are devoid of objectionable thin or uncoated areas.

In some cases, resinous materials may be added, particularly where the coating is applied directly to metal, since the resins will supply any additional required adhesiveness and toughness.

We claim:

A metal food and beverage container having a lining applied directly to the metal wall surface, said lining consisting of a mixture of wax and mica powder, the mica powder being of a size of substantially 100 to 200 mesh to the inch and present in substantially 2 to 30 percent of the mixture, whereby the softening point of the wax is increased without increasing its dry melting point.

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