Nov. 6, 1934. J. OLSON 1,979,992

LAMINATED PAPER CONTAINER

Filed June 16, 1932

Fig. 1.

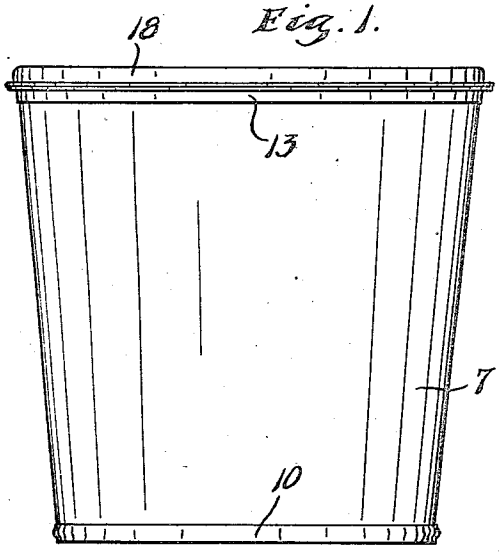



Fig. 3.

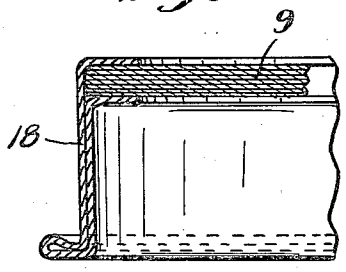



Fig. 4.

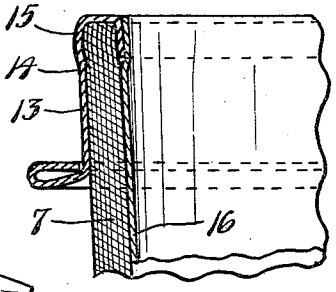



Fig. 6.

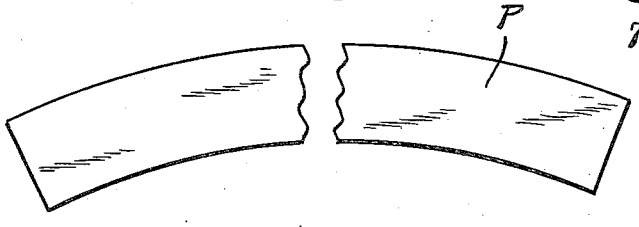



Fig. 5.

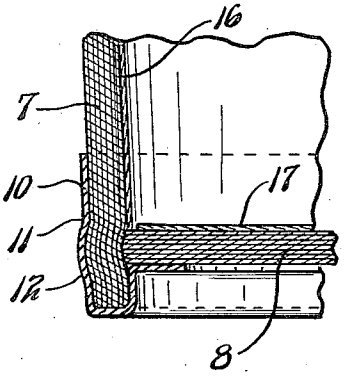
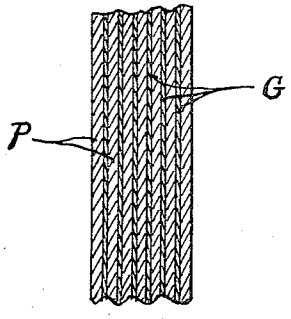



Fig. 2.




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# UNITED STATES PATENT OFFICE

1,979,992

## LAMINATED PAPER CONTAINER

John Olson, St. Paul, Minn.

Application June 16, 1932, Serial No. 617,545

7 Claims. (Cl. 229—3.5)

This invention relates to laminated paper containers and laminated paper boards wherein casein glues are used as binders.

It is the main object of this invention to provide a novel light, exceedingly strong, water resistant, laminated, paper container adapted particularly for use in packing food products, such as butter, lard etc.

It is another object of the invention to provide a novel laminated paper board capable of use in such containers and elsewhere.

The objects and advantages of the present invention will more fully appear from the following description, made in connection with the accompanying drawing, wherein like reference characters refer to the same or similar parts throughout the various views, and, in which,

Fig. 1 is a view in side elevation of a butter tub constructed in accordance with the present invention;

Fig. 2 is a sectional view through a portion of the side wall of the tub, taken on a greatly exaggerated scale;

Fig. 3 is a vertical section taken through a portion of the tub cover;

Fig. 4 is a vertical section taken through the upper portion of the side wall of the tub;

Fig. 5 is a vertical section taken through the lower portion of the tub, Figs. 3, 4 and 5 being shown on enlarged scale; and

Fig. 6 is a plan view showing portions of a sheet of paper from which the side wall of the tub is formed.

The casein glue of my invention is prepared from casein, oil, alkali and water. Although it is preferable in order to obtain certain advantages that certain oils and certain alkalis be used, I have found by actual experiment that many different oils and alkalis may be used in preparing the casein glue, and I believe that many other oils and alkalis with which I have not experimented can also be successfully used.

Although I have produced satisfactory glues which may be used for different purposes, my chief concern has been to produce a glue which will form a wholly satisfactory binder for use in producing a strong, light weight, laminated, paper container within which such foods as butter may be packed for handling and shipment.

Although socalled South American or sun-dried casein can be used for my purpose, I have produced most satisfactory results with socalled American or oven dried casein. I prefer to use fifty mesh oven dried casein, although from twenty mesh to one hundred mesh casein may be used.

I have found that nearly any vegetable oil and certain mineral oils and some animal oils may be used to form the oil constituent of the casein glue. Vegetable oils that have been found to be particularly satisfactory are pine oil, linseed oil (unboiled), castor oil, cocoanut oil, corn oil and cotton seed oil. Mineral oils that have been found satisfactory for use are fine oil and penetrating oil. One animal oil that has been found satisfactory is whale oil. It is thought that other vegetable, mineral and animal oils than those specified may also be used. Of the various oils with which I have experimented, I prefer to use linseed oil as the chief oil constituent because it is inexpensive and produces most satisfactory results, and with this linseed oil I prefer to use a small quantity of pine oil, because the pine oil eliminates the disagreeable smell of the casein both while the glue is being mixed and after the glue has been applied and has hardened. Although pine oil alone produces very fine results, this oil is quite expensive in comparison to linseed oil and it is preferred therefore to use but a small quantity of the pine oil. Both linseed oil and pine oil have high penetrating properties.

I have found that there are a large number of alkalis that may be used. Among these are sal soda, bicarbonate of soda, borax, magnesium oxide and slack lime. Other stronger alkalis can also be used but it is preferred to use a relatively weak alkali in order to prevent discoloration of the glue and of the paper or other work in connection with which it is used and to also prevent burning of the paper or of the other ingredients in the glue. Of these various alkalis, the most satisfactory results were obtained with sal soda, bicarbonate of soda and borax, with a small quantity of water glass used with any one of these alkalis. I prefer the use of sal soda and a small quantity of water glass.

Following is my preferred formula for my casein glue, the different ingredients being used in approximately the proportions stated, and the proportions being given in dry measure units:—

| | Ounces |
|---|---|
| Mesh oven dried casein | 8 |
| Linseed oil (unboiled) | ¾ |
| Pine oil | ¼ |
| Sal soda | 2 |
| Water | 40 |
| Water | 8 to 16 |

½ oz. water glass may be also used if desired.

In preparing the glue, the casein is first mixed with the oils thoroughly by use of a proper mixing machine, which will agitate the same. The oils cause the casein to swell and soften. After the casein and oils have been thoroughly mixed, the alkali is added and thoroughly mixed with the same. The first mentioned quantity of water at a temperature of from 70° to 80° F. is then placed in a clean casein glue mixing machine somewhat on the order of a concrete mixer and the prepared casein, oil and alkali mixture is then fed slowly into the water. In the above formula as stated, forty parts of water will be mixed with eight parts casein, two parts sal soda, three quarter parts linseed oil and one fourth part pine oil in this manner. The water with the other ingredients is mixed until a smooth paste is formed, whereupon the water glass may be added if desired, although the water glass is not absolutely necessary. This preparation shortly after the water is mixed with the other ingredients, is first quite thin whereupon it forms a thick paste. The preparation is allowed to stand for about half an hour and as time goes on the preparation smooths out to a thinner consistency until a smooth colloidal suspension is produced which forms what I choose to call my dissolvent.

After the dissolvent has been produced, I add my second quantity of water. In the above formula for one purpose I add approximately sixteen parts by weight of water, while for another purpose to make a thicker glue I add only eight parts by weight of water. This last quantity of water is thoroughly mixed with the dissolvent whereupon my glue is prepared ready for use.

There is considerable latitude permitted in the proportions of the oil and alkali and water that may be used with a given quantity of casein, depending somewhat on the particular oils and alkalis used. For example in the above preferred formula, I may use from one half to three parts oils. I also may use from one to four ounces sal soda. From one half to one and a half ounces of water glass may be used. To form the dissolvent, I may use from thirty two to forty eight parts water, while to the dissolvent I may vary the quantity of water added considerably depending on whether a thick glue or a thin glue is desired.

Preferably from one to three parts oil will always be used with eight parts casein no matter which one or more of the various oils that may be employed are used. When bicarbonate of soda is used as the alkali from two to six parts of the same will be used with the standard eight part quantity of casein. When borax is used, from one to six parts variation is possible. When magnesium oxide is used from one to four parts variation is possible while when slack lime is used from one to three parts is the variation possible.

Although in preparing the dissolvent, it has been found possible to add the first named quantity of water to the casein first, then mix the same, then add the alkali and then add the oil, I have found that it is highly advantageous to first mix the casein and oil together, then add the alkali and then the water. By mixing the oil and casein first, less time is required for the mixing operation than when the water and casein are first mixed. Also when the alkali is added to the oil and casein mixture, much less frothing takes place than when the alkali is added to a water and casein mixture. The oil also when it is added to the casein seems to produce a much smoother mixture and a mixture much less liable to lump than is the case when the glue is prepared by first mixing the casein and water together.

As has been previously stated, my casein glue has been developed chiefly for use as a binder to secure together and coat the paper laminations of a paper container for use particularly as a butter tub and as a container for other edible foodstuffs. The glue is adapted for this purpose because of its peculiar properties when used therewith. In the drawing, there is illustrated a laminated paper butter tub wherein my casein glue is used.

Referring to the drawing, the tub illustrated includes a side wall 7 which flares outwardly from bottom to top, a bottom 8 and a top 9, all of which are constructed from laminated paper, the sheets of which are bound together and coated and impregnated with my casein glue G, as best illustrated in Fig. 2. The side wall 7 consists of a single, long arcuate strip of paper P as best shown in Fig. 6, or a series of overlapped shorter arcuate strips which during formation of the side wall are first coated with the casein glue preferably on both sides and circularly wound under pressure as on a drum to form the side wall. The bottom 8 and top 9 are formed by circular sheets of paper coated preferably on both sides with my casein glue and pressed together under high pressure. A bottom hoop 10 encircles the exterior portion of the side wall 7 adjacent the lower edge thereof, extends across the lower edge of the side wall below the same, encircles the interior surface of the side wall adjacent its extreme lower portion and forms an inwardly projecting flange upon which the bottom 8 rests. Crimp lines 11 and 12 are formed in the hoop 10, one slightly above the upper edge of the bottom 8 and one slightly below the bottom edge of the bottom 8 and these crimp lines distort the side wall 7 slightly to tightly bring the side wall into engagement with the bottom 8. Another hoop 13 encircles the side wall 7 adjacent its upper edge and is provided at its lower edge with an exterior outwardly extending reversely bent flange, while adjacent the upper edge of the side wall the hoop is crimped at 14 to form an exterior outwardly bulged portion 15. The hoop 13 projects over the upper edge of the side wall and is downwardly bent to encircle the interior of the side wall adjacent its upper edge. A lining sheet of paper 16 lines the interior surface of the side wall 7 and projects over the interior flange of the hoop 13. Another lining sheet 17 lines the top surface of the bottom 8. A cover hoop 18 encompasses the edge of the cover 9, has an inwardly projecting flange overlying the top surface of the cover adjacent its edge, projects downwardly below the cover 9 in inwardly flaring relation therefrom, has an outturned flange at its lower portion and is reversely bent upwardly on itself against the downwardly projecting portion and forms an inwardly projecting flange which is disposed below the cover 9 adjacent its edge.

Although different types of paper may be used to form the side wall 7, bottom 8 and top 9 of my tub, I have obtained best results by use of what is known in the trade as "kraft" paper. I have also found that both lined and unlined chipboard paper may be used and I believe that manila paper and tag board can also be used but these papers will not give the strength obtained by use of kraft paper, although it is believed that they will be sufficiently strong for butter tub use.

For the side wall I prefer to use an open sheet

kraft paper of from one hundred twenty five to one hundred thirty pounds to a ream containing four hundred eighty sheets 24 inches by 36 inches and to use eight laminations or windings of this paper. In order that this paper may be worked without blistering what is known as a high fold paper should be used. By "high fold" is meant a paper which is very pliable when bent crosswise of the direction of the grain of the paper while stiffer and more brittle when bent lengthwise of the grain. The grain of the paper used will run lengthwise of the sheet P rather than crosswise thereof and the paper accordingly is quite flexible and pliable crosswise of its length, while in the direction of its length it will be less pliable and more brittle. An open sheet or porous paper is used so that the casein glue may more readily penetrate through the fibers of the paper.

With open sheet, high fold kraft paper, or for that matter with any paper that is used for the side wall of the container, I prefer to use a casein glue prepared as described and to which approximately twice as much water is added to the dissolvent as casein used in forming the dissolvent. In other words, approximately sixteen ounces by weight of water will be properly proportioned with a dissolvent containing eight ounces of casein.

I have found that satisfactory results can be obtained in making the side wall of the container by use of kraft paper of from sixty pound stock to one hundred and fifty pound stock. With sixty pound stock paper as many as eighteen windings or laminations will be employed, while with the heavy weight one hundred fifty pound stock, five laminations or windings will suffice. The number of windings or laminations used will depend largely on the weight of the paper used.

Chipboard, a somewhat softer paper than either kraft or manila paper, was successfully used in weights known to the trade as from .012 to .026 inch gauge and although not as satisfactory results were obtained as with kraft, side walls were produced which could be properly used.

In making up the bottom 8 and top 9, an open sheet low fold paper is used, and preferably a heavier weight paper is used than that used in making the side wall. I have found kraft paper preferable for this purpose and this paper may be used in any of the weights above specified in connection with the making of the side wall. A low fold paper is used as it is not necessary for the bottom and top of the tub to be pliable. In preparing the top and bottom of the tub, preferably a more concentrated glue will be used than the glue used in connection with the side wall. I prefer to use a casein glue prepared as described and to which only the same quantity of weight of water is added to the dissolvent as the quantity of weight of casein used in the dissolvent. In other words, approximately eight ounces of weight by water will be properly proportioned with a dissolvent containing eight ounces of casein.

Of course, lined or unlined chipboard, manila paper or tag board can be used for making the bottom and top of the package if desired.

The peculiar properties given by my casein glue to the side wall, bottom and top of the container are as follows:—

When the glue is first applied to the paper, the oil in the glue permits the same to be easily handled and smoothly and evenly spread onto the paper without forming bristle marks permanently in the glue when applied by use of a brush. The oil in the glue causes the same to penetrate into the paper through the fibers thereof to impregnate the entire sheet with the glue, whereupon when the different laminations are bound together, the casein glue extends through and thoroughly permeates the entire board that is formed. As the glue dries, a tremendously strong board is provided having great tensile strength. The board when dried is water resistant and from all tests that I have conducted, I believe that the board is absolutely water proof. I have subjected a tub made as specified to one hundred pounds steam pressure per square inch at 350° F. continuously for fifteen minutes and have found that the steam did not affect the tub in the least. I have also held water within tubs for days at a time and have packed butter in the tubs for weeks at a time without affecting the walls of the tub in the slightest degree. The casein glue which is used to coat the inner and outer surfaces of the side wall, top and bottom of the tub, makes the same exceedingly tough and resistant to bruising or other injury. The oil in the glue gives flexibility to the paper while it is being worked and it also seems to give flexibility to the hardened glue to prevent the same from cracking or chipping as the board is flexed after the glue has set and hardened. The pine oil used in the glue prevents the glue from smelling either while it is being applied or after it has set and hardened.

The glue produced has a long working life (the period of time elapsing between preparation for application and jellation of the glue). The working life of my glue is between fifty and eighty hours.

The liner sheets 16 and 17 that are used in the tub are formed from a paper which will readily take wax or paraffin. These papers are known in the trade as waxing papers. If it is desired, paraffin can be applied to these papers after the tub has been completely formed, or immediately prior to the time that foodstuffs are to be packed in the tub.

My glue does not discolor the paper in connection with which it is used, and a light colored paper obtained as by bleaching is, therefore, permissible. When the tub is to be used for packing butter, it is highly important that the package be a light color and of a neat and attractive appearance. Such a package may be made by use of my glue.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of the present invention.

What is claimed is:—

1. A laminated paper container comprising a plurality of paper laminations forming walls for the container and an oil impregnated casein glue permeating and binding together the paper laminations.

2. A laminated paper container comprising paper laminations forming the walls thereof and an oil impregnated casein glue binding together and permeating the paper laminations and coating the exterior surfaces of the walls.

3. A laminated paper container for use in holding foodstuffs comprising paper laminated walls and a pine oil impregnated casein glue penetrating the paper laminations and binding the same together.

4. A paper container comprising paper lami-

nated side walls formed from a high fold open sheet circularly wound on itself with the grain of the paper extending longitudinally of the sheet and oil impregnated casein glue binding the different laminations of the sheet together and penetrating the same.

5. A paper board comprising sheets of paper laid one on top of another and an oil impregnated casein glue penetrating through the various layers of paper and hardened to make the board water resistant and to give the same even tensile strength throughout.

6. A container having a wall constructed of a multiplicity of laminations of relatively porous paper material permeated and united by a casein glue including an ingredient to cause the glue to permeate said material so as to form a dense hard substantially unitary construction.

7. A container for shipping butter or the like in substantial quantity having a substantially vertically extending wall constructed of a multiplicity of laminations of relatively porous paper material and a liquid composition including a casein glue and an ingredient to cause the glue to permeate said material and adhesively securing the laminations together to form a dense, hard and substantially unitary construction that is non-absorbent of liquids shipped therein.

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