Dec. 17, 1929. C. ELLIS 1,739,582

WATER RESISTANT PAPER DISK STOPPER
FOR MILK BOTTLES AND THE LIKE
Original Filed May 7, 1926

Fig. 1.

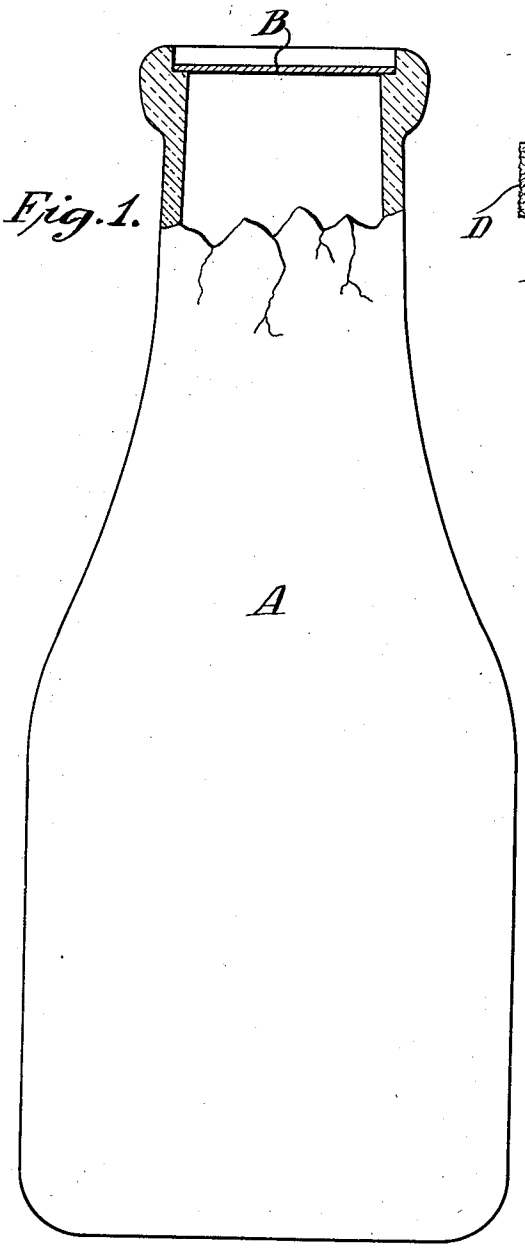


Fig. 2.

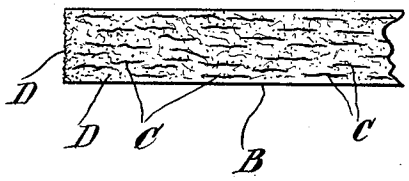
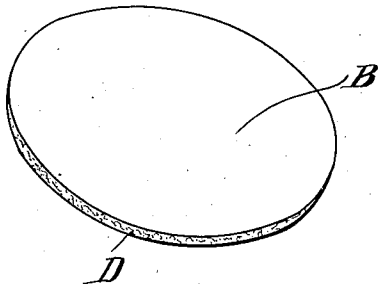


Fig. 3.



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UNITED STATES PATENT OFFICE

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WATER-RESISTANT PAPER-DISK STOPPER FOR MILK BOTTLES AND THE LIKE

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This invention relates to water resistant paper disk stoppers for milk bottles and the like and also to a container comprising such disk closure and relates especially to paper disk stoppers of the type described in my copending application Serial No. 29,258 (see pages 4, 5, 12 and 20 of aforesaid specification).

The present invention in its preferred form relates to a paper disk of a water resistant character produced by incorporating with the wood pulp or paper pulp at some stage in its manufacture prior to being formed into a sheet, an appropriate proportion of a wax emulsion, particularly one made from paraffin wax and subsequently sheeting the so treated pulp, whereby a water resistant product is obtained. This is cut into disks of the size appropriate to fit into milk bottles and similar containers. Thus, a package or container results comprising a bottle and a disk stopper or closure, held in place by a frictional contact with the walls of said bottle.

I prefer to use such a quantity of wax in the paper pulp that a disk is obtained which will not permit milk or other liquids to penetrate when such liquids are placed in the bottle and the disk inserted in the mouth of the bottle, even though such contact of liquid may be over a period of several days.

The exact degree of waterproofing or water resistance, however, depends on service conditions, and in some cases, a waterproofing effect of a comparatively slight degree may be all that is required, while, in other cases, a much more substantial waterproofing effect is needed.

Ordinarily in producing a disk of a character sufficiently water resistant for milk bottles, the paper may carry four to five per cent of paraffin wax. In the present method of waterproofing it is customary to apply a coating of wax to each side of the disk and the amount of wax thus incorporated in the paper is considerably higher than that required in the present invention. Thus, a saving of paraffin, or other wax, results.

Futhermore, in waterproofing paper disks in accordance with present methods the paper from which the disk is to be cut is usually printed with the manufacturer's name or trade mark and then the paper is punched or cut into disk form. Or the punching may be done first and the printing afterwards, subsequently the disks are waxed by contacting with molten paraffin, which treatment coats not only the surfaces of the paper disk with wax, but also the edges of said disk coming in contact with the wax.

Since the firmness with which the disk is held in place in the bottle mouth depends, in part at least, upon the frictional contact of the rim or periphery of the disk, lubrication of the edges of the disk with paraffin wax is undesirable. This is especially true when the cheaper grades of paraffin wax are used, which are rather soft, and which in the case, for example, of scale wax, may contain some lubricating oils, and such disks when coated in the manner aforesaid, are open to the possible objection of not being capable of being firmly seated in the bottle mouth.

So long as the bottle remains chilled this may not cause trouble, but if the container is allowed to reach room temperature, or to stand in the sun for any length of time, the stopper may loosen, or at least, cease to be adequately and firmly seated.

According to the present invention the dissemination of wax throughout the mass of paper pulp tends to secure an adequate waterproofing effect with a minimum amount of wax and at the same time avoids that surface coating of wax along the periphery of the disk, causing local lubrication; such as would result from dipping the disk in a paraffin bath. A greater proportion of the fibres in the surface of the periphery are free to engage in a frictional contact with the walls of the bottle mouth and a firm stoppering effect results.

Furthermore, instead of using the harder and more expensive grades of paraffin wax, it is possible to use in the present invention various cheaper grades including scale wax, or wax which has been softened with various oils. Thus, in some instances I prefer to employ an emulsion or dispersion of wax and a good grade of petroleum oil, particularly one which is practically tasteless and

odorless, such as the various so-called medicinal oils, of which products such as "Nujol" or "Marcol" are typical.

The waxy material of the present invention is not, however, limited to paraffin, but may include mixtures of paraffin with other waxes, such as carnauba, candelilla, Montan, ceresin and the like, or these waxes may be used by themselves as the essential waxy component of the emulsion or dispersion employed.

In order to obtain the waxy dispersion I may employ various emulsifying agents such as soap, alkali, starch, bentonite, and the like. Thus, five or ten per cent of stearic or oleic acid may be melted with the paraffin and this composition emulsified with a hot dilute aqueous solution of caustic soda or ammonia. The ammonia composition is preferable in some cases as free ammonia may be removed very readily. A wax disperson may be made, suitable for the purpose, by agitating or grinding paraffin wax with water and one of the aforesaid emulsifying or dispersing agents, or any other suitable dispersing agent. Preferably I employ the colloid mill to make such dispersion and in this case I preferably employ only a very small amount of emulsifying or dispersing agent. Thus, less than one per cent of potassium or sodium oleate may be employed to make a fine dispersion of paraffin wax in water, the dispersion containing about fifty per cent of the wax, and yet being quite liquid. The use of such milled wax, as the wax dispersion made in the colloid mill, is termed, is advantageous in that the wax may be employed in the form of a concentrated dispersion and yet will become disseminated through a large amount of wet paper pulp.

Preferably the paraffin emulsion is added to the beater engine at the time the paper stock is charged there into and after thorough mixing in the usual manner in the engine a quantity of rosin size or any other desired sizing agent may be added, followed by the introduction of alum or other setting agent before the charge is withdrawn.

The addition of rosin size or similar sizing agent, however, is not necessary in many cases.

By incorporating with the paper stock, while in the beater engine, just sufficient wax to create the requisite waterproofing effect and the addition of a setting agent, the wax precipitates throughout the particles of the pulp mass. Thus, two or three per cent by weight of wax, based on the paper stock, may be introduced in this manner to secure water resistance.

The paper stock may be ordinary sulphite pulp or pulp obtained by other processes of treating wood, or it may be prepared from ground wood or mixtures of ground wood with sulphite pulp, or other pulp. The employment of other fibres adapted to be sheeted to make paper is not precluded.

In some cases oxidized paraffin may be employed to produce a dispersion. This emulsifies or disperses better than the unoxidized wax. The entire wax content of this dispersion, or a part thereof, may be made from oxidized paraffin. The latter may be produced, for example, by blowing air through paraffin wax for several hours at a temperature of 160° C.

In the preferred form of the invention I may have present in the paper pulp a substantial proportion of hydrocellulose to serve or assist as a fixative for the wax. The hydrocellulose may be added to the pulp or formed in it in any suitable manner.

The invention may be illustrated by the following:

A mixture of equal parts by weight of sulphite pulp and ground wood are agitated in water in the beater engine with a dispersion of paraffin wax sufficient to introduce about four per cent of wax into the finished paper. The dispersion is made by passing through a colloid mill equal parts by volume of molten wax and a one per cent solution of sodium or potassium oleate. Agitation in the beater engine is continued until hydrocellulose is formed to a considerable extent.

After thorough admixture, rosin size is added, sufficient to introduce one or two per cent of rosin or resinate and sufficient alum is then added to react with the resinate and soap.

The pulp so treated is formed into a sheet, usually of single ply construction and for the milk bottle disk or closure of the present invention should have a thickness preferably between thirty and forty points, although thinner or thicker sheets therefor are not precluded.

The sheet is calendered, preferably hot, and the particles of wax are thus further disseminated through the fibrous mass (and into the fibres thereof) composing the sheet. In this way an enhanced degree of water resistance is obtained. The paper stock is then printed in sheet form and finally cut or punched into disks of a size closely fitting into the mouth of the glass container which is to be stoppered. In other cases the sheet is cut into disk form and the disks subsequently printed. Of course, the printing may be omitted when no emblem or advertising matter is required.

The procedure of the foregoing illustration may be varied in different ways, as for example, a cheaper paper stock may be made by utilizing three parts by weight of ground wood to one part of sulphite or sulphate pulp. The paraffin wax may receive an addition of hydrocarbon oil. Thus ten to twenty per cent of oil may be added to the wax and a dispersion made therefrom, which, in some cases,

may permit of better results in printing the waterproofed paper.

Other waxes such as carnauba employed as a dispersion may be incorporated in the paper pulp in lieu of paraffin wax, yielding a paper of greater stiffness and one which when sheeted can be pressed or molded into various shapes and on cooling maintain such shape, even though exposed to the sun's rays. Paraffin wax, on the other hand, employed in the same manner yields a paper which will not hold its shape effectually under these conditions.

The container of the present invention is illustrated diagrammatically in the appended drawing, in which Fig. 1 shows partly in elevation and partly in section, a bottle of the milk bottle type. Fig. 2 is a cross section of a paper closure disk, as described above. Fig. 3 shows the disk in perspective. Like reference characters denote like parts in the drawings.

In the drawing A is a bottle, in the mouth of which is situated the disk closure B seated in the shoulder or recess of the bottle mouth. This disk contains a disseminated wax produced in the manner aforesaid and the rim or periphery of the disk engages in firm contact with the side walls of said recess.

In Fig. 2, B is the closure disk of fibrous structure, as indicated by C and having the particles of wax disseminated through the mass as indicated by D. This drawing is merely diagrammatic as the proportion of wax and the degree and temperature of calendering will make a considerable difference in the appearance of the product. The drawing, therefore, can be considered only as illustrative and not in any sense serving as a restriction with respect to the structure thus diagrammatically depicted.

As has been indicated in the foregoing, the present method of dipping paper disks into wax to secure a coating of the wax on the surfaces and on the periphery does not secure uniform distribution of said wax. In the present invention it is possible to disseminate the wax uniformly throughout the paper stock. This does not necessarily mean that the wax extends continuously through the mass, but that it is deposited on or in the fibres in such a manner that when the pulp is made into sheet form the waxy particles will be distributed therethrough in a substantially uniform manner, that is, sufficiently closely and regularly to make a water resistant material. The wax introduced into the paper pulp by means of an emulsion or dispersion is a deposited wax rather than one which has been applied by dipping and the term "deposited" as used herein, therefore, applies to the water resistant product containing wax which has been thrown down or deposited from a suspension, dispersion, emulsion and the like. By the term "deposited" as used herein, reference is made to wax which has been thrown down or deposited from a suspension, dispersion, emulsion and the like. This term is used to distinguish over the processes wherein the wax is applied by mere dipping of an article into molten wax or analogous method.

It is possible to use such a large proportion of wax with respect to the paper stock that on hot calendering the wax will ooze out to some extent, so that a waxy surface and also, in some cases, a waxy periphery may result. In the present invention, however, so far as is concerned the specific product, namely; a water resistant paper disk adapted for stoppering containers of the milk bottle type, I prefer to use a lesser proportion of wax, in fact, the minimum amount of wax which will secure water resistance, in order thereby to obtain a greater frictional seating effect due to the greater grip on the mouth walls of the bottle by virtue of some of the periphery fibers, or parts thereof, being sufficiently free from waxy and greasy material to accomplish this objective.

Finally I wish to call attention to the fact that in the preferred form of invention the waxes, oils and the like employed to obtain water resistance should be as pure as possible, or, in any event, preferably sterilized or treated and purified in such manner as to be of sanitary quality and free from odors or other contaminating influence on a product so sensitive as milk. Therefore, in preparing the preferred form of the invention such substances as rubber, tars, asphalts and the like which might contaminate milk are excluded.

What I claim is:—

1. A bottle closure disk composed of cellulose fibre and milled paraffin wax dispersed therethrough, said disk having a thickness of between thirty and forty points and having edges adapted to engage in firm frictional contact with the side walls of a bottle container adapted to receive said disk in the mouth thereof; whereby the container is firmly stoppered and serves to contain and transport milk and other liquids.

2. A container comprising a bottle having a recessed mouth adapted to receive a paper closure disk, and carrying in said recess a closure disk composed of paper of a thickness between thirty and forty points and containing disseminated wax serving as a waterproofing agent.

3. A water resistant paper disk stopper for bottles containing ground wood and sulphite pulp fibre carrying disseminated and deposited paraffin wax.

4. A water resistant single sheet paper disk suitable for stoppering milk bottles, said disk being composed substantially of ground wood and sulphite pulp carrying uniformly disseminated and deposited paraffin wax.

5. A water resistant single sheet paper disk adapted for use as a stopper for milk bottles, said disk carrying uniformly distributed deposited wax; the edges of said disk being adapted to secure fibrous engagement with the mouth walls of such milk bottles, whereby a frictional seating effect is obtained.

6. In single sheet paper disks suitable for closing milk bottles, the employment of a waterproofing composition comprising paraffin wax and a medicinal mineral oil.

7. A water resistant single sheet paper disk adapted for closing a container of the milk bottle type, said disk containing a substantial proportion of hydrocellulose and carrying uniformly disseminated and deposited wax of a character adapted for contact with milk; whereby a sanitary closure is obtained.

8. A paper disk water-proofed with oxidized paraffin.

9. A closure for containers said closure being made from paper carrying oxidized paraffin.

10. A container disk closure comprising paper carrying paraffin wax introduced into the paper from an emulsified condition.

11. A container closure made of paper having incorporated thereinto a paraffin wax and a setting agent for said wax.

12. A closure for containers, said closure being made from paper pulp incorporated with emulsified paraffin wax.

13. A container closure comprising paper board carrying paraffin wax introduced into the stock from which the board was made in an emulsified condition.

14. A closure for containers, said closure being made from stock containing ground wood pulp incorporated with emulsified wax.

15. A water resistant paper disk stopper for bottles made from stock containing ground wood pulp carrying emulsified paraffin wax.

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