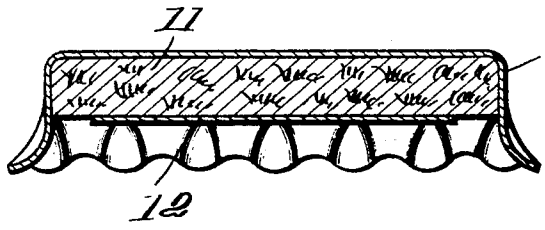
Dec. 7, 1948. E. C. PFEFFER, JR 2,455,802

GLASS CLOTH SPOTTING MATERIAL

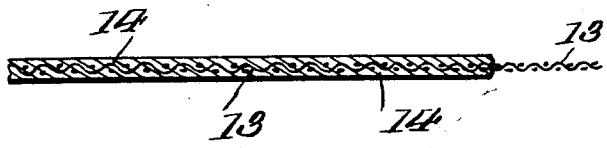
Filed June 14, 1943

FIG. 1.



3513
X3523
X3528

FIG. 2.



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2,455,802

GLASS CLOTH SPOTTING MATERIAL

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2 Claims. (Cl. 117—126)

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In providing closures for containers of foodstuffs and other materials, it has been a practice to provide a resilient material for establishing a firm seat and seal upon the container and to employ a lining material for preventing contact of the contents of the container with this resilient pad.

In the ordinary crown seal employed for glass beverage bottles and cans, for example, it has been the practice to employ a cork disk as a cushion pad within the closure cap, and to surface this disk with a thin layer of aluminum or other metal which is non-permeable to the beverage. Owing to existing difficulties, the employment of aluminum for this purpose is restricted, and it is desirable to provide a lining material which is cheap, strong, and capable of performing its sealing functions under the conditions of manufacture and employment.

Normal baking operations upon lacquers and enamels applied to the surface of metal cans and the like require a temperature of at least 375 degrees F. to bring the resin to a condition at which it has the necessary strength and cohesion, and the requisite chemical resistance against penetration or dissolution by many liquids, such as water. When it is sought to form such a sealing material by employing resin lacquers directly upon the cushion pad, the necessity of baking the resin at a high temperature, for preventing the development of off-flavors in the contents of the container, creates difficulty in that cardboard, cork, and like organic cushioning substances deteriorate chemically and physically at the temperatures requisite for baking. When it is sought to employ spots of liners having a paper base saturated or coated with a resin composition, the same difficulty arises. For example, white sulfite papers do not withstand baking at temperatures in excess of 300 degrees F., which is essentially the minimum baking temperature for the coatings.

It has now been found that a closure facing material of adequate strength and possessing the necessary flexibility for procuring a tight seal even under the pressure conditions often prevailing with bottled or canned beverages, can be made from a glass fabric having a coating of baked resin.

In the accompanying drawings:

Figure 1 shows a closure lining material employed in a crown seal.

Figure 2 is a sectional view through a portion of the lining material, on a much larger scale.

In these drawings, the metal crown seal 10 is formed as usual with its crimped or fluted edge,

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and with a recess for receiving a cushion pad 11 of cork or like substance, upon which is mounted a lining material in the form of a spot 12. It is preferred to secure the pad 11 in position by a cement, and to mount the spot 12 upon the pad 11 by a thermo-adhesive material.

The lining material is constructed as shown in Fig. 2 of a glass fabric 13 having a sealing coating of the thermo-set resin which provides continuous surfaces at both faces of the fabric and is shown in Fig. 2 as a coating 14.

The glass fabric may be formed of threads each comprising a bundle of filaments of spun glass, the individual filaments having a diameter of the order of one to three ten-thousandths of an inch with thirty or forty such filaments forming a bundle. These filaments are preferably not tightly twisted or spun in providing the bundle, as it is desirable to leave essentially longitudinally extending crevices into which the varnish may enter during the coating operation, to assure a thorough permeation of the varnish into the interstices of the threads. In this respect, the glass fabric differs from paper in which the fibers are individually intermeshed or felted, and in which the varnish can operate by penetration into the pores of the individual fibers. The glass cloth should have a close weave, so that there are essentially no pores visible from side to side of the uncoated material.

Appropriate coating materials are oleoresinous varnishes and enamels, thermosetting phenol-aldehyde 100 percent resin enamels, vinyl resin lacquers (such as polyvinyl chloride and the mixed polymers and interpolymers from vinyl chloride and vinyl acetate and containing 80 or more percent of the vinyl chloride), and the combinations of such vinyl halide and halide ester polymer lacquers with thermoplastic or thermosetting phenol-aldehyde resins. When employing phenol-aldehyde and vinyl resin lacquers, it is preferred to include a plasticizer to assure flexibility. Such lacquers and enamels are preferably dissolved in a suitable solvent such as ketones, esters, or mixtures of the same (such as methyl-isobutyl ketone, isophorone, cellosolve esters, etc.), usually with the addition of diluent hydrocarbons (such as toluol and xylol). The resin-base material is employed in proportion to the solvent to provide a viscosity which will deposit a sufficient thickness of the coating composition to provide a desired amount of resin after elimination of the solvent. It is notable that oleoresinous varnishes can be employed for forming surfaces having desirable flavor and strength

characteristics, since such varnishes are customarily regarded as requiring too great a baking temperature for such employment.

The glass fabric may advantageously have a thickness of two to four thousandths of an inch, and the resin deposit is such as to give a total thickness to the finished material of about three to five thousandths of an inch.

The resin coating composition is applied by brushing, spraying or roller-coating, care being taken to assure a thorough saturation and permeation.

Following coating, the cloth is subjected to drying and baking operations, at a temperature of 375 degrees F. or higher, being the temperature required for baking the lacquer base in order to give it the necessary characteristics of strength and resistance to action from or upon the liquid (such as aqueous solutions and suspensions) to be packaged in the container.

It may be pointed out that when it is sought to employ paper as a base for lining material, baking operations at temperatures exceeding 300 to 350 degrees F. cause charring or decomposition of the base, and even lower temperatures cause the paper to lose combined moisture. In some baking operations, this moisture is lost at varying temperatures of baking, and causes serious damage to the coating material in causing the formation of pores through which permeation may occur, and in seriously degrading the strength of the coating material. The charring and decomposition of the paper itself prevents the fibers of the paper from serving as a reinforcement to the coating, and attempts to make liner facing material in this fashion, by use of temperatures high enough (400 to 450 degrees F. or higher) to assure optimum strength and flavor characteristics have led to the degradation of the structure so that it is too brittle to provide liners which are resistant against the deformations occurring while cutting, seating and sealing crown closures: for example, the strength of the customary uncoated drab express paper averages around 20 to 30 pounds under the Mullen test for bursting strength, and when varnished the strength averages around 30 to 45 pounds, as compared with over 160 pounds with the present material.

The material formed in the manner herein described does not crack or fracture during the operation of cutting the liner material into a spot or other facing, during operations of assembly while closing the container. Furthermore, the baking of the lining at a high temperature permits the employment of thermo-adhesive materials in securing the spot in place, without change or degradation in the spot material since it has already been subjected to a higher temperature during manufacture.

A further advantage of employment of glass as a base, is that it is capable of withstanding temperatures at least as high as the thermo-decomposition and combustion points of such resin coatings, without serious damage to itself, and it does not develop products upon heating in contact with the selected resin which are catalysts for provoking decomposition of lacquer coatings such as vinyl ester-halide polymers. The glass itself has no flavor characteristic, and hence it does not have deleterious consequences such as arise in employment of charred or thermo-decomposed cellulose fibers.

As a specific example of practice, a glass fiber cloth having a thickness of 2.5 thousandths of an inch was coated with a clear enamel prepared from a thermofusible or non-heat-hardening phenol-aldehyde resin (100 pounds of Bakelite BR254 which had been cooked at 350 degrees F. with China-wood oil (100 pounds) for three hours until an interassociation of the resin and oil had been produced to form an oleoresinous base together with a limited polymerization of the oil but without jelling of the mixture. This was thinned with a mixture of 90 pounds of isophorone, 80 pounds of vinyl polymer resin (VYHS—a copolymerized 87% vinyl chloride, 13% vinyl acetate resin), dissolved in 96 pounds of isophorone and 224 pounds of xylol. This vinyl solution was mixed with 50 pounds of the oleoresinous solution. The mixture was thinned to approximately seven to ten seconds viscosity (#4 Ford cup test) with methyl ethyl ketone. A coating was applied to the fiber cloth by dipping, and the cloth was allowed to drain and air-dry for ten minutes. Baking was accomplished at 350 degrees F. for nine minutes of final bake. A second coating was similarly applied, drained and air-dried, and then baked at 375 degrees F. for eleven minutes of final bake. The Mullen bursting strength was in excess of 160 pounds—the limit of the tester. On crowning tests no evidence of cracking around the sealing area was observed.

In a further example of practice, a glass fiber cloth having a thickness of 3.5 thousandths of an inch was coated with an enamel prepared by cooking 100 pounds of a non-heat-hardening phenol-aldehyde resin with 100 pounds of China-wood oil at 450 degrees for one hour until the oleoresin strings from a hot paddle, thinning with 300 pounds of high-flash naphtha, and then further thinning with toluol to approximately seven to ten seconds viscosity on the #4 Ford cup test. Application was by single-coat dipping, followed by draining and air-drying as before.

The material was baked at 400 degrees F. for 13 minutes at peak or final bake. The Mullen test here also showed the strength to exceed the limit of the tester. The product showed no evidence of cracking around the sealing area during crowning test. The product was not so flexible as that of the above example, partly by reason of the greater base thickness of glass fiber and partly by reason of the lesser flexibility of the coating material.

It has been found that by this procedure it is possible to prepare closure lining materials having a continuous surface and being essentially water-impermeable, and having the characteristics of being flexible, free of flavor characteristics and having adequate bursting and tensile strengths, and thus amply sufficient and satisfactory for crown seal spots, closure disks for screw caps, lock-type and Newman closures, etc.

It is obvious that the invention is not limited to the form of employment described and shown, but may be practiced in many ways within the scope of the appended claims.

I claim:

1. A closure liner facing material for employment upon a resiliently yieldable base, comprising a fabric consisting of multiple interwoven fine fibers of glass and having a thickness of substantially 2 to 4 thousandths of an inch, and a coating adherent to the fibers of the fabric and providing a continuous surface, the material of said coating being the residue produced by baking at a temperature of substantially 375 degrees F. an enamel prepared by effecting limited polymerization of substantially 100 parts by weight of China-wood

oil in the presence of substantially 100 parts by weight of a thermofusible phenol-aldehyde resin for thereby producing an oleoresinous base and then mixing with said base a solution in a volatile organic solvent of substantially 80 parts by weight of vinyl chloride-vinyl acetate polymer resin, said facing material being characterized in being flexible, free of flavor characteristics, and having a high tensile strength.

2. A closure liner facing material for employment upon a resiliently yieldable base, comprising a fabric consisting of multiple interwoven fine fibers of glass and having a thickness of substantially 2 to 4 thousandths of an inch, and a coating of water-impermeable resinous material consisting in major part of an oleo-resinous base formed of heat-polymerizable interassociated drying oil and non-heat-hardening phenol-aldehyde resin and for the residue consisting of vinyl halide and vinyl acetate polymer resin, which has been baked at a temperature exceeding 350 degrees F. and is adherent to the fibers of the fabric and provides a continuous surface, said facing material being characterized in being flexible, free of flavor characteristics, and having a high tensile strength.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,867,637	Warth	July 19, 1922
1,956,481	Warth	Apr. 24, 1934
2,013,119	Warth	Sept. 3, 1935
2,132,702	Simpson	Oct. 11, 1938
2,138,439	Worth	Nov. 29, 1938
2,138,882	Robie	Dec. 6, 1938
2,195,191	Schmidt	Mar. 26, 1940
2,204,859	Hyatt et al.	June 18, 1940
2,219,054	Palm et al.	Oct. 22, 1940
2,238,681	Dorough	Apr. 15, 1941
2,259,496	Soday	Oct. 21, 1941
2,333,535	Lauer	Nov. 2, 1943
2,412,592	Maier	Dec. 17, 1946

FOREIGN PATENTS

Number	Country	Date
844,748	France	1939