Nov. 15, 1938. A. MacLACHLAN 2,136,557

COATING

Filed Dec. 3, 1937

Fig. 1.

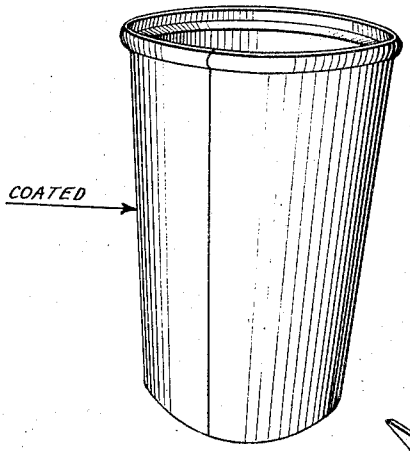
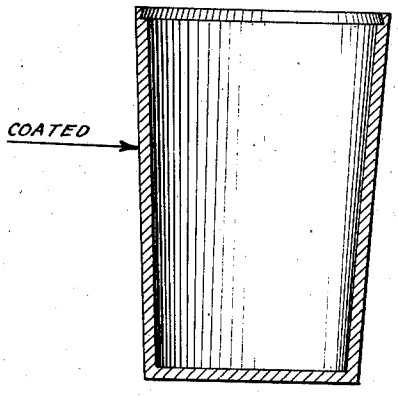


Fig. 2.



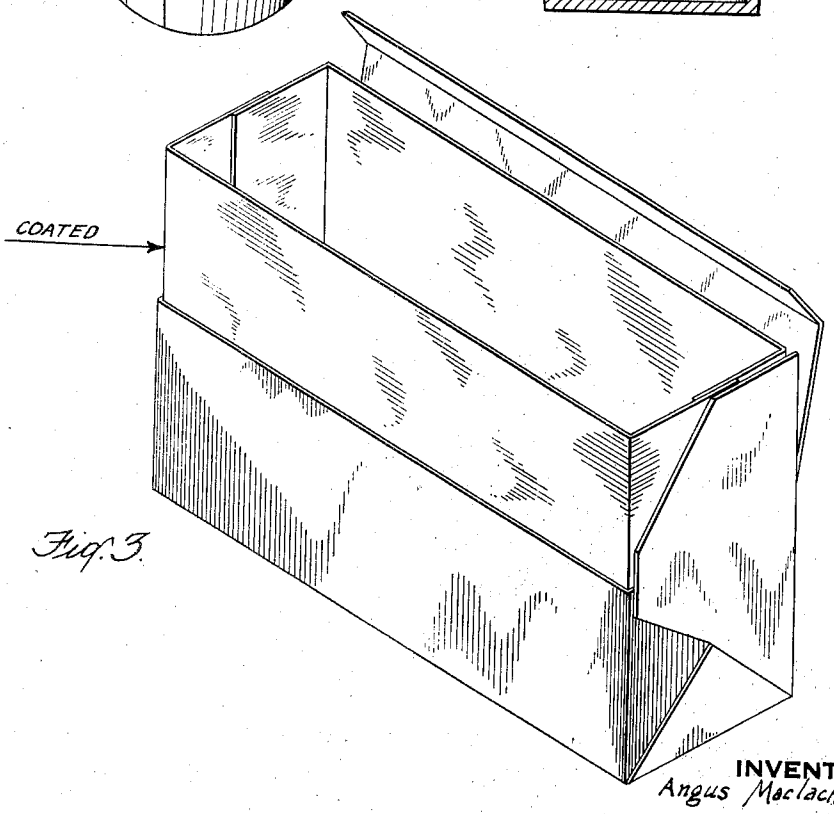


Fig. 3.

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COATING

Angus MacLachlan, deceased, late of Metuchen, N. J., by Walter H. Griffin, executor, New York, N. Y.

Application December 3, 1937, Serial No. 177,971

5 Claims. (Cl. 91—68)

This invention relates to an article of fibrous or cellulosic material which is partially or entirely coated or impregnated with a fat to render it waterproof and greaseproof. In a more specific aspect, the invention relates to a container particularly adapted for the packaging of foods in which the coating material is an edible fat. In another specific aspect, the invention relates to a container for packaging grease and oils, or oily materials.

Prior to the invention, packages of sheet materials, and particularly of paper or moulded fibrous material have come into very wide use. Where waterproof or moistureproof qualities are required, such containers have been coated with materials such as paraffin or wax, but the coating materials which have been known prior to the invention have, for the most part, been unsatisfactory as greaseproofing materials and not entirely impervious to vapors, so that moisture may be slowly absorbed through such a package and flavor slowly lost, whereas those which have been adapted for coating the containers in which greasy materials are to be packaged have been so expensive, difficult of application, or unsatisfactory in use as to limit to a considerable extent the use of paper containers.

Accordingly, it is an object of this invention to provide a waterproof, greaseproof, and, if desired, impervious fibrous or cellulosic article which avoids the difficulties and objections to those known materials and which may be uniformly impregnated with or without appreciable surface coating, or may be uniformly surface coated with or without impregnation, and the coating or impregnating material of which will help to stiffen the fibrous or cellulosic base material, but which may allow substantial flexing thereof without impairment of the greaseproof quality of the material.

It is also an object of the present invention to provide inexpensive containers (i. e., cartons, wrappers, bottles, dishes, and in short anything designed to hold an article or material or temporarily to protect it from loss or contamination), which are coated with a material which is unobjectionable from every standpoint, and which furthermore serves to improve on the qualities of the material of which the container is made, and which will satisfactorily resist the action of water, fats, oils and other materials which are present in foods, or other articles or materials, such as are commonly placed in such containers.

It is a further object of the invention to provide a coated container which is not much more expensive than paraffin-coated containers, but which will be capable of much wider use for the packaging of numerous materials, including milk, crackers, salad dressings, lubricating oils, paints, except that paint thinners may dissolve the coating, so that paints which contain any large amounts of such thinners should not be packaged in this material, putty, and many other materials.

In the accompanying drawing, are illustrated three types of containers embodying the present invention.

In Fig. 1 is shown in perspective a cup type container made from paper which is shaped and pasted and thereafter impregnated in the usual manner with the waterproofing and greaseproofing material hereinafter described.

In Fig. 2, is illustrated a similar type of container made from fibrous pulp deposited upon a mould and subsequently pressed and coated, e. g., by impregnating with a waterproofing and greaseproofing material.

In Fig. 3 is shown a carton lined with a sheet of paper coated with the same material.

A material which has been found to be highly advantageous for this purpose is a hydrogenated fish oil (e. g., menhaden oil) in which the hydrogenation has been carried to a point such that the product is a hard material which melts fairly sharply at a temperature near 55° C. (130° F.), and which does not become soft or sticky or greasy much below that temperature. The material as it comes from the hydrogenation process usually has a rather strong, sweetish odor which, if objectionable, may be removed by melting the material in vats at a high temperature and blowing with steam under a vacuum as high as is practicable, or by other suitable treatment. After such treatment the material is substantially odorless and tasteless and it may be used directly for the coating of containers, etc.

The hydrogenated oil, preferably after the deodorizing treatment as just described, is melted and preferably maintained at a temperature of about 250° F. while it is being applied to the objects to be coated or impregnated. A higher temperature will result in more rapid impregnation, but it has been found that 250° F. produces entirely satisfactory results.

When a container, for example, is immersed in a bath of this material at a temperature of 250° F., or higher, it will at first violently boil exactly as a cruller does in hot fat, and when this boiling has ceased, the material will have penetrated the paper sheet and the moisture will have been substantially entirely driven out from the paper.

The coating or impregnating may, however, be done in other ways well known in the art, as by spraying, brushing or rolling.

Upon first removing the coated paper object from the impregnating bath and cooling to atmospheric temperature, it will be found relatively soft and pliable, but upon standing it will gradually harden until it has assumed its final condition, which is quite similar to that of Celluloid, i. e., relatively flexible without cracking, but elastic and hard. The coating may with some advantage be remelted and rehardened once or several times.

Although hydrogenated fish oil as described above is preferred, and it has been found that the results produced thereby are particularly satisfactory, it is to be understood that many other materials fall within the scope of the invention. The reason for the reason for the advantages of hydrogenated fish oil has not been fully determined but the fact that the marine oils are composed predominantly of the higher fatty acids, especially those of eighteen or more carbon atoms is very important. It is also quite important that the range in these oils is quite narrow. Thus menhaden oil consists of about 70% of glycerides of the acids of between eighteen and twenty-two carbon atoms and almost entirely of glycerides of fatty acids of between sixteen and twenty-two carbon atoms. This results in a high-melting product substantially free from any fat that will become oily at temperatures encountered in storage and shipping and gives a sharp melting point or very narrow melting range. Other fats, either hydrogenated or not, that contain no appreciable proportion of materials which remain liquid in the mixture at temperatures below 40° C. may be used, particularly those materials that melt sharply at around 55° C. and contain no appreciable content of liquid material of lower melting point. Pure fats, such as pure stearin, (glyceryl tristearate) are examples of such materials.

It has also been found that the solid products resulting from hydrogenation of marine oils which contain esters of the higher fatty acids with the higher alcohols may be used according to this invention. Sperm oil is an example of such an oil.

Some vegetable oils also give good results, but many vegetable oils and most animal oils and fats will be found to contain so much of the lower fatty acid constituents which remain liquid below 40° C. or even at ordinary room temperature that they cannot be used without special treatment to remove such constituents.

To illustrate the essential difference between the type of material suitable for use according to this invention and the type of material which is generally unsuited, menhaden oil may be compared with cocoanut oil, which could be used only if the liquid constituents are separated or solidified by special treatment and, therefore, may be generally considered to be unsuited. The fatty acids in manhaden oil are given by Allen's Commercial Organic Analysis (5th edition, vol. 2, p. 301, published by Blakiston, Philadelphia, Pa.) as:

	Per cent
Palmitic acid (contains 16 carbon atoms)	22.7
Myristic acid (contains 14 carbon atoms)	9.2
Stearic acid (contains 18 carbon atoms)	1.8
Unsaturated acid containing 18 carbon atoms	24.9
Unsaturated acid containing 20 carbon atoms	22.2
Unsaturated acid containing 22 carbon atoms	20.2

Soya bean oil, which also may be used according to the invention, has approximately the following composition:

	Per cent
Palmitic acid (contains 16 carbon atoms)	6.5
Stearic acid (contains 18 carbon atoms)	4.2
Arachidic acid (contains 20 carbon atoms)	0.7
Lignoceric acid (contains 24 carbon atoms)	0.1
Oleic acid (unsaturated) (contains 18 carbon atoms)	32.0
Linolic acid (unsaturated) contains 18 carbon atoms)	49.3

Other glycerides, acids and impurities in very small proportions.

Thus it is seen that this oil consists almost entirely of oils of fatty acids having more than 14 carbon atoms. Cocoanut oil, in contrast, contains the following fatty acids, according to Allen's Commercial Organic Analysis:

	Per cent
Caproic acid (containing 6 carbon atoms)	2
Caprylic acid (containing 8 carbon atoms)	9
Capric acid (containing 10 carbon atoms)	10
Lauric acid (containing 12 carbon atoms)	45
Myristic acid (containing 14 carbon atoms)	20
Palmitic acid (containing 16 carbon atoms)	7
Stearic acid (containing 18 carbon atoms)	5
Oleic acid (containing 18 carbon atoms)	2

It will be noted that in this oil the greatest part consists of oils of fatty acids having less than 14 carbon atoms.

The lower of these fatty acids or their esters have a tendency, as already explained, to give in the hydrogenated products constituents that remain liquid or semi-liquid therein at ordinary temperatures and even a small percentage of such products remaining in liquid condition may give the whole coating a greasy or oily feel and appearance, or even, by being interspersed with the solid material, so divide the particles of solid material as to permit oil or grease contained within a coated or impregnated container to pass through the coating or impregnating material.

Thus, the oils which have been found most highly desirable for use in this invention contain no appreciable amount of these lower fatty acids; and other fats and particularly other hydrogenated fats may be used, provided these fats do not contain any appreciable amount of a constituent that remains liquid at temperatures ordinarily encountered, that is temperatures up to around 55° C. or at least up to around 40° C. The liquid materials may either be originally absent or may be removed or solidified in the preparation of the material, and very small amounts of the lower melting constituents may be present in solid solution in the higher melting fats. Pure stearin, laurin, myristin, palmitin, etc., or natural or artificial mixtures of these, may be used; but the mixtures are superior, provided always that in their final state they contain no appreciable quantities of materials that will remain as liquids at ordinary temperatures.

The solid hydrogenated fats used according to the invention, as well as the pure fatty materials as mentioned above, are in contrast to greasy materials such as tallow, commercial stearin, and the like in that it melts fairly sharply, and, at temperatures substantially below its melting point, it is dry, i. e., has no liquid oil constituent, and therefore does not have any tendency to render greasy other materials with which it comes in contact, nor to collect dust.

Materials used in the present invention may be

applied by coating and impregnating machinery in the ways already known and in common use in the art, and may be applied either for the coating of rigid containers, e. g., those made of moulded pulp or of paper board, or to a coating of flexible paper either in package form or which is to be used for the making of packages, and such material may be used in place of waxed paper for substantially all purposes in which waxed paper may be used at the present time, and in addition, for many other purposes where waxed paper is not satisfactory because of the effect of greases thereon, or because of the objectionable "greasiness" of its surface.

It has been found that a particularly advantageous method of using this material is to incorporate it into the paper stock by adding it in the beater. The material is readily emulsified by known methods, e. g., by an alkaline solution, from which it may be thrown down onto the fibers, e. g., by acidifying, or by means of alum, as in the ordinary sizing step. It has been found, for example, that a very satisfactory emulsion for this purpose may be formed as is commonly done with other fatty materials, e. g., by dissolving triethanol amine in boiling water and pouring the melted fat into the hot solution with more or less violent agitation until the fat is satisfactorily dispersed. Paper treated with this material during the beating or sizing may be made into paper or board which will be thoroughly and uniformly impregnated with the greaseproofing material, but may be substantially free from any excess coating of the material on its surface, depending, of course, upon the amount of material added. The impregnating material may also serve in part as a binder in the fibrous mass, so that the sheet may be compressed while hot and formed thereby into a more compact material than would be possible with the fiber alone. In this way, also, fibers may be used for the formation of materials suitable for producing containers, including wrappers, etc., although such fibers have not felting properties which would make them satisfactory for producing the same materials without the use of fatty impregnating material.

In some cases it will also be desirable, instead of impregnating the fibers or cellulosic base, or impregnating and coating, merely to surface coat the base without thorough impregnation. Thus, the base material used for cartons, wrappers, etc., may be coated on one side, e. g., by spraying the melted fatty material thereon, or by passing a sheet over a coating roll, and the other side of the base may be left substantially free from coating material, so as to remain subject to printing, pasting, etc.

This is particularly advantageous in containers for lubricating oil or other products where there is the danger that emptied containers may be refilled with inferior products. If the container has an absorbent outer surface, that surface will become soiled the first time the container is emptied and thus provide a warning to any future purchaser of the container. Molded cellulose pulp containers coated on the inside as shown in Figure 3 have been found especially useful for this purpose. Ordinarily, however, it is preferred to print the base sheet, if it is to be printed at all, before impregnation or coating, and it is an important advantage of the present invention that the impregnating and coating material does not affect ordinary printing inks.

It has been found, furthermore, that the invention is applicable to the treatment of non-fibrous materials, such, for example, as flexible cellulosic films used for packaging various materials. The fatty material in this case may be applied as already described, but preferably is incorporated in a surface lacquer, replacing, in the latter case, wax which has been used to render the permeable cellulosic film impermeable.

The word "coating" has been used herein broadly, and to include a coating wholly within the sheet,—that is, impregnation as well as surface coating,—that is, a substantial layer above the base to which the coating is applied.

The word "fat" has been used to describe the fatty acid glycerides and mixtures thereof, and it is not intended to include within its meaning derivatives thereof such as oxidation or polymerization products, the free-fatty acids, and the sulphurization products such as the so-called vulcanized oils.

Although a preferred embodiment has been described above and various modifications thereof, it is to be understood that numerous other changes and modifications may be made within the scope of the invention.

Reference is hereby made to the copending application, Serial No. 640,568, filed October 13, 1932, by Angus MacLachlan, from which application the claims of the present application are continued.

What is claimed is:

1. A waterproof and greaseproof container comprising a fibrous base made greaseproof and waterproof by being treated with a fatty material that is solid at around 40° C. and contains no appreciable amount of material that is not solid at such temperatures.

2. A waterproof and greaseproof container comprising a fibrous base made greaseproof and waterproof by being treated with an hydrogenated fatty material that is solid at around 40° C. and contains no appreciable amount of material that is not solid at such temperatures.

3. A container adapted for oily and greasy materials that comprises a fibrous material, absorbent on the outside, but made moistureproof and greaseproof by a coating of an hydrogenated fatty material on the inside, said material containing no appreciable amount of material which is liquid at around 40° C.

4. A container adapted for oily and greasy materials that comprises a fibrous material, absorbent on the outside, but made moistureproof and greaseproof by a coating of an hydrogenated fatty material on the outside, said material containing no appreciable amount of material which is liquid at around 55° C.

5. A container adapted for oily and greasy materials that comprises a fibrous material, absorbent on the outside, but made moistureproof and greaseproof by a coating of a fatty material on the inside, said material containing no appreciable amount of material which is liquid at around 40° C.

WALTER H. GRIFFIN,
Executor of the Estate of Angus MacLachlan, Deceased.