June 20, 1939. J. H. SWAN, 3D 2,162,764

CONTAINER

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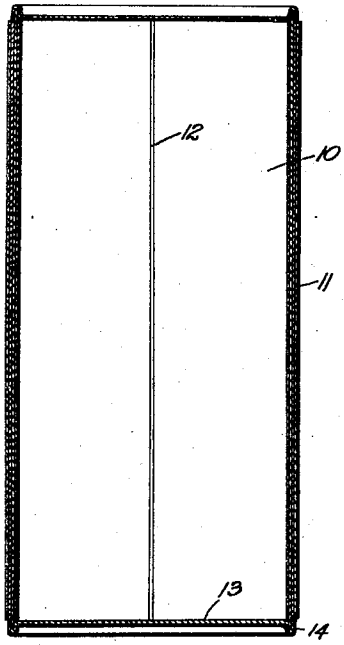


Fig. 1

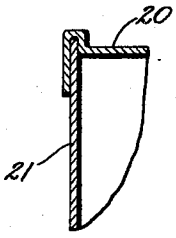


Fig. 3

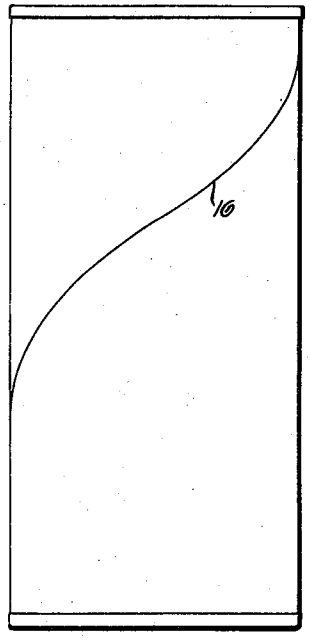


Fig. 2

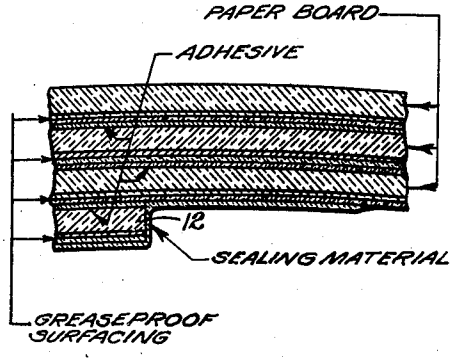


Fig. 4

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CONTAINER

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Application September 29, 1934, Serial No. 746,181

14 Claims. (Cl. 229—3.5)

This invention relates to containers and more particularly to containers for receiving lubricating oil and similar oily materials.

It is the principal object of the invention to provide a container which is oil and grease proof, is simple and inexpensive in construction, and which can be readily destroyed after use in such manner as to effectively prevent its reuse.

It is a further object to provide a container of this character formed of a fibrous material such as paperboard, the container remaining oil-proof over extended periods of use.

It is also an object to provide a simple and economical method of making this container from fibrous material.

Other objects and advantages will be apparent from the description, the accompanying drawing, and the appended claims.

In the drawing,

Fig. 1 represents a vertical sectional view through a container constructed in accordance with the present invention;

Fig. 2 is an elevational view of a slightly modified construction of the container; and

Fig. 3 is a detail sectional view showing a modified form of end cap construction for use with the container.

Fig. 4 is a fragmentary horizontal sectional view on an enlarged scale through the wall of a formed container such as shown in Fig. 1.

It is highly desirable in the merchandising of oil, and more particularly lubricating oil for internal combustion engines, to place the oil in containers which are sealed at the oil refinery and are opened only in the presence of the ultimate purchaser. In this way there is positive assurance of the character and quality of the oil which is purchased and the possibility of substitution of inferior grades of oil is largely minimized.

The present invention provides for obtaining these advantages through the use of a simple and inexpensive container formed principally or entirely of a fibrous sheet material. A container of this character is found to possess important advantages over a metal can in the following respects, that is, it is less expensive than a metal can, usually of lesser weight, and can be more readily and completely destroyed following its use, to prevent substitution of inferior grades of oil therein.

In accordance with the present invention, a container is formed of paperboard in a suitable forming process, the board having previously been subjected to a grease proofing and oilproofing treatment to render the same impervious to the passage of oil therethrough. The oilproofing treatment is preferably carried out while the board is in sheet form, and in a continuous process, so that it is accomplished in a very economical manner. The board with the oilproof coating thereon is subsequently formed into the container, providing preferably a plurality of overlapping layers, each grease proof in character, to provide adequate strength and resistance to penetration of the oil.

The oilproofing treatment of the paper or paperboard sheet, preferably includes the application thereto of a composite coating comprising a plurality of thin layers having predetermined coordinated characteristics of oilproofness, flexibility, resistance to bending, cracking and the like. Thus a lower thin coating layer is applied having the predominant characteristic of flexibility, with a secondary characteristic of oilproofness. This lower coating forms a base for the reception of an overlying coating which is predominant in oilproofing characteristics. The composite coating of the proper controlled characteristics as thus formed is found to be greatly superior to the mere duplication of a single coating. The lower coating layer of high flexibility imparts flexibility characteristics to the upper coating, tending to prevent the rupture of the upper coating when the board is bent or stressed. In this way the impervious character of the upper coating is maintained throughout the formation of the board into the container, and subsequently throughout the disruptive effects in use due to handling and the like. In addition to its flexibility characteristics, the lower coating layer may also provide additional oilproofing qualities to the upper layer, to form a secondary protection against the passage of oil should a defect occur in the upper coating layer. The upper coating layer is formed to provide a maximum oilproofness, and in addition is preferably of a tough nature to provide with the lower coating a strong composite oilproof coating adapted to remain impervious to the penetration of oil over extended periods.

The lower coating composition may comprise rubber latex and an oil insoluble adhesive such as casein, alkali metal silicates, glue, or gelatine. A coating of this character when dried in place upon a sheet of board produces high flexibility, will permit of bending the board for formation into a container, and forms an impervious coating entirely covering up the surface of the board. The rubber latex has qualities of elasticity and

spreading ability, while the oil insoluble adhesive imparts superior characteristics of adhesiveness and also of grease proofness. Various additive and preserving materials may be used as desired, and as disclosed in my Patents 1,957,368 and 1,957,369, dated May 1, 1934.

As an example of a very satisfactory coating composition for the base coat which is applied to the paper or board, the following has given satisfactory results.

Rubber latex emulsion containing about 38% solids and in addition about 2% by weight of an alkali metal polysulfide, and 2% by weight of an alkaline compound such as ammonia, is mixed with a casein solution containing about one pound of casein to the gallon of water, and also containing about 10% of paraformaldehyde on the dry weight of the casein, in the proportions of about 60% or more by volume of rubber latex and 40% or less by volume of casein solution to form the liquid coating composition.

As an alternative composition for the lower coating layer, the composition may be varied to provide additional oilproofing qualities, with slightly less flexibility characteristics. Thus when it is not necessary to have maximum flexibility, the rubber latex in the above composition may be substituted by a polyhydric alcohol such as glycerine or ethylene glycol. Such polyhydric alcohol is in itself an effective oilproofing material, and in addition it imparts flexibility to the composite coating. As a specific example of the use of such material, the composition may comprise a mixture of glue as an oil insoluble adhesive and glycerine as a polyhydric alcohol grease proofing and flexibility material, the weight of the glycerine being equal to the dry weight of the glue. Additive and preserving materials may be added in the usual manner.

While the upper layer of the composite coating may be formed in the manner disclosed in my aforesaid patents, it is preferred to form such coating in the manner disclosed in my copending application Serial No. 671,085, filed May 15, 1933, now Patent No. 2,039,361, issued May 5, 1936. According to the disclosure of such application, the upper layer of the composite grease-proof coating comprises essentially a solution of cellulose, such as a solution of a cellulose ester, for example, nitrocellulose or a cellulose acetate, in an organic solvent. Very satisfactory results are secured in the practicing of the present invention through the use of a solution of nitrocellulose in a mixture of organic solvents, such as a mixture of acetone, methanol, gasoline, and/or toluol. The use of this material is highly desirable since it provides in conjunction with the lower coating above described a composite coating which is tough, highly moisture proof, grease and oilproof. Furthermore the cellulose solution can be applied in a very thin layer over the base coating and therefore the process may be carried out on a commercial scale in an economical manner. The lower coat of the composite greaseproof coating is applied to the sheet of paperboard material as a surface coating layer in the form of a relatively thin film and forms a flexible base for the overlying or cellulose coat which is also in the form of a relatively thin film maintained upon the surface of the lower coat, and the composite coating is thus found to withstand bending of the board without breaking or cracking, to be substantially free of pin holes and other defects, and forms a very desirable coating for use in conjunction with the present invention.

The board with the grease-proof coating applied thereto is subsequently formed into a container. The container may be either of the convolute type such as shown in Fig. 1, or of the spiral type as shown in Fig. 2. Referring to Figs. 1 and 4, the formed container is shown at 10 comprising a single sheet of paper board 11 forming a cylindrical wall thereof, the sheet being wrapped around itself to form preferably a multiple layer, the drawing showing three thicknesses of material, each having the greaseproof surface innermost where one side only is greaseproofed. Satisfactory results have been obtained from the standpoint of oilproofness and strength with the triple thickness of material, although more or less layers could be used as desired.

The surface of the board that is overlapped in the formed container is preferably glued throughout its extent, so that the several layers are securely fastened to each other and form a strong composite structure. The glue application also serves to secure the inner edge 12 of the board to the wall of the container, and for greaseproofing purposes it is preferably sealed along its extent to the wall of the container to prevent passage of oil either into the body of the board, or between the successive layers of the wall. For this purpose it is preferred to apply a cellulose material, such as the nitrocellulose coating forming the upper layer of the composite coating. This may be readily applied in any desired manner along the edge 12, whereupon it quickly dries to form an effective oilproof seal, becoming integrally attached to the upper coating layer on the surface of the board itself.

The ends 13 which may be formed of metal are then pressed over the end of the container, and the rim 14 bent or spun into sealing relation with one or more of the layers of the wall. Preferably the entire end of the container is dipped into an oilproofing material such as the nitrocellulose solution, immediately prior to the application of the end 13. The solution as thus applied sets in place after the application of the end and effectively seals the passage at the end preventing escape of oil at this point.

In Fig. 2 the container is shown as formed in the spiral manner. In such construction there is a spiral joint 16 on the inner surface of the container between the plurality of strips of paperboard, and this joint is sealed in the same manner as described above in connection with the lap joint 12.

In place of using metal end caps, the caps may also be formed of fibrous paperboard material. A fragmentary section is shown in Fig. 3 where the cap 20 is formed of paperboard which has been subjected to an oilproofing treatment such as that described for the making of the cylindrical portion 21. Because of the high flexibility of the composite coating of the present invention the oilproof character of the board is maintained throughout the forming operations incident to the formation of the cap, and it may then be sealed in place in the same manner as described for the metal cap.

The invention therefore provides a container for receiving lubricating oil and the like which is quite inexpensive and simple in construction. The board is preferably treated to provide an oilproofing surface while still in sheet form, and consequently this operation can be done very effectively and at low cost. The composite character of the coating is such as to provide com-

bined characteristics of flexibility, oilproofness, and an extraordinary resistance to the rupture of the coating, or the destroying of the impervious character thereof, in any of the forming operations or in any normal use of the container. When it is desired to open the container, either the end or the side wall can be cut by a suitable opening tool so that the container is completely destroyed and can not be reused, thus assuring against substitution of inferior products.

While the products herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise products and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A container of the character described which comprises a fibrous wall portion formed of a plurality of layers of paperboard glued to each other, the paperboard having a composite oil-proof surface coating thereon comprising a lower layer having high flexibility and an overlying layer being predominantly oilproof in character, the lower layer being adapted to impart flexibility characteristics to the upper layer to maintain the impervious character thereof against the disruptive effects in use due to bending and the like, the edge of the fibrous material comprising the wall, and the joints formed by the ends of the container being sealed with an oilproofing material.

2. A container of the character described for receiving lubricating oil and the like comprising a fibrous sheet of material having a preformed composite oilproofing coating thereon, said coating comprising a lower layer having characteristics of flexibility and oilproofness, and an upper layer having high oilproofness, said lower layer imparting flexibility to the composite coating to preserve the impervious character thereof during use, at least the inner edge of said material and the end portions of the container being sealed during formation with an oilproofing material of the general character of that of the preformed upper coating layer and adapted to unite therewith to form an impervious sealed container.

3. A container of the character described for receiving oil and the like having side walls formed of paperboard having a composite greaseproofing and oilproofing coating thereon, said coating comprising a lower coating layer having oilproofing properties and high flexibility, and an overlying coating predominantly oilproof in character, and comprising a cellulose material, the upper coating having toughness to preserve the impervious character of the composite coating during use, and having end members fastened in place on said side walls and sealed thereto with an oilproof sealing material adapted to form a homogeneous oilproof film with said coating.

4. A container of the character described which comprises a fibrous wall portion formed of paperboard having a composite oilproofing coating thereon, said composite coating including a lower layer having high flexibility characteristics and including an oil insoluble adhesive and one of the group comprising rubber latex and a polyhydric alcohol, the upper layer being predominantly oilproof in character and comprising a thin coating of nitrocellulose, the exposed edges of said paperboard in the formed container being sealed by means of a coating of nitrocellulose.

5. A container of the character described for receiving lubricating oil and the like comprising a fibrous sheet of material having a composite oilproofing coating thereon, said coating comprising a lower layer having high flexibility and containing rubber latex and an oil insoluble adhesive, and an upper layer having high oilproofness and toughness, and comprising a coating of nitrocellulose, the exposed edges of said material and the end portions of the container being sealed during formation with a coating of nitrocellulose integrally attached to the upper coating layer.

6. A container of the character described for receiving lubricating oil and the like comprising a fibrous sheet of material having a composite oilproofing coating thereon, said coating comprising a lower flexible layer including a polyhydric alcohol and an oil insoluble adhesive, and an upper oilproof layer comprising a coating of nitrocellulose, the exposed edges of said material and the end portions of the container being sealed during formation with a coating of nitrocellulose integrally attached to said upper coating layer.

7. The method of making a fibrous container for receiving lubricating oil and the like which comprises forming a composite oilproofing coating on a fibrous sheet of paperboard, said coating comprising a lower layer having high flexibility and an upper layer predominantly oilproof in character, the lower layer being adapted to impart flexibility characteristics to the upper layer to maintain the impervious character thereof against disruptive effects in use due to bending and the like, forming the coated fibrous sheet material into a container, and sealing the exposed edges of said sheet material and the ends of the container in assembled position by the application thereto of an oilproofing material of the general character of that of the upper coating layer.

8. The method of making a container for receiving lubricating oil and the like which comprises forming a composite oilproofing coating on a fibrous sheet of paperboard, said coating comprising a lower layer having high flexibility and an upper layer predominantly oilproof in character, the lower layer being adapted to impart flexibility characteristics to the upper layer to maintain the impervious character thereof against disruptive effects in use due to bending and the like, applying an adhesive to the side of the sheet material opposite that to which said composite coating is applied, forming said sheet material into a multiwalled container with said composite coating innermost, and applying an oilproofing and sealing material to the exposed edges in said formed container to effectively seal the interior thereof.

9. A method in the forming of a container of the character described comprising the steps of applying to a sheet of paper a greaseproof surfacing layer having such flexibility as to maintain an effectively impervious surface film in subsequent forming operations, applying adhesive to the surface of the sheet, forming said sheet into a multiwalled container, the several overlapping walls being adhesively secured to each other in greaseproofing relationship to produce a container wall having throughout its thickness a recurring series of layers of greaseproof surfacing, fibrous material and adhesive, and applying to the exposed edge of said sheet a coating of a greaseproofing material adapted to unite homogeneously with said greaseproofing surfacing layer to

provide a formed container having an interior effectively impervious to the passage of grease.

10. A method in the forming of a container of the character described comprising the steps of applying to a sheet of paper a greaseproof coating layer comprising a thin film of cellulose ester having such flexibility as to maintain an effectively impervious surface film in subsequent forming operations, applying an adhesive to the surface of the sheet, forming said sheet into a multiwalled container, the several overlapping walls being adhesively secured to each other in greaseproofing relationship by means of said adhesive, and applying to the exposed edge of said sheet a coating of a greaseproofing material adapted to unite homogeneously with said greaseproofing coating layer to provide a formed container having an interior effectively impervious to the passage of grease.

11. The method of making a container for receiving lubricating oil and the like which comprises forming a composite oilproofing coating on a fibrous sheet of paperboard, said coating comprising a lower layer having high flexibility and an upper layer predominantly oilproof in character, the lower layer being adapted to impart flexibility characteristics to the upper layer to maintain the impervious character thereof against disruptive effects in use due to bending and the like, applying an adhesive to the sheet material to which said composite coating is applied, forming said sheet material into a multiwalled container with said composite coating innermost, and applying an oilproofing and sealing material to the exposed edges in said formed container to effectively seal the interior thereof.

12. A container of the character described adapted to receive lubricating oil and the like and to be destroyed after a single use comprising a fibrous sheet of paper having a flexible greaseproof surfacing layer applied thereto, the coated sheet being wound into tubular form and adhesively secured upon itself to provide a plurality of overlapping layers each greaseproof in character to produce a container wall having throughout its thickness a recurring series of layers of greaseproof coating, fibrous material and adhesive, the exposed inner edge of said sheet being sealed with a coating of a greaseproofing material adapted to unite homogeneously with said greaseproof surfacing layer to provide an effectively greaseproof container.

13. The method of making a fibrous container for receiving greasy and oily material, such as lubricating oil and the like which comprises applying as a surface coating layer to a sheet of paperboard material a thin film of greaseproofing material, said surface coating layer having such flexibility as to maintain an effectively impervious greaseproof surfacing during subsequent forming operations, applying an adhesive to the sheet material, forming said sheet material into a multi-walled container with the several overlapping walls being adhesively secured to each other leaving an interior exposed edge of said sheet of paperboard material, and applying to said interior exposed edge of said sheet material and to the ends of the formed container body a greaseproofing material adapted to form an overall impervious interior surfacing film with the surfacing on said body portion.

14. A container of the character described adapted to receive greasy and oily materials such as lubricating oil and the like and to be destroyed after a single use which comprises. a multi-walled wound body portion of fibrous paperboard material having a flexible effectively impervious greaseproof surfacing layer applied to the sheet from which said body portion is formed as a thin film on the surface thereof, said sheet having the greaseproofing surface film thereon facing inwardly of the formed container and covering the interior wall of said formed container in an effectively impervious manner, the formed container having an interior exposed edge of the paperboard body portion, said greaseproofing surface film on the wound body portion extending in a continuous manner from said interior wall to beneath the said edge of the interior wall of said body portion to provide additional protection against seepage of the contents of the container between the walls of said multi-walled body portion the container having end members fastened in place on said body portion, said end members and the exposed edge of said paperboard body portion being additionally sealed with a greaseproof sealing material adapted to unite with the surfacing on the walls of said body portion to form an impervious greaseproof surfacing film therewith.

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