

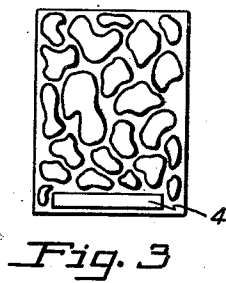
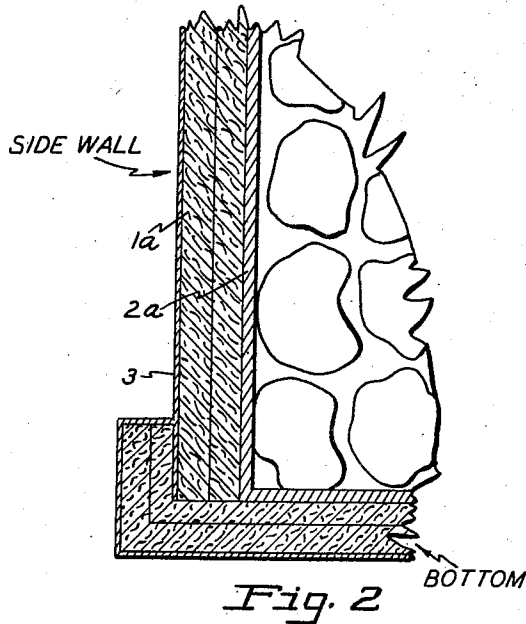
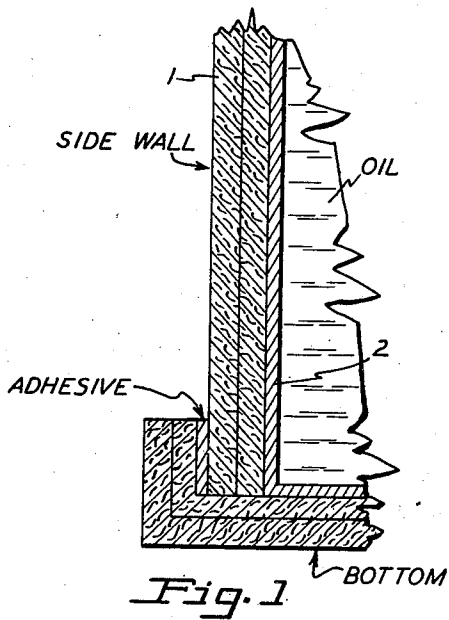
Sept. 5, 1944.

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2,357,767

METHOD OF DEHYDRATING

Filed Feb. 16, 1943



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UNITED STATES PATENT OFFICE

2,357,767

METHOD OF DEHYDRATING

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Application February 16, 1943, Serial No. 476,111

14 Claims. (Cl. 210-8.5)

My invention relates to methods of dehydrating various substances and has particular reference to the dehydrating of oils and other substances, the water content of which is required to be lowered or to be maintained at a lower than normal level.

In the preparation of various kinds of oils for the market a considerable problem is presented in the removal of water from such oils and elaborate processes have been devised for the treatment of such oils in an effort to remove the water content therefrom. Particularly oils to be used as lubricating oils, such as petroleum oils adapted for use in internal combustion engines and the like, should be water free.

It is therefore an object of my invention to provide an extremely simple method by which the water content in oils may be removed.

It is another object of my invention to provide a method by which the water content may be removed from oils during a period of storage of the oils and without requiring the employment of special apparatus or special process steps for so doing.

It is another object of my invention to provide a storage container into which oils containing water may be placed and in which the container is so constructed as to remove the moisture content from the oils and pass it through the walls of the container to the atmosphere but will prevent the ingress of moisture from the atmosphere.

Another object of my invention is to provide a method by which any article which has been treated to reduce its moisture content below normal may be stored with assurance that the article will be maintained with its moisture content at least as low as at the time it was stored.

Other objects and advantages of my invention will be apparent from a study of the following specifications, read in connection with the accompanying drawing, wherein

Fig. 1 is a sectional view of a portion of the wall of a container which may be employed in the practice of my invention;

Fig. 2 is a sectional view of a portion of a modified container wall which may be employed in the practice of a modified form of my invention; and

Fig. 3 is a diagrammatic view illustrating a still further modified view of my invention.

In the preparation of oils, particularly lubricating oils, for the market it has heretofore been the practice to treat such oils for the purpose of removing occluded moisture therefrom, after

which the oils were placed in suitable containers for storage and distribution. It has recently become common practice in the storage and distribution of such oils to package such oils in hermetically sealed metal cans or containers, the seal of which is broken only at the time the oil is to be put into an engine or otherwise immediately used as a lubricant. A further development of this manner of packaging oils has been the introduction into this industry of fiber containers as a substitute for the metal containers, again such containers being hermetically sealed at the time they are filled and remain sealed until the oil is to be immediately used. Such fiber containers may be of paper, cardboard or similar materials which are relatively porous to the passage of either oil or water and are required to be treated with suitable moisture and grease-proofing materials in order to render them serviceable as oil containers.

One form of such container comprises a cylindrical drum, the walls of which are built up to the desired thickness by the winding of several layers of paper or cardboard one upon the other, each layer being secured to the next by means of a suitable adhesive while multi-layer paper ends are provided for such drums adapted to be hermetically sealed to the cylindrical walls of the container body.

I have discovered that if containers of this character have their interiors completely coated with a relatively simple grease-proofing coating which is hygroscopic in character, oils which are stored in such containers will, over a relatively short period of time, lose all of the moisture content which may be in the oil at the time it was placed in such containers.

For example, a container may be used having fibrous walls such as indicated at 1 in Fig. 1, having a coating 2 on its interior formed from a glue-glycerin-water mixture, in which the glycerin to glue ratio is from approximately 10% to 200%, and to which has been added some hygroscopic salt such as magnesium chloride, sodium nitrate, ammonium nitrate, sodium iodide or any other hygroscopic salt which will not react with hydrocarbons. Such container when filled with oil and sealed will provide, by reason of the glue-glycerin interior coating, an oil-proof container which will prevent the oil from escaping. However, any moisture which may be contained within the oil will contact the interior surface of the hygroscopic coating 2 and due to the fact that the moisture in the oil has a relatively high vapor pressure as compared to the lower vapor pres-

sure of the oil and the specific gravity of the moisture being higher than that of the oil, the combined phenomena of interfacial surface tension between the hygroscopic oil-proof film and the moisture containing oil resting in contact with the hygroscopic film, the moisture will be absorbed by the hygroscopic film and will be given off to the porous walls of the container. The container, being exposed to the atmosphere, such moisture in the porous container walls will pass to the atmosphere at any time that the moisture content of the atmosphere becomes less than the moisture content in the container walls.

Thus even under climatic conditions of relatively high humidity, appreciable quantities of moisture leaving the oil and passing into the walls of the container will be extracted from the container walls until a balance is reached between the amount of moisture in the container walls and the amount of moisture in the surrounding atmosphere. Each time the humidity of the surrounding atmosphere diminishes, additional moisture will be removed from the porous container walls as long as there is any moisture contained in the oil packaged in the container.

A peculiar phenomenon is that the reverse action does not occur, namely, moisture from relatively humid air may pass into the porous walls of the container but will not pass inwardly through the hygroscopic grease-proofing film since there does not exist on the exterior of the film (that surface of the film adjacent the container walls) the difference in interfacial surface tension and that difference in vapor pressure as exists on the face of the grease-proofing film which is contacted by the oil.

In actual practice oils containing a relatively high moisture content, such as crankcase drainings, have been stored in containers of the character described herein and immediately after the container is filled and sealed the porous walls of the container become so saturated with moisture removed from the oil as to become relatively flaccid. Upon further standing this moisture has passed to the surrounding atmosphere and the walls of the container become stiff. Upon opening the containers after a relatively short period of storage of several days, the oil within the container is found to be moisture-free.

In other instances new oil which has been treated to reduce its moisture content to what has been considered a minimum has been found to give up additional moisture upon being packaged in a container as described herein and when the container is opened after a short period of storage the contents are found to be moisture-free.

Thus by storing oils in containers of the character described there appears to be a repeating process of removal of the moisture and its passage to the atmosphere each time the humidity of the surrounding atmosphere becomes less than the moisture content of the container walls, the process consisting of a uni-directional extraction of moisture from the contents and its passage to the atmosphere while moisture from the atmosphere is effectively prevented from passing into the contents.

A modification of the procedure may be successfully employed in the packaging of different dehydrated fruits, vegetables or other food products, in which the container walls 1a are treated with a hygroscopic grease-proof film 2a of the character hereinbefore described upon the interior of the container while the exterior of the

container may be treated with a water-proofing film 3 of any desired character to provide a moisture-proof fibrous wall container.

Food products which have been dehydrated and placed within such containers and the containers being then hermetically sealed will give up additional moisture through the interior film 2a until all of the moisture has been removed or until the porous wall 1a of the container has absorbed moisture to its saturation point. No moisture being permitted to enter the container by reason of the moisture-proof external coating 3, such food products will be maintained with their moisture content lower than when they were placed in the container.

As a further modification, such dehydrated food products may be placed in a container such as illustrated in Fig. 3, in which the porous walls of the container have been treated either internally or externally or both with a moisture-proofing film and then a disk or other shaped piece of porous material 4 which has been coated with a hygroscopic grease-proofing film of the character described herein is inserted into the container prior to its seal. Such insert will then act to extract moisture from the contents to the limit of the absorptive power of the porous material, thus maintaining the contents at a lower moisture content than at the time such contents were placed in the container.

While I have shown and described the preferred embodiment of my invention, I do not desire to be limited to any of the details of construction shown or described herein, except as defined in the appended claims.

I claim:

1. The method of dehydrating materials which comprises storing said material in a closed container, at least a portion of which is constructed of material capable of absorbing moisture and lined on the interior surface with a hygroscopic grease-proofing film.

2. The method of dehydrating materials which comprises storing said material in a closed container, at least a portion of which is constructed of material capable of absorbing moisture and lined on the interior surface with a hygroscopic grease-proofing film, and exposing the exterior of said portion to the atmosphere.

3. The method of dehydrating materials which comprises storing said material in a closed container, at least a portion of which is constructed of porous material capable of absorbing moisture from the material and releasing it to the atmosphere and lined on the interior surface with a hygroscopic grease-proofing film, and exposing the exterior of said portion to the atmosphere.

4. The method of dehydrating materials which comprises storing said material in a closed container, at least a portion of which is constructed of material capable of absorbing moisture and lined on the interior surface with a film of glue and glycerin to which is added a hygroscopic salt.

5. The method of dehydrating materials which comprises storing said material in a closed container, at least a portion of which is constructed of material capable of absorbing moisture and lined on the interior surface with a film comprising glue and glycerin in glycerin to glue ratio of from 10% to 200%, to which has been added a hygroscopic salt.

6. The method of dehydrating materials which comprises storing said material in a closed container, at least a portion of which is constructed of material capable of absorbing moisture and

lined on the interior surface with a film comprising glue and glycerin in glycerin to glue ratio of from 10% to 200%, to which has been added a hygroscopic salt which will not chemically react with the material to be dehydrated.

7. The method of dehydrating oil which comprises storing said oil in a closed container, at least a portion of which is constructed of material capable of absorbing moisture and lined on the interior surface with a hygroscopic grease-proofing film.

8. The method of dehydrating materials which comprises storing said material in a closed container, the exterior surface of which is impervious to moisture, at least a portion of said container interiorly of said surface being formed of material capable of absorbing moisture and lined on the interior with a hygroscopic grease-proofing film.

9. The method of dehydrating materials which comprises storing said material in a closed container, the exterior surface of which is impervious to moisture and the interior of said container having disposed therein a moisture absorbent material coated with a film of hygroscopic grease-proofing material.

10. The method of dehydrating oil which consists in storing said oil in a closed container, the exterior surface of which is impervious to moisture and the interior wall of said container being formed of a moisture absorbent material coated with a film of hygroscopic grease-proofing material.

11. The method of dehydrating oil which consists in storing said oil in a closed container, the wall of said container being formed of a moisture absorbent material coated on the interior surface with a film of hygroscopic grease-proofing material.

12. The method of dehydrating oil which consists in storing said oil in a closed container, the exterior surface of which is impervious to moisture and the interior wall of said container being formed of a moisture absorbent material coated with a film of flexible hygroscopic grease-proofing material.

13. The method of dehydrating oil which consists in storing said oil in a closed container, the wall of said container being formed of a moisture absorbent material coated on the interior surface with a film of flexible hygroscopic grease-proofing material.

14. The method of dehydrating mineral oils which consists in storing said oils in a closed container formed of a material capable of absorbing moisture and lined on the interior with a film comprising glue and glycerin in the glycerin to glue ratio of from 10% to 200% to which has been added a hygroscopic material of the group including glycerin, magnesium chloride, sodium nitrate, ammonium nitrate and sodium iodide.

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