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E. M. YARD

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DRYING CAPSULE

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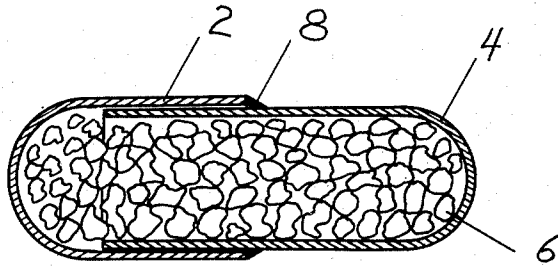


Fig. 1

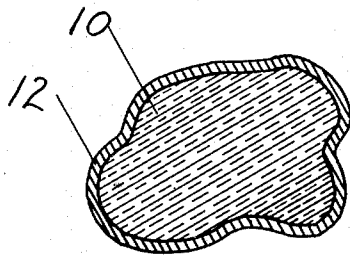


Fig. 2

INVENTOR.
Edward M. Yard
BY
Albert Sperry.

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DRYING CAPSULE

Edward M. Yard, Trenton, N. J.

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This invention relates to drying agents and is directed particularly to agents having a prolonged and controlled drying action.

Many types of dehydrating or desiccating agents are known but they are not generally presented in a form which permits them to be added directly to material such as table salt, chemicals or drugs for removing excess moisture therefrom. Furthermore, most drying agents act vigorously when first exposed to the atmosphere but soon become spent or saturated so that their effectiveness is short-lived and varies greatly in intensity.

In accordance with the present invention these objections to prior drying agents are overcome and a product is provided which can be placed directly in contact with salt, chemicals or other substances to be dried. Products embodying the present invention can be conveniently handled and they are characterized by a prolonged and moderated drying action. These advantages are attained by enclosing desiccating agents, which may be very vigorous in their action, within a capsule, closure or a coating of an air impermeable, moisture transmitting material such as gelatin, uncoated cellophane or incompletely polymerized and moisture absorbing resinous material. In this way the desiccating agent is shielded from direct contact with air or the material to be dried but moisture is absorbed from the material by the enclosing moisture transmitting cover and is in turn absorbed from the cover by the desiccating agent.

One of the objects of the present invention is to provide a novel type of drying agent presenting an exposed surface which is impermeable to air but which is capable of absorbing moisture.

Another object of the invention is to provide a novel drying agent which is characterized by its prolonged and moderate action.

A specific object of the invention is to provide a drying agent having an outer exposed surface composed of gelatin.

These and other objects and features of the present invention will appear from the following description thereof in which reference is made to the figures of the accompanying drawing and to specific compositions which represent typical and preferred products.

The drying agents of the present invention consist essentially of an inner desiccating agent and an outer container or covering which is capable of absorbing moisture from the air or material with which it is in contact whereby the desiccating agent enclosed within the outer en-

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closure or covering serves to extract the moisture from the covering rather than from the atmosphere or material being treated. In this way the activity of the drying agent is dependent primarily upon the water absorbing and transmitting characteristics of the outer cover rather than upon the action of the enclosed desiccant whereas the action of the inner desiccating agent is controlled and limited and its life is materially prolonged. Moreover, the drying effect is maintained relatively constant over long periods of time, and excessive drying is avoided. At the same time, contamination and chemical reaction between the drying agent and the material being treated is avoided.

Substantially any desiccating agent may be used but for greater convenience the desiccating agent should be in the form of a granular or powdered material. Among the preferred materials of this character are silica gel, lime, activated alumina oxide, calcium chloride, phosphorous pentoxide, and activated carbon. These and other dehydrating agents selected may be employed but it is generally preferable for the desiccant to retain a granular form until exhausted in order to avoid contamination of the material being treated in the event the covering material should become softened or split when allowed to remain in contact with the material being dried after its activity has expired.

The desiccant selected for use is enclosed within a container, capsule or coating of material which is preferably inert chemically and impermeable to air but which is capable of absorbing or transmitting moisture therethrough from the air or material with which it comes in contact. A preferred enclosing material is gelatin which may be in the form of a capsule, a closed container, or an adhering film. However, other enclosing materials may be used such as casein, glue, incompletely polymerized glyptal or other water absorbing or moisture permeable synthetic resins, uncoated cellophane and the like.

As shown in Fig. 1, a most convenient form of drying agent embodying the present invention consists of a gelatin capsule embodying the sections 2 and 4 which are positioned in telescoping relation so as to form an enclosure in which the desiccating agent, such as granular activated alumina 6, is enclosed. If desired, the sections of the capsule may be sealed as shown at 8 by the application of glue, resin petroleum jelly, or other sealing compositions. However, it is found in actual practice that when the capsule is formed of gelatin and exposed to moist air,

the sections of the capsule soon soften and become welded to each other so as to form a sealed enclosure for the activated alumina without the application of any separate or added sealing material.

Capsules of the type described and shown may conveniently be placed in containers for maintaining a dry atmosphere wherever desired. Thus for example, one or two capsules may be placed in a drawer or box containing postage stamps, labels, photographic paper or the like. They may also be placed in gun cases or tool chests to prevent rusting or in linen closets or drawers to prevent the mildewing of fabrics. Since the capsule form of the present invention is particularly clean, neat and readily handled its uses are unlimited. Moreover, it can be produced, stored and shipped easily and can be preserved in unaffected condition for long periods of time in sealed bottles or vacuum containers.

When applied to a material for drying purposes the desiccating agent itself does not come into direct contact with the salt or chemical or sift out of the capsule so as to contaminate or react with the material to be dried. Moreover, the desiccating agent does not come into direct contact with moisture carried by the air or the material being treated. The outer gelatin or resinous capsule is relatively inert chemically so that there is no danger of chemical reaction between the enclosure and the material to which the capsules are added. At the same time, the capsules may be made sufficiently large so that they will not shake from a salt shaker or become lost in a container of powdered or granular material. When exhausted they can be separated easily from the chemical or material and other capsules substituted therefor. The gelatin continues to absorb moisture from the air or material in contact therewith as long as the silica gel or other desiccating agent within the capsule remains active and continues to withdraw moisture from the gelatin enclosure. In this way the action of the enclosed desiccating agent is limited or controlled and its effectiveness is materially prolonged since a limited but appreciable drying action can be maintained for long periods of time and all danger of excessive drying out of the product being treated is avoided. The thickness and composition of the enclosing material employed may of course be varied and the effectiveness and life of the drying agent can thus be controlled so as to afford a limited drying action for long periods of time or a greater drying action over a more limited period. Thin gelatin capsules containing silica gel serve to maintain a much drier atmosphere, for example, than do capsules of greater thickness containing calcium chloride. The drying agents embodying the present invention can therefore be produced so

as to maintain the most desirable atmosphere or condition for the preservation or treatment of any particular material.

It is also found in practice that enclosures formed of gelatin, for example, tend to become softer and more pervious to moisture after prolonged exposure to a moist atmosphere. The shielding effect of the enclosing material therefore tends to be reduced as the activity of the desiccating agent becomes less and as a result the continued drying effect is more nearly constant throughout the life of the product.

Instead of using enclosures in the form of capsules the granules may be enclosed in a sealed bag or package of any desired form, shape and size so as to be hung or placed in a closet, drawer, reaction chamber or elsewhere.

If desired for use in chemical reactions the drying agent may consist of granules of a desiccating agent coated with a film of gelatin or other impervious and inert water absorbing material. Thus as shown in Fig. 2 the desiccating agent appears as a granule 10 having a surface coating consisting of a film 12 of absorption limiting material such as gelatin or water absorbing resinous material.

Drying agents of this character can be added to alcohol, gasoline, or other liquids to be dried and in which the coating material is insoluble. Thus products embodying the present invention may be used in drying towers and condensers and employed elsewhere in carrying out chemical reactions or for producing or preserving liquids with a minimum moisture content.

The present invention is thus capable of many changes in form and composition and will vary with different applications and uses thereof. It should therefore be understood that the particular embodiments of the invention shown in the drawing and described above are intended to be illustrative only and are designed to indicate the nature of the present invention rather than to limit the scope thereof.

I claim:

1. A drying agent consisting of a gelatin capsule containing a desiccating material.
2. A drying agent consisting of a gelatin capsule containing silica gel.

EDWARD M. YARD.

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