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INDICATOR PACKAGE FOR CEMENTS AND THE LIKE

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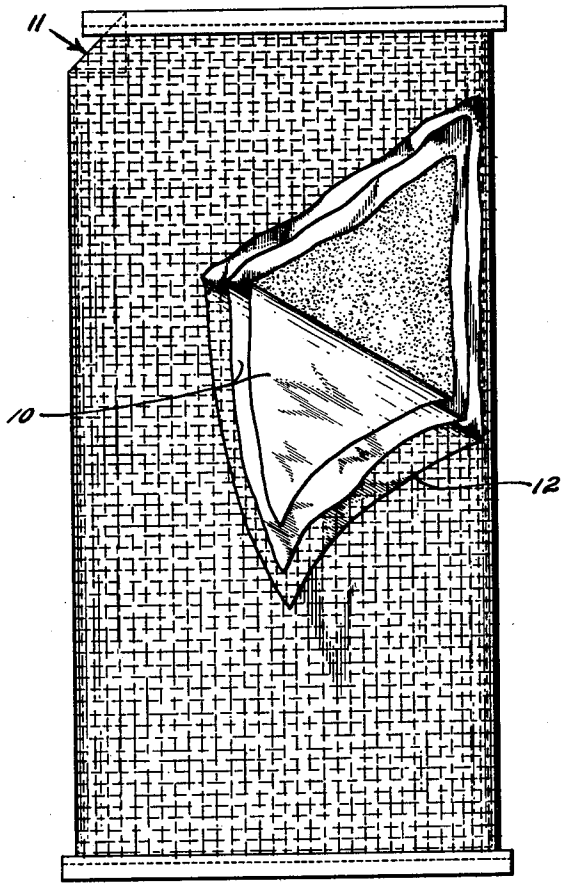

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INDICATOR PACKAGE FOR CEMENTS AND THE LIKE

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5 Claims. (Cl. 229—55)

This invention relates generally to a novel type of indicator package for materials that are desired to be kept in an unaltered condition, at least in certain respects, and in particular free from exposure to or absorption of moisture, or excessive moisture.

Our primary object is to provide a container, itself having indicator characteristics, adaptable to show either or both exposure of the package to moisture, or a change in the condition of the contents resulting, for example, from moisture absorption. Where the indicator feature of the container is to be employed, as ordinarily, to show simply that the package has been exposed to moisture, the container may be given its indicator characteristics independently of the contents of the package. Where used as a means for indicating a change in the condition of the contents themselves, the invention is applicable to the packaging of various materials subject to changes in condition, and especially where such changes result in variation of the acidity or alkalinity, or pH value (hydrogen ion activity or concentration) of the material. As will later be apparent, an alkaline or acid indicator, as the case may require and as determined by whether the material in the container or placed in the presence of the indicator is acid or alkaline, may be selected to give a color transformation in accordance with the change in condition of the material.

The invention has been developed particularly for the purpose of providing what may be termed an indicator bag or sack type package for alkaline cementitious or construction materials, for example Portland cement, and accordingly the invention will be described with particular though typical reference to the packaging of Portland cement.

Because of the possibility of impairment of the cement and its desired properties as a result of exposure to moisture prior to use, it is important if the cement has for any reason been exposed to moisture that the fact be known. This is particularly true with respect to oil well cements which may have rather closely predetermined setting periods and are apt to cause considerable difficulties in well cementing operations if materially affected by partial preliminary hydration. Accordingly, it is of decided advantage to the operator to be able to have full assurance that the cement at the time of use has not been impaired by reason of exposure to moisture. In accordance with the invention we have provided a cement bag or container having indicator characteristics such that by color transformation, the bag itself will show whether it has been moistened, and if desired can be made to show the presence of excessive moisture in the contained cement.

Preferably the bag is made in the usual size of standard cement bags and of a sufficiently strong paper. The paper employed is given indicator properties rendering it subject to color change upon being moistened, by incorporating in the paper, as by impregnation, a suitable chemical indicator or dye. In the broad aspects of the invention the bag may be of any desired construction and of any suitable thickness, either single or multiple ply with the indicator paper at the outside, and either with or without the indicator paper contacting or exposed to the contents of the bag. In order for the bag to be color sensitive to changes in the moisture content of the cement in the bag, the indicator paper may be used in one or more thicknesses contacting the cement, or at least in sufficient proximity thereto as to be subject to color change by the alkaline action of the cement upon moisture absorption.

In general, however, we prefer to use the indicator paper as a means of indicating whether the package itself has been exposed to moisture, and for this purpose and to give the package adequate strength, to form the bag of multiple ply paper, the inner plies of which may be of ordinary relatively heavy and strong paper commonly used for making cement bags. The outer exposed ply is made of suitable weight paper impregnated or treated with an acid indicator or dye which is subject to color change by reaction with or neutralization by an alkali, and in this instance by the moistened alkaline constituents of the cement.

Ordinarily in sacking cement, an amount of cement dust settles and remains on the outer surface of the bag. If for any reason such surface cement is not present, (as where the invention is applied to packages of non-alkaline material, or alkaline materials packaged without being deposited on the outer surface of the container) a small amount of cement or in fact any suitable base such as a metallic hydroxide, may be applied to the surface of the bag in sufficient amount that upon being moistened, the resultant alkalinity will change the color of the indicator dye.

It will be understood that any suitable indicator or dye may be used, and that there are many known chemical indicators adaptable for the purpose. Also the indicator may be selected to give any desired color transformation. Thus the indicator normally may be colorless, or it may

have any suitable initial color. In general, effective indicators may be selected from the commonly known aniline acid dyes, including the alizarine and azo dyes, that have not been permanentized in the paper to the extent of destroying their acid activity. That is to say, the dye will be used in sufficiently fugitive condition to retain its acid activity and susceptibility to color change beyond at least the average time that the cement will remain sacked.

For color effect, we may make the bag of a paper impregnated with yellow acid aniline dye or one within the yellow-orange range, which will have a red or reddish color transformation when subjected to the alkaline action of the moistened cement. Typical yellow or yellowish dyes are sold on the market under the trade names "Brilliant Paper Yellow" and "Golden Rod Yellow." The bag will retain its normal color while dry, but upon application of moisture to the bag and to the alkaline material on its surface, the bag will itself undergo a distinct color change, say yellow to red.

As illustrative of other indicator dyes, reference is had to the following: tri phenol methane dye stuff, normally green, goes colorless, di phenal naphthyl methane, normally green, turns blue, red mono azo dye stuff, normally red, turns orange or yellowish brown; and bromo cresol dye, normally yellow, turns to reddish purple.

The accompanying drawing shows a typical embodiment of the invention as applied to multiple ply paper bags for Portland cement, the outer ply typically being shown colored by a yellow indicator dye.

Except for its outer indicator ply, the container shown in the drawing is a known and conventional form of paper bag for sacking Portland cement. The bag comprises a suitable number of inner plies 10 made of paper selected for such desirable qualities as strength and moisture imperviousness. Such bags ordinarily are filled through a self-sealing opening at one corner of the bag, as generally indicated at 11. Preferably the entire outer layer or ply 12 of the bag is made of an indicator paper of the character previously described, and adapted to show by color transformation, when the surface of the bag has become wetted. One particular advantage of having the indicator distributed over or applied to substantially the entire surface area of the bag, as by making the entire outer ply 12 of the indicator paper, is that the latter will show a wetted surface condition on any area of the bag, and the extent of the wetting in accordance with the area of the color transformation.

We claim:

1. A package for alkaline cementitious material, comprising a multiple ply moisture absorbent paper bag, the outer ply containing an acid dye in the presence of an alkaline substance, said dye being adapted to undergo a distinct and permanent color transformation by reaction with said alkaline substance when the outside of the bag becomes wetted.

2. A package for alkaline cementitious material, comprising a moisture absorbent paper bag containing an acid dye in the presence of an alkaline substance, the color of said dye normally being within the yellow-orange range and adapted to undergo a distinct and permanent reddish color transformation by reaction with said alkaline substance when the outside of the bag becomes wetted.

3. A cement bag container of moisture absorbent paper, the outer surface material of which is coated with particles of cement and contains an acid dye adapted to undergo a distinct and permanent color transformation by reaction with alkaline constituents of said cement particles when the outside of the bag becomes wetted.

4. A cement bag container, the outer surface material of which comprises moisture absorbent paper coated with particles of cement and containing an acid dye adapted to undergo a distinct and permanent color transformation by reaction with alkaline constituents of said cement particles when the outer surface of the bag becomes wetted, said acid dye being distributed over substantially the entire surface area of the bag so as to show the location and extent of surface wetting of the bag.

5. A cement bag container, the outer surface material of which comprises moisture absorbent paper coated with particles of cement and containing a dye normally within the yellow-orange range and adapted to undergo a distinct and permanent reddish color transformation by reaction with alkaline constituents of said cement particles when the outer surface of the bag becomes wetted, said dye being distributed over substantially the entire surface area of the bag so as to show the location and extent of surface wetting of the bag.

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