

Apparatus and method for deodorizing confined air spaces which utilize baking soda

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EXCERPTS: BACKGROUND OF THE INVENTION

Nowadays, refrigerators have become a common appliance in virtually every household and typically are used for storage and preservation of food, in particular of fresh food such as fruits, vegetables, dairy products, and the like. It is desirable to keep the food items fresh as long as possible in the refrigerator.

It is a well known problem that many food items tend to release malodors into the air which are then captured in the limited air space in a refrigerator. Not only are these malodors unpleasant and offensive to the user of the refrigerator, they can also have a negative impact on the quality of other foods in the refrigerator. For example, it is known that some foods emit strong odors (e.g. fish, boiled eggs, onions, etc.) and that these odors can transfer to other nearby foods and hurt the taste and freshness of those foods. A common example is transfer of odors into an open container of orange juice or of milk resulting in a noticeable degradation in their taste. It is also well known that malodors from some vegetables (onions, garlic) can transfer to other foods stored within a vegetable drawer. This problem is aggravated when the vegetable drawer is sealed such that there is very little air exchange with the larger compartment of the refrigerator (herein referred to as the "fresh food compartment") and when vegetables have been cut or are stored without any outer wrapping. This problem of odor transfer is particularly acute in the case of ice cubes where odors from the fresh food compartment of the refrigerator can be transferred to the ice in the freezer compartment of the refrigerator. This is especially true in the case of refrigerators in which there is air exchange between the fresh food and freezer compartments, and especially in the case of refrigerators with built-in ice-makers.

A common attempt to solve this odor contamination problem is the use of an opened box of baking soda, especially in the refrigerators. However, this static method is not very effective, because the bulk of the baking soda is not exposed to the contaminated air, and the air movement around the baking soda is minimal. In addition, there is the possibility that an opened box of baking soda could be tipped over, creating a mess in the refrigerator.

The ARM & HAMMER® Division of the Church & Dwight Co., Inc. of Princeton, N.J., U.S.A. has also recently introduced a product known as FRIDGE-n-FREEZER™ FLOW-THRU FRESHENER™ that attempts to address some of these

problems. The FRIDGE-n-FREEZER™ FLOW-THRU FRESHENER™, as shown in U.S. Pat. No. 4,624,366, is essentially a box of baking soda that has openings on the sides to increase the amount of surface area of the box through which the baking soda is exposed. The baking soda is contained in the box by a "cloth filter" nonwoven material that is positioned between the baking soda and the openings in the box. This product, however, suffers from the disadvantages that the baking soda is still packed so densely in the box that air is unable to flow through the baking soda. Deodorization of the air to remove malodors in the device of the present invention may be achieved by a filter medium that neutralizes the odors, that absorbs the malodor molecules, and/or that adsorbs the molecules constituting a malodor onto a surface of a filter medium. **The term "adsorption" is well defined in the art and refers to the adherence of molecules to surfaces which effectively reduces the mobility of these molecules to the two dimensions of the surface.** Those molecules remaining in the air will then diffuse so that further molecules come into contact with the surface and subsequently will be adsorbed. Consequently, most of the malodor molecules will travel into the proximity of one of the surfaces at some point in time so that finally most of the malodor will be removed from the air.

Activated carbon is known to be a very effective filter medium for adsorption of odors due to its high specific surface area. The filter member of the present invention may further comprise agents supported on the filter element to specifically attack certain malodors such as those comprising S atoms or N atoms. Additionally, or alternatively, the filter member of the present invention may comprise a filter medium capable of removing ethylene from the air. Other odor removing substances may include, but are not limited to zeolites.

The apparatus can be provided in the form of a package or kit which comprises a passive filter member, a package containing said apparatus; and optionally informational indicia, including printed matter such as a set of instructions, in association with said apparatus or the package to communicate said benefits to a consumer.

Informational indicia can be provided in association with the apparatus itself or, when the present article comprises a package, in association with the package. As used in this context, the phrase "in association with" means the informational indicia (e.g., a set of instructions) are either directly printed on the apparatus itself (or package itself) or presented in a different manner including, but not limited to, a video tape, a brochure, print advertisement, electronic advertisement, and/or verbal communication, so as to communicate the set of instructions to a consumer of the article of manufacture. Informational indicia can include, but is not limited to: a set of instructions that direct a consumer how the steps need to be carried out (such as the methods of use described herein) to obtain the communicated benefits; diagrams, pictures, and/or logos which communicate the benefits and steps which need to be carried out to obtain the benefits; and the like.