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METHOD OF TREATING MILLING PRODUCTS

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My invention relates to the improving of milling products and more particularly has reference to the bleaching and ageing or maturing of wheat flour and other grain and vegetable flours and edible milling products in general.

A present form of general milling practice comprises a treatment of the flour with chlorine-containing gas to effect ageing thereof, thereby eliminating storage and the time element to bring about the proper and necessary conditioning of the flour. The gases heretofore employed for this purpose, in addition to being maturing agents, also possess bleaching properties. However, they materially injure the quality of the flour when employed in sufficient amount to obtain a complete bleach and therefore it is customary to use an amount of the gas not substantially in excess of that required to age the flour, the bleaching being secured by a subsequent treatment with bleaching agents.

In my prior application, Serial #732,536, filed June 26, 1934, of which this application is a continuation-in-part, I have disclosed and claimed a process for ageing and bleaching milling products in dry form by admixing therewith a solid chlorine-liberating compound, such as calcium hypochlorite, and a solid ammonium compound, these compounds reacting with each other within the flour to form a gaseous bleaching and maturing agent. The ammonium compounds specifically disclosed for this purpose in my prior application referred to are the phosphate, sulphate, carbonate, persulphate, borate, chlorate, perchlorate, nitrate and nitrite, as exemplary of inorganic ammonium salts, and ammonium acetate, benzoate and citrate as illustrative of organic salts.

I have now found that the solid chlorine-liberating compounds of my prior application can be dispensed with when the flour is given the customary gas treatment above referred to, the flour containing sufficient chlorine as a result of this ageing operation to react with the ammonium compounds to form a bleaching agent within and to impart the desired color to the flour.

It is accordingly an object of the present invention to replace the chlorine-liberating solids of my prior application by the customary gas treatment above referred to, whereby the gas treatment not only ages the flour but also chlorinates it sufficiently to react upon the ammonium compound to form a bleaching agent in situ.

Other objects and advantages of my invention will appear from the more detailed description thereof.

The gaseous treating agents used in the present process are any of those heretofore contemplated for the ageing and bleaching of milling products. Suitable gases are chlorine, chlorine dioxide or chlorine peroxide, nitrosyl chloride, nitrogen trichloride and similar gaseous compounds containing chlorine or both chlorine and nitrogen. The gas treatment of the flour is effected in tumblers or closed containers in the usual manner and inasmuch as such operations are well known to the art, detailed description thereof is here unnecessary.

The gas treatment is insufficient to impart the desired color to the flour since, as already indicated, the quality of the flour is degraded, if not completely ruined, by an adequate amount of the gas to effect a complete bleach. As stated, this gas treatment is essentially for the purpose of ageing or maturing the flour and if any bleaching is effected thereby, it is only partial. However, in the present process, the gas treatment performs the additional function of chlorinating or pre-conditioning the flour for reaction with the ammonium compound.

Of the ammonium compounds mentioned, the preferred are those which are dry and free-flowing in finely divided or powdered form, such as ammonium sulphate, phosphate and chloride. They should be added as soon as the flour has been gas-treated, or before or at the time of the gas treatment. Since the compounds which I employ can be prepared in finely divided or powdered form, they can be fed into and intimately mixed with the dry flour by means of the powder feeding devices of the type now commonly used in the mills and they are preferably powdered to a fineness approximating that of the milling product to be treated or to such a degree that 75% to 95% will pass through a 300 mesh screen.

As in my prior application referred to, the oxygen-containing ammonium salts are preferred, particularly ammonium phosphate and ammonium sulphate which are especially desirable since they are non-hygroscopic, dry and free-flowing in finely divided solid form and are stable and usable under the usual mill conditions.

Only minute amounts of the ammonium compound are necessary to react and form sufficient bleaching agent within the chlorinated flour to effect satisfactory bleaching or to complete such partial bleaching as may be obtained by the gas treatment. For example, one-half ounce ammonium phosphate or sulphate per 198 pound barrel of flour, added immediately after the customary gas treatment now employed in the art, is sufficient

to impart a satisfactory color to the flour after the flour has been exposed to the action of the ammonium compound or its reaction products for a time period of about 12 to 18 hours. The ammonium compound, as such, has no maturing action and therefore its addition, particularly in the small amounts employed, presents no danger of over-treating the matured product of the gas operation.

By the term "dry", as applied in the appended claims to the milling product, it is meant that the milling product, although containing its normal or usual moisture content, has not been intentionally wetted as is done, for example, in the making of dough.

Having described my invention, I claim:

1. A method for bleaching and ageing flour and other milling products which comprises treating the milling product in dry form with chlorine-containing gas and with a finely divided solid ammonium compound capable of and in sufficient amount for reacting with chlorine in the presence of the milling product to form a bleaching agent, and exposing the milling product in dry form to the action of said agent for a time period adequate to effect substantial bleaching thereof.

2. The method as defined in claim 1 further characterized in that the ammonium compound is present in the milling product during the gas treatment.

3. A method for improving milling products which comprises ageing the product by contacting it in dry form with a chlorine-containing gas, then admixing with the dry product a finely divided solid ammonium compound capable of and in sufficient amount for generating a bleaching agent in the thus treated product, and exposing the milling product in dry form to the action of said agent for a time period adequate to effect substantial bleaching thereof.

4. A method for bleaching and ageing flour and other milling products which comprises treating the milling product in dry form with chlorine-containing gas, then admixing with the dry product finely divided solid ammonium phosphate in sufficient amount to form a bleaching agent in the thus treated product, and exposing the milling product in dry form to the action of said agent for a time period adequate to effect substantial bleaching thereof.

5. A method for bleaching and ageing flour and other milling products which comprises treating the milling product in dry form with chlorine-containing gas, then admixing with the dry product finely divided solid ammonium sulphate in sufficient amount to form a bleaching agent in the thus treated product, and exposing the milling product in dry form to the action of said agent for a time period adequate to effect substantial bleaching thereof.

6. A method for bleaching and ageing flour and other milling products which comprises treating the milling product in dry form with chlorine-containing gas, then admixing with the dry product finely divided solid ammonium chloride in sufficient amount to form a bleaching agent in the thus treated product, and exposing the milling product in dry form to the action of said agent for a time period adequate to effect substantial bleaching thereof.

7. A method for improving milling products which comprises ageing the product by contacting it in dry form with a chlorine-containing gas, then admixing with the dry product a finely divided solid, non-hygroscopic, oxygen-containing ammonium salt capable of and in sufficient amount for reacting with the chlorine content of the product to form a bleaching agent, and exposing the milling product in dry form to the action of said agent for a time period adequate to effect substantial bleaching thereof.

8. A method for improving milling products which comprises ageing the product by contacting it in dry form with a gaseous compound of chlorine and nitrogen, then admixing with the dry product a finely divided solid ammonium compound capable of and in sufficient amount for generating a bleaching agent in the thus treated product, and exposing the milling product in dry form to the action of said agent for a time period adequate to effect substantial bleaching thereof.

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