Patented Aug. 18, 1936 2,051,779

UNITED STATES PATENT OFFICE

2,051,779

PROCESS FOR THE PRODUCTION OF CASEIN POWDER ADAPTED TO BE MOLDED DIRECTLY

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No Drawing. Application February 28, 1934, Serial No. 713,421. In Germany March 1, 1933

3 Claims. (Cl. 106—38)

It is known that it is possible to produce from casein artificial horn of good quality by preliminarily forming the casein powder, which has previously been moistened more or less, into rods or sheets under high pressure by means of heated hose-presses or rollers, subsequently hardening these preliminarily formed pieces either directly in the formalin bath or else pressing them first into blocks or slabs in the hot press, subsequently hardening these products.

A large number of experiments and suggestions have been made for the purpose of avoiding this rather protracted and troublesome method, i. e. the preliminarily forming of the casein powder into rods and sheets, and to mould the casein powder, after it has been moistened more or less, immediately into the desired shapes in hot moulds. This method of moulding has been attempted with or without the simultaneous addition of hardening agents, without, however, attaining any utilizable results.

One of the most modern suggestions aimed at grinding the casein as fine as dust and to expose it in the form of a whirl to water or aqueous vapour in form of the very finest possible spray, so as to uniformly moisten in this manner each particle of casein dust. This method which, as a matter of course, embodies very great technical difficulties, has not shown any permanent results either with regard to the possibility of directly pressing the casein powder into the required shapes with the aid of moulds.

The drawbacks inherent in such a method of directly compressing the casein powder into the ready-made article, are represented, in the first instance, by minute cracks on the surface, partly directly after terminating the moulding process, partly, however, not until the drying process after hardening the compressed articles in a formaldehyde bath, has been terminated. These minute cracks possess the property of not only destroying the surface, but also the strength of the article in question.

Exhaustive experiments have proved, that these drawbacks will be avoided and that faultless moulded or pressed articles will be obtained, if the moisture, naturally contained within the casein powder (mostly 6–8% of water), is utilized in bringing about a swelling of the casein particle from within of the latter to the fullest possible extent. This is most advantageously effected by heating or boiling the casein powder in water-soluble alcohols after reducing it to a gritty state. This process will usually be carried out with the aid of a reflux condenser which enables the alcohol to flow back and to act upon the casein during the entire time of the heat treatment.

The modus of carrying out this method is extremely simple.

The process during the treatment of the casein will now probably be that that a softening of the super-dried, external and, therefore, hard cell walls of the ordinary casein takes place, being reinforced during the heating process, because, as a result of this heating the water-soluble alcohol soaks into the casin grains (particles) and causes the natural water content of the casein grain to expand. If it should be attempted to bring about this development by placing the casein in water and heating the latter, the draw-back would be met with, that the whole of the casein powder absorbs an excessive quantity of water and that it is sintered down to a smeary and slimy mass which has absorbed a very large quantity of water, with the result, that its further direct conversion has been rendered absolutely impossible and during the subsequent drying process which, as a matter of course, must be carried through much more severely than in connection with readily volatile agents, the old draw-back already referred to, i. e. the hardening of the external cell walls, would re-appear still more (to an increased extent). The process according to the present invention, however, renders a caking and sliming of the casein wholly impossible, because the alcohols can not convert the casein into a smeary slimy mass.

The period during which, according to the present invention, the casein is subjected to heating does naturally depend upon the kind of casein used. Usually a treatment of about one hour per 100 kilos of casein is found to be sufficient. If large quantities of alcohol are used for instance, 10 parts for every one part of casein, a moulding powder will be obtained which will produce almost transparent moulded articles. However, it is by no means necessary to add to the casein a quantity of alcohol which is so large that degreasing actually is effected.

After the termination of the heating period, during which it will be of advantage to constantly stir the casein, the casein powder is desiccated in a careful manner, either by allowing the medium to evaporate or, in case of its recovery, and this is, of course, essential in connection with practical working, allowing the medium to evaporate in vacuum and condensing it again in a suitable manner.

A casein powder thus obtained will, generally speaking, be adapted to be so converted into a

plastic condition with an admixture of 15 to 20% of water, that, whilst retaining its powdery condition, will yield a press mass of excellent quality. The powder may either be pressed directly under application of heat or it may, by means of a pressure without heat or in connection with slight heat, be preliminarily pressed into tablets, the latter being immediately, or at a later time, converted into the desired article with the aid of the hot press. In every case, the pressed articles thus obtained, are characterized by a smooth and durable surface, yielding in the hardening bath and after the subsequent desiccating process, pressed goods which will meet the most exacting requirements.

It is a matter of course that already during the heating period or, if desired, subsequently, the known fillers, for instance lithopone and coloring agents may be added as well as bleaching or discoloring agents.

The process is useable for rennet—as well as for acid-casein. Finally, during the treatment with alcohols instead of vacuum excess pressures may also be employed.

Example

1. 100 kilograms of casein (rennet or acid casein) is mixed with 200 litres of ethylalcohol techn. The mixture is heated to about 50° C. preferably in a rotating vessel combined with reflux condenser for two hours. The alcohol is then allowed to flow out from the vessel. The remaining alcohol—which is taken by the swollen case-in-grain—is evaporated preferably under vacuo; the nearly dried casein is taken out and ready to be moulded; and since the foregoing specification and claims refer to the use of alcohols of low boiling point, alcohols other than ethyl alcohol which may be defined as having a low boiling point are comprehended within the disclosure.

I claim:

1. A process for producing mouldable casein, comprising reacting moisture containing granular casein with a water soluble alcohol at a temperature of substantially 50° C. until the grains of the casein have swollen by individual absorption of the alcohol, and removing the excess alcoholic reactant.

2. A process for producing mouldable casein, comprising refluxing a primary water soluble alcohol with moisture containing casein powder, softening the cell walls of the said powder particles to permit absorption of a portion of the alcohol and consequent expansion of said particles by said moisture contained therein, at a temperature of substantially 50° C., and decanting the excess alcoholic reactant.

3. A process for producing mouldable casein, comprising refluxing ethyl alcohol with a granular casein at substantially 50° C., until the granules of the casein have individually expanded under the influence of absorbed alcohol removing the supernatant liquid and drying the casein residue.

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