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CULINARY UTENSIL OF FIBROUS STRUCTURE AND METHOD OF MAKING SAME

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This invention relates to plates and other or similar culinary utensils constructed of fibrous material and to an improved method of manufacturing such fibrous products and refers particularly to the manufacture of fibrous plates and other culinary utensils which possess, for a predetermined thickness or caliper, relatively great stiffness and rigidity.

Fibrous plates and other similar articles heretofore constructed, whether stamped from the paper directly or from molded pulp, have very little of the stiffness and rigidity of the articles they are intended to replace. Since nearly all plates or molded articles from paper have a caliper of approximately from 10 to 30 points, this lack of stiffness and rigidity is very noticeable. However, it is desirable to maintain this low caliper in order to obtain relatively light weight products of the desired heat-transfer properties and, at the same time, far more economical and efficient in other respects for manufacturing and selling.

It is one of the objects of my invention to produce these utensils with the same caliper as plates and other articles now produced from paper, but to greatly increase the rigidity; that is, to approach to a maximum degree the characteristics of the articles they are to replace.

Another object of my invention is to so treat the pulp or paper making material while the same is being disintegrated in a beater engine or the like in the wet state in such a manner that when dry, it will have the hereinbefore mentioned stiff and rigid characteristics.

A further object of my invention is to treat the pulp to render it waterproof for molding articles to be used for cooking or for food products, and to render these articles sufficiently fire-resisting to withstand relatively high temperature when the plates or utensils are used for cooking purposes.

The process of my invention may be carried out in several ways, for instance, the plates or utensils may be molded directly from the pulp in wire molds which allow for free passage of water under pressure, or the pulp may be beaten out in an ordinary beater engine and run over any standard paper making machine or wet machine, so called.

In carrying out my process, a beater engine may be loaded with pulp or paper making materials, such as ordinary ground wood-pulp, chemical pulps, asbestos, and various combinations of these. When the pulp is beaten out to the proper degree of fineness, it is then treated with a stiff-

ening agent. The stiffening agent found most suitable for this purpose is raw starch, such as potato or corn starch. However, other starchy materials may be used to advantage. It has been found desirable to mix the starch in cold water before adding it to the stock in the beater engine, as this produces a fine milky suspension which readily and uniformly mixes with the pulp. Cold water is used, because it is important not to cook this starch, since cooked starch does not give the stiffness desired, as will be hereinafter set forth. After the starch suspension is thoroughly mixed with the stock, the stock is then sized by any of the well known methods of sizing, such as rosin size, wax sizes, or the like. When the sizing is completed, the stock is then run into paper on any of the standard paper making machines and made into dry rolls or sheets of a desired caliper. This paper is now ready to be molded into the plates or other articles. Before molding the paper, it may be tempered, that is, slightly moistened, and then stamped in hot molds or dies designed for the purpose or those which are now commonly used for molding paper articles. It is necessary that the molds be quite hot, having a temperature of not less than 300° F., or thereabout. It is by means of the hot mold that the starch is modified; that is, the starch particles which are intimately mixed in the stock burst and swell, which, with the combination of heat and pressure in the molds, cause the finished articles to be rigid and stiff. The effect of the bursting and swelling of the raw starch particles completely fills the interstices and pores of the finished product. Various degrees of stiffness can be produced by different proportions of starch used in the prepared stock. It has been found in practice that very large proportions of starch can be added to the stock and retained in the finished article, thereby producing a correspondingly more rigid utensil. Products have been made containing as high as 40% starch; however, 10% to 20% of starch gives desirable results.

If it is found desirable to mold the paper cold, it can be tempered in a weak alkaline solution and then molded and pressed in cold dies; and when the pulp is dry, it will become rigid and stiff, as the alkaline acts as a medium of modifying the starch. However, this latter process is not desirable if the paper has been sized to waterproof, as the alkaline reaction affects the waterproofing size in the paper. This alternative is utilizable only when a stiff, rigid plate is desired with little or no waterproof properties.

The hereinbefore described method of treating

the stock with unmodified starch and modifying it under heat and mechanical pressure, or by means of an alkaline solution, also renders the finished article greaseproof, since a film of dry, modified starch permeates the sheet, and the modified or converted starch has greaseproofing qualities.

In carrying out my process by any of the well known methods of molding in wire constructed molds, the procedure is as follows:

The stock may be prepared in the beater in the usual manner, the starch and sizing being added as previously described, well beaten out to the desired degree of fineness. This pulp is then diluted with water to a consistency of about 1%, which is generally necessary in molding stock in wire constructed molds. This stock is then flowed into the molds and pressed or formed into the desired shapes, the molds being so constructed as to allow free passage of water and to give the desired shape to the article. When the molding process is completed, the article is still wet, containing practically 60% water. It may now be transferred into another mold of the same design and held in this shape under heat and pressure until dried. In order to properly convert the starch as above mentioned, it is necessary to have a heat of not less than 300°-400° F. or thereabouts. To allow quick evaporation of the water, it may be necessary to have these molds perforated or of reinforced wire construction. Pulp articles having a caliper of 30 points will dry in approximately 15 to 30 seconds; and they have the requisite heat-transfer properties.

If the articles are molded by the well known method of blowing pulp onto molds, or by means of sucking the wet pulp onto molds after forming, they may be placed in conveyors and dried at a longer period of time and at a lower temperature; in this case, it has been found that a temperature of about 200°-250° and about 30 minutes is sufficient to convert the starch and to dry the article.

These articles, thus made, are useful for many kinds of plates, dishes, and utensils of substantially all kinds.

When the utensils are to be used for baking or cooking, the stock may be compounded with various proportions of asbestos. For cooking pastry, it has been found that 20% to 25% asbestos or thereabouts is sufficient; for higher temperatures, 50% to 85% asbestos.

The plates and utensils, as described, may be coated with desired well known compounds in order to improve their appearance. These coating compounds are preferably of such character as not to affect food products in any way.

Examples of furnishes which have proved to be practical for cooking utensils are as follows:

	Pounds
1. Wood-pulp-----	60
Sulphite-----	15
Asbestos-----	30

To this may be added 10 to 20 pounds of corn starch mixed in sufficient water to allow a fine suspension. About five pounds of rosin size may then be added. After thoroughly mixing and beating the above material into the desired fineness, about five pounds of aluminum sulphate may be added to precipitate the rosin size. This furnish is suitable for running on a paper machine, either a Fourdrinier or a cylinder machine, the caliper of the finished stock being about from

10 to 30 points. The same may be tempered and molded under heat and pressure.

2. 400 lbs. of sulphite

600 lbs. of asbestos treated with from 10 to 20 pounds of starch and sized. The paper may be run to the desired caliper, and molded under heat and pressure. This furnish is suitable for cooking utensils where great heat is required, such as for roast meats, baking fish, or the like.

	Pounds
3. Wood-pulp-----	60
Fine sawdust about from 20 to 40 mesh----	15

To this may be added about 25 pounds of asbestos treated with from 10 to 20 pounds of starch sized with about 5 parts of rosin size and 5 parts of alum. This furnish may be used where the article is molded directly from the pulp in a liquid suspension. In molding pulp articles in this manner, it has been found necessary to have a rather free stock, that is, a stock from which the water is easily released.

In order to accomplish this, it has been found desirable to add the above proportion of sawdust, which gives the pulp the desired freeness. This furnish may be suitable for baking pies and pastry.

	Pounds
4. Asbestos-----	85
Sawdust-----	15
	Parts
Starch-----	10 to 20
Rosin size and alum-----	5

This furnish may be used in direct molding from pulp, the sawdust being added to free the stock for this purpose. This furnish may be suitable for cooking where high temperatures are necessary.

The above examples are merely given for the purpose of illustrating possible mixes which may be used and are not intended to be construed as a limitation of my invention.

In my process it will be noted that the starch is the medium for producing the stiffness and rigidity and also imparts the grease-resisting properties, and should not be confused with the methods of sizing paper with the well known method of cooking starch. The cooked starch size does not give the desired stiffness and rigidity, nor does it impart the slightest degree of grease-resisting properties; it is by incorporating the raw starch in the stock in the beater in the proportion mentioned that this rigidity and grease-proofness is obtained. Cooked starch sizes are unsatisfactory because they are modified before being added to the stock. It is the bursting or modifying of the raw starch particles that renders the finished product stiff and much stronger than is possible in the case of ordinary starch sizes. Furthermore, it is possible to introduce into the beater a much larger proportion of starch than could be used by the cooked starch size methods, thus obtaining various degrees of rigidity and strength. Whenever 15% or 20% is used, it is possible to produce a very high lustrous finish.

The term "starch" or "starchy materials" as used in the specification and claims is intended to include such materials as tapioca, sago and cereals such as flour, fine corn meal, or in general, any material which may produce the bursting action hereinbefore described. The term "points" is used herein as it is customarily used in the

paper-making industry to connote thickness in thousandths of an inch.

I claim as my invention:

1. A culinary utensil shaped and adapted to hold foodstuff during cooking and baking operations and of a relatively stiff and rigid molded structure comprising interfelted fibrous material of a thickness not exceeding about 0.030 inch, the pores of which contain swelled starch particles derived from raw starch modified to a swelled condition in situ in the pores, said starch being present in the amount of at least 10%, based on the dry weight of the fibrous material, and said amount of starch serving to stiffen said structure sufficiently to keep its molded shape when handled and to render said structure substantially greaseproof.

2. A culinary utensil shaped and adapted to hold foodstuff during cooking and baking operations and of heat-withstanding, comparatively thin, relatively stiff, molded, fibrous structure of a wall thickness not exceeding about 0.030 inch and comprising asbestos and alkali modified and swollen starch, said starch having been modified and swollen in situ in such structure and being present in the amount of at least about 10%, based on the dry weight of fibrous material, and said amount of starch serving to stiffen said structure sufficiently to keep its molded shape when handled and to render said structure substantially greaseproof.

3. A culinary utensil shaped and adapted to hold foodstuff during cooking and baking operations and of heat-withstanding, relatively stiff, molded fibrous plate structure of a thickness not exceeding about 0.030 inch and comprising asbestos and alkali modified and swollen starch, said starch having been modified and swollen in situ in such structure and being present in the amount of at least about 10%, based on the dry weight of fibrous material, and said amount of starch serving to stiffen said plate structure sufficiently to keep its molded shape when handled and to render said structure substantially greaseproof.

4. A method of making relatively stiff, molded, fibrous culinary utensils shaped and adapted to hold foodstuff during cooking and baking operations, which comprises mixing unmodified starch and a fibrous pulp in an aqueous vehicle to produce a mixture containing at least about 10% starch, based on the dry weight of the pulp, forming said mixture into such molded culinary utensil of a wall thickness not exceeding about 0.030 inch, and modifying the starch included in the structure by moist heat and pressure, thereby stiffening such structure sufficiently to keep its molded shape.

5. A method of making relatively stiff, molded, fibrous culinary utensils shaped and adapted to hold foodstuff during cooking and baking operations, which comprises mixing unmodified starch and a fibrous pulp in an aqueous vehicle to produce a mixture containing at least about 10% starch, based on the dry weight of the pulp, forming said mixture into such molded culinary utensil of a wall thickness not exceeding about 0.030 inch, and modifying the starch in said structure in the presence of alkali and moisture and drying such structure, thereby stiffening such structure sufficiently to keep its molded shape.

6. A method of making thin but stiff fibrous culinary utensils shaped and adapted to hold foodstuff during cooking and baking operations, which comprises mixing with fibrous pulp in an aqueous vehicle raw starch in the amount of at least about 10%, based on the dry weight of the pulp, forming the mixture into such molded culinary utensil of a wall thickness not exceeding about 0.030 inch, and while such structure contains water subjecting it to a sufficiently elevated temperature for a sufficient period of time to rupture and swell the starch granules and thereby to fill the pores of the molded structure and to stiffen it sufficiently to keep its molded shape when handled.

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