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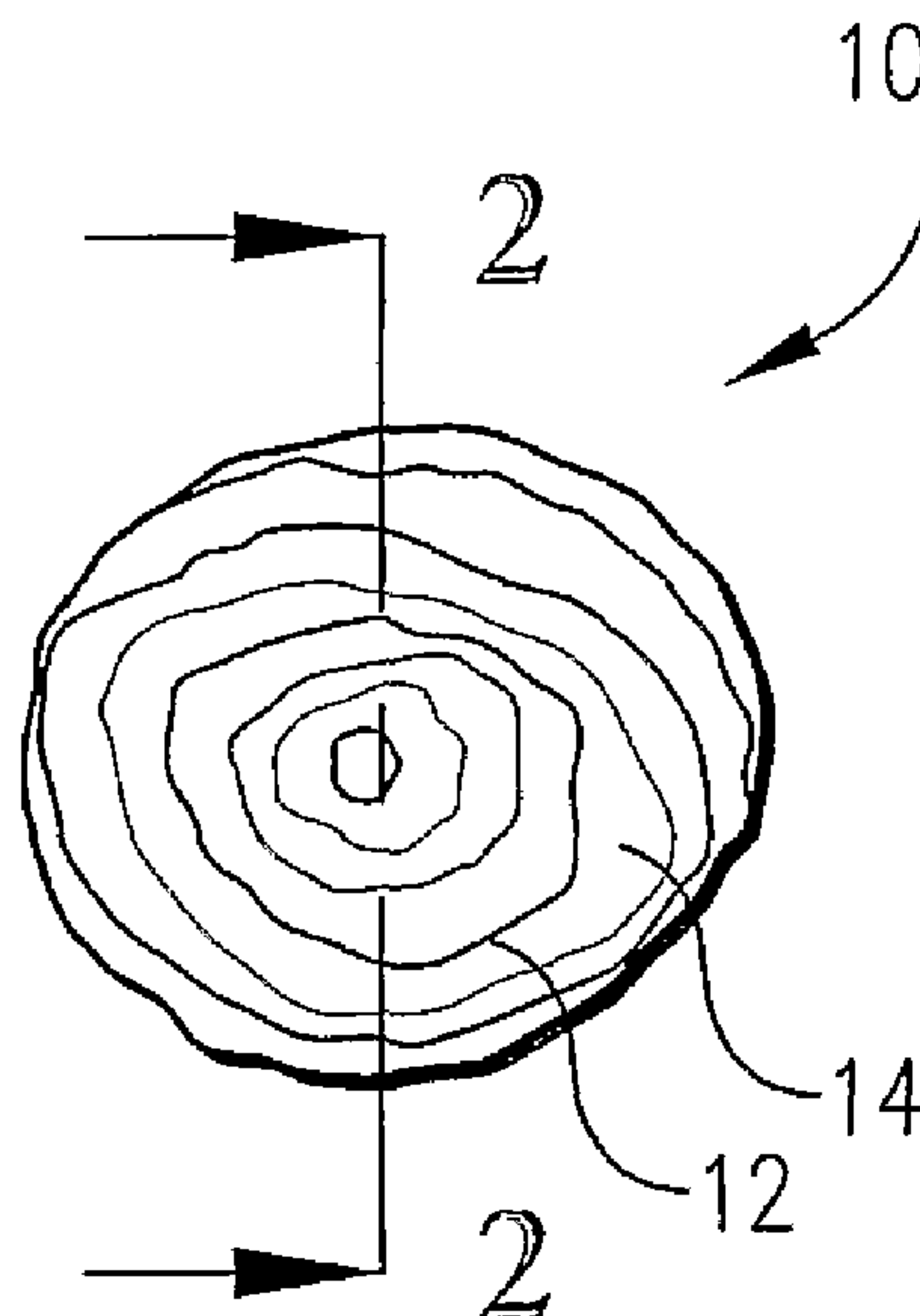
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(54) Title: WHEAT GLUTEN-BASED EMULSIFIED SAUSAGE PRODUCTS AND METHOD OF PRODUCTION THEREOF



(57) **Abrégé/Abstract:**

Improved low-meat or meatless food products such as wieners, sausages and batter-derived luncheon meat substitutes are provided which have taste and organoleptic properties similar to their traditional counterparts. These products, such as meatless wieners (10), include a plurality of discrete, spaced apart gluten-containing layers (12) separated by spaces (14). The products are prepared by first formulating an aqueous batter containing at least about 25 % by weight gluten, and normally quantities of fat and bulking agents such as carageenan and gum, and taste ingredients including salt and flavorings. The batter ingredients are mixed until the batter exhibits a characteristic film-forming property upon manual stretching, indicating that the gluten content of the batter is properly developed. The developed batter is then stuffed into casing using a casing horn or similar device, followed by cooking, cooling and casing removal to yield the final products.

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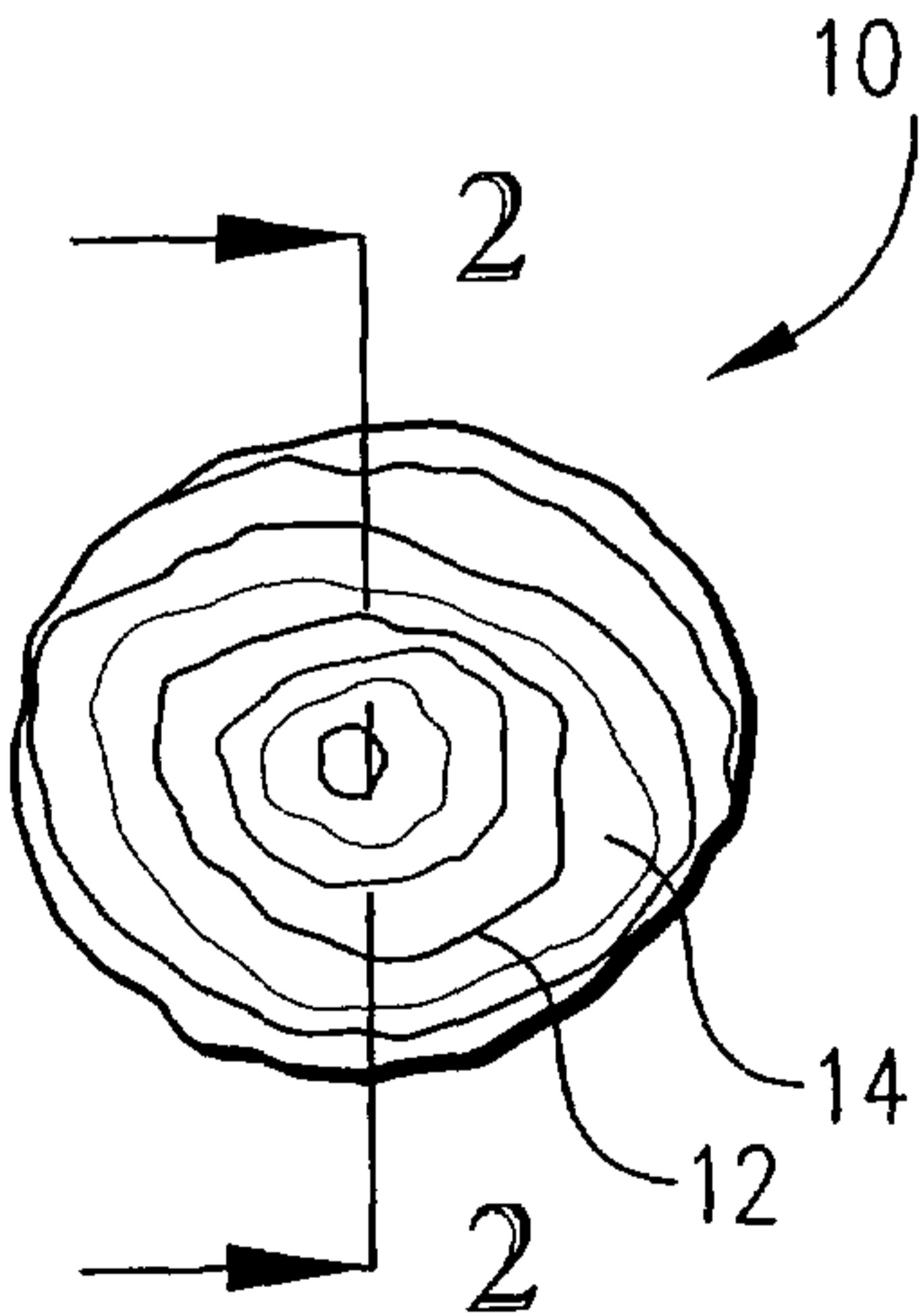
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(54) Title: WHEAT GLUTEN-BASED EMULSIFIED SAUSAGE PRODUCTS AND METHOD OF PRO DUTION THEREOF



(57) Abstract: Improved low-meat or meatless food products such as wieners, sausages and batter-derived luncheon meat substitutes are provided which have taste and organoleptic properties similar to their traditional counterparts. These products, such as meatless wieners (10), include a plurality of discrete, spaced apart gluten-containing layers (12) separated by spaces (14). The products are prepared by first formulating an aqueous batter containing at least about 25 % by weight gluten, and noramlly quantities of fat and bulking agents such as carageenan and gum, and taste ingredients including salt and flavorings. The batter ingredients are mixed until the batter exhibits a characteristic film-forming property upon manual stretching, indicating that the gluten content of the batter is properly developed. The developed batter is then stuffed into casing using a casing horn or similar device, followed by cooking, cooling and casing removal to yield the final products.

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WHEAT GLUTEN-BASED EMULSIFIED SAUSAGE PRODUCTS AND METHOD OF PRODUCTION THEREOF

5 BACKGROUND OF THE INVENTION

Field of the Invention

The present invention is broadly concerned with gluten-containing food products such as batter-based sausages (e.g., wieners) which include at least about 25% by weight gluten therein and have texture and taste qualities very similar to their
10 conventional high fat, meat-containing counterparts. More particularly, the invention is directed to such food products (which are preferably meatless), as well as methods for preparing the precursor batters and techniques for forming and cooking the batters; the resultant products are characterized by a plurality of discrete, spaced apart gluten-containing layers giving the products desirable texture and organoleptic properties.

15 Description of the Prior Art

Traditional wieners and other related emulsion or batter-derived products contain substantial quantities of meat and fat. Very commonly, wieners may have 25-35% fat, and a variety of meats such as beef, pork or poultry. Such products are
20 accordingly high in calories and not suited for dietary purposes. In addition, the meat content of many of these products makes them unusable in the diets of certain religions.

Attempts have been made in the past to produce low calorie substitute products which are either low in meat and fat content or are completely meat-free. Generally speaking, these substitute products have poor organoleptic properties, as compared with
25 their traditional counterparts. For example, meatless wieners have been prepared using soy protein isolate, but this creates a gel-like product which is not at all similar in appearance or taste to conventional wieners. Other wiener products have included gluten and albumin proteins, but again the results are not truly satisfactory.

There is accordingly a real and unsatisfied need in the art for improved
30 substitute batter-derived food products which are relatively low in calories and fat, but have high protein contents and the texture and organoleptics of counterpart meat products.

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SUMMARY OF THE INVENTION

The present invention overcomes the problems outlined above and provides food products which contain a substantial fraction of wheat gluten (at least about 25% by weight) and which when formed give improved texture and taste qualities. The formed food bodies of the invention, after cooking, present in cross-section a plurality of discrete, spaced apart, gluten-containing layers, with at least certain of these layers having a thickness of from about 0.005-0.020 inches and being spaced apart a distance of about 0.001-0.010 inches. This layering gives the products the texture and mouth feel of traditional meat products.

In preferred forms, the products of the invention include from about 25-65% by weight gluten therein and fat contents of up to about 10% by weight, more preferably up to about 3% by weight. Water contents range from about 30-65% by weight. The products are normally selected from the group consisting of elongated emulsion-type sausages and batter-derived luncheon meat substitutes (e.g., bolognas) with the presently preferred product being a gluten-based wiener.

In order to provide the best eating qualities, the products of the invention normally include respective quantities of starch, gum, and flavoring and coloring therein. Of course, the specific types and amounts of these optional ingredients depends upon the product in question.

In preparative procedures, a food batter is formulated which includes water, fat, and at least about 25% by weight gluten. This mixture is agitated for a sufficient period to cause the mixture to form a thin film upon manual stretching thereof. The presence of such a film indicates that the gluten content of the mixture is properly hydrated and developed. Although the ingredients may be simultaneously mixed together in a single batch, it has been found that better results are achieved if an initial slurry is made up containing water, coloring, oil and thickening ingredients such as carageenan and guar gum. Thereafter, a portion of this first slurry is mixed with wheat gluten (normally vital wheat gluten and/or wheat protein isolate), flavoring(s) and water, and this second mixture is agitated until filming occurs upon manual stretching of a sample of the mixture. This signals that the mixture is complete as a food batter. At this point, the pH of the batter should be from about 5.8-7.5, more preferably from about 6.3-6.8.

Once the batter is formed, it is stuffed into casings much in the manner of conventional wieners or the like. A conventional stuffing horn is normally used in this process, in order to create stuffed wieners or other products. After stuffing, the products may be cooked in a continuous oven or smokehouse until the internal temperature of

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the product is at least about 180°F, more preferably from about 190-210°F. The cooking protocol is similar to that used for conventional meat products, involving the period of dry cooking followed by steam cooking. After cooking, the casings are normally removed and the cooked product can be directly consumed or packaged.

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BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic representation of a cross-section of a wiener produced in accordance with the invention, with the section taken transverse to the longitudinal axis of the wiener; and

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Fig. 2 is a schematic representation of another cross-section of a wiener produced in accordance with the invention, with the section taken parallel to the longitudinal axis of the wiener.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

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An exemplary product in accordance with the invention is a meatless wiener 10, illustrated in cross-section in Figs. 1 and 2. The product 10 is characterized as a formed body presenting in cross-section a series of discrete, spaced apart gluten layers 12. These layers are relatively thin, having a thickness of from about 0.005-0.020 inches, more preferably from about 0.005-0.008 inches. The spacings 14 between the layers 12 include other ingredients of the wiener such as carageenan, gum, fat (oil) and corn syrup solids. It will be appreciated that the Figures are schematic in nature and not drawn to scale; rather, the layers 12 and spacings 14 have been shown larger for ease of understanding.

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The following examples set forth presently preferred ingredients and techniques for producing the products of the invention. It is to be understood, however, that these examples are provided by way of illustration and nothing therein should be taken as a limitation upon the overall scope of the invention.

Example 1

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In this example, meatless wieners were prepared using a wheat gluten-containing batter. In formulating the batter, the first step was preparation of a slurry having the following ingredients, with approximate levels of use:

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Table 1

Ingredient	% By Weight
Water	73.70
Corn Syrup	6.76
Canola Oil	3.68
Salt	5.53
Carageenan	3.56
Midsol 50 Wheat Starch	1.97
Nutricol ME 8721	2.55
Guar Gum	2.24
FD&C Red #3	0.01

The Nutricol ME 8721 product is a mixture of Konjac flour, carageenan and dextrose and is sold by the FMC BioPolymer of Philadelphia, PA. The carageenan product is sold by the Carageenan Company of Santa Ana, CA, and is a refined Kappa carageenan designed for use as a binder in food applications. The Midsol 50 Wheat Starch is sold by Midwest Grain Products, Inc. of Atchison, KS and is a highly refined wheat starch for general use in foods.

In preparative procedures, the water and food coloring are initially mixed together, in a high shear bowl chopper mixer. Next, the salt, carageenan, Midsol 50, Nutricol ME 8721 and guar gum are added to the aqueous mixture, and the bowl chopper is turned on at a speed of from 2,400-6,500 rpm. Mixing in this manner is continued for a period of about 2-3 minutes until the mixture is uniform and hydrated. The corn syrup and canola oil are then added with additional mixing in the bowl chopper for a period of from about 2-7 minutes. This first slurry is then placed in another vessel.

In the next step, the final batter is prepared. This batter had the following ingredients and approximate ingredient levels:

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Table 2

Ingredient	% By Weight
Slurry #1	19.11
Meat Flavoring	2.40
Wiener Flavoring	2.01
Vital Wheat Gluten	31.80
Wheat Protein Isolate	3.18
Ice	10.06
Water	31.44

The wheat protein isolate used was Midsol FP3000 sold by Midwest Grain Products, Inc. of Atchison, KS and contained a minimum of 90% by weight protein. The vital wheat gluten was also a Midwest Grain product and contained a minimum of 75% by weight protein.

The ingredients of Table 2 were placed in the bowl chopper and mixed at 2,400-6,500 rpm for a period of about 3-7 minutes. At the beginning of the mixing, the mixture had a stiff consistency similar to that of toothpaste. However, as mixing proceeded, the gluten started to develop. During the course of mixing, the mixture was sampled several times to determine the degree of development. When the mixture exhibited a film upon manual stretching, mixing was terminated, and the batter was complete. The batter has a pH of about 6.3. The ice was used in order to insure that the mixture was maintained at a temperature level of below about 65°F. If cold water were available, this could be used in lieu of ice.

The completed wiener batter was then stuffed into conventional cellulose wiener casings using a common horn-type stuffer. The stuffed wieners were then cooked by a first dry cook step for 10-15 minutes using 110°F dry bulb/0°F wet bulb drying air in a smokehouse. Cooking was completed using a full steam ΔT cooking schedule, where ΔT was 40-45°F, until the internal temperature of the wieners was 200°F. When this internal temperature was reached, cooking was continued at a constant temperature for 3-4 minutes. After cooking, the product was showered with cold water for 20-30 minutes (an option would be brine chilling).

After cooling, the casings were removed from the wieners, and the latter were ready for consumption or packaging.

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The resultant wieners exhibited a texture and flavor very similar to those of conventional high fat meat-containing wieners. A close examination of a cross-section of the wieners revealed a plurality of generally arcuate or circular, spaced apart ring-type layers. The layers were formed of cooked wheat gluten, whereas the space
5 between the layers was filled with other ingredients. The layers had a thickness ranging from about 0.005-0.020 inches and were spaced apart a distance of from about 0.001-0.010 inches. The wieners had a protein content of about 27.9% by weight, and a fat content of about 0.66% by weight, and a gluten content of about 35% by weight.

Example 2

In this example, a wiener batter was prepared using a different mixing technique, employing a conventional low-shear mixing device in lieu of the bowl chopper. In this test, the Table 1 ingredients were added to the low shear mixer in the same stepwise fashion of Example 1, and for similar mixing times. This produced a
15 first slurry which was set aside. Next, the ingredients of Table 2 were added to the mixer, with mixing for a period of about 5-8 minutes until the mixture began to firm up. Mixing was then stopped, and the mixture was allowed to set for a period of from about 5-10 minutes. During the set period, the mixture was repeatedly sampled and stretched until the characteristic film formed, indicating that the mixture was properly developed.

The completed batter was then stuffed, cooked and cooled as in Example 1, whereupon the casings were removed and the product was complete. This product was essentially identical in terms of texture and physical characteristics, as compared with the wieners of Example 1.

While the foregoing examples are specific to wiener production, it will be
25 appreciated that the invention is not so limited, either in terms of final products or ingredients. As indicated previously, the principles of the invention can be used in the preparation of many kinds of batter-derived products such as vienna sausages and bolognas. The following table sets forth approximate broad and preferred ranges for exemplary ingredients.

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Table 3

Ingredient	Broad Range (% by wt.)	Preferred Range (% by wt.)
Water	30-65	35-50
Gluten	25-65	30-50
Salt	0.5-10	3-7
Fat (Oil)	1-10	up to 3
Corn Syrup	2-10	3-8
Carageenan	0.5-7	2-5
Guar Gum	0.5-5	1-4
Flavorings	0.25-10	1-6

The products of the invention would typically have protein contents of from about 10-50%, more preferably from about 20-35% by weight.

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I claim:

1. A food product comprising a formed food body including therein at least about 25% by weight wheat gluten and presenting in cross-section a plurality of discrete, spaced apart, gluten-containing layers, at least certain of said layers having a thickness of from about 0.005-0.020 inches and being spaced apart a distance of from about 0.001-0.010 inches.

2. The product of claim 1, said body having up to about 10% by weight fat therein.

3. The product of claim 1, said body having from about 25-65% by weight wheat gluten therein.

4. The product of claim 1, said body having up to about 3% by weight fat therein.

5. The product of claim 1, said product selected from the group consisting of elongated emulsion-type sausages.

6. The product of claim 5, said product being a wiener.

7. The product of claim 1, said body including respective quantities of starch and gum therein.

8. The product of claim 1, said body including flavoring and coloring therein.

9. The product of claim 1, said body having from about 30-65% by weight water therein.

10. A method of preparing a food batter comprising the steps of:
forming a mixture including water, fat and at least about 25% by weight wheat gluten; and
agitating said mixture and causing the mixture to form a thin film upon manual stretching thereof.

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11. The method of claim 10, including the step of agitating said mixture in a high-shear mixer until the mixture forms said thin film.

12. The method of claim 11, said agitation step being carried out from a period of from about 3-7 minutes.

13. The method of claim 10, including the step of agitating the mixture in a low-shear mixer, and then allowing the mixture to set until the mixture forms said thin film.

14. The method of claim 13, said agitating step being carried out from a period of from about 5-8 minutes, and then allowing the mixture to set for a period of from about 5-10 minutes.

15. The method of claim 10, including the steps of:
first forming an emulsion including therein respective quantities of fat and water; and
thereafter forming said mixture comprising said emulsion and wheat gluten.

16. The method of claim 15, said emulsion including oil as said fat.

17. The method of claim 15, said emulsion including respective quantities of corn syrup, starch and gum.

18. The method of claim 15, said mixture including flavoring and additional water.

19. The method of claim 10, said agitating step being carried out so as to prevent the temperature of the mixture from exceeding about 65°F.

20. A food batter produced in accordance with the method of claim 10.

21. A food product produced using the food batter of claim 10.

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22. A method of preparing a food product comprising the steps of:
providing a quantity of the food batter comprising a mixture including water,
fat and at least about 25% by weight wheat gluten, said mixture having
been agitated and caused to form a thin film upon manual stretching
thereof;
stuffing said batter into a food casing; and
cooking said batter within the casing to yield said food product.

23. The method of claim 22, including the step of removing said
casing from said cooked food product.

24. The method of claim 22, said cooking step being carried out until
the internal temperature of said batter reaches a level of at least about 180°F.

25. The method of claim 22, including the step of cooling said
cooked food product.

26. A food product produced in accordance with the method of claim
22.

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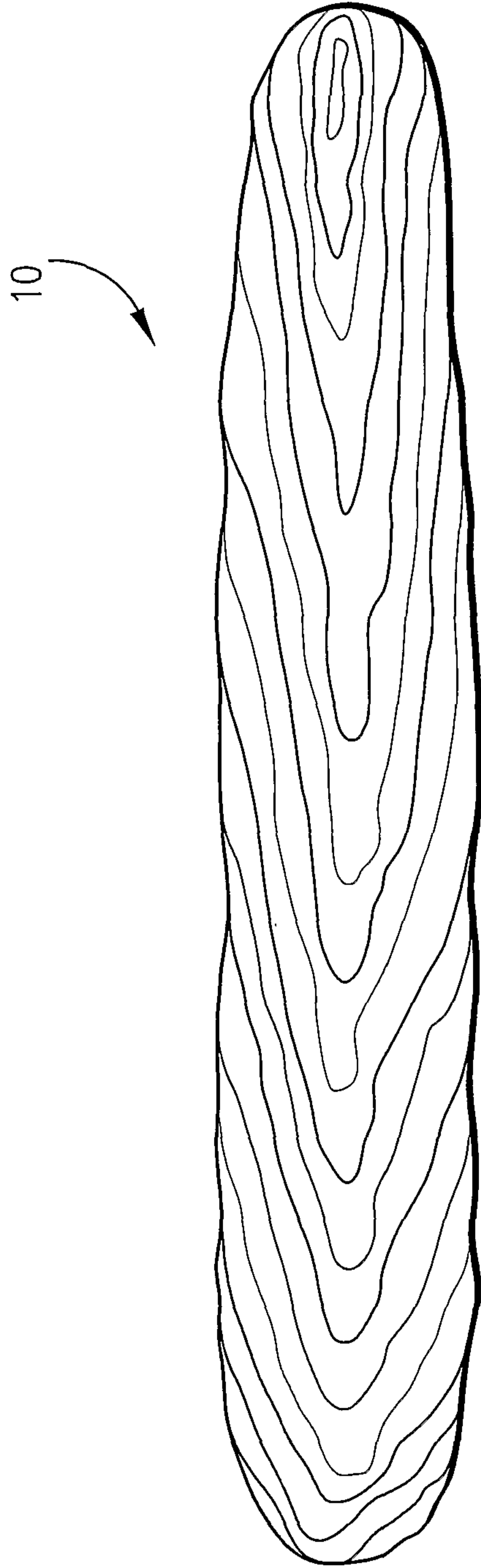


FIG. 1

FIG. 2

