

PATENT SPECIFICATION

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(54) PREPARATION OF AN EDIBLE PROTEIN PRODUCT

(71) We, SOCIÉTÉ DES PRODUITS NESTLÉ S.A., a Swiss body corporate of Vevey, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a process for the production of an edible product based on vegetable proteins, especially soya.

In the search for edible products based on vegetable proteins which may be eaten in the guise of meat, efforts have been concentrated on the composition, appearance, taste and texture of the product. It is above all the last of these various aspects which has been responsible for the development of the main techniques used at present, namely cooking-extrusion and spinning. However, in view of the relative imperfection of the results obtained by the first technique and the extreme complication of the second, other avenues have been explored more or less successfully. One recent known process for example comprises rolling an aqueous protein paste and crimping the sheet obtained in such a way that it has a quantity of small tight parallel folds, which, in the mouth give the impression that a fibrous product is being chewed. Agglomerates are formed from these sheets, which are extremely rich in proteins but which hardly contain more than 1% of fats, either by folding them or by stacking them and then bonding them together by means of an edible binding mixture rich in fats. The number of operations involved is considerable. Some of the operations involved, especially crimping, are fairly difficult. In other known processes, the product is given a laminar structure. In one such process, a layer of protein pregel is alternated with a layer of dough, the sandwich is rolled out, folded around a layer of binder, rolled out again and so on. This elaborate technique is reminiscent of the

technique used for producing millefeuille in confectionery. In another traditional process for producing an oriental product known as yuba, soya milk is heated in a shallow container, the skin formed on the surface of the milk is periodically removed, hung up to dry in air, the dried sheets are soaked in a stock, stacked in a pile, the pile thus formed is made into a roll, the roll is secured and then steam-cooked. This skilled process calls for considerable care and effort and cannot readily be carried out on a commercial scale.

Still on the subject of laminar products, reference may also be made here to the technique which comprises preparing flakes of vegetable protein by drying a vegetable milk on cylinders and grinding the sheet obtained in a mill. These flakes may then be mixed with an aqueous emulsion of fats. They are rehydrated during mixing and give the impression of small pieces of meat in the imitation meat pate thus obtained.

The present invention provides the possibility of producing by means of a very simple apparatus, from starting materials that are easily prepared and with a minimum of operations a completely new product based on vegetable proteins which is distinguished from all known products by the quality of its texture and its appearance and its taste.

According to the invention a layer of an aqueous colloidal suspension of vegetable proteins and fats is formed on a heated surface, the layer of suspension on this surface is dried to form a coherent film, the film thus formed is removed from the heated surface and moistened, layers of the moistened film are stacked one on top of another, the layers thus stacked one on top of another are compressed and the compressed pile thus formed is cooked.

The process according to the invention is flexible, by comparison with the crimping process for example, insofar as the composition of the colloidal suspension may be varied within wide limits. In particular, it

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may have a high fat content. In this way, it is possible directly to obtain a complete product without any need for fats to be subsequently incorporated either by way of a fatty binder or during an additional treatment, such as frying for example. The process according to the invention is advantageous and reliable by comparison with the process for producing yuba for example because it may readily be carried out on a commercial scale and comprises only a minimum of operations. Finally, if the gustative qualities which the above-mentioned paste based on flakes of vegetable proteins dipped in fat for example is required to show are considered by way of comparison, the process according to the invention gives surprising results. The product which it enables to be obtained shows remarkable qualities of texture, appearance and taste and equally remarkable eating qualities. It has been found that, during cooking of the pile, the films may become locally welded to one another. They can form in one plane zones of homogeneous, firm flesh which alternate with free zones and in space a network of links of meat containing small flattened air bubbles. The expression "flaky texture" is used hereinafter to describe this type of texture which is not unlike that of a good, firm crumb of fresh bread for example. This network of flattened links of meat may be more or less dense or more or less branched depending upon the quantity of water which is incorporated in the pile as a result of moistening and upon the degree of compression of the pile. The impression which a slice or piece cut from this fine meat may create when eaten may range from a crumb of bread to the meat preparations known as Italian cheese via roast veal in the direction of increasing moisture content.

To carry out the process according to the invention, the colloidal aqueous suspension may be prepared from whole vegetable seeds or from a standard commercial grade vegetable flour, such as defatted soya flour for example. In the second case, the fat is added to the suspension. An animal fat, a vegetable oil or a hydrogenated vegetable fat may be used for this purpose. The colloidal suspension prepared preferably has a dry matter content of from 10 to 30% by weight and, in % by weight of dry matter, contains from 3 to 65% of fats and from 35 to 90% of proteins.

In cases where the colloidal aqueous suspension is prepared from whole grains, they may optionally be hulled, crushed and ground in the presence of water in a colloidal mill. The suspension obtained may even be refined in a hammer mill for example before removing a solid residue by

centrifuging. Thereafter the antitryptic factor may be destroyed by brief heating at a very high temperature, for example by injecting steam. The suspension may be homogenised after concentration or after purification by isoelectric precipitation for example which enables the flatulent sugar content to be reduced. It is also possible to keep the solid residue left after grinding in the presence of water rather than removing it by centrifuging, which enables most of the constituents of the grain to be utilised whilst at the same time maintaining the possibility of reducing the flatulent sugar content. Homogenisation of the suspension is highly recommended because it facilitates formation of the coherent film during drying.

In cases where the colloidal aqueous suspension is prepared from a vegetable flour rich in proteins, such as a defatted soya flour for example, the flour may be suspended in water by means of a mixer, the antitryptic factor may be eliminated by briefly heating the suspension to elevated temperature and, optionally after purification by isoelectric precipitation, the intended fats may be added to the protein suspension, followed by homogenisation of the lipido-protein suspension thus obtained.

It is also possible to add to the lipido-protein suspension colorants, aromas, aroma precursors, aroma strengtheners and other standard edible additives for providing the product with particular nutritive, gustative or keeping properties.

A heated surface which has proved to be particularly practical for carrying out the process according to the invention is that of a drying cylinder. The number of cylinders, their dimensions, the width of the gap between two adjacent cylinders, the speed of rotation of the cylinders and the temperature of their surfaces may all be varied within wide limits. For example, it is possible to use a dryer comprising two cylinders of which the directions of rotation converge downwards at the nip separating them. In cases where a dryer of this type is used, the cylinders may be heated to a temperature of from about 120 to 160°C, the depth of the pool of liquid and the width of the gap between the cylinders may be fixed within the usual limits for this type of apparatus and the cylinders may be rotated at such a speed that the drying time is between about 2 seconds and 12 seconds.

The coherent film formed by the colloidal suspension dried on the heated surface may be detached by means of a doctor which is particularly well adapted to the surface in question. The film may be detached from a drying cylinder for example by applying a straight-edge doctor at a certain angle against its surface parallel to its axis. In

cases where a two-cylinder dryer of the kind described above is used for example, one doctor may be applied against each of the two cylinders on the side opposite the gap separating them. The detached film may have a residual moisture content of the order of 2 to 15% by weight.

The detached film may be moistened by spraying water onto it or by passing it through a stream of steam for example. The film may be moistened in such a way that it has a moisture content of from 10 to 90% by weight. The film may also be drawn in order to thin it out or to perfect its structure. It is possible either to stack separate sheets of the film or to wind onto a support several layers of a continuous ribbon of the film for example. In cases where a cylinder dryer is used, the detached film may be collected and wound onto a rotary cylinder arranged parallel to the drying cylinder. In this case, the film may be moistened during its travel between the drying cylinder and the winding cylinder or during its winding. In cases where it is desired to spray water onto the film being wound, it is of advantage to use for this purpose at least one flat-jet nozzle so that the film is moistened homogeneously over its entire width. Water with a temperature of from 5 to 90°C is preferably used for moistening. Colorants, aromas, aroma precursors, aroma strengtheners and other standard edible additives may be added to the water for providing the product with particular nutritive, gustative or keeping properties.

The superposed layers of film may be compressed by applying a pressure to the pile or, in the case of winding, by causing the winding cylinder to rotate at a higher peripheral speed than the drying cylinder. In the latter case, the film may simultaneously be drawn by applying sufficient traction to it. Stacking or winding is preferably continued in such a way that a total thickness of the superposed, compressed layers of from about 0.5 to 10 cm is obtained. In the case of winding, the mass obtained may be separated by cutting it along a generatrix of the cylinder and then spread flat.

The compressed pile of moist flaky mass may be cooked in different ways including, for example, cooking with steam in a chamber at atmospheric pressure, cooking in a water bath at temperatures of from 65 to 100°C, cooking in an autoclave at temperatures of from 100 to 140°C, or cooking in a microwave oven. Cooking times of less than 1 hour and cooking temperatures above 60°C are preferred. For cooking methods such as the first three mentioned above for example, it is advisable to cook the mass in a protective wrapping or container, an optionally sealed poly-

ethylene or polycarbonate bag for example, which throughout cooking conserves or maintains the moisture content of the product at a level similar to that which prevailed before cooking. It is also possible to combine moistening and cooking, for example in cases where moistening is carried out with steam and in particular when a continuous film is moistened with steam before being wound onto a cylinder.

Accordingly, it is possible by the process according to the invention to obtain a product which, after the cooking stage, is in the form of a wet mass with a flaky, cellular structure. In cases where a soya-based material is used as the starting material, it is possible to obtain a product which has a fine natural clear colour, reminiscent of that of a crumb of brown bread, coupled with a neutral and appetising taste and odour completely free of any trace of the bitter bean taste which often indelibly marks soya-based products.

The product obtained by the process according to the invention may be consumed in many different ways either fresh or after preserving treatments, such as dehydration, deep-freezing or sterilisation in cans with or without sauces or vegetables for example with which it combines excellently. In cases where the product obtained by the process according to the invention is to be eaten fresh, it is possible for example to cut 0.5 to 1 cm thick slices with the grain of the mass and to saute them in a frying pan. Beforehand the slices may if desired be salted, soaked in salt water or coated with egg or breadcrumb crumbs for example. The slices thus prepared can easily be cut with a table knife into juicy, succulent pieces reminiscent of omelette, Italian cheese or roast veal for example, depending upon the moisture content of the mass and the method of preparation used for the slices.

The invention is illustrated by the following Examples, in which the percentages quoted are percent by weight.

EXAMPLE 1.

20 kg of hulled, rough-ground soya beans with a dry matter (d.m.) content of 92% are ground for 20 minutes in the presence of 140 kg of water in a Polytron ("Polytron" is a registered Trade Mark) colloidal mill turning at 2000 revolutions per minute. The suspension obtained is refined by two successive treatments in a Fitzmill hammer mill which rotates at 6000 rpm and which is provided with a 0.6 mm wire for the first treatment and with a 0.3 mm wire for the second treatment. After the operation, the suspension has a pH-value of 6.5.

A solid residue of the suspension (cellulosic fibres, polysaccharides and

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substantially insoluble proteins) is separated by centrifuging in a WESTFALIA sludge remover. 30 kg of wet residue are thus obtained and discarded. The soya milk is then heated at 140°C for 60 seconds by the injection of steam, followed by cooling to ambient temperature. 134.4 kg of milk with a dry matter content of 7.2% are obtained in this way.

The milk is acidified to pH 4.6 by the addition of 10% hydrochloric acid. The precipitate obtained is separated by centrifuging in an ALFA LAVAL ("Alfa Laval" is a registered Trade Mark) plate centrifuge. The serum, which primarily contains the soluble carbohydrates (sucrose, stachyose and raffinose), is discarded. The pH of the precipitate (38.5 kg) is adjusted to pH 6.6 by the addition of 10% sodium hydroxide. The suspension is homogenised by being passed twice, first at 250 and then at 50 kg/cm², through a MANTON GAULIN homogeniser. On completion of the operation 40 kg of suspension are obtained with a d.m. of 20.5% of which, expressed in percent by weight of dry material, 55% are proteins and 30% are fats.

This suspension is dried on an ESCHER WYSS dryer with two cylinders 60 cm long and 35 cm in diameter. The speed of rotation of the cylinders is adjusted to 11 rpm, the steam pressure inside the cylinders to 2.4 atms gauge and the gap between the cylinders to 0.75 mm. The depth of the pool of suspension is kept at 20 cm. A dry film substantially 60 cm wide is obtained.

The dry film is wound successively around a cylinder 1 cm long and 20 cm in diameter driven by a variable speed motor. The speed of rotation of the cylinder is adjusted in such a way that the film is constantly under tension, hence compressing the layers of the film. This is achieved by causing the winding cylinder to

rotate at a higher peripheral speed than the drying cylinder.

Water is sprayed onto the film as it is being wound onto the cylinder by means of two flat jet nozzles of the spraying system type fed under a pressure of 1.5 atms gauge. The process is continued until the total thickness of the superposed layers on the cylinder reaches 3 cm. The mass obtained has a moisture content of 61%. The mass is separated from the cylinder by cutting it along a generatrix of the cylinder. The wet flaky mass is then in the form of a slab measuring approximately 60 x 60 x 3 cm. It is placed in a bag of sealed plastics material. The whole is cooked in steam in a chamber at atmospheric pressure. The temperature at the centre of the slab reaches 98°C after about 20 minutes. The slab is withdrawn from the chamber after about 30 minutes. The cooked mass has a flaky, aerated texture with a neutral flavour.

EXAMPLES 2 to 11.

A colloidal suspension is prepared in the same way as described in Example 1. The colloidal suspension thus prepared has a d.m. of 20.5% of which, in percent by weight of dry matter, 55% are proteins and 30% are fats. This suspension is dried on a two-cylinder dryer in the same way as described in Example 1. 10 different cooked slabs measuring approximately 60 x 60 x 3 cm are then prepared in the same way as described in Example 1 except for one or two differences which concern the moistening process or the cooking process. With one exception, all the products obtained have a fine clear flesh and a neutral flavour although they do differ from one another according to the circumstances, above all in their more or less dense texture. The moistening and cooking conditions and the characteristics of the texture of the masses obtained are shown in the following Table:

atmospheric pressure in a chamber. A cooked mass with a fine clear colour and a neutral flavour is obtained with a relatively dense flaky texture. This mass proves to be slightly fibrous and gritty when chewed.

EXAMPLE 13.

20 kg of rough-ground soya beans are treated in the same way as described in Example 1. After the suspension has been heat-treated, it is not subjected to isoelectric precipitation, but instead is directly concentrated *in vacuo* by means of a heat exchanger with a scraped surface until it has a dry matter content of 20%. The suspension is homogenised, dried and the film obtained is wound onto a cylinder in the same way as described in Example 1. The film is moistened and the slab obtained is cooked in the same way as described in Example 12. A clear mass with a neutral flavour is obtained with a relatively dense, flaky texture.

EXAMPLE 14.

20 kg of defatted soya flour with a d.m. of 88% (Soyafluff W 200, a product of CENTRAL SOYA) are suspended in 152 kg of water using a blade mixer. The suspension is heated at 140°C for 50 seconds, by the injection of steam and then cooled to ambient temperature. It is then acidified to pH 4.6 by the addition of 2.4 litres of 10% hydrochloric acid. The precipitate obtained is separated by centrifuging in a WESTFALIA sludge remover. The serum is clarified by centrifuging in an ALFA LAVAL plate centrifuge. The two precipitates thus obtained are combined and neutralised to pH 6.6 by the addition of 1.8 litres of 10% sodium hydroxide. On completion of the operation, 65.7 kg of precipitate with a d.m. of 14.2% are obtained.

32.8 kg of the neutralised precipitate are mixed with 2.2 kg of soya oil and homogenised in a MANTON-GAULIN homogeniser. 35 kg of a lipido-protein emulsion with a d.m. of 19.5% are thus obtained, the lipids representing 31.4% of the total dry matter.

The suspension is dried and the film obtained is wound in the same way as described in Example 1. The film is moistened and the slab obtained cooked in the same way as described in Example 12. A clear mass with a neutral flavour is obtained with a relatively dense, flaky texture. This mass proves to be slightly fibrous and gritty when chewed. By slightly increasing the proportion of fats in the suspension, a mass of smoother appearance and texture is obtained.

EXAMPLE 15.

The procedure is as described in Example 14, except that 2.2 kg of hydrogenated

peanut fat are used instead of the 2.2 kg of soya oil. The product obtained has the same properties and characteristics as the product obtained in Example 14.

EXAMPLE 16.

The procedure is as described in Example 14, except that 2.2 kg of lard are used instead of the 2.2 kg of soya oil. The product obtained has the same properties and characteristics as the product described in Example 14.

EXAMPLE 17.

20 kg of horse beans (*vicia faba*) with a d.m. of 88%, of which 1.5% are fats, are rough ground and then fine ground in the presence of water in the same way as described in Example 1. Before homogenisation, 1 kg of soya oil is added and 17.2 kg of an emulsion with a d.m. of 19.7% are obtained. The suspension is dried and the film obtained is wound onto a cylinder in the same way as described in Example 1. The film is moistened and the slab obtained is cooked in the manner described in Example 12. A greyish brown mass with a soft, fruity flavour and a flaky, aerated texture is obtained.

WHAT WE CLAIM IS:—

1. A process for the production of an edible product based on vegetable proteins which comprises the steps of:

(i) forming a layer of an aqueous colloidal suspension of vegetable proteins and fats on a heated surface;

(ii) drying said layer of suspension on said surface in such a way that it forms a coherent film;

(iii) detaching said film from said heated surface and moistening said film;

(iv) stacking layers of said moistened film one on top of another to form a pile;

(v) compressing said stacked layers; and

(vi) cooking said compressed pile.

2. A process according to Claim 1, in which said film is drawn.

3. A process according to Claim 1, in which said film is moistened to such an extent that it has a moisture content of from 10% to 90% by weight.

4. A process according to Claim 1, in which said colloidal suspension has a dry matter content of from 10% to 30% by weight.

5. A process according to Claim 1, in which said colloidal suspension contains in percent by weight of dry matter from 3 to 65% of fats and from 35 to 90% of proteins.

6. A process according to Claim 1, in which said colloidal suspension is dried on a cylinder dryer, said film is detached from a cylinder by means of a doctor applied to said cylinder and said detached film is

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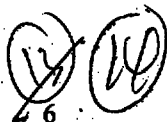
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atmospheric pressure in a chamber. A cooked mass with a fine clear colour and a neutral flavour is obtained with a relatively dense flaky texture. This mass proves to be slightly fibrous and gritty when chewed.

EXAMPLE 13.

20 kg of rough-ground soya beans are treated in the same way as described in Example 1. After the suspension has been heat-treated, it is not subjected to isoelectric precipitation, but instead is directly concentrated *in vacuo* by means of a heat exchanger with a scraped surface until it has a dry matter content of 20%. The suspension is homogenised, dried and the film obtained is wound onto a cylinder in the same way as described in Example 1. The film is moistened and the slab obtained is cooked in the same way as described in Example 12. A clear mass with a neutral flavour is obtained with a relatively dense, flaky texture.

EXAMPLE 14.

20 kg of defatted soya flour with a d.m. of 88% (Soyafluff W 200, a product of CENTRAL SOYA) are suspended in 152 kg of water using a blade mixer. The suspension is heated at 140°C for 50 seconds, by the injection of steam and then cooled to ambient temperature. It is then acidified to pH 4.6 by the addition of 2.4 litres of 10% hydrochloric acid. The precipitate obtained is separated by centrifuging in a WESTFALIA sludge remover. The serum is clarified by centrifuging in an ALFA LAVAL plate centrifuge. The two precipitates thus obtained are combined and neutralised to pH 6.6 by the addition of 1.8 litres of 10% sodium hydroxide. On completion of the operation, 65.7 kg of precipitate with a d.m. of 14.2% are obtained.

32.8 kg of the neutralised precipitate are mixed with 2.2 kg of soya oil and homogenised in a MANTON-GAULIN homogeniser. 35 kg of a lipido-protein emulsion with a d.m. of 19.5% are thus obtained, the lipids representing 31.4% of the total dry matter.

The suspension is dried and the film obtained is wound in the same way as described in Example 1. The film is moistened and the slab obtained cooked in the same way as described in Example 12. A clear mass with a neutral flavour is obtained with a relatively dense, flaky texture. This mass proves to be slightly fibrous and gritty when chewed. By slightly increasing the proportion of fats in the suspension, a mass of smoother appearance and texture is obtained.

EXAMPLE 15.

The procedure is as described in Example 14, except that 2.2 kg of hydrogenated

peanut fat are used instead of the 2.2 kg of soya oil. The product obtained has the same properties, and characteristics as the product obtained in Example 14.

EXAMPLE 16.

The procedure is as described in Example 14, except that 2.2 kg of lard are used instead of the 2.2 kg of soya oil. The product obtained has the same properties and characteristics as the product described in Example 14.

EXAMPLE 17.

20 kg of horse beans (*vicia faba*) with a d.m. of 88%, of which 1.5% are fats, are rough ground and then fine ground in the presence of water in the same way as described in Example 1. Before homogenisation, 1 kg of soya oil is added and 17.2 kg of an emulsion with a d.m. of 19.7% are obtained. The suspension is dried and the film obtained is wound onto a cylinder in the same way as described in Example 1. The film is moistened and the slab obtained is cooked in the manner described in Example 12. A greyish brown mass with a soft, fruity flavour and a flaky, aerated texture is obtained.

WHAT WE CLAIM IS:—

1. A process for the production of an edible product based on vegetable proteins which comprises the steps of:

- (i) forming a layer of an aqueous colloidal suspension of vegetable proteins and fats on a heated surface;
- (ii) drying said layer of suspension on said surface in such a way that it forms a coherent film;
- (iii) detaching said film from said heated surface and moistening said film;
- (iv) stacking layers of said moistened film one on top of another to form a pile;
- (v) compressing said stacked layers; and
- (vi) cooking said compressed pile.

2. A process according to Claim 1, in which said film is drawn.

3. A process according to Claim 1, in which said film is moistened to such an extent that it has a moisture content of from 10% to 90% by weight.

4. A process according to Claim 1, in which said colloidal suspension has a dry matter content of from 10% to 30% by weight.

5. A process according to Claim 1, in which said colloidal suspension contains in percent by weight of dry matter from 3 to 65% of fats and from 35 to 90% of proteins.

6. A process according to Claim 1, in which said colloidal suspension is dried on a cylinder dryer, said film is detached from a cylinder by means of a doctor applied to said cylinder and said detached film is



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Ex. No.	Moistening		Cooking			Texture
	medium	moisture %	medium	temp °C	time mins	
2	water	20	chamber	100	30	flaky and aerated
3	water	40	chamber	100	30	↓ dense, compact slightly aerated
1	water	60	chamber	100	30	
4	water	80	chamber	100	30	
5	water	60	autoclave	140	15	dense, compact hard dark brown colour
6	water	60	water-bath	65	30	flaky, relatively dense
7	water	60	water-bath	95	30	
8	water	60	microwave oven		5	
9	steam	20	chamber	100	30	flaky and aerated
10	steam	60			30	flaky, relatively dense
11	water	60	chamber	100	30	flaky dense

This Table prompts the following comments, reminders or additional information:

- 5 — in the column headed "moistening medium", the term "water" implies the spraying of water through two flat jet nozzles onto the film in the process of being wound, whereas the term "steam" implies that the film passes over a stream of saturated steam at atmospheric pressure during its travel between the drying cylinder and the winding cylinder.
- 10 — in the column headed "moisture", the figure quoted represents the total moisture content of the slab before it is cooked.
- 15 — in the column headed "cooking medium", the term "chamber" means that cooking takes place in the steam in a chamber, whilst the term "microwave oven" means that cooking takes place in a microwave oven with an output of 4 KW.
- 20 — in the column headed "texture" the arrow implies that the texture of the product changes progressively from a flaky aerated texture to a dense, compact and slightly aerated texture in the course of an increase in the moisture content from 20% to 80% in stages of 20%.
- 25 — In Example 10, the treatment with steam is such that the temperature of the
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mass reaches 80°C on the winding cylinder. Examination of its texture proves that it has undergone the transformation due to cooking. Accordingly, the cooking stage is completed on the cylinder itself.

— In Example 11, the mass is cooked in a metal mould, whereas in Examples 1 to 9 the mass is cooked in a sealed bag of plastics material.

EXAMPLE 12.

20 kg of rough-ground soya beans are treated in the same way as described in Example 1, except that the solid residue is not separated from the suspension after grinding in the presence of water. 83 kg of suspension with a d.m. of 17.5% are obtained. The suspension is dried and the film is wound in the same way as described in Example 1. The film is moistened during its winding by spraying water through two flat jet nozzles in such a way that the mass of wound film has a total moisture content of 60%. The mass is separated from the winding cylinder by cutting it along a generatrix of the cylinder. A mass in the form of a slab measuring approximately 60 x 60 x 3 cm is obtained and is placed in a bag of plastics material. The slab is cooked in its bag for 30 minutes with steam at

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- 7 wound onto a rotary winding cylinder parallel to said drying cylinder.
- 5 7. A process according to Claim 6, in which traction is applied to said film detached from said drying cylinder as it is being wound onto said winding cylinder.
- 10 8. A process according to Claim 6, in which said detached film is moistened by spraying it with water before or during its winding.
- 15 9. A process according to Claim 6, in which said detached film is moistened by directing a jet of steam onto it before or during its winding.
10. A process according to Claim 1, in which said compressed pile is cooked by

being heated to a temperature above 60°C over a period of less than 1 hour.

11. A process for the production of an edible product based on vegetable proteins substantially as described with particular reference to any of the Examples. 20

12. An edible product based on vegetable proteins whenever produced by a process as claimed in any one of Claims 1 to 11. 25

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