

Manufacture of noodles

The subject of the present invention is a process for the manufacture of noodles in which a mixture of flour or cereal and water is prepared having
5 a water content of 25-40%, the mixture is converted to a band of pasta, the band is laminated and it is cut into noodles, as well as an apparatus for carrying out this process.

10 US 5,211,965 (KK TAKASHIN) describes an apparatus for the manufacture of a base for noodles comprising a cylindrical device with a screw conveyor having, at one end, an inlet for supplying the raw materials of the noodle base and, at another end, an
15 extrusion die having a rectangular outlet orifice whose width is adjustable, so as to be able to adjust the pressure to which the mixture of raw materials pushed through the orifice by the screw conveyor is subjected, and thereby to be able to adjust the throughput and/or
20 the firmness of the base for noodles thus extruded in the form of a thick band.

Moreover, traditional lines marketed by companies such as Ohtake, Fuji or Tokyo Menki for the industrial manufacture of oriental noodles may comprise
25 successive devices for mixing the components, converting the mixture into a band of pasta, laminating the band, cutting, treating with steam, forming into a coil, drying, cooling and packaging, the mixing device itself generally comprising two horizontal or vertical
30 paddle mixers mounted in parallel, the components being mixed in loads alternately in one or other mixer.

The aim of the present invention is to propose a process for the manufacture of noodles and an apparatus for its implementation which are simple and
35 which subject the said mixture of cereal semolina or flour and water to only low shearing.

To this end, the process for the manufacture of noodles according to the present invention, in which a

mixture of cereal semolina or flour and water is prepared having a water content of 25-40%, the mixture is converted to a band of pasta, the band is laminated and it is cut into noodles, differs in that the mixture
5 is prepared in a twin-screw kneader at a relative pressure of 0-1000 kPa and it is converted to a band of pasta by then pressing it through a die with an oblong outlet orifice.

Likewise, the apparatus for carrying out the
10 process according to the present invention comprises a twin-screw kneader, a die with an oblong outlet orifice, a laminating device and a cutting device.

It has been observed, surprisingly, that it is indeed possible to manufacture noodles having
15 organoleptic qualities at least comparable to those of noodles, especially oriental noodles, manufactured by a traditional process, although the process and the apparatus for carrying it out are comparatively simpler.

20 In the present text, the term "noodles" used as such denotes in the general sense any pasta or noodles based on cereal semolina or flour having the shape of a relatively thin band with a section which is generally rectangular or curved in the form of a semi-tube.

25 The expression "western noodles" denotes pastas having such a shape, which are generally prepared from hard wheat semolina and water, and which can be expected to have a crisp texture under the teeth, in other words an "al dente" texture, after cooking in
30 salt water for a sufficient period.

The expression "oriental noodles" denotes pastas having such a shape, which are generally prepared from soft wheat flour and kansui, and which can be expected to have an elastic texture under the
35 teeth after relatively brief cooking in a sufficient quantity of water with which they are intended to be consumed.

The term "kansui" denotes an aqueous alkaline solution, namely water in which is dissolved a composition of salts comprising especially NaCl, carboxymethylcellulose (CMC), K_2CO_3 , Na_2CO_3 and/or Na polyphosphate for example. These salts are intended to exert a stabilizing effect on the elastic texture of the oriental noodles during their traditional consumption with their cooking water.

To carry out the present process, a wheat semolina or flour is preferably used, supplemented or otherwise with ingredients such as egg yolk or spices for example. It is possible to use in particular a hard wheat semolina having a particle size of 250-350 μm to manufacture western noodles, or a soft wheat flour having a particle size of 50-150 μm to prepare oriental noodles for example.

Provision may be made, where necessary, for a premixing and prewetting stage, especially in a rapid paddle mixer which delivers a premix in the form of moistened flour or semolina lumps, such a step making it possible to save on in particular the useful free space in the mixer for example.

The semolina or flour is therefore mixed with a quantity of water such that the mixture obtained has a water content of 25-40%, preferably 30-35% by weight.

To manufacture western noodles, hard wheat semolina may be mixed with water.

To manufacture oriental noodles, soft wheat flour may be mixed with kansui.

The kansui may comprise 2-10% NaCl, 0-1% CMC, 0.1-1% K_2CO_3 and/or Na_2CO_3 and 0-1% Na polyphosphate. A colouring such as beta-carotene for example may also be added thereto.

The mixture is therefore prepared in a twin-screw kneader under a relatively low pressure of 0-1000 kPa. In fact, this relative pressure may even be maintained at the bottom of this range and not exceed 100 kPa for example.

The general drawing or the arrangement and/or the layout of the various elements which form the two screws of the kneader, especially mixing and/or kneading bilobes, may indeed, on the one hand, be provided such that the pressure and shearing stresses exerted on the mixture are minimized and, on the other hand, be adapted to the raw materials and to the desired product.

The residence time of the mixture in the kneader may be 20-60 s, it being possible for the two screws to rotate at a speed of between 40 and 120 revolutions per min (rpm) for example.

Provision may be made to degas the mixture before it leaves the kneader. It may be degassed in particular by aspiration by a vacuum of less than an absolute pressure of 50 kPa, preferably less than or equal to an absolute pressure of 20 kPa. Such a degassing is particularly recommended in the case of a manufacture of dehydrated western noodles since it makes it possible to avoid a problem of cracking and the appearance of white spots at the surface of the noodles for example.

In a preferred embodiment of the present process, the mixture is pressed through a die under the effect of the pressure exerted by the twin-screw kneader.

In a specific embodiment of the present process, provision is made to press the mixture through the die with the aid of a gear pump connected between the kneader and the die.

It has indeed also been observed, surprisingly, that in spite of the fact that the mixture thus passes through a gear pump and that it is briefly subjected to severe stresses which it might be feared would damage it, this specific embodiment of the present process also makes it possible to manufacture noodles having organoleptic qualities comparable to those of noodles manufactured by a traditional process.

Indeed, between the teeth of a gear pump comprising two toothed wheels or rollers which mesh into each other, the mixture may be subjected to a compression of several MPa values for example. If the
5 mixture is not thereby damaged, this may be due to the fact that it is subjected to this compression for only a very short time of the order of a fraction of a second without being subjected to any shearing for example.

10 In this specific embodiment of the present process, the relative pressure exerted by the pump on the mixture may be between more than 1000 kP and 12,000 kP, preferably between 5000 kP and 12,000 kP for example.

15 The mixture is therefore converted to a band of pasta by pressing it through a die with an oblong outlet orifice. This outlet orifice is preferably rectangular and may be provided in a vertical or horizontal plane, the long side of the rectangle being
20 respectively horizontal or transverse for example.

In the preferred embodiment of the process where the mixture is pressed through the die under the effect of the pressure exerted by the twin-screw kneader, the dimensions of the outlet orifice of the
25 die may be such that the relative pressure in the kneader may be maintained at the relatively low value desired. Provision can thus be made for a width of the outlet orifice, in particular a length of the short side of the rectangle of between 8 mm and 20 mm, and a
30 length of the outlet orifice, in particular a length of the long side of the rectangle of between 50 mm and 200 mm for example.

In the specific embodiment of the present process where the mixture is pressed through the die
35 with the aid of a gear pump connected between the kneader and the die, provision may be made for a width of the outlet orifice, in particular a length of the short side of the rectangle of between 1.5 mm and

10 mm, and a length of the outlet orifice, in particular a length of the long side of the rectangle of between 50 mm and 200 mm for example.

5 The band leaving the die may be laminated by passing it through a pair or a succession of pairs of rollers, especially a succession of two to five pairs of rollers of decreasing gap, starting with a first gap of 2-20 mm, ending with a final gap of 0.6-1.5 mm for example.

10 Once the band has been laminated, it can be cut lengthwise, into strips of 1-10 mm for western noodles or 1-3 mm in width for oriental noodles for example.

15 In the case where western noodles are manufactured, these 1-10 mm wide strips or noodles may be cut at right angles to the desired length. They may then be packaged as they are, as fresh pastas or after having been dried in a traditional hot air dryer with controlled humidity for example.

20 In the case where oriental noodles are manufactured, these 1-3 mm wide strips or noodles may be treated with steam, shaped into coils and dried, especially with hot air or by deep-frying for example.

25 To carry out this steam treatment and this forming into a coil, each strip or noodle may be converted to a continuous stream of transverse loops by causing it to hit a suitable brake. These streams may be treated with steam at atmospheric pressure at 95-100°C for 1-3 min and they can be cut transversely into pieces whose length is equal to twice their width. The
30 pieces can then be folded into two so as to obtain a square coil of noodles.

These coils of oriental noodles may be dried with hot air at 65-95°C for 30-60 min, or by deep-frying them at 120-160°C for 30 s to 2 min for example.

35 In the latter case, each coil may be placed in a square-shaped tub which is immersed in an oil bath heated to the desired temperatures, this oil being

preferably an oil resistant to heat, especially palm or groundnut oil for example.

The coils may then be cooled with cold air, especially with the aid of a stream or blast of cold
5 air sufficiently strong to detach and carry, in the form of droplets, at least a portion of the oil remaining at the surface of the fried noodles.

The deep-frying may also be preceded by a brief immersion of the coils in cold water, especially for
10 1-5 s, in order to avoid possible problems of sticking of the noodles.

The apparatus for implementing the process according to the present invention therefore comprises a twin-screw kneader, a die with an oblong outlet
15 orifice, a laminating device and a cutting device.

The twin-screw mixer may comprise two screws rotating in the same direction and meshing with each other for example.

The two screws may have, alternately and/or in
20 succession, mixing, kneading and/or holding zones for example. These zones may be appropriately formed by varying the length and the direction of the screw pitch, or even the shape of the screws in these zones.

The two screws may comprise in particular two
25 parallel shafts rotating in the same direction and onto which are slipped and fixed against each other bilobes, each having the shape of a screw section whose thickness may be less than, equal to or greater than the screw pitch. The length and the direction of the
30 screw pitch associated with a bilobe, as well as the respective angular positions of two successive bilobes, may be chosen as a function of the type of work or operation which it is desired to carry out in the zone considered.

35 To form a mixing zone, bilobes with a positive pitch can be used. To form a kneading zone, bilobes with no pitch may be used. To form a mixed zone for mixing and kneading, successive bilobes with positive

itches which are angularly spaced apart may be used. Finally, to form a holding zone, bilobes with a negative pitch may be used for example.

5 The shape of the bilobes of a twin-screw kneader viewed in the direction of the axis of the screws may differ from the corresponding shape of the bilobes of a twin-screw extruder, by way of comparison, by a smaller width which, on the one hand, leaves more free space available for the material to be treated and
10 which, on the other hand, leaves a more open angle of contact between a summit of the bilobe and the inner wall of the casing against which it rotates. The consequence of this bigger free space and this more open angle of contact is in particular to minimize the
15 shearing exerted on the material treated.

This smaller width of the bilobes may also be associated with a smaller diameter of the axes as well as a smaller screw length/diameter ratio, especially a ratio of between 7 and 10 for a twin-screw kneader
20 compared with a ratio of between 20 and 30 for a twin-screw extruder for example.

Both screws may be enclosed in a jacketed barrel, especially a jacketed barrel subdivided into compartments in which a cooling or heating fluid may be
25 circulated. This barrel may have at an upstream end one or more inlets for supplying the screws with components to be mixed and, at a downstream end, a possible connection for vacuum aspiration and an outlet for the mixture.

30 In a preferred embodiment of the present apparatus, the outlet of the kneader leads directly to the die.

The die therefore has an oblong, preferably rectangular, outlet orifice which may be provided in a
35 vertical or horizontal plane, the long side of the rectangle being respectively horizontal or transverse for example.

In a specific embodiment of the present apparatus, a gear pump is provided between the outlet of the kneader and the die.

5 The gear pump may comprise two toothed wheels, or toothed rollers, which mesh with each other. Both rollers may rotate in a housing around axes situated in a plane perpendicular to the direction of a current of the mixture to be converted into a band coming from the kneader. They may each rotate in an opposite direction,
10 the teeth coming apart upstream and coming together downstream. The outer edge of the teeth can slide against a corresponding inner wall of the housing, thus defining interstitial spaces intended for the transport of the mixture to be converted into a band downstream.

15 The shape of the teeth may be specially designed to avoid as much as possible any friction between the teeth which mesh and any shearing on the mixture transported.

The die and the possible gear pump may be
20 enclosed in a jacketed casing subdivided into compartments in which a cooling or heating fluid may be circulated.

The laminating device may comprise a pair or a succession of pairs of rollers, especially a succession
25 of two to five pairs of rollers of decreasing gap. A first pair of rollers may have a relatively large gap, corresponding to the width of the outlet orifice of the die, in order to be able to take control of the forward movement of the band for example. A last pair of
30 rollers may have a gap corresponding to the desired final thickness of the noodles for example.

The cutting device may comprise longitudinal cutting means, especially rotating discs provided after the last pair of rollers, and transverse cutting means,
35 especially blades for example.

If it is intended for the manufacture of oriental noodles, the present apparatus may comprise a braking device provided after the longitudinal cutting

means and comprising especially a stop against which the individual noodles or strips are forced to form transverse undulations or loops which form a continuous stream by being squeezed one behind the other.

5 A device for treating these streams of loops with steam may be provided after the braking device and before the transverse cutting means.

 After the transverse cutting means, a folding device may be provided followed by a drying device.

10 The latter may be produced in the form of a hot-air drying tunnel or in the form of a deep-frying device for example.

 In the latter case, provision is preferably made for a device for immersing in cold water and a
15 device for blowing oil respectively before and after the deep-frying device.

 As regards the advantages of the present process and of the present apparatus for implementing it, it was noted above that, surprisingly, they indeed
20 make it possible to manufacture noodles having organoleptic qualities completely comparable to those of noodles, especially oriental noodles, manufactured by a traditional process and apparatus, although the present process and the present apparatus are
25 comparatively simpler.

 To this there may be added that it has also been observed, surprisingly, that the present process, preferably comprising the steps of immersing in cold water and of blowing oil described above, can also make
30 it possible to reduce substantially the quantity of oil absorbed by oriental noodles compared with the quantity of oil which they absorb if they are manufactured by a traditional process and apparatus.

 It is finally possible to note the fact that,
35 compared with a manufacture of oriental noodles carried out with the aid of a traditional plant as described in the introduction of the present text, the present process and the present apparatus allow a continuous

manufacture of oriental pasta which minimizes variations in the quality of the mixture, especially in its water content and in its elasticity, while considerably shortening the duration of the mixing
5 step.

The apparatus according to the present invention is described in greater detail below with reference to the accompanying drawing given by way of example and in which:

10 - Figure 1 is an overall schematic representation of a preferred embodiment of the present apparatus,

- Figure 2 is an overall schematic representation of a specific embodiment of the present
15 apparatus,

- Figure 3 is a partially open schematic view of the kneader and of the die of the preferred embodiment of the present apparatus represented in Figure 1,

20 - Figure 4 is a schematic top view of a screw of the kneader of the embodiments of the apparatus which are represented in Figures 1 to 3,

- Figure 5 is a cross-sectional view of the two screws of an extruder, for comparison, and

25 - Figure 6 is a cross-sectional view of the two screws of the kneader of the embodiments of the apparatus which are represented in Figures 1 to 3.

In the preferred embodiment represented in Figure 1, the present apparatus comprises a twin-screw
30 kneader 1, a die with a rectangular outlet orifice 2, a laminating device 3-7, a cutting device 8-9, a braking device 10, a device for treating with steam 11, a folding device 12, a device for immersing in cold water 13, a deep-frying device 14, and a device for blowing
35 oil 15.

The laminating device comprises a succession of five pairs of rollers 3-7 with a decreasing gap. A first pair of rollers 3 has a relatively wide gap,

corresponding to the width of the outlet orifice of the die, in order to be able to take control of the forward movement of the band. A last pair of rollers 7 has a gap corresponding to the desired final thickness of the
5 noodles.

The cutting device comprises longitudinal cutting means, in this case rotating discs 8 provided after the last pair of rollers 7, and transverse cutting means, in this case blades 9 provided after the
10 device for treating with steam 11.

The braking device provided after the longitudinal cutting means 8 comprises a stop 10 against which the individual strips or noodles 16 are forced to form transverse undulations or loops which
15 form a continuous stream 17 by squeezing one behind the other.

The device for steam treatment 11 of these streams of loops 17 is provided after the braking device 10 and before the transverse cutting means 9.

20 In the specific embodiment represented in Figure 2, the present apparatus differs from the preferred embodiment represented in Figure 1 only by the fact that a gear pump 18 is connected between the outlet of the kneader 1 and the die 2.

25 As schematically represented in Figure 3, the kneader 1 of the preferred embodiment of the apparatus represented in Figure 1 comprises two screws 19 and 20 rotating in the same direction and meshing with each other. Both screws are driven by a motor 21.

30 The two screws 19 and 20 are enclosed in a jacketed barrel 22 subdivided into compartments i-iii in which a cooling or heating fluid may be circulated. The barrel 22 has at an upstream end an inlet 23 for supplying the screws with components to be mixed and at
35 a downstream end an outlet 24 for the mixture which leads directly to the die 2.

The die 2 has a rectangular outlet orifice 25 provided in a horizontal plane, the long side of the rectangle being transverse.

As seen in Figure 4, the screws 19 and 20 of the kneader, only one of which is represented, have at their upstream end a mixing zone 26 consisting of few bilobes with a positive pitch. They then have alternately five mixed zones for mixing and kneading 28 each consisting of few bilobes 27 with positive pitches which are angularly spaced apart, and four kneading zones 29 each consisting of two bilobes with no pitch 30. They have, at their downstream end, an outlet zone corresponding to the outlet 24 and consisting of two bilobes with no pitch separated by a space 32. The outlet zone is followed downstream by a holding zone 33 consisting of a holding bilobe 34 with a negative pitch.

Figures 5 and 6 show that, viewed in in [sic] the direction of the axis of the screws, the shape of the bilobes 35 of a twin-screw kneader can be distinguished from the corresponding shape of the bilobes 36 of a twin-screw extruder, by way of comparison. The width 37 of the bilobes of the kneader is less than the width 38 of the bilobes of an extruder, which leaves more free space available for the material to be treated.

Likewise, the angle of contact 39 between the summit of the bilobes 35 of the kneader and the inner wall of the casing against which it rotates is more open than the corresponding angle of contact 40 for the bilobes 36 of an extruder, which minimizes the shearing exerted on the material treated.

The fact that the kneader exerts only weak pressure and shearing stresses on the material to be treated also allows a lighter construction. Accordingly, the diameter 41 of the axes of the screws of the kneader may be considerably smaller than the diameter 42 of the axes of the screws of an extruder,

which leaves even more free space available for the material to be treated.

The process according to the present invention is described in greater detail in the examples presented below by way of illustration. The percentages are given therein by weight.

Example 1

10 An apparatus corresponding to the preferred embodiment represented in Figure 1 is used in which the kneader is a READCO-type TELEDYNE kneader comprising two screws 125 mm in diameter meshing with one another and rotating in the same direction, and having a total
15 length of 1100 mm.

 The die has a rectangular outlet orifice of 10 mm x 100 mm.

 The laminating device comprises a succession of four pairs of rollers with gaps which are successively
20 4, 2.5, 1.5 and 0.8 mm.

 The kneader is fed with 730 kg/h of soft wheat flour having a particle size of 50-120 μ m and with 235 kg/h of kansui having the following composition:

25	Sodium chloride	7.0%
	CMC	0.7%
	K ₂ CO ₃	0.26%
	Na ₂ CO ₃	0.17%
	Na polyphosphate	0.34%
30	Beta-carotene	0.005%
	Water	difference to 100%

 The speed of rotation of the kneader screw is adjusted to 80 rpm. The mixture is then subjected to a
35 relative pressure of 600 kPa in the kneader where it stays for about 45 s.

 The band leaving the die has a thickness of 16-18 mm. This is successively reduced to a thickness of

5, 3, 2 and 1 mm after passing through the pairs of laminating rollers.

It is then cut into strips 2 mm wide which are converted into continuous streams of transverse loops by arriving against the stop of the braking device.

These streams are treated with steam at atmospheric pressure at 98°C for 80 s and then cut transversely into pieces with a length double their width which are then folded into two to form square coils of noodles.

The coils are immersed for 2 s in cold water and then deep-fried, in this case in palm oil at 135°C for 70 s.

These coils are then cooled with the aid of a blast of cold air which carries away part of the oil remaining at the surface of the noodles.

Oriental noodles are thus obtained which have organoleptic qualities in all respects comparable to those of traditional oriental noodles.

The oriental noodles thus obtained have, in addition, the advantage of having absorbed a quantity of oil which is reduced by about 4-8% compared with the quantity of oil absorbed by oriental noodles as obtained by a traditional process and with the aid of a traditional apparatus as described in the introduction of the present text for example.

Example 2

The procedure is carried out as described in Example 1, with the exception of the fact that the kansui has the following composition:

Sodium chloride	4.8%
CMC	0.48%
K ₂ CO ₃	0.48%
Na ₂ CO ₃	0.32%
Na polyphosphate	0.15%

Beta-carotene	0.005%
Water	difference to 100%

The mixture is subjected to a relative pressure
5 of 800 kPa in the kneader and the coils are deep-fried
for 80 s.

Oriental noodles are thus obtained which have
organoleptic qualities in all respects comparable to
those of traditional oriental noodles.

10 The oriental noodles thus obtained have, in
addition, the advantage of having absorbed a quantity
of oil which is reduced by about 4-8% compared with the
quantity of oil absorbed by oriental noodles as
obtained by a traditional process and with the aid of a
15 traditional apparatus as described in the introduction
of the present text for example.

Example 3

An apparatus corresponding to the specific
20 embodiment represented in Figure 2 up to and including
the laminating device is used in which the kneader is a
READCO-type TELEDYNE kneader as described in Example 1,
the kneader barrel has a connection for vacuum
aspiration at its downstream end just before its
25 outlet, and the gear pump is a VACOREX 90/90-type MAAG
pump.

The die has a rectangular outlet orifice of
2 mm x 100 mm.

The laminating device comprises a succession of
30 four pairs of rollers with gaps which are successively
2.0, 1.5, 1.3 and 1 mm.

By circulating a heating fluid, a temperature
of 48°C is maintained in the kneader barrel.

The kneader is fed with 800 kg/h of hard wheat
35 semolina having a particle size of 250-300 μ m and with
200 kg/h of water.

The speed of rotation of the kneader screws is
adjusted to 70 rpm. The mixture is then subjected to a

relative pressure of 800 kPa in the kneader where it stays for about 45 s.

The mixture is degassed by aspiration with a vacuum equal to an absolute pressure of 20 kPa.

5 The speed of rotation of the toothed rollers of the gear pump is adjusted to 36 rpm. The relative pressure thus exerted by the pump on the mixture is 11,000 kPa.

10 The band leaving the die has a thickness of 3-4 mm. It is successively reduced to a thickness of 2.5, 1.6, 1.4 and 1.2 mm after passing through the pairs of laminating rollers.

15 The laminated band is cut lengthwise into strips 8 mm wide which are themselves cut transversely into noodles of few tenths of cm in length.

These western noodles are dried in a traditional hot-air dryer with controlled humidity.

20 Western noodles or tagliatelli are thus obtained which have an attractive yellow colour with no white spot and whose organoleptic qualities are comparable, or even superior to those of tagliatelli manufactured traditionally.

Claims

1. Process for the manufacture of noodles, in which a mixture of cereal semolina or flour and water is prepared having a water content of 25-40%, the mixture is converted to a band of pasta, the band is laminated and it is cut into noodles, characterized in that the mixture is prepared in a twin-screw kneader at a relative pressure of 0-1000 kPa and it is converted into a band of pasta by then pressing it through a die with an oblong outlet orifice.
2. Process according to Claim 1, in which, to manufacture oriental noodles, a mixture of soft wheat flour and kansui is prepared, the soft wheat flour having a particle size of 50-150 μm .
3. Process according to Claim 1, in which, to manufacture western noodles, a mixture of hard wheat semolina and water is prepared, the hard wheat semolina having a particle size of 250-350 μm .
4. Process according to Claim 2, in which the kansui comprises 2-10% NaCl, 0-1% CMC, 0.1-1% K_2CO_3 and/or Na_2CO_3 and 0-1% Na polyphosphate.
5. Process according to Claim 1, in which the residence time of the mixture in the kneader is 20-60 s.
6. Process according to Claim 1, in which the mixture is pressed through a die under the effect of the pressure exerted by the twin-screw kneader.
7. Process according to Claim 1, in which the mixture is pressed through the die with the aid of a gear pump connected between the kneader and the die.
8. Process according to Claim 6, in which the mixture is pressed through a die having a rectangular outlet orifice of 8-20 mm by 50-200 mm.
9. Process according to Claim 7, in which the mixture is pressed through a die having a rectangular outlet orifice of 1.5-10 mm by 50-200 mm.



10. Process according to Claim 1, in which the band leaving the die is laminated by passing it through a succession of two to five pairs of rollers with a decreasing gap, starting with a first gap of 2-20 mm and ending with a final gap of 0.6-1.5 mm.

11. Process according to Claim 2, in which the laminated band is cut lengthwise into strips 1-3 mm wide, the strips are formed into a coil, they are treated with steam at atmospheric pressure at 95-100°C for 1-3 min, the coils are immersed in cold water for 1-5 s, they are deep fried at 120-160°C for 30 s to 2 min and they are cooled with the aid of a blast of cold air.

12. Process according to Claim 3, in which the laminated band is cut lengthwise into strips 1-10 mm wide.

13. Apparatus for carrying out the process according to Claim 1, comprising a twin-screw kneader, a die with an oblong outlet orifice, a laminating device and a cutting device.

14. Apparatus according to Claim 13, in which the twin-screw kneader comprises two screws rotating in the same direction and meshing with each other.

15. Apparatus according to Claim 13, comprising, in addition, a gear pump connected between the outlet of the kneader and the die.

16. Apparatus according to Claim 13, for the manufacture of oriental noodles, comprising in addition, after the laminating device, longitudinal cutting means, a braking device comprising a stop, a device for treating with steam, a folding device, a device for immersing in cold water, a device for deep-frying and a device for blowing oil.

