

- 1 -

"METHOD FOR MANUFACTURING BOILED NOODLES
AND APPARATUS FOR THE SAME"

The present invention relates to a method for
5 manufacturing boiled noodles and an apparatus for the
same and, more particularly to a method for
manufacturing a predetermined batch of noodles on a
single meal basis; and an apparatus for the same.

10 Noodles are generally manufactured by hand or by a
noodle manufacturing machine. In the prior art
method, the following steps are carried out:

Wheat flour is subjected to mixing and kneading with
15 kneading water containing salt to form a noodle
substrate. Elasticity of the noodle substrate is
achieved by means of forming and kneading a block of
substrate aging the same, pressing and expanding the
substrate, by applying a wheat flour thereto and,
20 folding and pressing, slicing and cutting the
substrate to form raw noodle elements.

Accordingly, the prior art method requires at least
several hours to obtain the raw noodle elements, as
25 well as twelve hours in a previous day of preparation,

- 2 -

further twenty to fifty minutes are required in order to boil the raw noodle elements. When the noodles are made by the prior art noodle manufacturing machine, twenty five minutes is required to boil the raw noodle elements, because the quantity of the water to be added to the grain flour is less than that of the hand-made noodles. Further higher pressure must be applied to the substrate of noodle in comparison with the hand-made manufacturing.

Although the manufacturing time is shortened by the noodle manufacturing machine, the prior art noodle manufacturing method and apparatus have the following disadvantages; the installation area is large, further because of the long boiling time necessiated, the taste of the noodles is impaired.

It is known that noodles are most delicious immediately after boiling. From the above described noodle manufacturing and boiling conditions of the prior art, shops selling buckwheat and noodles usually manufacture and boil the vermicelli before opening shop in accordance with an estimation of customers and offer the noodles according to customer's orders in business hours. It is accordingly, impossible to

- 3 -

serve the most delicious noodles to the customer immediately after boiling, and it is inevitable that much material will be wasted.

5 Vermicelli in the form of dried noodles or macaroni is manufactured by a noodle belt, cutting out other manufacturing methods and pressure applying steps, and the manufacturing methods and pressure applying steps, and the drying process. However a long boiling time
10 is required. The vermicelli is stored in the boiled condition and accordingly it is impossible to provide a delicious noodle immediately after boiling. The waiting time for the customer increases and material loss can not be eliminated.

15 Furthermore, customers might order a Japanese noodle or a Chinese-style noodle. Even when the customer orders the Japanese noodle, one might order a soft boiled noodle, and another a hard boiled noodle. It
20 is, however, impossible to respond to the various orders, because about ten portions of vermicelli are boiled in one boiling basket in the shop. This is the same in an Italian shop selling macaroni and spaghetti and a Chinese-style shop selling Chinese-style
25 vermicelli.

- 4 -

It is, further, well known that hand made buckwheat, hand-made Japanese noodles and Chinese-style noodles are more delicious than those by manufactured by machine. It is, however, very hard to master the technique for fabricating delicious noodles, and much labour is required.

It is an object of the present invention to provide a method for manufacturing boiled noodles and an apparatus for the same, which can alleviate the problems described above.

It is an object of the present invention to provide a method and an apparatus which can fabricate boiled noodles over a very short time period.

More particularly, according to the present invention, there is provided a method for manufacturing boiled noodles comprising steps of; fabricating a raw noodle substrate by admixing a grain flour and kneading water; forming the so formed noodle substrate into noodle elements and; boiling the noodle elements in the boiling basket; characterised in that the end period of said steps is indicated by means of a signal obtained by sensing a position of said basket in a

- 5 -

boiling oven and in that the steps are started by a further signal indicative of the positioning of the basket in the oven to receive a predetermined amount of noodle elements; thereby to fabricate a predetermined quantity of boiled noodles directly from a grain flour.

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According to the present invention there is also provided a boiled noodle manufacturing apparatus comprising in combination, a raw noodle manufacturing unit including a grain flour supplying member for supplying and measuring grain flour, a kneading member for kneading said grain flour including a helical mixer and a blade, said kneading member being operatively connected to said grain flour supplying member, a kneading water supply member for supplying and measuring kneading water to said grain flour; and a noodle element forming member operatively connected to said kneading member to form raw noodle elements and; a boiling unit for boiling said raw noodle elements from said noodle element forming member said unit including a rotating wheel supporting a removable boiling basket for receiving the raw noodle elements and being intermittently rotatable, a sensor means producing a signal indicative that the boiling basket has passed through a predetermined position, a

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- 6 -

controlling unit generating a signal corresponding to a predetermined amount of noodles; thereby controlling said raw noodle manufacturing unit and said boiling unit, whereby the predetermined batches are fabricated from the grain flour by controlling the operation of said raw noodle manufacturing unit and said boiling unit by said signals.

10 The object, advantages and other features of the present invention will be more apparent from the following description of a preferred embodiment thereof, made with reference to the accompanying drawings which are included by way of illustration only, in which:

Figure 1 is a plan view of a boiled noodles manufacturing apparatus of a first embodiment of the present invention:

20 Figure 2 is a side elevation view of the boiled noodles manufacturing apparatus of Figure 1.

- 7 -

Figure 3 is a sectioned side elevation view of the boiled noodle manufacturing apparatus of Figure 1.

5 Figure 4 is a partially sectioned elevation view of a portion of the boiled noodle manufacturing apparatus of Figure 1.

10 Figure 5 is a perspective view of a copying roller of the boiled noodle manufacturing apparatus of Figure 1.

Figure 6 is a view showing an operation of a copying roller of the boiled noodle manufacturing apparatus of Figure 1.

15 Figures 7A and 7B show two different designs for a boiling basket forming a part of the boiled noodle manufacturing apparatus of Figure 1.

20 Figure 8 is a block diagram of a control unit for controlling the boiled noodle manufacturing apparatus of the present invention.

- 8 -

Figure 9 is a side elevational section view of a modification of the boiled noodles manufacturing apparatus of Figure 1.

5 Figure 10 is a plan view of a boiled noodles manufacturing apparatus according to a second embodiment of the present invention.

10 Figure 11 is a side elevational sectioned view of the boiled noodle manufacturing apparatus of Figure 10.

Detailed Description of the Embodiments

Referring to Figures 1 to 3 of the drawings, there is
15 shown a boiled noodle manufacturing apparatus of the present invention. The boiled noodle manufacturing apparatus comprises, substantially, a raw noodle manufacturing unit A_1 for fabricating raw noodle elements, and a boiling unit B for boiling the raw
20 noodle elements.

The raw noodle manufacturing unit A_1 is provided with a grain flour supplying member 1 for automatically weighing and supplying the grain flour, a kneading

- 9 -

member 2 for kneading the grain flour with a kneading water and for producing a grain paste, a kneading water supplying member 3 for automatically supplying increased amounts of the kneading and mixing water to the kneading member 2, and a noodle element forming member 4 for forming raw noodle elements. Each of the kneading member 2, the noodle element forming member 3 and the kneading water supplying member 4 is accomodated in a housing 5 supported movably on casters 6a.

The grain flour supplying member 1 is provided with a container 7 arranged on an upper end portion of the housing 5, and a grain flour indicator 8 mounted on the container 7 for indicating the quantity of the grain flour in the container 7. The kneading member 2 is located to a lower side of the grain flour supplying member 1. As is shown in Figure 3, the kneading member 2 comprises a cylindrical tube 9, an inlet 10a connecting the cylindrical tube 9 with the container 7 of the grain flour supplying member 1. An outlet 10b debouches from the cylindrical tube 9. A rotating shaft 11 having a screw-shaped flight 12 and blades 13 to form a high speed rotating beater, is driven by

motor M_1 .

5 The noodle element forming member 3 is arranged below the kneading member 2 and comprises a first nip roller 14 having rolls 14a and 14b for coarsely rolling a noodle substrate, a second nip roller 15 having rolls 15a and 15b to roll the noodle substrate roughly rolled by the first nip roller 14, a finishing roller 16 having rolls 16a and 16b and to roll the noodle substrate precisely, and a cutting roller 17 for fabricating the noodle elements by cutting the noodle substrate.

15 The kneading water supplying member 4 comprises a kneading water tank 18 for storing and supplying the kneading water to the kneading member 2, and a valve 19 for adjusting the flow quantity of the kneading water to the kneading member 2. The grain flour supplying member 1 and the kneading water supplying member 4 are automatically started and stopped on a batch basis. It is preferable to provide a bridge preventing member K between the grain flour supplying member 1 and the kneading member 2 as is shown in Figure 2. As is best shown in Figure 4, the bridge

- 11 -

preventing member K is equipped with a scrapper L connected to an actuating motor M_2 . The scrapper L is provided in the inlet 10a and is rotated by the actuating motor M_2 while the grain flour supplying member 1 operates and thereby prevents the generation of a bridge of flour caused by the grain flour sticking together.

The boiling unit 3 comprises, substantially, a housing 20 movably supported by castors 6b, a boiling oven in the form of an electrical oven 21 having an electric heater 22, a rotation wheel 23 mounted rotatably on the electrical oven 22, a rotating motor M_7 for driving the rotation wheel 23. The electrical oven 21 is mounted in the housing 20 by way of an adiabatic material 6. The rotation wheel 23 is provided with a plurality of hanging hooks 24. A predetermined number of boiling baskets 25 are hung from the hanging hooks 24 so as to be inserted into the boiling oven.

The predetermined quantity of the grain flour corresponding to the batch size is supplied to the kneading member 2 from the grain flour supplying

- 12 -

member 1 and is mixed with the kneading water supplied from the kneading water supplying member 4.

5 A kneaded substrate is then supplied to the noodle element forming member 3. In the noodle element forming member 3, the noodle substrate is coarsely rolled by the first nip roller 14, and is expanded by the second nip roller 15. The noodle substrate expanded by the second nip roller 15 is uniformly
10 expanded by the finishing roller 16 and thereafter sliced by the cutting roller 17 to form the raw noodle elements.

The kneading water is supplied from the tank 18 to a
15 slot provided on the inner side of the rotating shaft 11 of the mixing member 2 and is sprayed into the cylindrical tube 9 by way of nozzle 11a provided on the rotating shaft 11, and hence mixes with the predetermined quantity of grain flour supplied to the
20 cylindrical tube 9 from the grain flour supplying member 1 through the inlet 10a.

In the kneading member 2, the grain flour is measured and applied in measured batches at a given timing.
25 The grain flour supplied to the kneading member 2 is

- 13 -

mixed by the high speed rotation of the spiral flight 12 and is then miltured with the kneading water. The gluten so created is forced toward an inner wall of the cylindrical tube 9 by the screw flight 12 rotating of high speed, and a paste of the seasoned flour is efficiently formed in spite of an excess of kneading water.

The rotation speed of the rotating shaft 11 of the kneading member 2 should be 900 to 2500 rpm.

The rotation speed of the rotating shaft 11 is in inverse proportion to a diameter of the cylindrical tube 9 of the kneading member 2. According to experimental data, the rotation speed of the rotating shaft 11 was required to be 900 rpm when the diameter of the cylindrical tube 9 was 9 cm.

However, it is preferable to set the rotation speed in the range 900 rpm to 2500 rpm according to the characteristics of the noodle and the type of grain flour. Further, a helix angle of the blade 13 is preferably selected in the range from twenty to seventy degrees depending upon the characteristics of the vermicelli and the grain flour selected.

- 14 -

A driving motor M_4 is provided for driving the first nip roller 14, a driving motor M_6 for driving the finishing roller 16.

5 A noodle substrate directing member 26 is arranged at an upper side of the first nip roller 14. As is shown in Figure 5, the substrate directing member 26 comprises an arc-shaped plate 27 having a curved portion 27a formed on one end portion of the plate 27, supporting plates 28 connected to other end portion of
10 the plate 27 and a crank member CR connected to the member 26. The crank member CR comprises a driven shaft 29 driven by the motor M_4 , first cam 30a secured to the driven shaft 29, a lever 31 connected rotatably to the first cam 30, a second cam 30b connected
15 rotatably to the lever 31 and a crank shaft 32 secured to the second cam 30b and connected to the supports 28. The substrate directing member 26 performs a reciprocal movement on operation of the crank CR and hence supplies the noodle substrate to the rolls 14a
20 and 14b of the first nip roller 14. A gating member GA is provided in a lower side of the first nip roller 14. As is shown in Figure 5, the gating member GA comprises a semi-circular shaped gating plate 33 and a

- 15 -

supporting shaft 34. The gating plate 33 is inserted into, and disengaged from, a gap formed between the rolls 14a and 14b of the first nip roller 14 by the rotation of the supporting shaft 34 to open and close the gap.

As is shown in Figure 6, the noodle element forming member 36 further comprises a roller actuating member 35 for actuating the first nip rollers 14. The roller actuating member 36 comprises a bush 37 fastened to the shaft 35a of the roll 14a of the first nip roller 14, a first actuating lever 38a contacting an outer surface of the bush 37, a supporting shaft 39 supporting one end portion of the first lever 38a, a second actuating lever 38a fastened to the supporting shaft 39, an eccentric cam 40, a first limit switch 41a and a second limit switch 41b.

The second lever 38b is pivotally rotated with respect to supporting shaft 39 as a supporting point and moves the roll 14a of the roller 14. The cam is rotated by the motor M_4 . The first and second limit switches 41a and 41b are actuated by the rotation of the motor

M₄.

As is shown in figures 1 to 3, it is preferable to provide dial-type indicators 14D, 15D and 16D and gap adjusting handles 14T, 15T and 16T on the rollers 14, 15 and 16 respectively to adjust, easily and precisely, the gaps of the rollers. It is also preferable to provided dial indicators on the grain flour supplying member 1 and the kneading water supplying member 4.

The first nip rollers 14 are constructed so that the rolls 14a and 14b closely approach with each other during the feed of the noodle substrate therebetween, and the gating member GA is so arranged that a desired gap is formed between the rolls 14a and 14b in closed state, and so that the gap opens when the supply of the noodle finished.

The first nip roller 14 constructed as above prevents the noodle substrate separating from the rollers, and the seasoned substrate of the noodle thus compressively contacts the rolls 14a and 14b.

- 17 -

The noodle manufacturing apparatus further comprises a controlling member for controlling the operation of the raw noodle manufacturing unit A_1 and the boiling operation of the boiling unit B. The controlling member includes a sensor means 42 for sensing the movement of the boiling basket 25.

As is shown in Figures 7A and 7B, the sensor means 42 comprises a starting sensor 42a for sensing the start of boiling and a finish sensor 42b for sensing the finishing of boiling. The shape of the handle 43 of the basket 25 can be selected in accordance with the vermicelli type; eg Japanese noodles buckwheat, macaroni, or Chinese noodles. Each of the boiling baskets 25 corresponding to vermicelli required is detected by the start sensor 42a and the finish sensor 42b. It is preferable to make the handle 43 of the boiling basket 25 a separate colour in order to make the basket easily distinguished. Fig. 7A shows the boiling basket 25 for boiling Japanese noodles, and Fig. 7B shows the boiling basket 25 for boiling buckwheat.

- 18 -

As is shown in Fig. 1, the start sensor 42a is mounted on the boiling unit B so as to be located in the vicinity of an outlet of the noodle element forming member 3. The finish sensor 42b is arranged in the vicinity of the boiling finishing position. As shown in Figure 19, the boiling basket 25 is hung at point 2K. The start sensor 42a senses the arrival and the passage of the basket 25 and produces an electric signal for starting the operation of the noodle manufacturing unit A₁. The finish sensor 42b detects the arrival of the basket 25 at a point E and produces an information device in the form of a lamp or a buzzer.

A stirring bar (not shown in the drawings) can be arranged on the upper end portion of the noodle boiling unit B so as to be movable upwardly and downwardly thereby stirring the batch of noodles in the basket 25 during the stopping interval in the intermittent rotation of the boiling basket 25. Data indicative of batch size and type are input into a micro-computer of the controlling member. The micro-computer receives an electric signal from the start sensor 42a and supplies an actuating signal to

- 19 -

each element of the device at a predetermined time.

The micro-computer also stores data for the grain

flour and the kneading water, the starting and

stopping timings of the raw noodle manufacturing unit

5 A_1 and the boiling unit B, data of the rotation of the

shaft 11 of the kneading member 2 and data of movement

of the plate 27, the gate GA and the eccentric cam 40

of the noodle element forming member 3, data for

starting the first nip roller 14, the second nip

10 roller 15, the finishing roller 16 and the cutting

roller 17 and the data of the timing responding to the

intermittent rotation of the rotation wheel 23 of the

noodle boiling unit B.

15 Figure 8 shows the control unit for controlling the

operation of the raw noodle manufacturing unit A_1 and

the boiling unit B . The controlling unit comprises

an instruction inputting member IP for producing

instructions in order to operate the raw noodle

20 manufacturing unit A_1 and the boiling unit B, an input

operating member 10, a calculation processing member

CP, an output controlling member OC, and an output

processing member OP.

- 20 -

As is best shown in Figure 8, the instruction inputting member IP comprises a plurality of instruction inputting elements IPI-IP20. Each of the instruction signal generating elements IPI-IP20 respectively include an electrical element and generate an instructing signal as is shown in the instruction inputting member IP. The calculation processing member CP includes a micro-computer MC having memories. The micro-computer MC is electrically connected to the instruction inputting member IP. The output processing member 10 comprises a plurality of actuation signal generating elements OP1-OP13. Each of the actuation signal generating elements OP1-OP13 controls the operation of each of the raw noodle manufacturing unit A_1 and the boiling unit B respectively shown in the Figure 8.

The desired number and size of batches and the types of the vermicelli, can be input into the memories of the calculation processing member CP by operating the input signal generating elements IPI-IP20. The micro-computer MC receives electrical signals and outputs the instruction signals to the each portion of the raw noodle manufacturing unit A_1 and the boiling unit B.

- 21 -

The micro-computer MC memorises the data for timing the operation of; the grain flour supplying member 1, the starting and stopping operations of the kneading member 2, the plate 27, the gating member GA, the
5 first nip roller 14, the second nip roller 15, the finishing roller 16 and the cutting roller 17 of the noodle element forming member 3, and the intermittent rotation of the rotating wheel 23 of the boiling unit B corresponding to the kinds of the noodle.

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The microcomputer MC further supplies an operating instruction to the informing device and controls the temperature of the boiling water.

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In the instruction input member IP, the instruction signal generating element IP_1 generates a driving signal for driving the apparatus; the element IP_2 generates a stopping signal for stopping the operation of the apparatus; the element IP_3 generates an
20 automatic or manual instruction signal; the element IP_4 generates a stopping signal; IP_5 generates starting and stopping signals for controlling the moving operation of the boiling basket; IP_7 generates a water supplying signal; IP_8 produces a signal for

- 22 -

opening the first nip roller; IP generates a signal
for closing the first nip roller; IP11 generates a
boiling finish signal; IP12 generates a signal
indicative of the stopping time of the boiling basket;
5 IP13 generates a signal for controlling the kneading
member 2; IP14 generates a signal for controlling the
cutting roller; the element IP15 generates a signal for
controlling the grain flour supplying member; IP16
generates a signal for controlling the roller; the
10 element IP17 generates a signal for controlling the
starting and stopping operations of the first nip
roller; IP18 generates signals for controlling the
opening and closing operations of the first nip
roller; the element IP19 generates a signal for
15 controlling the rotation of the rotating wheel and the
instruction signal generates signals for controlling
the supply of the kneading water (to the kneading
member or by pass).

20 Operation of the boiled noodles manufacturing
apparatus shown in Figures 1-7 will be described as
follows.

10 kg of wheat flour is inserted into the container 7
of the grain flour supplying member 1. Kneading water
containing salt is filled into the kneading water tank
18. Assuming that two customers visit a shop first
5 and thereafter three customers visit the shop.

In this case, two boiling baskets 25 are disposed on
the hanging hooks 24 in a position MS (Figure 1) and
the start sensor 24a is activated by the handle 43 of
10 the boiling basket 25 at a starting position SR. By
The activation of the start sensor 42a generates the
starting signal in the instruction inputting member IP
shown in Figure 8. The starting signal produced in
the instruction inputting member IP is supplied to the
15 microcomputer MC by way of the input operating member
10. The micro-computer MC outputs an instruction
signal to the actuation signal outputting elements
OP1, OP4 and OP12 the output processing member OP by
way of the output controlling member DC, according to
20 a program input into the micro-computer MC When the
actuation signal outputting elements OP1, OP4 and OP12
receive the actuation signal from the micro-computer
MC, the grain flour supplying member 1 and the
kneading water supplying member 4 are actuated to
25 start operation and, at the same time, the electric

- 24 -

valve is by-passed. The operation of the grain flour supplying member 1 causes a grain flour batch corresponding to one meal (e.g. 65 g) to be supplied to the kneading member 2. By operation of the kneading water supplying member 4, the kneading water (e.g. 35 cc) is supplied to the kneading member 2 according to the programme. In the kneading member 2, the wheat flour is instantaneously hydrated by the kneading water and mixed therewith by means of the operation of the high speed rotating of the kneading member 2. The wheat flour passes through the kneading member 2 over about ten seconds and becomes a shaped substrate. The substrate ejected from the kneading member 2 is fed to the first nip roller 14 and the plate 27 of the substrate directing member 26 shown in Figure 5 pushes the substrate between closed rolls 14a and 14b according to the instruction signal supplied to the actuation signal output element OP6 according to the programming. The actuation signal from the element OP6 causes the first nip roller 14 to form a gap between rolls 14a and 14b and to start rotating. A coarse noodle substrate is thus generated.

- 25 -

The coarse noodle substrate thus created is fed to the cutting roller 17 by way of the second nip roller 15 and the finishing roller 16. The cutting roller 17 has, for example, twenty blades and creates raw
5 noodles having a thickness of 1.7 mm and a width of 2.7 mm.

The instruction signals are further supplied from the microcomputer MC to the actuation signal output
10 elements OP9 and OP10. The actuation signal output elements OP9 controls the rotating wheel 23 to begin intermittent rotation to locate the first boiling basket 25 beneath the cutting roller 17, and thereby the raw noodle elements are inserted into the first
15 boiling basket 25.

The data of the intermittent motion of the rotating wheel 23 is input to the microcomputer so that the movement of the first boiling basket 25 is stopped
20 until the insertion of the raw noodle elements finishes.

Next, the start sensor 42a further senses the arrival and passage of the second boiling basket 25. The
25 sensing signal of the start sensor 42a is supplied to

- 26 -

the microcomputer MC and thereby each portion of the grain flour supplying member 1 and the kneading water supplying member 4 is actuated by the identified operations of the above.

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The three further baskets are not disposed on the hanging hooks until one minute after the arrival of the next three customers. Accordingly, the start sensor 42a is not activated. During this period the raw noodles are not fabricated, although the rotating wheel 23 intermittently rotates until the next boiling basket arrives on the point 2E. Inexperienced operators, therefore, can fabricate the boiled noodles merely by hanging the boiling baskets 25 on the hooks 24, since the boiled noodles are automatically manufactured in accordance with the number of the baskets applied to the hooks (according to the number of customers.)

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In the boiling unit B, the finish sensor 42b senses that the first basket has arrived at point E (finishing portion of the boiling of the noodles) and supplies the finishing signal to the micro-computer MC. The microcomputer MC processes the finishing signal and thereafter supplies the control signals to

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- 27 -

the actuating signal output element OPS to indicate the finish of boiling by actuating the information device such as a buzzer or a chime. When the customer likes soft boiled noodles, the boiling basket must be removed from the boiling water at point E to achieve customer satisfaction.

Various examples of the manufactures boiled noodles according to the present invention are shown in Table 1. Table 1 shown data relating to Japanese noodles, buckwheat, Chinese style noodles and spaghetti which are obtained by the present invention. Table 2 illustrates the necessary boiling time intervals for boiling the noodles by the method of the present invention and by a prior art method. As is apparent from the Table 2, the boiled noodles can be manufactured according to the present invention during the very short time interval in the range of from 1/100 to 1/4,000 in comparison with that of the prior art.

Table 1

	Japanese noodle	Buckwheat	Chinese noodle	Spaghetti
Used grain flour	Wheatflour 100%	Buckwheat flour: 50% Wheatflour 50%	Wheatflour 100%	Wheatflour 100%
Kneading water	Salt. water. 7Be	Salt. water 2Be	Brine water 4Be	Water
Wheat flour (weight)	65 g	70 g	68 g	70 g
Volume of kneading water	35 ml	35 ml	35 ml	19 ml
Water (%)	54 %	50 %	51 %	27 %
Kneading time	8 sec.	8 sec.	8 sec.	8 sec.
Raw noodle manufacturing time	9 sec.	10 sec.	10 sec.	10 sec.
Thickness of raw noodle	1.7 mm	1.4 mm	1.4 mm	2.1 mm
Width of raw noodle	2.7 mm	2.0 mm	2.0 mm	2.1 mm
Boiling position	250°	94°	94°	125°
Boiling time	4 minutes	1.5 minutes	1.5 minutes	2 minutes

- 27B -

Table 2

		Japanese noodle	Buckwheat	Chinese-style noodle	Spaghetti
Time factor	Boiled noodle manufacturing time (present invention)	18 (sec)	18 (sec)	18 (sec)	18 (sec)
	Boiled noodle manufacturing time (Prior art)	4-16 (hours)	30-45 (minutes)	3-16 (hours)	20 (hours) including drying time
	Ratio of necessary times of the invention and prior art	$1/847 - 1/3,388$	$1/100 \approx 1/150$	$1/600 - 1/3,200$	$1/4,000$

Figure 9 shows a modification of the boiled noodle manufacturing apparatus of the present invention. The boiled noodle manufacturing apparatus of Figure 9 is provided with a raw noodle manufacturing unit A_1 of

- 28 -

the compressing outlet type. The boiled noodle manufacturing apparatus of Figure 9 does not differ much from that of Figures 1 to 8 except that a noodle element forming member 3A is of the compressing outlet type. In the Figure 9. The identified or corresponding parts shown in Figure 8 are illustrated by the same reference characters.

The noodle element forming member 3a comprises a cylinder 14A connected to a transferring end portion of a mixing member 2, a compressing plate 16A connected to a shaft 17A moved reciprocally by a reciprocal mechanism of an air cylinder or a gearing motor 17A and sliding reciprocally in the cylinder 14A. A die 26A is provided on an end portion of the cylinder 14A. Alternatively a screw-shaped flight can be employed instead of the compressing plate 26A. Furthermore, it is preferable to remove any residual air by connecting a pressure-reducing pump to the cylinder 14A. The die 26A has a plurality of shaped holes corresponding to spaghetti or Korean style ra'amen as desired, and is removably mounted in cylinder 14A. The outlet pressure of the noodle element forming member 3A is adjustable to the necessary pressure corresponding to the kind of

- 29 -

noodle. The compressing plate 16A is located initially on an upper end R during the supply of the noodle substrate and thereafter returns to the R position after moving toward a lower position when the compressing plate 26A reaches an inner surface of the die 26A. The noodle elements transferred from die 26A are received in the boiling basket 25. The reciprocal operation of the compressing plate 16A is controlled by instructions from the microcomputer MC. The boiled noodle manufacturing apparatus of the compressing outlet type fabricates one meal of the boiled noodles from the raw grain flour by the same method as that of the roll-type manufacturing apparatus. Additionally, the noodle element forming member 3A can be set horizontally instead of vertically.

The apparatus of Figure 9 fabricates the noodles in accordance with the starting and stopping operations based on the timings of the instructions memorised in the microcomputer MC, corresponding to the quantity of the grain flour substrate and the quantity of the kneading water to be added. The apparatus of Figure 9 has, accordingly, a very different feature from that of the apparatus of the prior art.

- 30 -

The present invention can also provide a boiled noodle manufacturing apparatus which is combined with two to five sets of raw noodle manufacturing units which have different types of the cutting roller, or two to five compressing outlet type machines, each of which has a different shape and size. These boiled noodle manufacturing apparatuses allow a reduced floor area to be utilized and hence increase the efficiency of the operation, while reducing the installation cost.

Figures 10 and 11 show a further embodiment of the boiled noodle manufacturing apparatus of the present invention. The apparatus comprises a raw noodle manufacturing unit for manufacturing raw Japanese noodles, a raw noodles manufacturing unit for fabricating the raw buckwheat and a boiling unit B. In Figures 10 and 11, like parts are identified by the same reference characters with those of Figures 1 to 3. In Figures 10 and 11, an alphanumeric character U represents the corresponding portion of a machine for manufacturing the Japanese noodles, character S shows the corresponding portion of a machine for fabricating the buckwheat. Furthermore, an alphanumeric character US represents a position for inserting the Japanese noodles into a boiling basket 25 a character UE represents a finishing position of boiling the

- 31 -

Japanese noodles, SS shows a position for inserting raw buckwheat into the boiling basket 25 and MS represents start instructing position.

5 In the boiled noodle manufacturing apparatus of
Figures 10 and 11, assuming that 10kg wheat flour is
stored in a grain flour supplying member 10; 10kg of
mixed grain flour (buckwheat flour: 70 %; wheat flour:
30 %) is stored in a grain flour supplying member 15;
10 8 litres of kneading water containing salt is stored
in a kneading water supplying member 18U, and 8 litres
of kneading water containing salt is stored in a
kneading water supplying member 18S. Under these
conditions, boiling water is heated by turning on a 10
15 kw electric heater by operating an automatic switch on
an operating panel (not shown in the drawing).

Under these conditions, it is possible to service six
customers by offering various kinds of noodles and
20 buckwheat, for example, a Tempura buckwheat, a Zaru
buckwheat, a hard boiled noodle, a Carrei noodle and a
Tempura noodle. As is shown in Figure 10, three
baskets 25 for receiving raw noodle elements which
require a long boiling interval are, in turn, hung on
25 a hook 24 of a rotating wheel 18 which rotate

- 32 -

intermittently. In this case, each handle of the noodle boiling baskets 25 is white in order to distinguish them. Next, three buckwheat boiling baskets 25 are, in turn, hung on the hooks 24 of rotating wheel 23. The handles 43 of the buckwheat boiling baskets are orange.

When the first noodle boiling basket 25 arrives at the boil finishing position MS, a boil finishing sensor senses the first noodle boiling basket 25 and generates an electrical sensing signal. The electrical sensing signal operates the control unit to actuate each of the grain flour supplying member 1U, a kneading water supplying member 4U and a kneading member 2U of the raw noodle manufacturing unit A_1 . By the operation of these members, the quantities of the wheat flour and the noodle kneading water corresponding to one batch are supplied to the kneading member 2U. The kneading member 2U produces a seasoned noodle substrate. The noodle substrate is applied to a first nip roller 14U after eight seconds. During this time interval the rolls of the nip roller 14U contact each other and close while the pushing plate is activated. After a given time interval, the

- 33 -

nip roller is operated by an instruction from the microcomputer MC (showing in Figure 7) until the rollers 14U forms a gap of 2.2 (mm) and the noodle substrate is produced therefrom. The noodle substrate generated by the first nip roller 14U is moved toward a second nip roller 15U and is rolled. The rolled substrate is moved toward a finishing roller 16U and a cutting roller 17U to form the raw noodle elements having a thickness of 1.7 mm, a width of 2.7 mm and a length of 22 cm, corresponding to the quantity of one meal after nine seconds. The raw noodle elements are received in the basket 25 stopping below the cutting roller 17U and thereafter rotating wheel 23 is intermittently rotated in response to the instructing signal from the microcomputer. In this manner, the raw noodle elements are, in turn, received into the second and third noodle boiling baskets.

When the fourth boiling basket 25 for boiling the buckwheat arrives at the boil finishing position MS, the boil finishing sensor detects the basket and generates a detecting signal. Each of the grain flour supplying member 1S, the kneading water supplying member 4S and the kneading member 2S is activated according to the programming of the microcomputer MC

- 34 -

of the control unit. By the activation of these members, the mixed grain flour corresponding to one meal is supplied to the kneading member 2S and thereafter a seasoned buckwheat substrate is produced from the kneading member 2S. The substrate from the kneading member 2S is stored in the front portion of the buckwheat manufacturing unit A₁ and the boiling unit B thereafter carries out the same operations as described above. In this manner, the raw buckwheat elements are, in turn, inserted into the fifth and sixth boiling baskets.

When the first boiling basket for boiling the Japanese noodle arrives at the noodle boiling finish position UE after four minutes, the informing device is operated in response to the sensing signal of the sensor to inform the finish of boiling to the operator. The operator can then remove the boiling basket from the boiling oven. The operator can thus offer excellent Japanese noodles or excellent buckwheat, since the Japanese noodles and the buckwheat have been boiled at the appropriate timings.

- 35 -

When each of the fourth to sixth boiling baskets for boiling the raw buckwheat elements arrive at the position SE after one minute and thirty seconds, the sensor detects the finish of boiling of the buckwheat and generates the informing signal.

When one customer likes hard boiled Japanese noodles, the third basket must be taken up from the boiling water as well as the second basket when the second basket arrives to the boil finishing position and thereafter the hard boiled Japanese noodle can be also offered to the customer after washing it.

Accordingly, good boiled noodles can be offered to the customers according to their requirements. In this manner, Japanese noodles can be provided during the same waiting time to six customers, since the Japanese noodle boiling baskets are inserted into the boiling baskets are inserted into the boiling oven prior to the buckwheat boiling baskets. The apparatus of Figures 10 and 11 can fabricate one meal of the various kinds of the boiled noodles during a very short time interval in connection with the prior art apparatus.

- 36 -

Furthermore, the present invention provides the manufacturing method and the apparatus which can fabricate not only the Japanese noodle, the buckwheat and ra'amen, but also the macaroni and the spaghetti according to the number of customers, and their specific requirements.

As explained in the foregoing, the present invention inter alia provides that;

(1) A raw grain flour and kneading water are automatically measured in every meal.

(2) In a kneading member having a high speed beater, grain flour is pulverised and kneading water is sprayed to achieve hydration instantaneously.

(3) Grain flour is forced to an inner wall of a cylindrical tube and a pulverised grain flour is created during a time interval such as seven seconds.

(4) Raw noodle elements are created from a noodle element forming member at nine to ten minutes.

- 37 -

(5) Raw noodle elements fabricated by the noodle element forming member are received by boiling baskets, and therefore the turbidity of the boiling water is avoided.

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(6) Complex operations of the apparatus are programmed within a computer and, therefore, unexperienced operators can easily perform the fabrication of noodles by means of carrying out easy operations such as hanging the desired number of boiling baskets, inputting the data of the kinds of noodle and the number of meal to control unit.

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CLAIMS

1. A method for manufacturing boiled noodles comprising steps of; fabricating raw noodle substrate by admixing a grain flour and kneading water; forming the so formed noodle substrate into noodle elements and; boiling the noodle elements in a boiling basket; characterised in that the end period of said steps is indicated by means of a signal obtained by sensing a position of said basket in a boiling oven, and in that the steps are started by a further signal indicative of the positioning of a the basket in the oven to receive a predetermined amount of noodle elements; thereby to fabricate a predetermined quantity of boiled noodles directly from a grain flour.

2. A boiled noodle manufacturing apparatus comprising in combination:
a raw noodle manufacturing unit including a grain flour supplying member for supplying and measuring grain flour, a kneading member for kneading said grain flour including a helical mixer and a blade, said kneading member being operatively connected to said grain flour supplying member, a kneading water supply member for supplying and measuring kneading water to said grain flour; and a noodle element forming member operatively connected to



said kneading member to form raw noodle elements and;

5 a boiling unit for boiling said raw noodle elements from said noodle element forming member said unit including a rotating wheel supporting a removable boiling basket for receiving the raw noodle elements and being intermittently rotatable, a sensor means producing a signal indicative that the boiling basket has passed through a predetermined position, a controlling unit generating a signal corresponding to
10 a predetermined amount of noodles;

thereby controlling said raw noodle manufacturing unit and said boiling unit, whereby the predetermined batches are fabricated from the grain flour by controlling the operation of said raw noodle
15 manufacturing unit and said boiling unit by said signals.

3. An apparatus as claimed in claim 2, wherein said noodle element forming member comprises a first
20 nip roller for coarsely rolling a noodle substrate produced by the kneading member, a second nip roller for rolling the substrate from said first nip roller, a finishing roller for rolling the substrate rolled by said second nip roller, and a cutting roller for
25 slicing said noodle substrate from said finishing roller to form raw noodle elements, wherein said boiled noodles manufacturing apparatus comprises a



- 40 -

single raw noodle manufacturing unit or a plurality of raw noodle manufacturing units each of which is provided with cutting rollers of different configuration.

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4. An apparatus as claimed in claim 2 which comprises one or a plurality of raw noodle manufacturing units each having a raw noodle element forming member for manufacturing raw noodle elements and a boiling unit for boiling said raw noodle elements, wherein each of said raw noodle element forming members of said plurality of raw noodle manufacturing units comprises a pressing means for compressing a kneaded grain flour from a kneading member, a cylindrical tube communicating with said kneading member, and an outlet plate, the outlet plate of each of said plurality of raw noodle manufacturing units having dies of a different size from each other.

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5. An apparatus as claimed in claim 2 which comprises a combination of one to five roller type raw noodle manufacturing units, one to five compressing outlet type raw noodle manufacturing units, and one boiling unit for boiling raw noodle elements fabricated from said units.



- 41 -

6. An apparatus as claimed in claim 3 to 5,
wherein said first nip roller of the noodle element
forming member is able to form a gap, and a gating
member for making the first nip roller form the gap,
5 whereby said gap is opened and closed by relative
movement of said roll and said gating member.

7. An apparatus as claimed in claim 6, wherein
said gating member comprises a pushing plate adapted
10 to activate the rolls of said first nip roller when
said gap is either closed or open.

8. An apparatus as claimed in any one of claims
2 to 5, comprising a controlling unit including a
15 microcomputer storing data indicative of desired
timings, whereby each of the operations is carried out
at a set timing; data indicative of the predetermined
number of meals and the types of the noodle; and
wherein the microcomputer generates a signal in
20 response to the sensor means to control operations
including each of the automatic measuring and
supplying operations of said grain flour supplying
member, and said kneading water supplying member;
opening and closing and operation of the gap between
25 the first nip roller, starting and stopping operations



- 42 -

of the second nip roller, finishing roller and the cutting roller and activating the compressing outlet plate or the compressing screw, resetting the compressing outlet plate or compressing screw, the intermittent rotation of the rotating wheel of the boiling unit and starting and stopping of an informing device in the form of an indicating alarm or a buzzer.

9. An apparatus as claimed in any of claims 2 to 5, wherein said sensor means includes a plurality of sensors arranged, respectively, at a starting position representative of the start of the apparatus and a boiling finish position representative of the finish of the boiling step, and wherein said boiling unit includes a plurality of boiling baskets having, respectively, different shaped portions to be sensed by said sensors.

10. Apparatus as claimed in claim 2 and substantially as herein described with reference to and as/or as illustrated in the accompanying drawings.

11. A method according to claim 1 and substantially as hereinbefore set forth with reference



- 43 -

to, and/or as illustrated in the accompanying
drawings.
