

Method for Manufacturing Comb-Shaped Toothpick

TECHNICAL BACKGROUND

The present invention relates to a method for manufacturing a comb-shaped toothpick and, more particularly, to a method for processing a comb-shaped toothpick surface.

BACKGROUND

Please refer to FIG. 1 which shows a cross sectional view of a conventional comb-shaped toothpick. Most of the designs of comb-shaped toothpicks (or a row of toothpicks) currently available on the market are the same as the shape disclosed in Taiwan Utility Model No. M304327 entitled “SEPARABLE PLATE-LIKE TOOTHPICK STRUCTURE”, which is to produce a continuous but separable comb-shaped (or row-like) design. When viewed from a side of the shape, the toothpick 60 includes a grip section 61 and a sharp tooth picking section 62 at a front end thereof. The bottoms of a plurality of toothpicks 60 are connected to form a continuous shape of a comb (or row-like) during formation of the toothpicks 60. When in use, a toothpick 60 is pulled away from a side of the comb-shaped (or row-like) continuous shape. As can be seen from the cross section of the front view, a single toothpick 60, after separation from the toothpicks 60, has a tip 601 on a top end thereof, such that the toothpick 60 tapers upwards when viewed from the cross section of the front view. In actual use, the toothpick 60 having smooth, upwardly tapering outer sides, however, provides insufficient structural strength and is apt to break.

Furthermore, in the design of the shape of the toothpick 60, only the tooth picking section 62 at the front end of the toothpick 60 can be used to remove food residue from between the teeth. The food residue stuck on the gum surfaces can only be removed by repeatedly using the tooth picking section 62, such that the oral epidermis is apt to be stabbed by the sharp tooth picking section 62 during picking, which lacks safety and is apt

to injury and become infected. This is because, except the tip of the above conventional toothpick, the two sides of the toothpick 60 have no auxiliary shapes for contacting with the surfaces of the teeth during various movement orientations of the toothpick.

Furthermore, the shape of the two sides of the conventional toothpick 60 is of a smooth design, and the surface strength of the smooth surfaces is insufficient. Thus, when the bottom of the toothpick is separated from the comb-shaped (row-like) continuous shape for use, the strength of the two sides of the toothpick 60 is insufficient, such that the user would feel the toothpick 60 is too soft during tooth picking and, thus, could not exert a corresponding force for tooth picking. As a result, the toothpick 60 of this type provides convenient use, but the utility is poor.

BRIEF SUMMARY OF THE INVENTION

The present invention is a method for manufacturing a comb-shaped toothpick. The method includes a first formation step including positioning a wooden block by a positioning device, moving the wooden block to a predetermined cutting position, and cutting the wooden block by a rotary cutter, with the rotary cutter including a plurality of dies on a surface thereof, with each of the plurality of dies including a top end having a blade, with each of the plurality of dies including two sides each having an intermediate portion with at least one stepped cutting portion, with a cutter groove defined in a connection area between two adjacent dies, with the wooden block cut by the rotary cutter to form a plurality of toothpick shapes, with each of the plurality of toothpick shapes including a top edge formed by the cutter groove, a corresponding number of stepped portions formed by the stepped cutting portions, and a bottom groove formed by the blade; a second formation step including, after the first formation step is accomplished, cutting the plurality of toothpick shapes along a predetermined curve or slope beginning from a predetermined location spaced from an edge of an end of the plurality of toothpick shapes towards the end, such that two sides of the top edge, two sides of the at least one stepped

portion, and two sides of the bottom groove of each of the plurality of toothpick shapes taper towards the end to form a front end; and a cutting step including controlling a cutter to cut the plurality of toothpick shapes after the first formation step and the second formation step, wherein a cutting depth is larger than a depth from the top edge to the
5 bottom groove of the toothpick shape.

Preferably, the positioning device includes a pressing rod and an actuation face. The pressing rod is controllable to position the wooden block on the actuation face. The actuation face moves the positioned wooden block to the predetermined cutting position.

Preferably, in the second formation step, the two sides of the top edge, the two
10 sides of the at least one stepped portion, and the two sides of the bottom groove of each of the plurality of toothpick shapes are cut with the same spacing and the same radius of curvature tapering towards an end to form a front end.

Preferably, the top edge, a protruding edge of the at least one stepped portion, and a bottom of the bottom groove of each of the plurality of toothpick shapes form the shortest
15 length of each side. The top edge, the protruding edge of the at least one stepped portion, and the bottom of the bottom groove have spacings therebetween on the shortest length on each side. The spacings are equal to the shortest distance spacings between protrusive points of each stepped cutting portion, the blade, and the cutter groove.

Preferably, a polishing step is carried out before the cutting step. The polishing
20 step includes controlling a polishing wheel to move along a path of the first formation step and the second formation step, polishing the surfaces of the plurality of toothpicks after cutting by the first formation step and the second formation step.

Preferably, the shortest length of each side of the toothpick shape and a longitudinal axis of the toothpick shape have an angle therebetween, and the angle is
25 between 10° and 20°.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic perspective view of a conventional comb-shaped toothpick structure.

FIG. 2 is a diagrammatic view illustrating processing of a preferred embodiment according to the present invention.

5 FIG. 3 is a diagrammatic view illustrating partial processing of the preferred embodiment according to the present invention.

FIG. 4 is a diagrammatic side view illustrating partial surface processing of the preferred embodiment according to the present invention.

FIG. 5 is another diagrammatic side view illustrating partial surface processing
10 of the preferred embodiment according to the present invention.

FIG. 6 is another diagrammatic view illustrating partial processing of the preferred embodiment according to the present invention.

FIG. 7 is a diagrammatic perspective view of the structure according to the present invention.

15 FIG. 8 is a diagrammatic view illustrating use of the preferred embodiment according to the present invention.

FIG. 9 is another diagrammatic view illustrating use of the preferred embodiment according to the present invention.

Reference numbers:

20	1	wooden block	10	toothpick
	101	top edge	102	stepped portion
	103	bottom groove	11	front end
	20, 20'	rotary cutter	21	die
	211	blade	212	stepped cutting portion
25	213	cutter groove	22	driving shaft
	30	polishing wheel	40	positioning device

41	pressing rod	42	actuation face
50	cutter	60	toothpick
601	tip	61	grip section
62	tooth picking section	1S	to-be-cut face
5	Hc cutting depth	Hd	depth from top edge to bottom groove
	T tooth		
	d1/d2/d3/d4 spacing	R1/R2/R3/R4	radiuses of curvatures
	θ		angle between the shortest side length and the longitudinal axis

10 DETAILED DESCRIPTION

With reference to FIGS. 2-6 and 8 showing diagrammatic views illustrating partial processing of a preferred embodiment according to the present invention, to solve the disadvantages of the design of the conventional comb-shaped toothpicks and to provide more beneficial production, the present invention provides the following steps in the production procedures.

A first formation step includes positioning a to-be-processed wooden block 1 by a positioning device 40. In this embodiment, the positioning device 40 includes a pressing rod 41 and an actuation face 42. The pressing rod 41 can be controlled, by a mechanical provision, to position the wooden block 1 on the actuation face 42 by pressing. The actuation face 42 moves the positioned wooden block 1 to a predetermined cutting position. After the wooden block 1 is positioned, a predetermined to-be-cut face 1S of the wooden block 1 is cut by a rotary cutter 20. The rotary cutter 20 includes a surface processed to form a plurality of dies 21. As can be seen from FIG. 3, the dies 21 are arranged in a row in sequence. Each die 21 includes a top end having a blade 211. Each of two sides of each die 21 includes an intermediate portion having at least one stepped cutting portion 212. In this embodiment, the shortest distances between the protrusive points of each stepped

cutting portion 212, the blade 211, and the cutter groove 213 form the shortest distance spacings, respectively. A most inwardly concave cutter groove 213 is defined in a connection area between two adjacent blades 211. After the to-be-cut face 1S has been cut by the dies 21 of the rotary cutter 20, a plurality of toothpick 10 shapes is formed. Each
5 toothpick 10 shape has two sides and includes a top edge 101 formed by the cutter groove 213 of the die 21, a corresponding number of stepped portions 102 formed by the stepped cutting portions 212, and a bottom groove 103 formed by the blade 211. The length of the to-be-cut face 1S subjected to the rectilinear rolling cutting of is the predetermined length of the toothpick 10. In this embodiment, the top edge 101, a protruding edge of the at least
10 one stepped portion 102, and a bottom of the bottom groove 103 of the toothpick 10 shapes form the shortest length of each side. The top edge 101, the protruding edge of the at least one stepped portion 102, and the bottom of the bottom groove 103 are located on the shortest length of the side. In this embodiment, the stepped portions 102 form three stepped portions 102A/102C/102E and 102B/102D/102F of equal height respectively on the
15 shortest side lengths of the two sides. The top edge, edges of the three stepped portions 102A/102C/102E and 102B/102D/102F of equal height, and the bottom of the bottom groove 103 form the shortest lengths of each side of spacings d1/d2/d3/d4. The spacings d1/d2/d3/d4 are equal to the shortest distance spacings d1/d2/d3/d4 between protrusive points of each stepped cutting portion 212, the blade 211, and the cutter groove 213, as
20 shown in FIG. 4. For a single toothpick shape 10, the shortest length of each side of the spacings d1/d2/d3/d4 and the longitudinal axis of the toothpick shape 10 have an angle θ therebetween. The angle θ is between 10° and 20° , which is the design most suitable for tooth picking. Furthermore, the rotary cutter 20 is controlled by an external power device through a driving shaft 22.

25 As shown by FIG. 4 taken from x-x' plane, a second formation step is carried out after the first formation step. After the to-be-cut face 1S has been subjected to the

rectilinear rolling cutting by the rotary cutter 20, the toothpick 10 shapes are optionally cut from a middle of the toothpick 10 shapes towards a predetermined location spaced from an edge of an end or each end of the toothpick 10 shapes by the rotary cutter 20 which is controlled to move along a predetermined curve towards an end to a location
5 indicated by the rotary cutter 20'. In this embodiment, the top edge 101, the at least one stepped portion 102, and the bottom of the bottom groove 103 are cut on each side with the same spacings $d1/d2/d3/d4$ and the same radius of curvature towards an end to form a front end 11. The radiuses of curvatures of cutting are $R1/R2/R3/R4$.

As shown by FIG. 5 taken from x-x' plane, a polishing step includes controlling
10 a polishing wheel 30 to move along the path (indicated by 30-30') in the first formation step and the second formation step to polish the processed surfaces of the toothpicks 10 after cutting by the first formation step and the second formation step.

As shown by FIG. 6, a cutting step includes controlling a cutter 50 after the first formation step, the second formation step, and the polishing step to proceed with cutting
15 on the processed surfaces of the toothpicks 10. The cutting depth H_c is larger than the depth H_d from the top edge 101 to the bottom groove 103.

FIGS. 7-9 show the resultant toothpick of the preferred embodiment according to the present invention. The toothpicks 10 arranged in a row like a comb resulting from processing by the method according to the present invention still has the advantage of
20 convenient carriage. The at least one stepped portion 102 on each side of a toothpick 10 separated from other toothpicks 10 can be used to pick teeth. Not only the front end 101 can be used to remove food residue, the toothpick 10 can be moved up and down, such that the at least one stepped portion 102 on each side can grind off the food residue stuck on the surface of the tooth T, thereby cleaning the surface of the tooth T.

CLAIMS

1. A method for manufacturing a comb-shaped toothpick, characterized by comprising:

a first formation step including positioning a wooden block by a positioning device, moving the wooden block to a predetermined cutting position, and cutting the wooden block by a rotary cutter, with the rotary cutter including a plurality of dies on a surface thereof, with each of the plurality of dies including a top end having a blade, with each of the plurality of dies including two sides each having an intermediate portion with at least one stepped cutting portion, with a cutter groove defined in a connection area between two adjacent dies, with the wooden block cut by the rotary cutter to form a plurality of toothpick shapes, with each of the plurality of toothpick shapes including a top edge formed by the cutter groove, a corresponding number of stepped portions formed by the stepped cutting portions, and a bottom groove formed by the blade;

a second formation step including, after the first formation step is accomplished, cutting the plurality of toothpick shapes along a predetermined curve or slope beginning from a predetermined location spaced from an edge of an end of the plurality of toothpick shapes towards the end, such that two sides of the top edge, two sides of the at least one stepped portion, and two sides of the bottom groove of each of the plurality of toothpick shapes are cut towards the end to form a front end; and

a cutting step including controlling a cutter to cut the plurality of toothpick shapes after the first formation step and the second formation step, wherein a cutting depth is larger than a depth from the top edge to the bottom groove of the toothpick shape.

2. The method for manufacturing a comb-shaped toothpick as claimed in claim 1, characterized in that the positioning device includes a pressing rod and an actuation face, the pressing rod is controllable to position the wooden block on the

actuation face, and the actuation face moves the positioned wooden block to the predetermined cutting position.

3. The method for manufacturing a comb-shaped toothpick as claimed in claim 1, characterized in that in the second formation step the two sides of the top edge, the two sides of the at least one stepped portion, and the two sides of the bottom groove of each of the plurality of toothpick shapes are cut with the same spacing and the same radius of curvature tapering towards an end to form a front end.

4. The method for manufacturing a comb-shaped toothpick as claimed in claim 1, characterized in that the top edge, a protruding edge of the at least one stepped portion, and a bottom of the bottom groove of the plurality of toothpick shapes form a shortest length of each side, the top edge, the protruding edge of the at least one stepped portion, and the bottom of the bottom groove have spacings therebetween on the shortest length of each side, and the spacings are equal to the shortest distance spacings between protrusive points of each stepped cutting portion, the blade, and the cutter groove.

5. The method for manufacturing a comb-shaped toothpick as claimed in claim 1, characterized in that a polishing step is carried out before the cutting step, the polishing step includes controlling a polishing wheel to move along a path of the first formation step and the second formation step, polishing the surfaces of the plurality of toothpicks after cutting by the first formation step and the second formation step.

6. The method for manufacturing a comb-shaped toothpick as claimed in claim 3, characterized in that the shortest length of each side of the toothpick shape and a longitudinal axis of the toothpick shape have an angle therebetween, and the angle is between 10° and 20°.