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(54) **SLIDE FASTENER CHAIN WITH ENHANCED VISIBILITY**

(57) The present invention proposes a chain (1) for forming a part of slide fastener (1000), comprising two stringers (100) having respective tapes (102) provided with cords (101) along one edge of each tape (102), said cords (101) being provided with a plurality of elements (10) regularly distributed along said respective cords (101), each one of said elements (10) having a first side (11) and a second side (12) substantially opposite to said first side (11), a length (L) along a first direction (x), the length (L) corresponding to a distance between a point of an edge of an end point (13) on a head portion (15) furthest from a leg portion (16) and the point of an edge of an end point (14) of the leg portion (16) furthest from the head portion (15), a height (H) on a second direction (z) substantially parallel to a main central axis (A) of a respective cord (101) and substantially orthogonal to the first direction (x). At least first side (11) of one or more of the plurality of elements (10) on at least one of the stringers (100) comprises a treated portion (50) provided with a plurality of scratches (51), the treated portion (50) extends in the first direction (x) of the one or more of the plurality of the elements (10). The present invention further proposes a method for preparation of such chain.

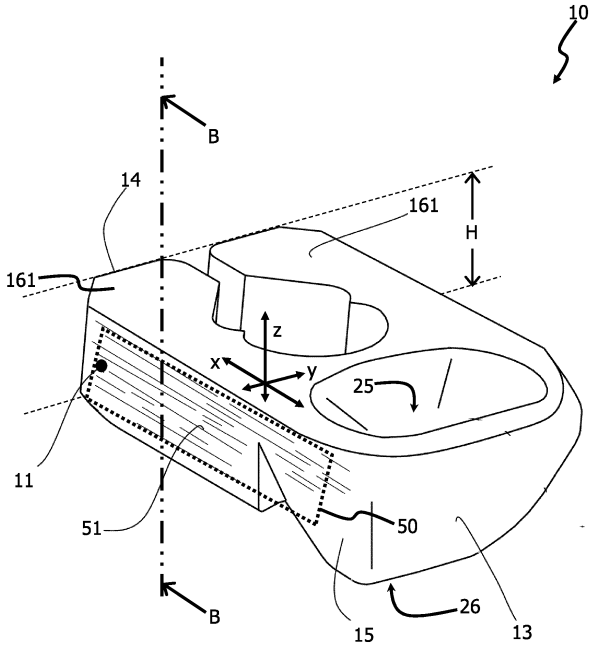

Figure 4

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Description

Technical Field of the Invention

[0001] The present invention relates to slide fasteners, more specifically to chains for slide fasteners, and yet more specifically to chains for slide fasteners with metallic elements with enhanced visibility, and a preparation method thereof.

Background of the Invention

[0002] Slide fasteners are mostly used on articles such as garments or bags carried by their users. Their visible appearance is usually a part of the appearance of such article. The importance of visible appearance is not only an aesthetic feature, but it is also related to functional aspects of the respective article, such as safety and visible confirmation of the satisfactory performance of the slide fastener. This invention offers an improvement over previous solutions.

[0003] Thus, it is desired to provide a functional chain for slide fasteners. Accordingly provision of a reliable, simple, low-cost and high precision method for obtainment of such chains is also important.

Objects of the Invention

[0004] The primary object of the present invention is to overcome the abovementioned shortcomings of the prior art.

[0005] Another object of the present invention is provision of slide fasteners having elements with enhanced visibility for user safety, and of a low-cost and highly consistent method for manufacturing the same.

[0006] Another object of the present invention is provision of slide fastener chains having elements with enhanced visibility for user safety, and of a low-cost and highly consistent method for manufacturing the same.

[0007] Another object of the present invention is provision of enhanced ease of use and prolonged service life to a slide fastener.

Summary of the Invention

[0008] The present invention proposes a chain for forming a part of slide fastener, comprising two stringers having respective tapes provided with cords along one edge of each tape, said cords being provided with a plurality of elements regularly distributed along said respective cords, each one of said elements having a first side and a second side substantially opposite to said first side, a length along a first direction, the length corresponding to a distance between a point of an edge of an end point on a head portion furthest from a leg portion and the point of an edge of an end point of the leg portion furthest from the head portion, a height on a second direction substantially parallel to a main central axis of a respective cord and substantially orthogonal to the first direction. At least first side of one or more of the plurality of elements on at least one of the stringers comprises a treated portion provided with a plurality of scratches, the treated portion extends in the first direction of the one or more of the plurality of the elements. The present invention further proposes a method for preparation of such chain.

Brief Description of the Figures

[0009] The figures, a brief explanation of which is herewith provided, are solely intended for providing a better understanding of the present invention and are as such not intended to define the scope of protection or the context in which said scope is to be interpreted in the absence of the description.

Figure 1 is a perspective view of an exemplary slide fastener including a chain according to the present invention.

Figure 2 is a perspective view schematizing the preparation of an exemplary stringer by crimping of a plurality of elements along a cord provided on an edge of a tape.

Figure 3 is a schematic plan view emphasizing an exemplary element attached to a cord on a stringer in a chain according to the present invention.

Figure 4 is a schematic perspective view of a single element in a chain according to the present invention, wherein parts of the chain other than said element are not shown for the purpose of emphasizing several features of the element.

Figure 5 is a detail on a B-B section view of the element shown in the Fig.4, emphasizing the Roughness on a treated portion of a first side of the element.

Figure 6 is a close-up front view of a chain according to the present invention where the presence of a plurality of scratches on treated portions are schematically emphasized.

Figure 7, shows a schematic cross-sectional view of an element in contact with an abrasive means during the abrading, the section of the element shown is equivalent to a B-B section view of the element shown in Fig.4

Detailed Description of the Invention

[0010] Referring now to the figures outlined before, the present invention proposes a chain (1) for forming a part of slide fastener (1000) which comprises two stringers (100) having respective tapes (102) provided with cords (101) along one edge of each tape (102), the cords (101)

being provided with a plurality of elements (10). The elements (10) are distributed regularly along the respective cords (101).

[0011] The elements (10) are adapted to detachably engage with those of the opposing stringer. Each one of the elements (10) has a first side (11) and a second side (12) substantially opposite to the first side (11). Each element (10) has an:

- upper side with an upper side surface (21),
- a lower side with a lower side surface (22),
- a front side with a front side surface (23) and
- rear side with rear side surface (24).

[0012] The upper side surface (21) connects respective upper edges of the first side (11) and the second side (12). The lower side surface (22) connects the respective lower edges of the first side (11) and the second side (12). The front side surface (23) is the surface most distant from the tape (102) to which a respective element (10) is secured. Rear side surface (24) is provided opposite to the front side surface (23).

[0013] Each one of the elements (10) further have a height (H) on a second direction (z) substantially parallel to a main central axis (A) of a respective cord (101). When the stringer is pulled from its both ends so that a plurality of elements thereon are substantially aligned on a line, the second direction (z) can be considered corresponding to an alignment direction of two or more successive elements (10) on a respective cord (101). The elements can include a metallic material, such as a metal or metal alloy including any of aluminum, aluminum alloy, copper or copper alloy such as brass selected as desired. Fig.1 shows a perspective view of an exemplary slide fastener including a chain according to the present invention, detail (C) from which being schematically emphasized in Fig.6.

[0014] Each one of the elements (10) has a head portion (15) configured to allow detachable attaching cooperation with elements of a respective (opposing) stringer and a leg portion (16) configured to allow the element to be attached to the cord (101) on the tape (102) of the stringer (100) to which it is to be attached. When, through an inner edge of the cord (101), that is the edge of the cord (101) to which elements (10) are attached, an imaginary line (i) extends along the third direction (y) to respective surfaces of the first side (11) and of the second side (12), the head portion (15) of the element (10) extends from the imaginary line (i) to the front side surface (23) of the element (10) that is the end point (13) of the head portion (15) and the leg portion (16) extends from the imaginary line (i) to the rear side surface (24) that is the end point (14) of the leg portion (16). In the embodiment disclosed herein, the head portion (15) has an engagement recessed portion (25) which is recessed at the upper side surface (21) of the element (10) and an engagement concave portion (26) which protrudes from the lower side surface (22) of the element (10) formed on the opposite side of the upper side surface (21) of the element (10). Each element (10) further has a length (L), measured in the width direction of the fastener tape, corresponding to a distance between the point of an edge of the end point (13) on the head portion (15) furthest from the leg portion (16) and the point of an edge of the end point (14) on the leg portion (16) furthest from the head portion (15), measured in a direction perpendicular to a main axis (A) of the cord (101). The leg portion (16) ensures the attachment of the element (10) to the cord (101) and comprises at least two legs (161) provided on the leg portion (16) which are crimped around the cord (101) and the tape (102). Other embodiments which utilise different configurations of recesses and protrusions will be apparent to the person skilled in the art.

[0015] In the chain according to the present invention, at least a first side (11) of one or more of the plurality of elements (10) on at least one of the stringers (100) comprises a treated portion (50) provided with a plurality of scratches (51), the treated portion (50) extending in the first direction (x) and preferably for a length that is at least one half of the length (L) of the first side (11) of the one or more of the plurality of the elements (10).

[0016] The locations of the plurality of scratches may extend in the second direction (z) for a distance at least one half of the height (H) of the element, preferably substantially along the height (H) of the element. The distance between juxtaposed scratches may be regular or irregular or may be a combination thereof. In some embodiments the treated portion (50) comprises at least a quarter of the area of the first side of the element (10), preferably the area of the treated portion (50) is greater than 50% of the area of the first side, more preferably substantially the whole of the side corresponds to the treated portion (50). The treated portion (50) may be formed by abrasion.

[0017] In an embodiment of the chain according to the present invention, the treated portion (50) has been measured by an optical profiler measuring device known as a ZeGage (OMP-0571A) made by Zygo Corporation. In this embodiment, the treated portion (50) is formed on the first side (11) and an optical profile of the condition of the surface of the treated portion (50) was obtained and measurements were taken from the treated portion (50) in the second direction (Z) measuring between the first and second sides.

[0018] As a result, it was identified that the treated portion (50) may have a Maximum Height of the Profile (R_y) value of 0.050 mm or less in a direction extending between the first and second sides (11, 12), the direction being substantially parallel to a third direction (y) which is substantially perpendicular to both the second direction (z) and first direction (x). Preferably the Maximum Height of the Profile (R_y) has a value of 0.010 mm or less, more preferably 0.001 mm or less.

[0019] The treated portion (50) may also have a roughness average (R_a) of 0.005 mm or less in a direction extending between the first and second sides (11, 12). It is preferable that the Roughness Average (R_a) is 0.001 mm or less, more preferably 0.0005 mm or less.

[0020] Also the second side (12) may be provided with such a treated portion (50).

[0021] In an embodiment according to the present invention, a first side (11) and/or second side (12) that contains a treated portion (50) of the plurality of elements (10) may be provided with a resin. Preferably the resin is applied to at least the whole of each treated portion (50), more preferably the resin is applied to the whole of each side which comprises a treated portion (50). The provision of resin corresponds to at least partly lacquering the elements (10). The resin is preferably transparent.

[0022] The present invention accordingly proposes a slide fastener (1000) comprising an embodiment of the chain (1) as described above. The slide fastener (1000) further comprises a slider (90) and may further comprise end stops (60) positioned next to a final element at one or more of the ends of rows of the elements (10) as is known in the art.

[0023] The present invention further proposes a method for treatment of a chain (1) as described above. The method is a part of a process for preparation of a slide fastener (1000). The chain (1) comprises two stringers (100) engaged to each other through respective pluralities of cooperating elements (10) distributed along respective cords (101) of each stringer (100).

[0024] Exemplary provision of a cord with elements is schematically depicted in Fig.2, which attachment method being available especially for elements formed from metallic material. Such elements are usually prepared by cutting an elongate body (80) (usually a metallic body) with rather roughly cut side surfaces (81). Cut surfaces generally include burrs and ridges, which may also impinge on the edges of the first and second sides of the element (11, 12), that impede reflection of light and smoothness when sliding a slider thereon. The chain according to the present invention also counteracts these issues, and it is enabled by a method as described below.

[0025] The method according to the present invention involves bringing the chain (1) into proximity with an abrasive means adapted to face a first side (1a) of the chain (1) and thereby to enable contact with a first side (11) of an element (10) when aligned with such element (10), such that one or more first sides (11) of the plurality of elements (10) are brought into contact with the abrasive means and thereby abraded. This step is performed to an extent in which a length, which is preferably at least a half of a length (L) of the first side (11) of the element selected from the respective plurality of elements (10) is exposed to abrasion; the length (L) corresponding to a point of an edge of an end point (13) on a head portion (15) furthest from a leg portion (16) and the point of an edge of an end point (14) of the leg portion (16) furthest from the head portion (15) of the respective element. In other words, the length (L) corresponds to the maximum extension of an element parallel to the first direction (x).

[0026] The abrasive means may be stationary, and the chain (1) may be guided on the abrasive means continuously or discontinuously in a direction substantially perpendicular to a central axis (A) of one of the cords (101), such that the chain (1) is able to be rubbed by the abrasive means.

[0027] Alternatively, the abrasive means may be moved, in which case the chain (1) may travel along a second direction (z) which is substantially parallel to a central axis (A) of one of the cords (101), and when the elements approach the abrasive means in this manner, the abrasive means may be moved perpendicularly to the second direction (z) which is the direction of movement of the chain.

[0028] The movement of the abrasive means may be in the form of an oscillation or vibration by reciprocations along the first direction (x) across the second direction (z). Alternatively, the movement of the abrasive means may be a rotation such that the abrasive means is approached tangentially to the side of an element to be treated.

[0029] Accordingly, a version of the method according to the present invention includes moving the abrasive means in a first direction (x) thereby the contact between the abrasive means and respective element(s) is substantially tangential relative to the first side (11) of (each) respective element(s) (10). In such a variation of the method, the first side (10) of each respective element can be provided with scratches (51) substantially along the first direction (x). The elements may be successively brought into contact with the abrasive means.

[0030] For an enhanced process economy in terms of simplicity, hardware costs and service life, the movement of the abrasive means can be a rotational movement.

[0031] In case where the movement of the abrasive means is rotational, the rotational movement can be arranged to be around an axis substantially parallel to the second direction (z). For instance, the abrasive means may provide a disk-like or a wheel-like means which has a predetermined thickness, and the abrasive portion which has the shape of the disk-like or wheel-like means has a rotating shaft member which rotates about a shaft penetrating its centre. It is preferable that the predetermined thickness of the abrasive portion is greater than the pitch of two elements, more preferably the thickness of the portion is two elements. As a result, the element(s) to be abraded synchronically contact an outer peripheral surface of the abrasive portion over at least two elements so that the surface of each said element is abraded in a stable condition.

[0032] This version of the method enables subjecting respective elements to abrasion for a longer time with a fixed speed of the movement of the chain relative to the abrasive means in the second direction (z). In this version, individual scratches within the plurality of scratches (51) can be formed substantially along the first direction

(x).

[0033] The elements (10) to be provided with a treated portion (50) may be brought into contact with the abrasive means either simultaneously, in successive groups or be processed as successive individuals or spaced regularly or otherwise.

[0034] Here, the term "abraded" can be interpreted as "is eroded irregularly" or "produces undulation" in a third direction (y) extending between the first and second sides and being substantially perpendicular to both the second direction (z) and the first direction (x). By passing such abrasive means against the one or more elements in this way, a respective treated portion of a respective element becomes abraded, since an amount of the material forming the element gets removed or displaced, leading to a scoring of the element and the formation of scratches (or grooves) in the treated portion (i.e. an abraded surface portion).

[0035] A schematic perspective view of a single element in a chain according to the present invention is shown in the Fig.4, wherein parts of the chain other than a single element are not shown in order to emphasize several features of the element. A detailed cross-section of the element along the line B-B shown in the Fig.4 is schematized in the Fig.5, emphasizing one possible embodiment of the Maximum Height of the Profile (R_y) on a treated portion of a first side of the element. A close-up front view of a chain according to the present invention is exemplified in Fig.6, wherein the presence of a plurality of scratches on treated portions is schematically emphasized.

[0036] The scratches or grooves may or may not be visible to the naked eye on close examination; but when viewed by the naked eye from a distance greater than 30 cm tend to provide a smoothed visible appearance to the element, i.e. have an effect of reflecting a greater amount of light than a surface without a treated portion (50) and so appearing to cause the relevant element surface to have a brighter burnish or to gleam with an increased brightness.

[0037] This effect provides an enhanced visibility to the chain, thereby providing an enhanced safety to a user e.g. whilst walking or bicycling. The advantages related to the present invention are available when at least a half of the length (L) of one or more respective sides (i.e. a first side or both first and second sides) of respective elements (10) include a treated portion (50) provided with the plurality of scratches (51) along the first direction (x) which is different than the second direction (z). The treated portion (50) may be formed by abrasion.

[0038] Another benefit of the invention is to provide a smooth feel to the element (10). As seen in Fig.2, the elements (10) are usually prepared by cutting an elongate body (80) with rather roughly cut side surfaces (81). As a result, a ridge line (82) along the ridge formed at the intersection of the front side surface (23) and the first side (11) or second side (12), and along the rear side surface (24) and first side (11) or second side (12) have relatively sharp edges. However as exemplified in Fig.3, the ridge lines between the front side surface (23) and the first side (11) and between the rear side surface (24) and the first side have been smoothed by provision of the ridge line with a radius, thereby obtaining a radial ridge line (83). Some of the lengths of individual scratches extend to the radial ridge line (83), but the detritus and deformity that is formed as the abrasive means approaches the elements is not retained by the sharp ridge line but is forced into or falls into the radial ridge line (83) and so the occurrence of burrs is prevented or reduced in comparison to the formation of scratches caused by a movement of the abrasive means or the elements (10) against the abrasive means in the second direction (z), that is in a direction substantially perpendicular to the plurality of scratches exemplified in Fig.4 to Fig.6.

[0039] Another benefit of the invention is that the chain (1) according to the present invention is smooth to the touch when stroked in the first direction (x) because the scratches are provided substantially along the first direction (x).

[0040] In the method according to the present invention, at least a half of a length (L) of the first side (11) of the respective plurality of elements (10) is exposed to abrasion. The length (L) corresponds to a distance between the point of an edge of the end point (13) on the head portion (15) furthest from the leg portion (16) and the point of an edge of the end point (14) on the leg portion (16) furthest from the head portion (15) measured in a direction perpendicular to a main axis (A) of the cord (101).

[0041] In a variation of the method according to the present invention, at least 75% of the length (L) of the first side (11) is exposed to abrasion. Thus, in an embodiment of the chain according to the present invention, at least 75 percent of the length (L) of the first sides (11) of the plurality of the elements (10) may include a treated portion (50) provided with a plurality of scratches (51) along a first direction (x) which is different from the second direction (z).

[0042] In a variation of the method according to the present invention, the abrasion is applied to an extent in which a Maximum Height of the Profile (R_y) value of 0.050 mm or less, or a Roughness Average (arithmetic average roughness, R_a) value of 0.005 mm or less is obtained within a treated portion (50) on a first side (11) of the element (10). To this end, the abrasive means may be adapted to provide onto a treated portion (50) on a first side (11) of the plurality of the elements (10) a Maximum Height of the Profile (R_y) value of 0.050 mm or less, or obtain a Roughness Average (R_a) value of 0.005 mm or less in a direction (f) perpendicular to the first direction (x). Low dimensions for the values of the Maximum Height of the Profile (R_y) or the Roughness Average (R_a) better enhance the visibility of the chain, thereby providing even more enhanced safety. Such low dimensions for the Maximum Height of the Profile (R_y) or the Roughness Average (R_a) further provide smoother and easier

use and an enhanced service life to a slide fastener including such chain, by minimizing any friction related erosion on contact surfaces between a slider (90) and the elements (10).

[0043] In a further variation of the method according to the present invention, the abrasion is applied to an extent in which a Maximum Height of the Profile (R_y) value of 0.010 mm or less, or preferably 0.001 mm or less is obtained within a treated portion (50) on a first side (11) of the element (10).

[0044] In a further variation of the method according to the present invention, the abrasion is applied to obtain a Roughness Average (R_a) of 0.001 mm or less, preferably 0.0005 mm or less within a treated portion (50) on a first side (11) of the element (10).

[0045] To this end, the abrasive means may be adapted to provide an abrasive surface corresponding to the above values of a Maximum Height of the Profile (R_y) or a Roughness Average (R_a), on a treated portion (50) on a first side (11) of one or more of the elements (10).

[0046] In a variation of the method according to the present invention, the abrasive means may include a material (i.e. an abrasive material with a hardness higher than a material substantially forming the elements which may be aluminum, aluminum alloy, copper or copper alloy such as brass selected as desired) selected from the list consisting of alumina, silicon carbide, diamond, cubic boron nitride and zirconia.

[0047] In particular, it is preferable that the abrasive means may be made from a nonwoven abrasive product. Said abrasive means may include a texture formed by abrasive particles impregnated in a material with elastic properties such as a nylon or an organic polymeric binder with natural or synthetic resin or a non-elastic material constructed to obtain elastic properties such as a sponge.

[0048] If the abrasive means is made using an elastic material such as nonwoven material, the treated portion (50) can be formed while substantially maintaining the contour of the surface of the first side (11) prior to respective processing step(s). That is, there is no significant deformation of the contour of the first side (11). A cross sectional schematic view of this process is shown in Fig.7. Here, abrasive means (30) is shown in contact with a first side (11) of an upper portion of element (10). The section of element (10) shown is equivalent to that in a section B-B in Fig.4. As the abrasive means (30) contacts the element (10) as previously described, the abrasive means partially envelops the element and receives the contour of the first side (11) so that abrasion is applied in a substantially comparable manner across the portion of the first side (11) that is to become the treated portion (50). That is, the first side (11) of the element (10) impinges against the abrasive means (30) to the extent of the treated portion (50) so that abrasion is applied to the treated portion (50). This provides a smooth feel to the element (10).

[0049] A variation of the method according to the present invention may further include guiding of the chain (1) and thereby approaching a second side (1b) of the chain to an abrasive means, such that abrasion is exerted onto a second side (12) of the elements (10).

[0050] The extent of the abrasion may be such that even a width (D) of an element (10) may be regularly or irregularly decreased, thereby decreasing a distance between the first side (11) and second side (10) of a respective element (10).

[0051] A variation of the method according to the present invention may further include provision of a treated portion (50) of an element with a resin to at least partially lacquer the elements. It is preferable that the resin is transparent or semitransparent. This provides an enhanced preservation of a smoothened visible appearance of the treated portion (50) and a lowering of friction forces therebetween for a prolonged time.

[0052] Additionally, the adhesion between the resin and elements is improved in, around and because of the region of the treated portion (50).

[0053] The method according to the present invention can be performed after the formation of the chain (1) and prior to attachment of a slider (90).

[0054] Thus the following objects are achieved by the present invention:

- overcoming the abovementioned shortcomings of the prior art,
- provision of:
  - slide fastener chains having elements with enhanced visibility for user safety,
  - slide fastener chains having elements with enhanced ease of use and prolonged service life,
  - slide fastener having such chains, and
  - a low-cost and highly consistent method for manufacturing the same.

List of reference signs:

[0055]

1	chain
1a	first side of the chain
1b	second side of the chain
10	element
11	first side of the element
12	second side of the element
13	end point on the head portion distal to the leg portion
14	end point on the leg portion distal to the head portion
15	head portion
16	leg portion
21	upper side surface

22	lower side surface
23	front side surface
24	rear side surface
25	engagement recessed portion
26	engagement concave portion
50	treated portion
51	plurality of scratches
60	end stop
82	ridge line
83	radial ridge line
100	stringer
101	cord
102	tape
161	leg
1000	slide fastener
A	main central axis of a cord
D	width of element
H	height of element
i	imaginary line
L	length of element
R_y	Maximum Height of the Profile
R_a	Roughness Average
x	first direction
y	third direction
z	second direction

Claims

1. A chain (1) for forming a part of slide fastener (1000), comprising two stringers (100) having respective tapes (102) provided with cords (101) along one edge of each tape (102), said cords (101) being provided with a plurality of elements (10) regularly distributed along said respective cords (101), each one of said elements (10) having

- a first side (11) and a second side (12) substantially opposite to said first side (11),
- a length (L) along a first direction (x), the length (L) corresponding to a distance between a point of an edge of an end point (13) on a head portion (15) furthest from a leg portion (16) and the point of an edge of an end point (14) of the leg portion (16) furthest from the head portion (15),
- a height (H) on a second direction (z) substantially parallel to a main central axis (A) of a respective cord (101) and substantially orthogonal to the first direction (x);

at least first side (11) of one or more of the plurality of elements (10) on at least one of the stringers (100) comprising a treated portion (50) provided with a plurality of scratches (51), the treated portion (50) extending in the first direction (x) of the one or more of the plurality of the elements (10).

2. The chain according to claim 1, wherein the treated portion (50) extends for at least one half of the length (L) of the first side (11) of the one or more of the plurality of the elements (10).

3. The chain according to any one of claims 1 or 2, wherein the treated portion (50) has a Maximum Height of the Profile (R_y) value of 0.050 mm or less in a direction (y) perpendicular to the first direction (x) in the first side (11).

4. The chain according to any one of the claims 1 to 3, wherein the second side (12) is also provided with such treated portion (50).

5. The chain according to any one of the claims 1 to 4, wherein a treated portion (50) of the plurality of elements (10) are provided with a resin.

6. A slide fastener (1000) comprising the chain according to any one of the claims 1 to 5.

7. A method for treatment of a chain (1) as a part of a process of preparation of a slide fastener (1000), the chain (1) comprising two stringers (100) engaged to each other over a plurality of elements (10) distributed along respective cords (101) of both stringers (100); said method including

- bringing the chain (1) into proximity with an abrasive means adapted to face a first side (1a) of the chain (1) and thereby to contact with a first side (11) of an element (10) when aligned with such element (10), such that one or more first sides (11) of the plurality of elements (10) are brought into contact with the abrasive means and thereby abraded;

resulting in that a length (L) measured along a first direction (x) on the first side (11) of an element (10) of the respective plurality of elements is exposed to abrasion.

8. The method according to claim 7, wherein the abrasion is applied to an extent in which a Maximum Height of the Profile (R_y) value of 0.050 mm or less is obtained within a treated portion (50) on a first side (11) of the element (10).

9. The method according to claim 8, wherein the abrasion is applied to an extent in which a Maximum Height of the Profile (R_y) value of 0.010 mm or less is obtained within a treated portion (50) on a first side (11) of the element (10).

10. The method according to any one of the claims 8 or 9, wherein the abrasive means moves.

11. The method according to the claim 10, wherein the

movement of the abrasive means comprises rotation around an axis substantially parallel to a second direction (z).

12. The method according to the claim 10, wherein the movement of the abrasive means is in the first direction (x) so that the contact between the abrasive means and respective elements is substantially tangential relative to the first side (11) of each respective element (10).

13. The method according to claim 12, wherein said tangential contact is substantially perpendicular to the second direction (z).

14. The method according to any one of the claims 7 to 13, further including guiding the chain (1) to bring a second side (1b) of the chain to approach an abrasive means such that abrasion is exerted onto a second side (12) of the element (10).

15. The method according to any one of the claims 7 to 14, further including provision of a treated portion (50) of an element with a resin.

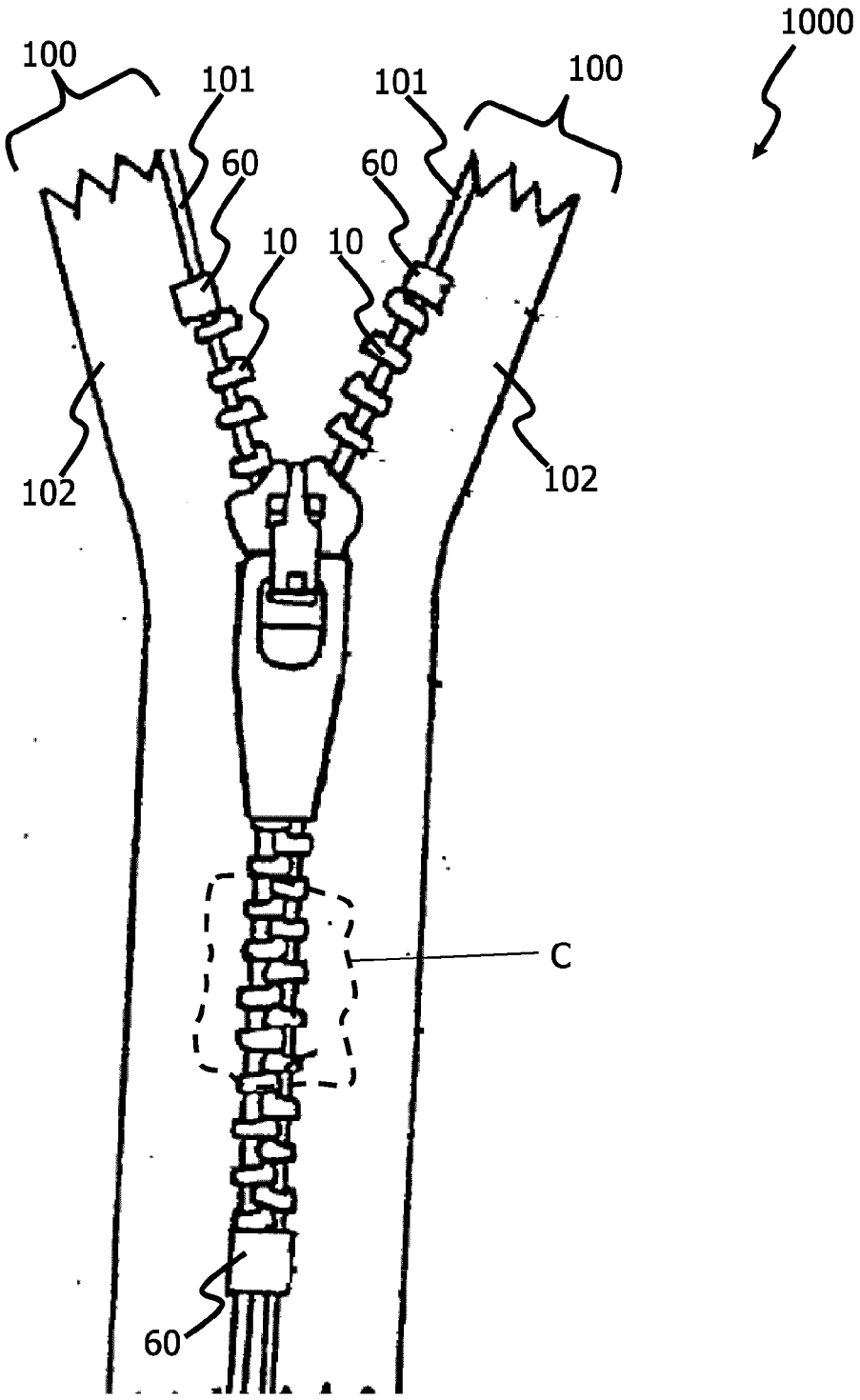

Figure 1

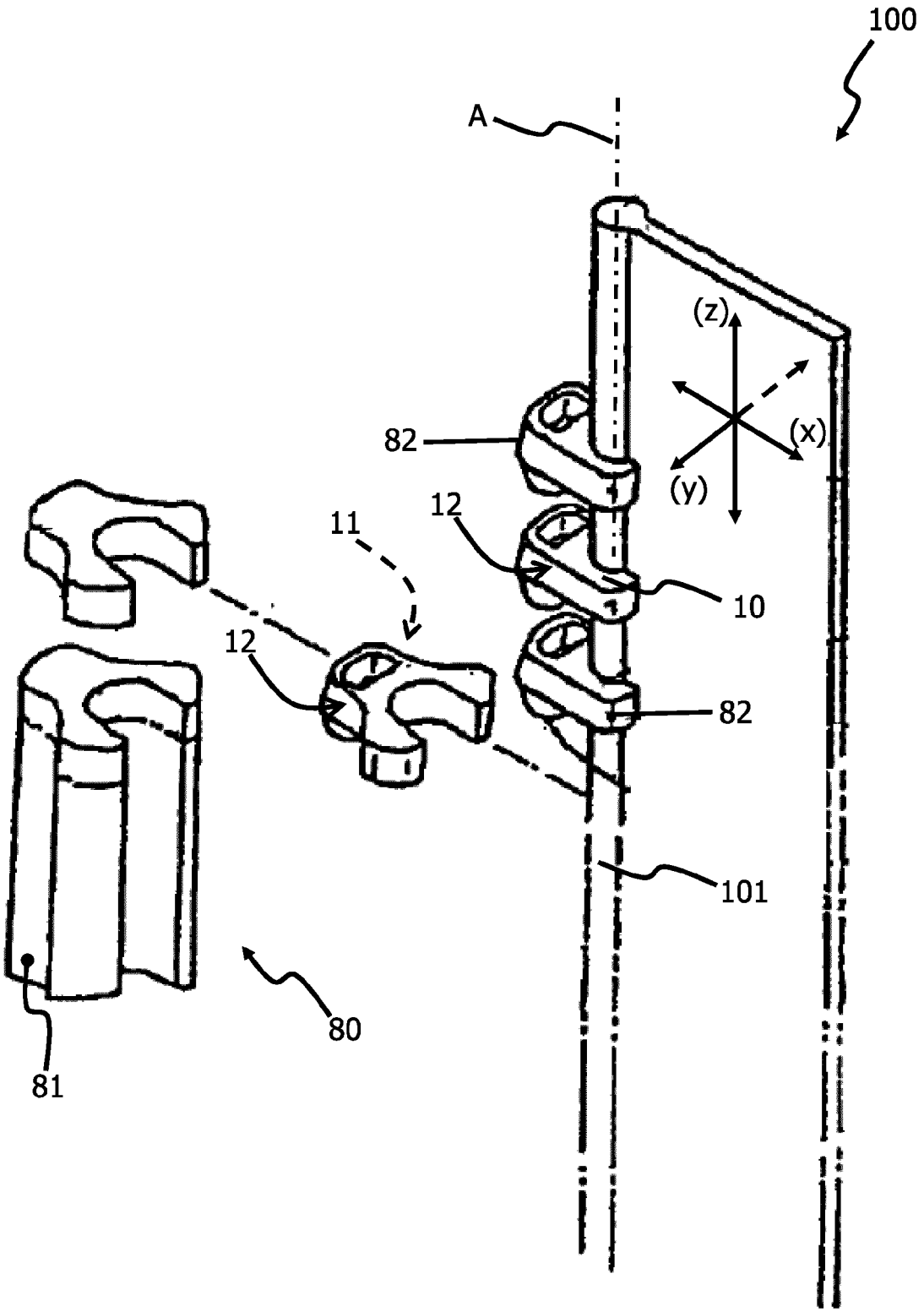

Figure 2

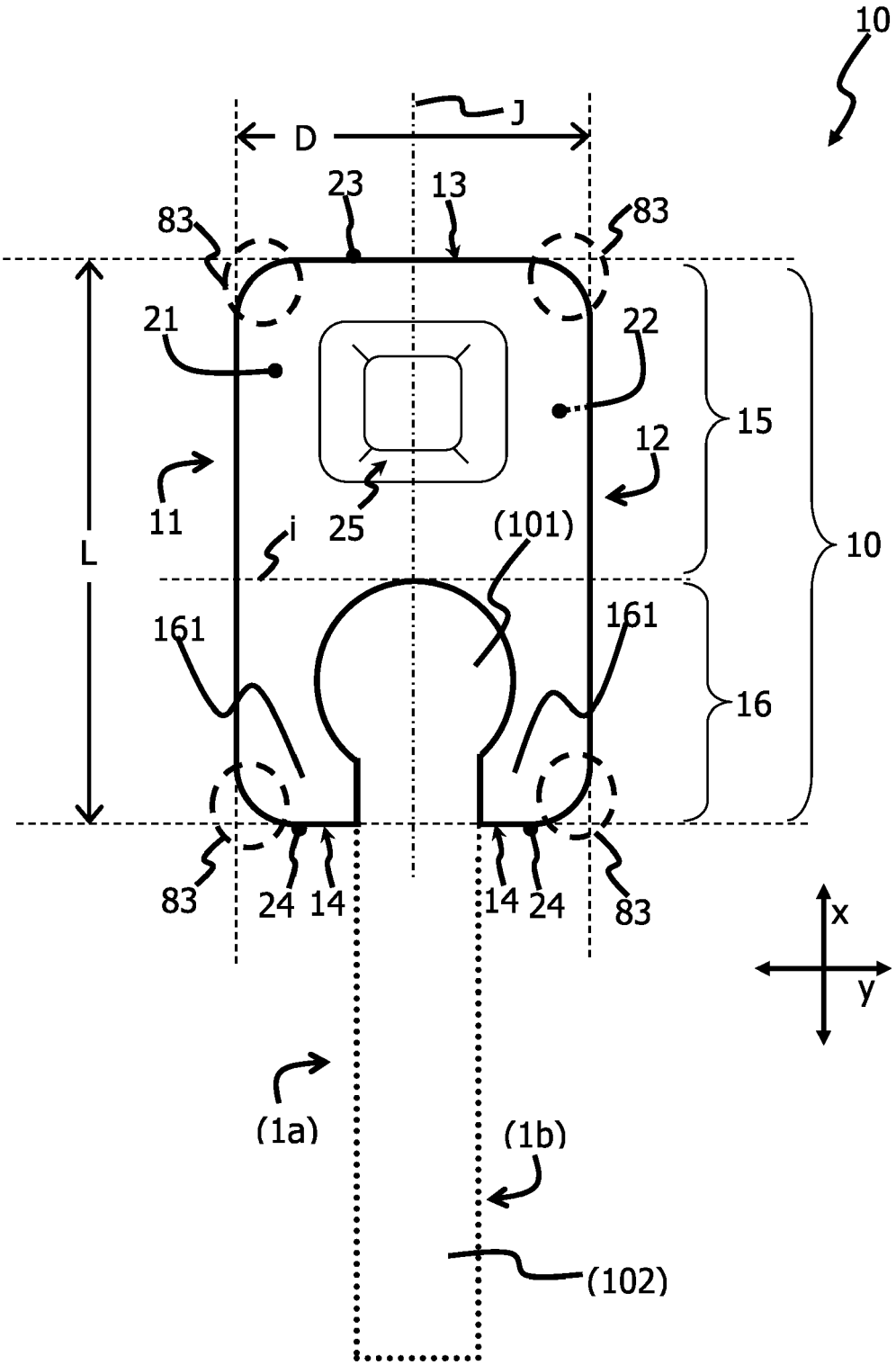
10
J
D
23
13
83
83
21
22
15
12
11
25
i
(101)
10
L
161
161
16
83
24
14
14
24
83
x
y
(1a)
(1b)
(102)

Figure 3

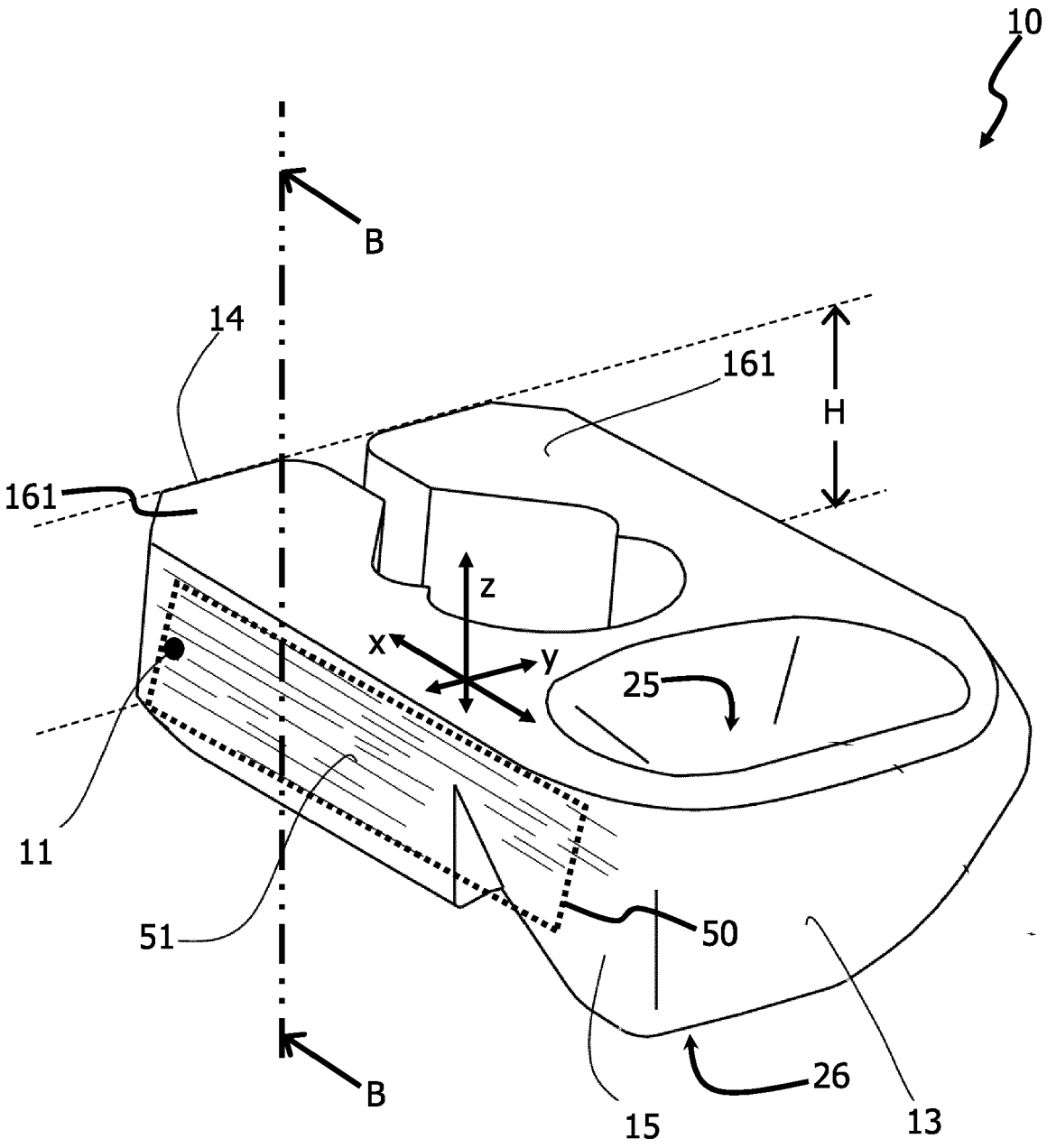

Figure 4

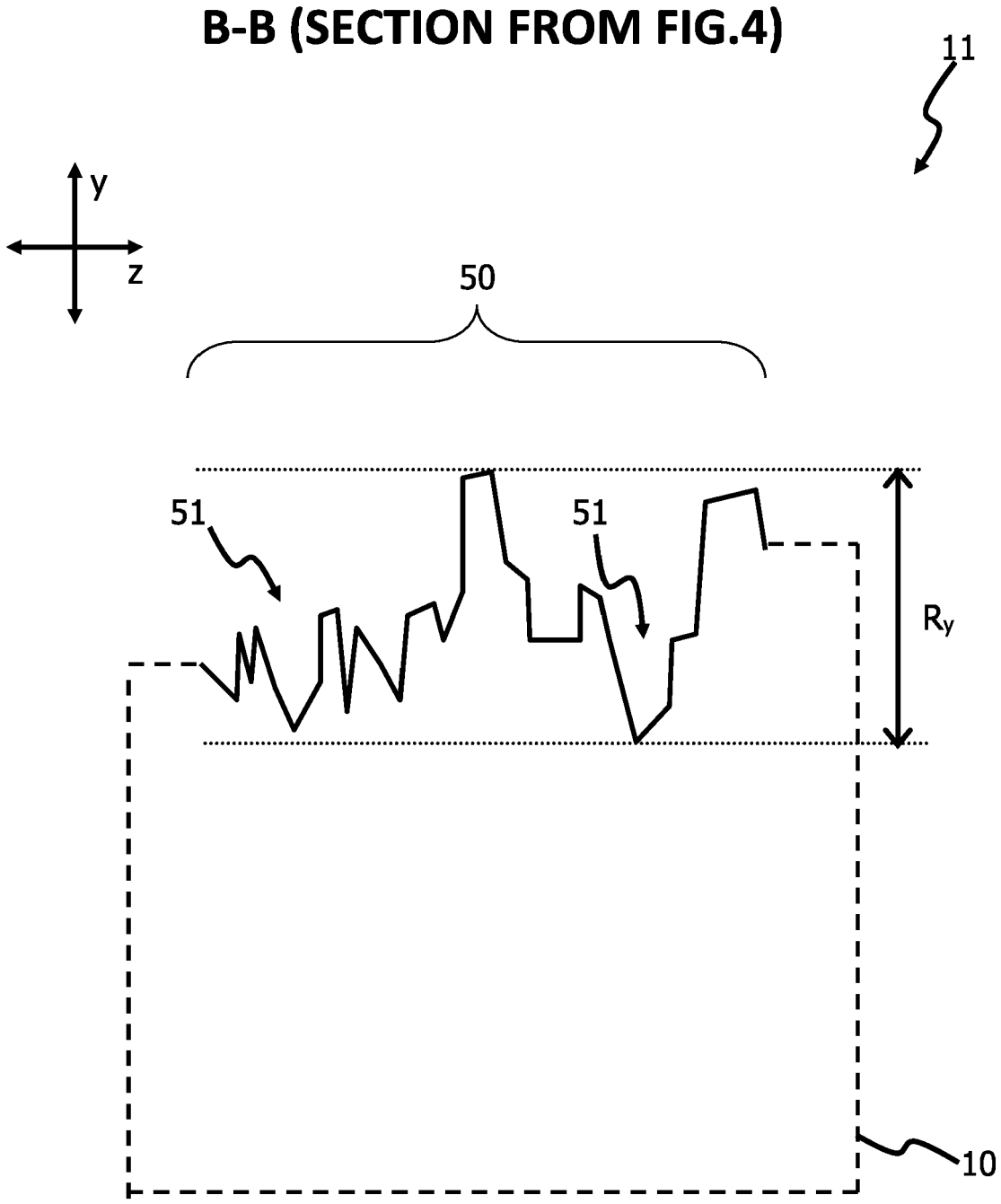

Figure 5

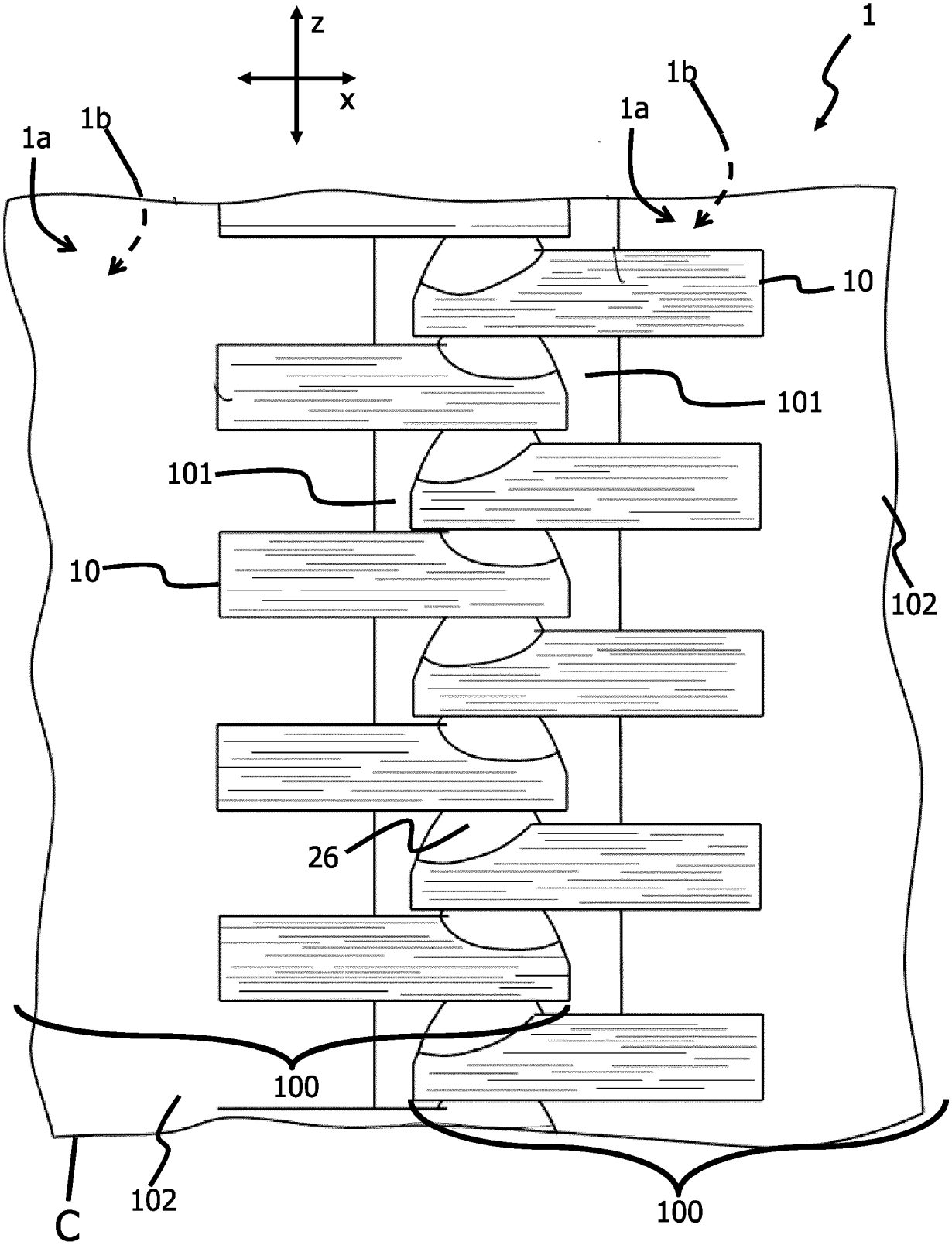

Figure 6

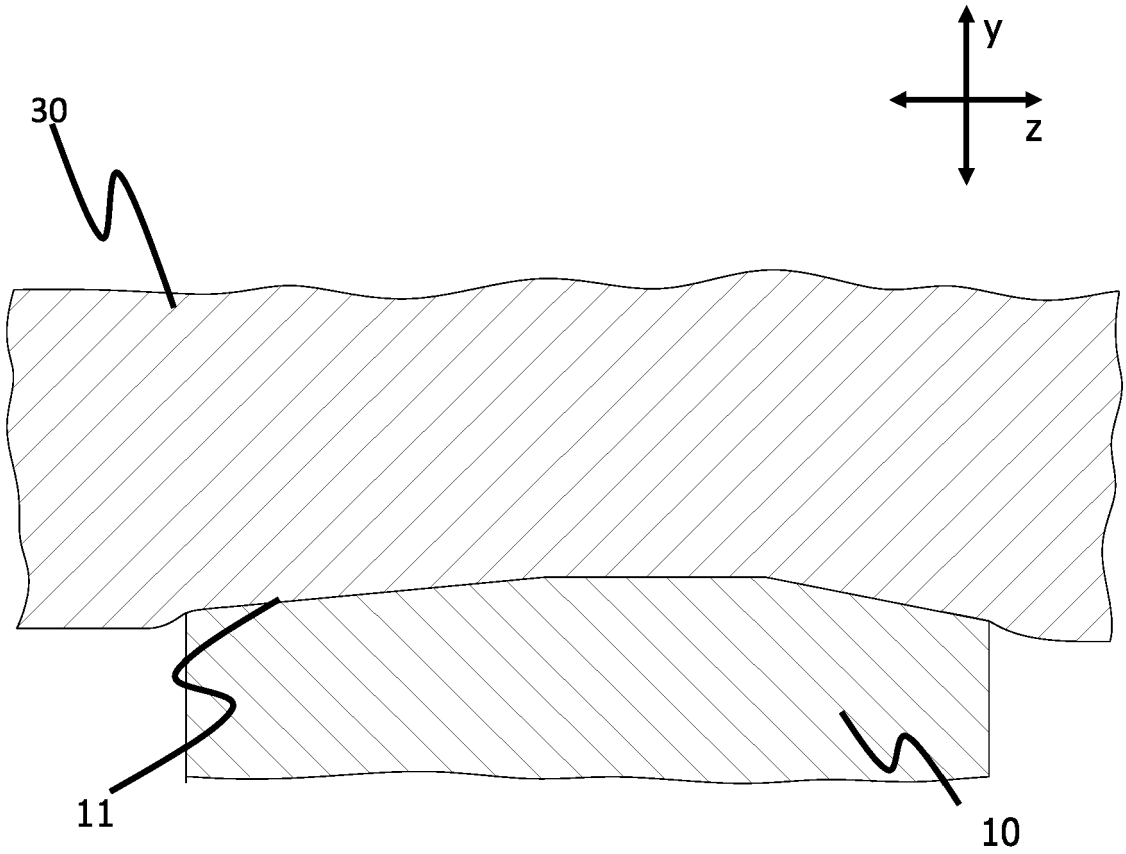

Figure 7

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EUROPEAN SEARCH REPORT

Application Number
EP 18 16 3767

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A44B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 August 2018	van Voorst, Frank

CATEGORY OF CITED DOCUMENTS

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