(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 974 616 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.01.2016 Bulletin 2016/03

(51) Int Cl.:
A44B 19/06 *(2006.01)*

(21) Application number: **15161734.7**

(22) Date of filing: **30.03.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA

(30) Priority: **18.07.2014 CN 201420400888 U**

(71) Applicant: **Chung, Roger C. Y.**
24257 New Taipei City (TW)

(72) Inventor: **Chung, Roger C. Y.**
24257 New Taipei City (TW)

(74) Representative: **2K Patentanwälte Blasberg Kewitz & Reichel Partnerschaft mbB**
Schumannstrasse 27
60325 Frankfurt am Main (DE)

(54) ZIPPER WITH STAMPED METAL ZIPPER TEETH

(57) A zipper with stamped metal zipper teeth includes two zipper tapes (1) each having a rib (11) at one lateral side thereof, and metal zipper teeth (2) mounted at the rib (11) of each zipper tape (1). Each zipper tooth (2) has two mounting legs located at the rear end thereof and clamped on the rib (11). The ratio between the width of each zipper tooth (2) and the gap between the mounting legs (23) of each zipper tooth (2) and the ratio between the combined height of each zipper tooth (2) and the associated engagement protrusion and the gap between the mounting legs (23) of each zipper tooth (2) are in respective predetermined ranges so that the zipper teeth (2) are stronger or even smaller than conventional #2 zipper teeth (2) and have a tight connection between the zipper (2) teeth and the zipper tape (1).

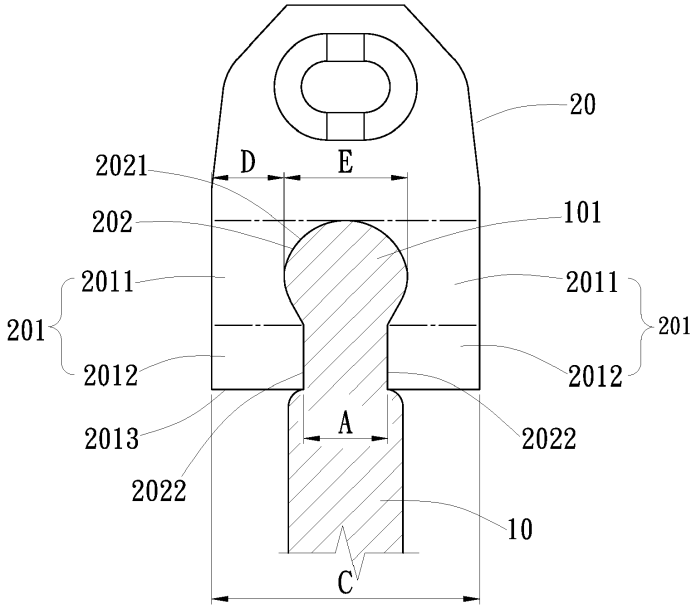

FIG. 1 Prior Art

EP 2 974 616 A1

Description

BACKGROUND OF THE INVENTION

(a) Field of the Invention

[0001] The present invention relates to zip fasteners and more particularly to a zipper with stamped metal zipper teeth. The zipper teeth are designed to have a high strength and can be made relatively small, preventing zipper teeth breaking and assuring a high level of connection tightness between the zipper teeth and the zipper tape.

(b) Description of the Prior Art

[0002] Conventional stamped metal zipper teeth for zippers are classified by size in #2, #3, #4, #5, #8, #10, wherein #2 is the smallest size. According to today's technology and zipper tooth structure, zipper teeth must be no smaller than the size #2 so that zipper teeth can be strong enough for tightly fastening to a zipper tape. If the zipper tooth are smaller than the size #2, the structural strength will be insufficient, and the zipper tooth can break and be easily forced away from the zipper tape. However, zippers with #2 zipper teeth cannot fully meet the needs of the industry. Some fashion designs require zippers with zipper teeth smaller than the size #2. Further, the use of smaller zipper teeth saves much metal material, and can achieve the purpose of environmental protection.

[0003] Referring to FIG. 1 and FIG. 2, a zipper with #2 zipper teeth comprises two zipper tapes 10, and a plurality of zipper teeth 20 fastened to one lateral side of each zipper tape 10. The zipper tape 10 has a rib 101 of circular cross section extending along one lateral side thereof for holding zipper teeth 20. Each zipper tooth 20 comprises two mounting legs 201 located at a rear end thereof, and a retaining hole 202 defined between the two mounting legs 201. Each mounting leg 201 comprises a root 2011, and an engaging portion 2012. The retaining hole 202 defines a smoothly arched wall 2021 between the roots 2011 of the two legs 201, and two planar walls 2022 respectively located at respective inner sides of the engaging portions 2012 of the two legs 201. Each planar wall 2022 has one end thereof connected to the smoothly arched wall 2021, and an opposite end thereof connected to a rear end wall 2013 of the respective mounting leg 201. Thus, when the mounting legs 201 are clamped on the rib 101 of each zipper tape 10, the smoothly arched wall 2021 is abutted against the rib 101, and the planar walls 2022 of the engaging portions 2012 are respectively clamped on the opposing top and bottom fabric walls of the zipper tape 10.

[0004] However, the width A between the two planar walls 2022 of the retaining hole 202 of each zipper tooth 20 and the width C of the zipper teeth 20 have a ratio C:A>3; the height B of the zipper teeth 20 and the width A between the two planar walls 2022 have a ratio B:A>2; thus, it is difficult to make the zipper teeth 20 further smaller. If the width D of the roots 2011 of the mounting legs 201 is increased, the width E of the smoothly arched walls 2021 of the retaining hole 202 will be decreased. In this case, the mounting legs 201 can simply secure a rib 101 having a relatively smaller diameter. If the width A of the retaining hole 202 remains unchanged, the area of the mounting legs 201 for clamping on the rib 101 will be reduced, and the zipper teeth 20 can easily be forced away from the rib 101. On the contrary, if the width D of the roots 2011 of the mounting legs 201 is reduced to increase the width E of the smoothly arched wall 2021 of the retaining hole 202, the area of the mounting legs 201 for clamping on the rib 101 can be greatly increased, however, the strength of the roots 2011 of the mounting legs 201 will be relatively reduced, and the mounting legs 201 can break easily. More particularly, the smoothly arched wall 2021 defined by the retaining hole 202 of each zipper tooth 20 is adapted for securing the rib 101, however, each zipper tooth 20 has no other engagement means to keep the rib 101 in positive engagement with the smoothly arched wall 2021, and the zipper teeth 20 can fall from the rib 101 easily after a long use.

SUMMARY OF THE INVENTION

[0005] The present invention has been accomplished under the circumstances in view. It is main object of the present invention to provide a zipper with stamped metal zipper teeth, which allows the zipper teeth to be made even smaller than conventional #2 metal zipper teeth, preventing zipper teeth breaking and assuring a high level of connection tightness between the zipper teeth and the zipper tape.

[0006] To achieve this and other objects of the present invention, a zipper comprises two zipper tapes each having a rib longitudinally extending along one lateral side thereof, and a plurality of zipper teeth fastened to the rib of each zipper tape. Each zipper tooth comprises an engagement protrusion located on one side of a front end thereof, a recess located on an opposite side of the front end for engaging into the recess of one respective zipper tooth at the other zipper tape, two mounting legs located at an opposing rear end thereof for clamping on two opposite lateral sides of the rib of one zipper tape and a retaining hole defined between the two mounting legs for accommodating the rib of one zipper tape. The gap between respective inner walls of respective rear ends of the two mounting legs of each zipper tooth is referenced by A. The combined height of each zipper tooth and the associated engagement protrusion is referenced by B. The width of the zipper teeth is referenced by C. The ratio between C and A is in the range of 2.5~3. The ratio between B and A is in the range of 1.3~1.8.

[0007] Thus, reasonably designing the structure of the zipper teeth enables the zipper teeth to have a high strength no matter they are made in any different spec-

ifications or even smaller than conventional #2 zipper teeth, and thus, the zipper teeth do not break easily, and can be tightly fastened to the zipper tapes and positively interlocked with the mating zipper teeth.

[0008] Further, each mounting leg of each zipper tooth comprises a root, and an engaging portion extending from the root for engaging the rib. The retaining hole of each zipper tooth defines a bottom wall, referenced by Z, and two first inner lateral wall respectively located on respective inner sides of the roots of the two mounting legs. The two first inner lateral walls each have a rear end thereof respectively connected to two opposite lateral sides of the bottom wall Z of the retaining hole. The two first inner lateral walls define a plane X between respective front ends thereof. The projected profile area of the bottom wall Z of the retaining hole, the two first inner lateral walls and the plane X is referenced by S1. The midpoint of the bottom wall Z of the retaining hole and two opposite ends of the plane X constitute three points that define an arc line Y. The projected profile area of the plane X and the arc line Y is referenced by S2. The area S1 is larger than the area S2.

[0009] The zipper with stamped metal zipper teeth of the invention has the advantages as follows:

(a) Based on the reasonable proportional design of A, B, C, the zipper teeth have a high structural strength no matter they are made in any specification or even smaller than conventional #2 zipper teeth, preventing zipper teeth breaking.

.(b) Through the design of the mounting legs and retaining hole, each zipper tooth can be tightly fastened the rib of each zipper tape, enabling the elastically deformed rib to fill up the whole area of the retaining hole Unlike the circular retaining hole design of the prior art zipper teeth, the retaining hole of each zipper tooth in accordance with the present invention forms a specially constructed structure of five connected planes, the cross-sectional shape of the rib can be highly changed after clamping of the two mounting legs of each zipper tooth on the rib, and therefore, the zipper teeth can be tightly fastened to the rib without vibration.

(c) After the two mounting legs of each zipper tooth are clamped on the rib, the rib is elastically deformed and has elastic potential energy, and therefore, the relatively thicker rib is prohibited from passing through the relatively narrower gap between the inner walls of the rear ends of the two mounting legs, preventing disconnection of the zipper teeth from the rib.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

FIG. 1 is a schematic sectional view of a stamped metal zipper tooth according to the prior art.

FIG. 2 is a side view of the stamped metal zipper tooth shown in FIG. 1.

FIG. 3 is an exploded view of a part of a zipper with stamped metal zipper teeth in accordance with the present invention.

FIG.4 is an oblique top elevational view of one zipper tooth in accordance with the present invention, illustrating the two mounting legs extended out.

FIG. 5 is a schematic elevational view of one zipper tooth in accordance with the present invention.

FIG.6 is a schematic front view illustrating one zipper tooth attached to the rib of one zipper tape in accordance with the present invention.

FIG. 7 is a schematic side view of one zipper tooth in accordance with the present invention.

FIG. 8 is a schematic drawing illustrating a projected plane of S1 as defined in the description.

FIG.9 is a schematic drawing illustrating a projected plane of S2, as defined in the description.

FIG.10 is a schematic drawing illustrating the two mounting legs of one zipper tooth attached to two opposite lateral sides of the rib of one zipper tape before crimping.

FIG. 11 corresponding to FIG. 10, illustrating the mounting legs crimped and clamped on the rib, and the rib elastically deformed.

FIG.12 is a schematic drawing illustrating an alternate form of the zipper tooth.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0011] Referring to FIG. 3, a zipper with stamped metal zipper teeth in accordance with the present invention has stamped metal teeth mounted on each of two zipper tapes thereof. In a first embodiment of the present invention, the zipper comprises two zipper tapes 1, and a plurality of zipper teeth 2 mounted on one lateral side edge of each zipper tape 1 in a line. The zipper tapes 1 are fabric tapes, each having a rib 11 of circular cross section extending along one lateral side edge thereof for securing the zipper teeth 2. The zipper teeth 2 are engagement members made of metal by stamping for fastening to the ribs 11 of the zipper tapes 1, as shown in FIG.3 and FIG.4. Each zipper tooth 2 comprises a polygonal engagement protrusion 21 located on one side of a front end thereof (see FIG. 7), and a polygonal engagement recess 22 located on an opposite side of the front end. When the two zipper tapes 1 are driven by a sliding member (zipper slider) to move toward each other, the engagement protrusions 21 of the zipper teeth 2 at one zipper tape 1 will be respectively forced into engagement with the recesses 22 of the respective zipper teeth 2 at the other zipper tape 1. On the contrary, when the sliding member is reversed, the engagement protrusions 21 of the zipper teeth 2 at one zipper tape 1 will be respectively disengaged from the recesses 22 of the respective zipper teeth 2 at the other zipper tape 1. As shown in FIG. 5 and FIG.

6, each zipper tooth 2 further comprises two mounting legs 23 located at an opposing rear end thereof for fastening to two opposite lateral sides of the rib 11 of one zipper tape 1 to secure the respective zipper tooth 2 to the respective zipper tape 1, and a retaining hole 24 defined between the two mounting legs 23 for accommodating the rib 11. More particularly, as shown FIG. 6 and FIG.7, the gap between respective inner walls of respective rear ends of the two mounting legs 23 is referenced by A; the combined height of each zipper tooth 2 and the associated engagement protrusion 21 is referenced by B; the width of the zipper teeth 2 between two opposite outer sidewalls 25 thereof is referenced by C. The optimal design of the present invention is that the ratio between C and A is C:A=2.5~3; the ratio between B and A is B:A=1.3-1.8. More specifically, the size of A is preferably within 0.4mm~0.5mm, the size of B is preferably within 0.6mm~0.8mm, the size of C is preferably within 1.1mm~1.4mm, and thus, the zipper teeth 2 can be made smaller than conventional #2 zipper teeth.

[0012] As illustrated in FIG. 5 and FIG. 6, the two mounting legs 23 symmetrically located at the rear end of the respective zipper tooth 2. Each mounting leg 23 comprises a root 231, and an engaging portion 232 extending from the root 231 for engaging the rib 11. The retaining hole 24 defines a bottom wall Z, and two first inner lateral walls 2311 respectively located on respective inner sides of the roots 231. The two first inner lateral walls 2311 have respective rear ends thereof respectively connected to two opposite lateral sides of the bottom wall Z. The two first inner lateral walls 2311 define a plane X between respective front ends thereof. The projected profile area of the bottom wall Z, the two first inner lateral walls 2311 and the plane X is referenced by S1 (see FIG.8). The midpoint of the bottom wall Z and two opposite ends of the plane X constitute three points that define an arc line Y. The projected profile area of the plane X and the arc line Y is referenced by S2 (see FIG.9). The invention is so designed that the area S1 is larger than the area S2. Further, the first inner lateral walls 2311 can be planar walls (see FIG. 5), or smoothly arched walls (see FIG.12). Further, each first inner lateral wall 2311 has the rear end thereof connected to the bottom wall Z by an arched surface 2312 or bevel surface, and thus, the retaining hole 24 has a particular shape.

[0013] As shown in FIG. 5, the engagement portion 232 of each mounting leg 23 defines a second inner lateral wall 2321 and a third inner lateral wall 2322 at an inner side thereof. The second inner lateral wall 2321 has a front end thereof connected to a rear end wall 233 of the mounting leg 23, and an opposing rear end thereof connected to the third inner lateral wall 2322. The third inner lateral wall 2322 has a front end thereof connected to the second inner lateral wall 2321, and an opposing rear end thereof connected to the front end of the first inner lateral wall 2311 by an arched surface 2323. The distance between the two second inner lateral walls 2321 is the aforesaid gap A between the inner walls of the rear ends of the two mounting legs 23. The second inner lateral walls 2321 of the engagement portions 232 of the mounting legs 23 are preferably planar walls respectively perpendicularly connected to the rear end walls 233 of the mounting legs 23. The third inner lateral walls 2322 of the engagement portions 232 of the mounting legs 23 are sloping walls connected between the respective first inner lateral walls 2311 and the respective second inner lateral walls 2321. The rear end walls 233 of the mounting legs 23 are preferably respectively connected to two opposite outer lateral walls 25 of the respective zipper tooth 2 by a respective sloping wall 234.

[0014] Based on the above-described structural design, the retaining hole 24 of each zipper tooth 2 forms a specially constructed structure of five connected planes. Unlike the structural design of the circular retaining hole of the prior art zipper tooth shown in FIG. 1, the design of the five plane-based retaining hole 24 is easy to process, and thus, the zipper teeth in accordance with the present invention can be easily made relatively smaller than conventional #2 zipper teeth. Further, as shown in FIG.10, the retaining hole 24 defined between the two mounting legs 23 of each zipper tooth 2 fits the rib 11 of each zipper tape 1 so that the rib 11 can be inserted in between the two mounting legs 23 into the retaining hole 24. After insertion of the rib 11 into the retaining hole 24, the mounting legs 23 are crimped and engaged into the opposing top and bottom walls of the respective zipper tape 1 to tightly hold the rib 11 therebetween. When the two mounting legs 23 are clamped on the rib 11 at two opposite lateral sides, as shown in FIG. 11, the rib 11 is elastically deformed to fill up the retaining hole 24. Because the cross-sectional shape of the rib 11 is highly changeable, the zipper teeth 2 can be more tightly secured to the rib 11, less prone to vibration. Further, after the two mounting legs 23 are clamped on the rib 11, the rib 11 is elastically deformed and has elastic potential energy, and therefore, the relatively thicker rib 11 is prohibited from passing through the relatively narrower gap A between the inner walls of the rear ends of the two mounting legs 23, preventing disconnection of the zipper teeth 2 from the rib 11.

[0015] Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

Claims

1. A zipper, comprising: two zipper tapes (1), each said zipper tape (1) comprising a rib (11) longitudinally extending along one lateral side thereof, and a plurality of zipper teeth (2) fastened to said rib (11) of each said zippertape (1), each said zippertooth (2) comprising an engagement protrusion (21) located

on one side of a front end thereof, a recess (22) located on an opposite side of the front end for engaging into the recess of one respective zipper tooth (2) at the other said zipper tape (1), two mounting legs (23) located at an opposing rear end thereof for clamping on two opposite lateral sides of said rib of one said zipper tape (1) and a retaining hole (24) defined between said two mounting legs (23) for accommodating said rib of one said zipper tape, wherein, if the gap between respective inner walls of respective rear ends of said two mounting legs (23) of each said zipper tooth (2) is referenced by A; the combined height of each said zipper tooth (2) and the associated said engagement protrusion (21) is referenced by B; and the overall width of each said zipper tooth (2) is referenced by C, then the ratio between C and A is in the range of 2.5~3; and the ratio between B and A is in the range of 1.3~1.8.

2. The zipper as claimed in claim 1, wherein the size of A is within 0.4mm~0.5mm, the size of B is within 0.6mm~0.8mm, and the size of C is within 1.1 mm~1.4mm.

3. The zipper as claimed in claim 2, wherein each said mounting leg (23) comprises a root (23 1) and an engaging portion (232) extending from said root (231) for engaging said rib (11); said retaining hole (24) defines a bottom wall, referenced by Z, and two first inner lateral wall (2311) respectively located on respective inner sides of said roots (231) of said two mounting legs (23), said two first inner lateral walls (2311) each having a rear end thereof respectively connected to two opposite lateral sides of said bottom wall Z of said retaining hole (24), said two first inner lateral walls (2311) defining a plane X between respective front ends thereof; the midpoint of said bottom wall Z of said retaining hole (24) and two opposite ends of said plane X constitute three points that define an arc line Y; if the projected profile area of said bottom wall Z of said retaining hole (24), said two first inner lateral walls (2311) and said plane X is referenced by S1 and the projected profile area of said plane X and said arc line Y is referenced by S2, then the area S1 is larger than the area S2.

4. The zipper as claimed in claim 3, wherein said first inner lateral walls (2311) are planar walls.

5. The zipper as claimed in claim 3, wherein said first inner lateral walls (2311) are smoothly arched walls.

6. The zipper as claimed in claim 3, wherein each said first inner lateral wall (2311) has a rear end thereof connected to said bottom wall Z of said retaining hole through one of arched surface and sloping wall.

7. The zipper as claimed in claim 3, wherein said engagement portion (232) of each said mounting leg (23) defines a second inner lateral wall (2321) and a third inner lateral wall (2322) at an inner side thereof; said second inner lateral wall (2321) has a front end thereof connected to a rear end wall (233) of the associated said mounting leg, and an opposing rear end thereof connected to sad third inner lateral wall (2322); said third inner lateral wall (2322) has a front end thereof connected to said second inner lateral wall (2321), and an opposing rear end thereof connected to the front end of said first inner lateral wall (2311) by an arched surface (2323).

8. The zipper as claimed in claim 7, wherein the distance between said two second inner lateral walls (2321) is said gap A between the respective inner walls of the respective rear ends of said two mounting legs (23) of each said zipper tooth (2); said second inner lateral walls (2321) of said engagement portions (232) of said mounting legs (23) are planar walls.

9. The zipper as claimed in claim 7, wherein said third inner lateral walls (2322) of said engagement portions (232) of said mounting legs (23) are sloping walls.

10. The zipper as claimed in claim 7, wherein said rear end walls (233) of said mounting legs (23) are respectively connected to two opposite outer lateral walls (25) of the respective said zipper tooth (2) by a respective sloping wall (234).

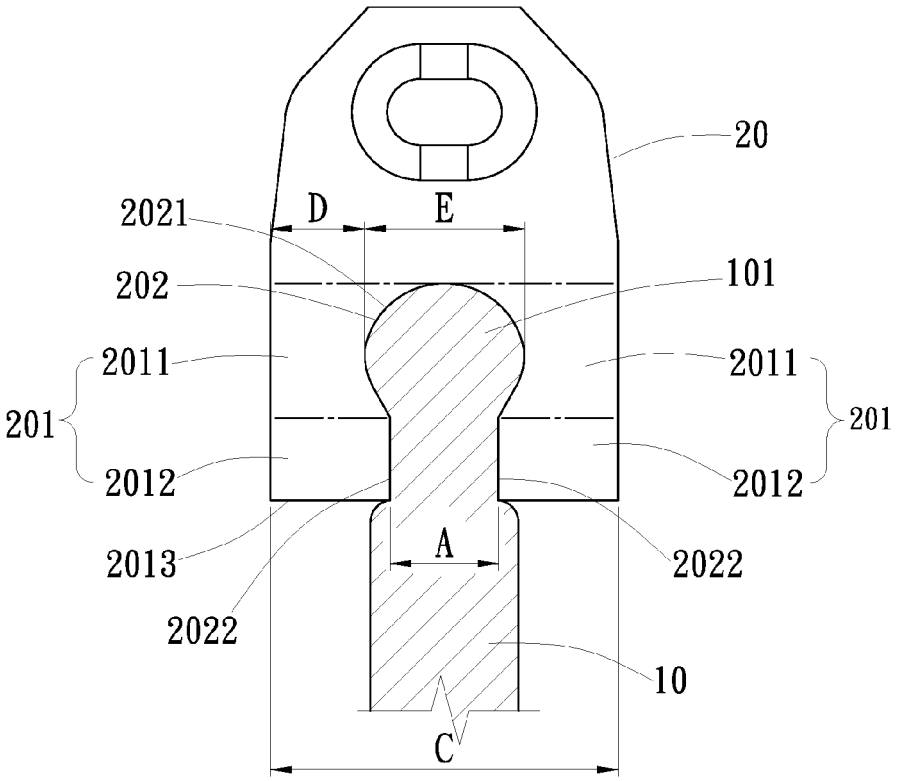

FIG. 1 Prior Art

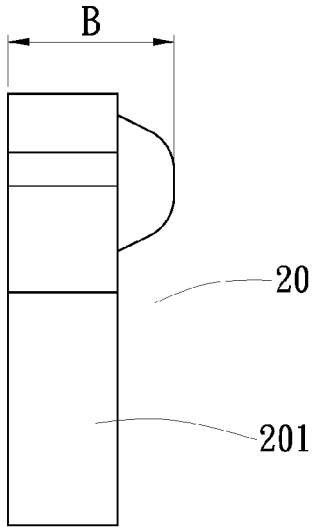

FIG. 2 Prior Art

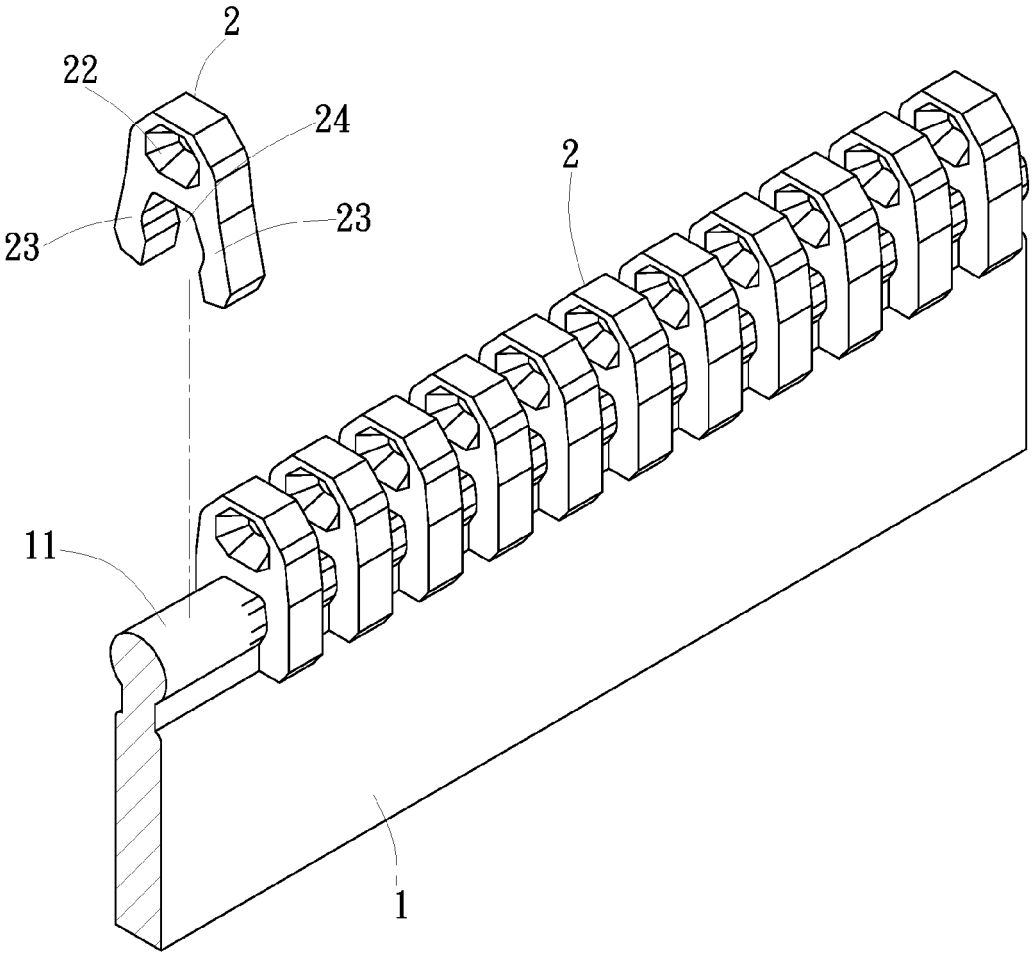

FIG. 3

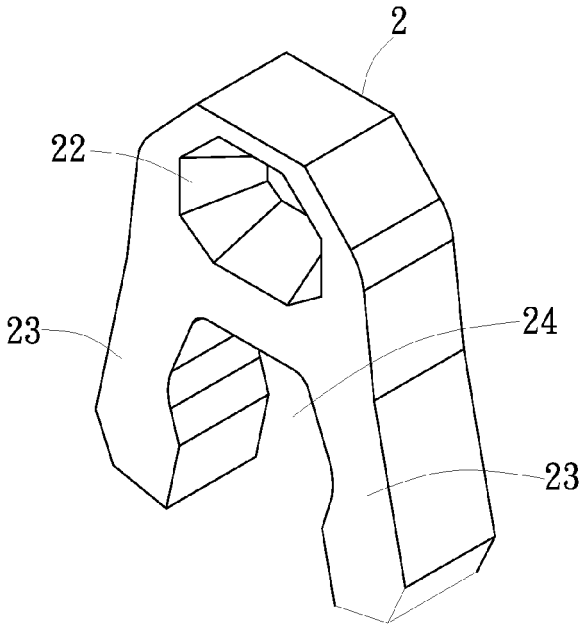
2
22
23
24
23

FIG. 4

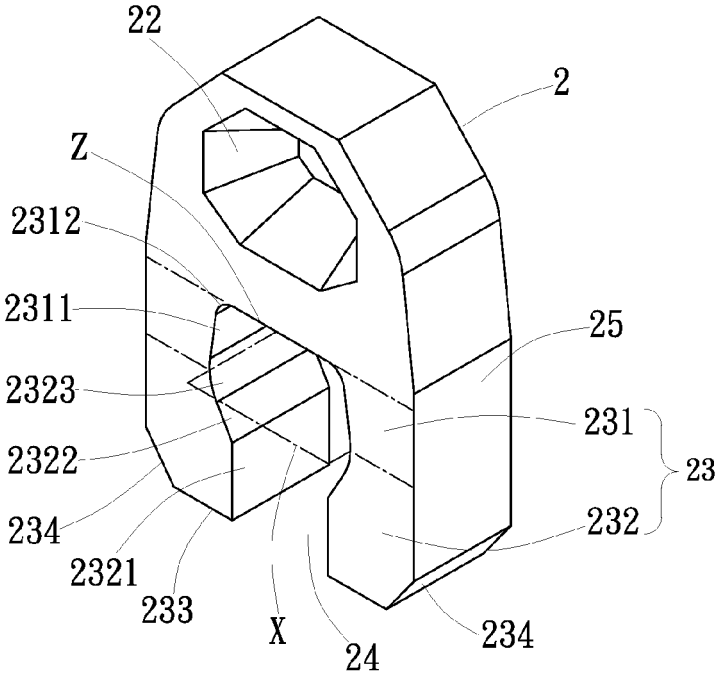
22
2
Z
2312
2311
25
2323
231
23
2322
232
234
2321
233
X
24
234

FIG. 5

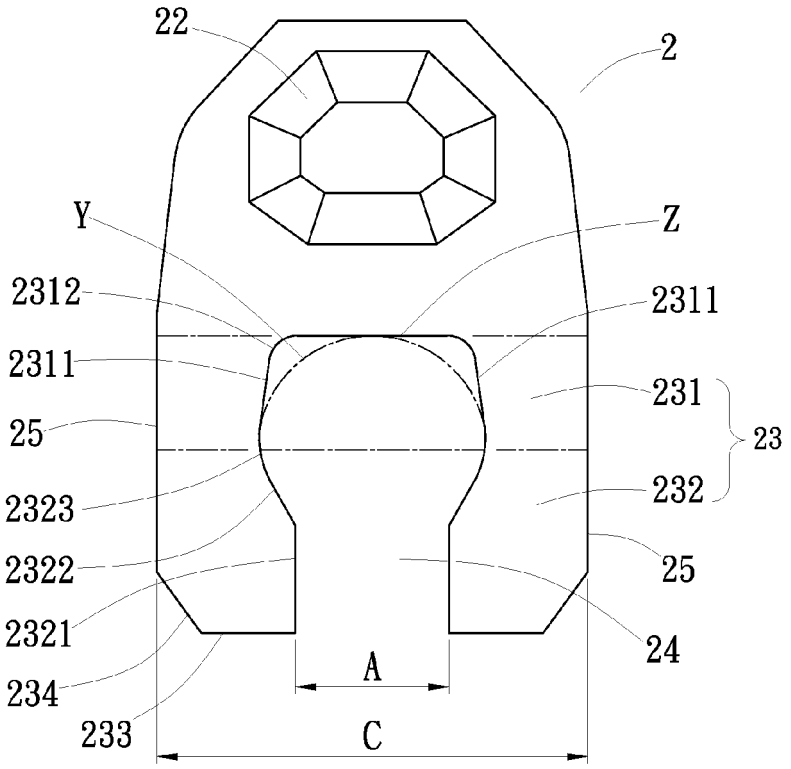
22
2
Y
Z
2312
2311
2311
231
23
25
232
2323
25
2322
24
2321
A
234
233
C

FIG. 6

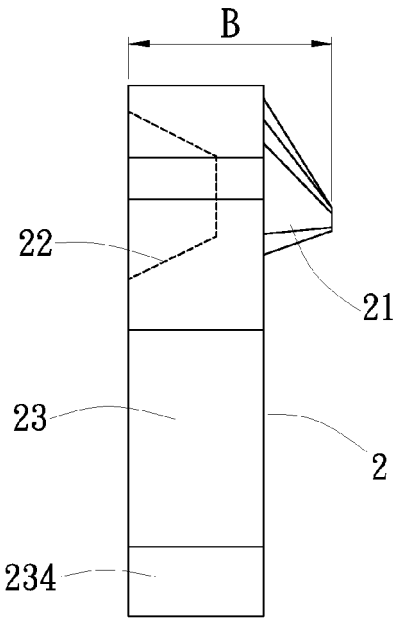
B
22
21
23
2
234

FIG. 7

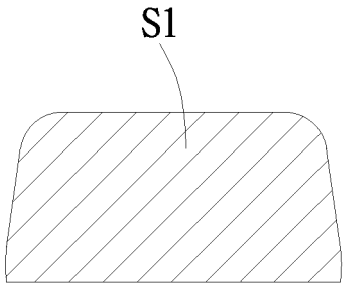

FIG. 8

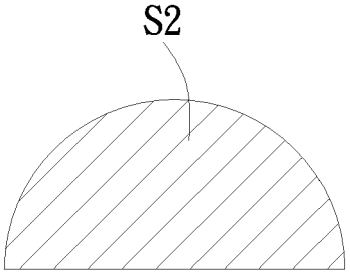

FIG. 9

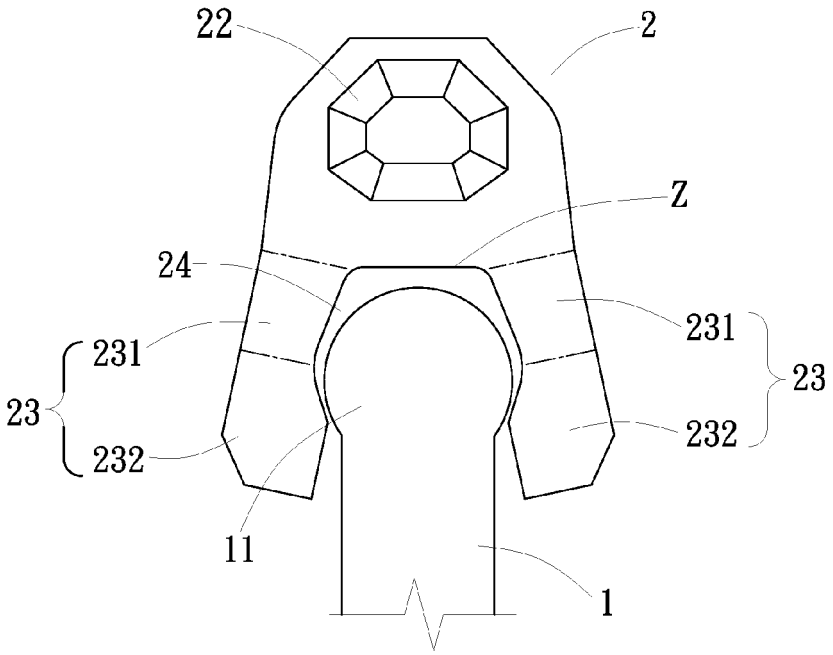
22
2
Z
24
231
23
232
231
23
232
11
1

FIG. 10

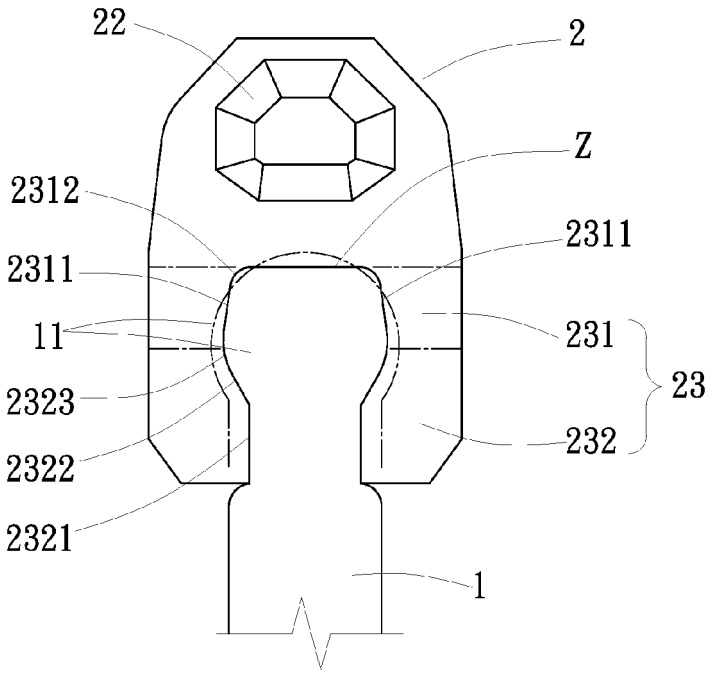
22
2
Z
2312
2311
2311
11
231
23
2323
232
2322
2321
1

FIG. 11

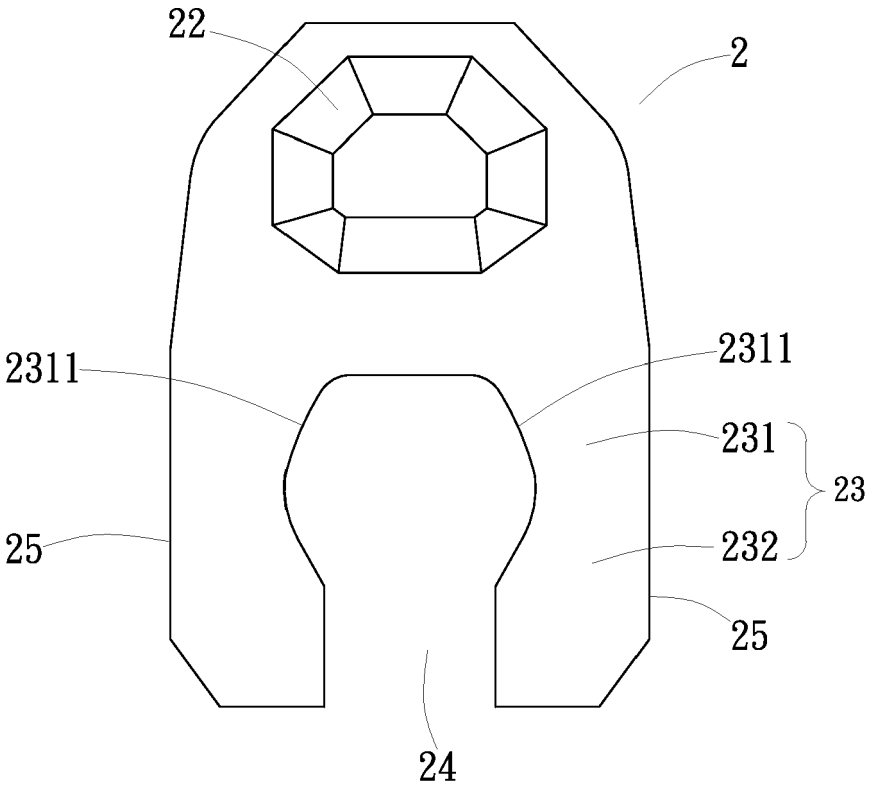

FIG. 12

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 15 16 1734

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2013/091712 A1 (YKK CORP [JP]; YAMAGATA MASAMICHI [IT]; ISHII HAYATO [IT]; KOZATO FUTO) 27 June 2013 (2013-06-27) * figures 1-4,8 * -----	1,3-10	INV. A44B19/06
X,P	CN 104 082 912 A (KENQING ZHEJIANG ZIPPER CO LTD) 8 October 2014 (2014-10-08) * the whole document * -----	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

A44B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 September 2015	van Voorst, Frank

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 16 1734

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-09-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013091712 A1	27-06-2013	CN 104023581 A	03-09-2014
		EP 2793634 A1	29-10-2014
		TW 201334728 A	01-09-2013
		WO 2013091712 A1	27-06-2013
CN 104082912 A	08-10-2014	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82