(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
03 June 2021 (03.06.2021)

WIPO | PCT

(10) International Publication Number
WO 2021/105134 A1

(51) International Patent Classification:
B62B 3/02 (2006.01) *B62B 7/06* (2006.01)

(21) International Application Number:
PCT/EP2020/083235

(22) International Filing Date:
24 November 2020 (24.11.2020)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201911175968.7 26 November 2019 (26.11.2019) CN

(71) Applicant: **WONDERLAND SWITZERLAND AG** [CH/CH]; Beim Bahnhof 5, 6312 Steinhausen (CH).

(72) Inventor: **YANG, Tao**; No 1, Yin Hu Industrial Zone, Qing Xi Town, Dongguan, Guangdong 523648 (CN).

(74) Agent: **HOEFER & PARTNER PATENTANWÄLTE MBB**; Pilgersheimer Str. 20, 81543 München (DE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

(54) Title: TUBULAR MEMBER FOR SUPPORT FRAME OF INFANT CARRIER, FOLDABLE SUPPORT FRAME AND INFANT CARRIER THEREOF

(57) Abstract: A tubular member (112) for a support frame of an infant carrier is a hollow structure and includes connection sections (1121) with the same structure formed at two ends of the tubular member (112) and a support section (1122) connected between the connection sections (1121). A center of mass of the support section (1122) is taken as a foot point to form a first axis direction along a vertical direction and form a second axis direction along a horizontal direction. A moment of inertia in the first axis direction is larger than that in the second axis direction. A cross-sectional area of the connection section (1121) is equal to a cross-sectional area of the support section (1122). The tubular member (112) can be matched with a standard joint and have preferable bending resistance and impact resistance without increasing its weight. The present invention further discloses a foldable support frame (11) having the tubular member (112) and an infant carrier (10) thereof.

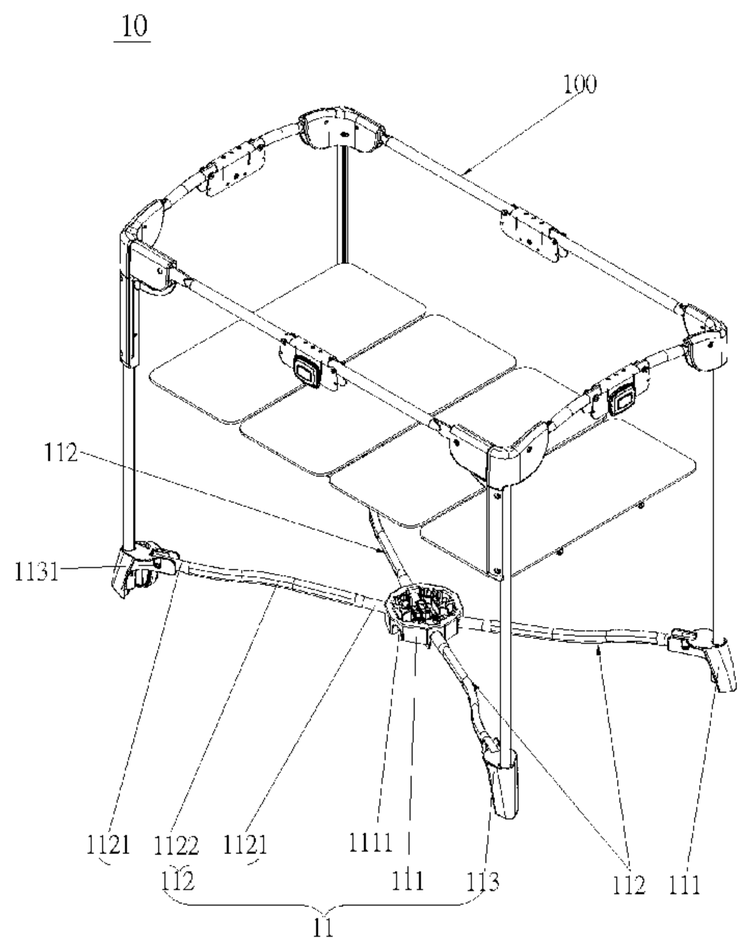

FIG. 4

WO 2021/105134 A1

Title
TUBULAR MEMBER FOR SUPPORT FRAME OF INFANT CARRIER, FOLDABLE SUPPORT FRAME AND INFANT CARRIER THEREOF

Field of the Invention

The present invention relates to a tubular member for a support frame of an infant carrier, a foldable support frame, and an infant carrier thereof according to the pre-characterizing clause of claims 1, 12, and 14.

Background of the Invention

Recently, various kinds of infant carriers have been developed and are widely used. Connection between a support frame and a carrier body directly relates to safety in use of the infant carrier. Since an infant may often jump up and down in the infant carrier, the infant carrier receives a larger impact in a vertical direction due to jumping of the infant, thereby bending or even breaking tubular members of the support frame, so as to cause an accident. That is, because the support frame cannot bear the larger impact, the tubular members of the support frame may bend to deform or be broken, so as to make the infant carrier unable to provide a steady support. As such, the infant may fall down or be not in control to collide with rigid structural components of the infant carrier, so as to be injured easily. In the prior art, the diameter or the tube-wall thickness of the tubular member is increased to enhance rigidity and a moment of inertia of the tubular member. However, this design may cause increases of the weight and the manufacturing cost of the tubular member. Furthermore, the tubular member with a modified size cannot be replaced conveniently since it cannot be matched with a standard joint.

Thus, it is necessary to design a tubular member for a support frame of an infant carrier, which can be matched with a standard joint and can have preferable bending resistance and impact resistance without increasing its weight.

Summary of the Invention

The present invention aims at providing a tubular member for a support frame of an infant carrier, which can be matched with a standard joint and can have preferable bending resistance and impact resistance without increasing its weight.

The present invention further aims at a foldable support frame having a tubular

member, which can be matched with a standard joint and can have preferable bending resistance and impact resistance without increasing its weight, for enhancing stability of the foldable support frame.

The present invention further aims at an infant carrier having a foldable support frame with enhanced stability for improving bending resistance and impact resistance of the infant carrier.

This is achieved by a tubular member according to claim 1, a foldable support frame according to claim 12, and an infant carrier according to claim 14. The dependent claims pertain to corresponding further developments and improvements.

As will be seen more clearly from the detailed description following below, the claimed tubular member for a support frame of an infant carrier is a hollow structure and includes two connection sections and a support section. The two connection sections are formed at two ends of the tubular member. The two connection sections have the same structure for connection. The support section is formed between the two connection sections. A center of mass of the support section is taken as a foot point to form a first axis direction along a vertical direction and form a second axis direction along a horizontal direction. A moment of inertia in the first axis direction is larger than a moment of inertia in the second axis direction. A cross-sectional area of the connection section is equal to a cross-sectional area of the support section.

Compared with the prior art, the tubular member of the present invention includes the two connection sections having the same structure as a connection section of an existing tubular member. The two connection sections are connected via the support section. The center of mass of the support section is taken as the foot point to form the first axis direction along the vertical direction and form the second axis direction along the horizontal direction. The moment of inertia in the first axis direction is larger than the moment of inertia in the second axis direction, so as to make the moment of inertia of the tubular member in the first axis direction (i.e. the vertical direction) larger than the moment of inertia of the tubular member in the second axis direction (i.e. the horizontal direction). The cross-sectional area of the connection section is equal to the cross-sectional area of the support section. In such a manner, compared with the existing tubular member, the present invention can efficiently increase the moment of inertia of the tubular member in the vertical direction without increasing the weight of the tubular member, so as to greatly improve bending resistance and impact resistance of the tubular member in the

vertical direction. Thus, the tubular member can have preferable bending resistance and impact resistance in the vertical direction.

Preferably, the support section has an oval-like cross-section.

Preferably, the oval-like cross-section includes two vertical planes parallel to each other and two arc-shaped planes symmetrical to each other. The two arc-shaped planes are connected to the two vertical planes to cooperatively form the oval-like cross-section, and a moment of inertia of the vertical plane in the first axis direction is larger than a moment of inertia of the arc-shaped plane in the second axis direction.

Preferably, the oval-like cross-section is formed by squeezing a circular structure having the same cross-sectional area along the second axis direction.

Preferably, the connection section has a circular cross-section to be advantageous to match with a standard joint, so as to make replacing of the tubular member more convenient and faster.

Preferably, a tube-wall thickness of the connection section is equal to a tube-wall thickness of the support section.

Preferably, an arc-shaped transition section is formed between the connection section and the support section.

Preferably, the tubular member is an integrally-formed structure to ensure stability and rigidity of the tubular member in use and further improve bending resistance and impact resistance of the tubular member.

Preferably, the connection section is a straight-tube structure.

Preferably, the support section is a curved-tube structure.

Preferably, the support section is a symmetrical structure having a protruding central portion.

The present invention further provides a foldable support frame including two joints and the aforementioned tubular member. The tubular member is connected between the two joints to be foldable relative to the joints along a folding direction. The connection section is pivoted to the joint. The first axis direction is parallel to the folding direction.

Compared with the prior art, the foldable support frame of the present invention includes the two joints and the tubular member connected to the two joints for support. The moment of inertia of the tubular member in the first axis direction is larger than the moment of inertia of the tubular member in the second axis direction, and the first axis direction is parallel to the folding direction of the foldable support frame, so as to

greatly enhance bending resistance and impact resistance of the tubular member. The cross-sectional area of the connection section is equal to the cross-sectional area of the support section. On the one hand, since the structure of the connection section of the tubular member of the present invention is identical to the structure of the existing tubular member, the existing tubular member can be replaced by the tubular member of the present invention directly without replacing the joint or other adaptive components when the existing tubular member is damaged or broken. After the process of replacing the existing tubular member by the tubular member of the present invention is completed, bending resistance and impact resistance of the foldable support frame along the folding direction can be improved greatly, so as to enhance the overall stability of the foldable support frame. On the other hand, since the tubular member of the present invention has better bending resistance and impact resistance than the existing tubular member without increasing the weight of the tubular member, the foldable support frame directly having the tubular member mounted thereon can have preferable bending resistance and impact resistance, so as to greatly enhance stability of the foldable support frame.

Preferably, the foldable support frame is a stroller frame, a crib frame, a bassinet frame, or a rocking-chair frame.

The present invention further provides an infant carrier including a carrier body and the aforementioned foldable support frame for supporting the carrier body.

Compared with the prior art, the infant carrier of the present invention includes the foldable support frame having preferable bending resistance and impact resistance for supporting the carrier body. When an infant jumps in the infant carrier to cause a larger impact in the vertical direction, the larger impact is directly exerted on the tubular member. Since the moment of inertia of the tubular member of the present invention is increased in the vertical direction, the foldable support frame of the present invention has better bending resistance and impact resistance in the vertical direction than the existing foldable support frame, so as to efficiently prevent an accident caused by deformation or fracture of the tubular member. Thus, the infant carrier of the present invention can still provide a steady and reliable support to the carrier body for ensuring safety of the infant when the infant carrier bears the larger impact caused by jumping of the infant.

Brief Description of the Drawings

In the following, the invention is further illustrated by way of example, taking reference to the accompanying drawings thereof:

FIG. 1 is a diagram of an existing tubular member in the prior art,

FIG. 2 is a diagram of a cross section of the existing tubular member in FIG. 1,

FIG. 3 shows test data of a moment of inertia of the existing tubular member in FIG. 2,

FIG. 4 is a diagram of an infant carrier according to an embodiment of the present invention,

FIG. 5 is a diagram of a tubular member in FIG. 4,

FIG. 6 is a diagram of a cross section of a connection section of the tubular member in FIG. 5,

FIG. 7 is a diagram of a cross section of a support section of the tubular member in FIG. 5, and

FIG. 8 shows test data of a moment of inertia of the support section of the tubular member in FIG. 7.

Detailed Description

The embodiments of the present invention will now be described with reference to the accompanying drawings.

As shown in FIGS. 4-7, an infant carrier 10 of the present invention includes a carrier body 100 for holding an infant and a foldable support frame 11 for supporting the carrier body 100. The foldable support frame 11 includes a joint 111, a joint 113 and a tubular member 112 connected to the joint 111 and the joint 113. The tubular member 112 is a hollow structure, and two connection sections 1121 are formed at two ends of the tubular member 112 respectively and have the same structure for connection. A support section 1122 is formed between the two connection sections 1121. The tubular member 112 is foldable along a folding direction relative to the joint 111 and the joint 113. The two connection sections 1121 of the tubular member 112 are pivoted to the joint 111 and the joint 113 respectively, so as to make the foldable support frame 11 of the present invention foldable. A first axis direction of the tubular member 112 is parallel to the folding direction. The tubular member 112 takes a center of mass of the support section 1122 as a foot point to form the first axis direction along a vertical direction and form a second axis direction along a horizontal direction. A moment of inertia in the first axis direction is larger than a moment of

inertia in the second axis direction. In FIGS. 2, 6 and 7, a y-axis direction is regarded as the first axis direction (i.e. the vertical direction), an x-axis direction is regarded as the second axis direction (i.e. the horizontal direction), and a z-axis direction is perpendicular to the first axis direction and the second axis direction. A cross-sectional area of the connection section 1121 is equal to a cross-sectional area of the support section 1122. On the one hand, since the structure of the connection section 1121 of the tubular member 112 is identical to the structure of an existing tubular member 112' as shown in FIG. 2, the existing tubular member 112' can be replaced by the tubular member 112 directly without replacing the joint 111 or other adaptive components when the existing tubular member 112' is damaged or broken. After the process of replacing the existing tubular member 112' by the tubular member 112 is completed, bending resistance and impact resistance of the foldable support frame 11 along the folding direction can be improved greatly, so as to enhance the overall stability of the foldable support frame 11. On the other hand, since the tubular member 112 has better bending resistance and impact resistance than the existing tubular member 112' without increasing the weight of the tubular member 112, the foldable support frame 11 of the present invention can have preferable bending resistance and impact resistance, so as to ensure safety of the infant. When the infant carrier 10 is in use, the foldable support frame 11 usually receives an impact in a vertical direction due to jumping of the infant. In that case, since the foldable support frame 11 is mounted on the infant carrier 10, the infant carrier 10 can bear a larger impact in the vertical direction than an existing infant carrier. The tubular member 112 of the present invention can efficiently improve its bending resistance and impact resistance by increasing the moment of inertia of the tubular member 112 in the vertical direction, for preventing the tubular member 112 from being bent or broken by jumping of the infant. In such a manner, the present invention can ensure that the infant carrier 10 can provide a steady support for safety of the infant when in use. Thus, the present invention can efficiently prevent the infant from falling down or colliding with the infant carrier due to deformation or fracture of the tubular member.

Description for comparison of the moment of inertia of the tubular member 112 of the present invention and the moment of inertia of the existing tubular member 112' is provided according to FIGS. 1-3 and FIGS. 5-8. Specifically, FIGS. 1-3 show the structure and test data of the moment of inertia of the existing tubular member 112'. As shown in FIG. 1, a connection section 1121' and a support section 1122' of the

existing tubular member 112' have the same structure and size. Any cross-sectional area of the connection section 1121' and any cross-sectional area of the support section 1122' are as shown in FIG. 2, and are equal to 45.87mm^2 as shown in FIG. 3. The moment of inertia in the first axis direction (i.e. the y-axis direction) corresponding to any cross-sectional area of the connection section 1121' and the support section 1122' is equal to 1913.25mm^4 (i.e. I_y in FIG. 3). The moment of inertia in the second axis direction (i.e. the x-axis direction) corresponding to any cross-sectional area of the connection section 1121' and the support section 1122' is equal to 1913.25mm^4 (i.e. I_x in FIG. 3). FIGS. 5-8 show the structure of the tubular member 112 and test data of the moment of inertia of the support section 1122. As shown in FIGS. 5-6, since the connection section 1121 of the tubular member 112 and the connection section 1121' and the support section 1122' of the existing tubular member 112' have the same structure and size, the connection section 1121 of the tubular member 112 and the connection section 1121' of the existing tubular member 112' can have the same moment of inertia in the first axis direction and the second axis direction. As shown in FIG. 7 and FIG. 8, the support section 1122 of the tubular member 112 and the connection section 1121' and the support section 1122' of the existing tubular member 112' have different structures. The moment of inertia in the first axis direction (i.e. the y-axis direction) corresponding to any cross-sectional area of the support section 1122 of the tubular member 112 is equal to 2539.69mm^4 (i.e. I_y in FIG. 8). The moment of inertia in the second axis direction (i.e. the x-axis direction) corresponding to any cross-sectional area of the support section 1122 is equal to 1094.52mm^4 (i.e. I_x in FIG. 8). As mentioned above, the moment of inertia of the support section 1122 of the tubular member 112 in the first axis direction is larger than the moment of inertia of the support section 1122' of the existing tubular member 112' in the first axis direction. Thus, compared with the existing tubular member 112', bending resistance and impact resistance of the tubular member 112 in the first axis direction can be improved greatly. When the foldable support frame 11 having the tubular member 112 mounted thereon is applied to the infant carrier 10, the infant carrier 10 can have preferable bending resistance and impact resistance, so as to improve safety and comfort of the infant carrier 10.

Specifically, the foldable support frame 11 of the present invention can be a crib frame, a stroller frame, a bassinet frame, or a rocking-chair frame. It should be mentioned that the working principle of the foldable support frame 11 adopting a

stroller frame design, a bassinet frame design, or a rocking-chair frame design is the same as the working principle of the foldable support frame 11 adopting a crib frame design. Thus, only the detailed description for the foldable support frame 11 adopting the crib frame design and the tubular member 112 of the present invention is provided as follows according to FIGS. 4-8.

As shown in FIGS. 4-5, the joint 111 and the joint 113 of the present invention have a pivot hole 1111 and a pivot hole 1131 formed thereon respectively. The two connection sections 1121 of each tubular member 112 have mounting holes 21 formed thereon respectively corresponding to the pivot hole 1111 and the pivot hole 1131. The tubular member 112 can be connected between the joint 111 and the joint 113 via utilizing pins or rivets to rotatably pass through the pivot hole 1111 and the mounting hole 21 and rotatably pass through the pivot hole 1131 and the mounting hole 21. FIG. 4 only shows the embodiment that the two connection sections 1121 of the tubular member 112 are connected to the joint 111 and the joint 113 having different structures. It can be understood to a person skilled in the art that the joint 111 and the joint 113 connected to the two connection sections 1121 of the tubular member 112 at different positions of the foldable support frame 11 can have the same structure, and the related description is omitted herein since it can be reasoned by analogy according to the aforementioned description without any creative work.

It should be mentioned that FIG. 4 only shows the detailed structure of the foldable support frame 11 for a crib. In other words, according to different applications of the foldable support frame 11, the tubular member 112 can be assembled with the related joints to form the foldable support frame 11 having the same structural design as an existing foldable support frame. The only difference between the foldable support frame 11 and the existing foldable support frame is that the foldable support frame 11 replaces the existing tubular member 112' with the tubular member 112 for having better bending resistance and impact resistance than the existing foldable support frame.

As shown in FIG. 5, an arc-shaped transition section 1123 is formed between the connection section 1121 and the support section 1122 of the tubular member 112. The tubular member 112 of the present invention is formed integrally to ensure stability and rigidity of the tubular member 112 in use and further improve bending resistance and impact resistance of the tubular member 112. Specifically, the connection section 1121 is a straight-tube structure, and the support section 1122 is a

curved-tube structure and is a symmetrical structure having a protruding central portion.

As shown in FIG. 6, the connection section 1121 of the tubular member 112 has a circular cross-section to be advantageous to match with a standard joint, so as to make replacing of the tubular member 112 more convenient and faster. Specifically, a tube-wall thickness of the connection section 1121 of the tubular member 112 is equal to a tube-wall thickness of the support section 1122.

As shown in FIG. 7, the support section 1122 of the tubular member 112 has an oval-like cross-section 1124. The oval-like cross-section 1124 includes two vertical planes 1125 parallel to each other and two arc-shaped planes 1126 symmetrical to each other. The two arc-shaped planes 1126 are connected to the two vertical planes 1125 to cooperatively form the oval-like cross-section 1124. The moment of inertia of the vertical plane 1125 in the first axis direction (i.e. the y-axis direction) is larger than the moment of inertia of the arc-shaped plane 1126 in the second axis direction (i.e. the x-axis direction). The oval-like cross-section 1124 could be formed by squeezing a circular structure 1127 as shown in FIG. 6 having the same cross-sectional area along the second axis direction (i.e. the x-axis direction).

As shown in FIGS. 1-8, the infant carrier 10 and the foldable support frame 11 of the present invention have the tubular member 112, of which the moment of inertia in the first axis direction (i.e. the vertical direction) is larger than the moment of inertia in the second axis direction (i.e. the horizontal direction), and the structure and size of the connection section of the tubular member 112 are the same as the structure and size of the connection section of the existing tubular member 112'. As such, compared with the existing tubular member 112', the present invention can efficiently increase the moment of inertia of the tubular member 112 in the vertical direction without increasing the weight of the tubular member 112, so as to greatly improve bending resistance and impact resistance of the tubular member 112 in the vertical direction. In such a manner, the existing tubular member 112' can be replaced by the tubular member 112 directly without replacing the joint 111 or other adaptive components when the existing tubular member 112' is damaged or broken. After the process of replacing the existing tubular member 112' by the tubular member 112 is completed, bending resistance and impact resistance of the infant carrier 10 and the foldable support frame 11 along the folding direction can be improved greatly, so as to enhance the overall stability of the infant carrier 10 and the foldable support frame 11.

Furthermore, since the tubular member 112 has better bending resistance and impact resistance than the existing tubular member 112' without increasing the weight of the tubular member 112, the infant carrier 10 and the foldable support frame 11 of the present invention can have preferable bending resistance and impact resistance, so as to greatly enhance stability and reliability of the infant carrier 10 and the foldable support frame 11 of the present invention and ensure safety of the infant.

Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

Claims

1. A tubular member (112) for a support frame of an infant carrier, the tubular member (112) being a hollow structure and comprising:

two connection sections (1121) formed at two ends of the tubular member (112), the two connection sections (1121) having the same structure for connection; and characterized by:

a support section (1122) formed between the two connection sections (1121), a center of mass of the support section being taken as a foot point to form a first axis direction along a vertical direction and form a second axis direction along a horizontal direction, a moment of inertia in the first axis direction being larger than a moment of inertia in the second axis direction, a cross-sectional area of the connection section (1121) being equal to a cross-sectional area of the support section (1122).

2. The tubular member (112) for the support frame of the infant carrier of claim 1, characterized in that the support section (1122) has an oval-like cross-section (1124).

3. The tubular member (112) for the support frame of the infant carrier of claim 2, characterized in that the oval-like cross-section (1124) comprises two vertical planes (1125) parallel to each other and two arc-shaped planes (1126) symmetrical to each other, the two arc-shaped planes (1126) are connected to the two vertical planes (1125) to cooperatively form the oval-like cross-section (1124), and a moment of inertia of the vertical plane (1125) in the first axis direction is larger than a moment of inertia of the arc-shaped plane (1126) in the second axis direction.

4. The tubular member (112) for the support frame of the infant carrier of claim 3, characterized in that the oval-like cross-section (1124) is formed by squeezing a circular structure (1127) having the same cross-sectional area along the second axis direction.

5. The tubular member (112) for the support frame of the infant carrier of claim 1, characterized in that the connection section (1121) has a circular cross-section.

6. The tubular member (112) for the support frame of the infant carrier of claim 1, characterized in that a tube-wall thickness of the connection section (1121) is equal to a tube-wall thickness of the support section (1122).

7. The tubular member (112) for the support frame of the infant carrier of claim 1, characterized in that an arc-shaped transition section (1123) is formed between the connection section (1121) and the support section (1122).

8. The tubular member (112) for the support frame of the infant carrier of claim 1, characterized in that the tubular member (112) is an integrally-formed structure.

9. The tubular member (112) for the support frame of the infant carrier of claim 1, characterized in that the connection section (1121) is a straight-tube structure.

10. The tubular member (112) for the support frame of the infant carrier of claim 1, characterized in that the support section (1122) is a curved-tube structure.

11. The tubular member (112) for the support frame of the infant carrier of claim 10, characterized in that the support section (1122) is a symmetrical structure having a protruding central portion.

12. A foldable support frame (11) comprising:
two joints (111, 113); and characterized by:
the tubular member (112) of any of claims 1-11, the tubular member (112) being connected between the two joints (111, 113) to be foldable relative to the joints (111, 113) along a folding direction, the connection section (1121) being pivoted to the joint (111, 113), the first axis direction being parallel to the folding direction.

13. The foldable support frame (11) of claim 12, characterized in that the foldable support frame (11) is a stroller frame, a crib frame, a bassinet frame, or a rocking-chair frame.

14. An infant carrier (10) characterized by:

a carrier body (100); and

the foldable support frame (11) of any of claims 12-13 for supporting the carrier body (100).

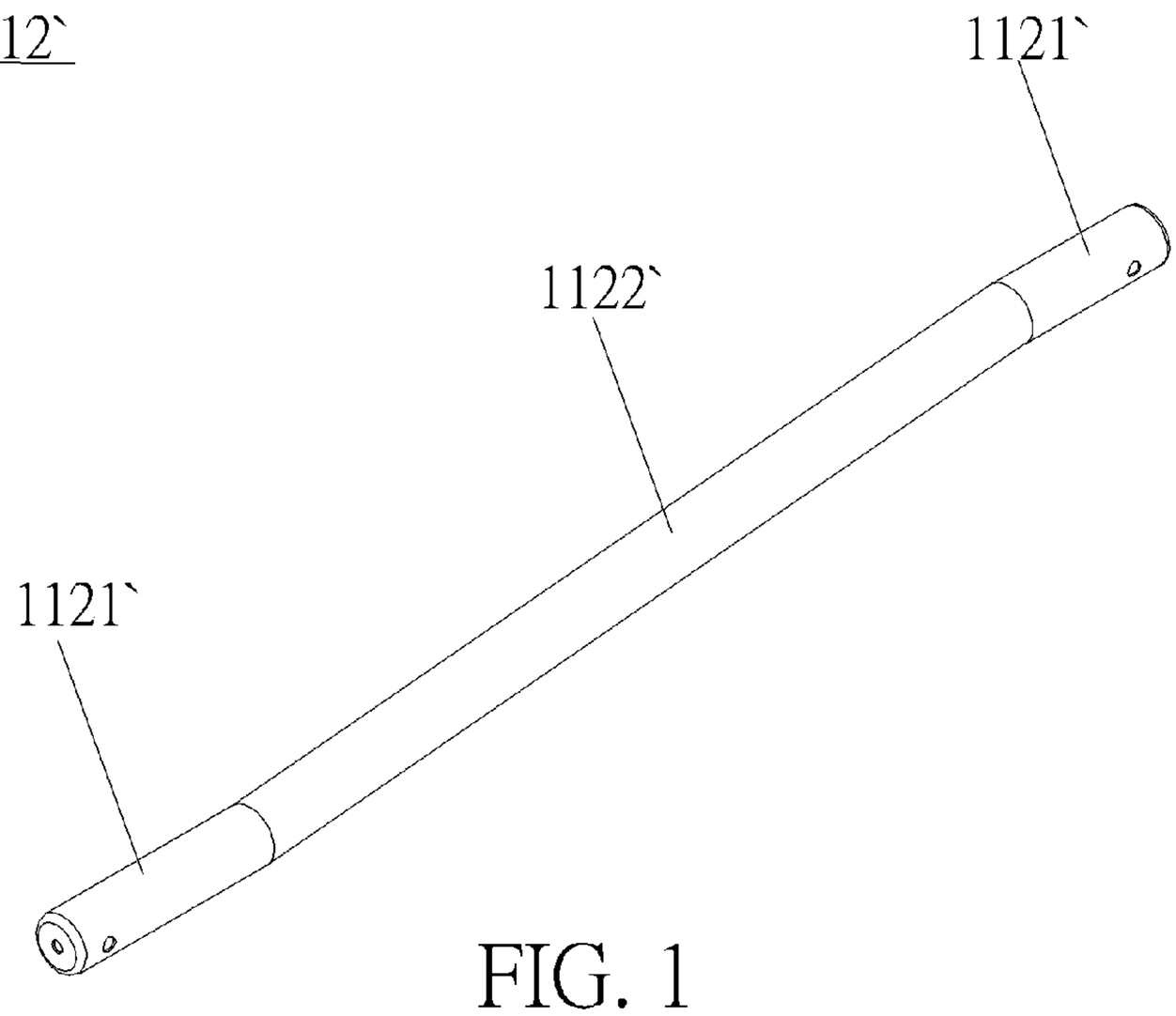

FIG. 1

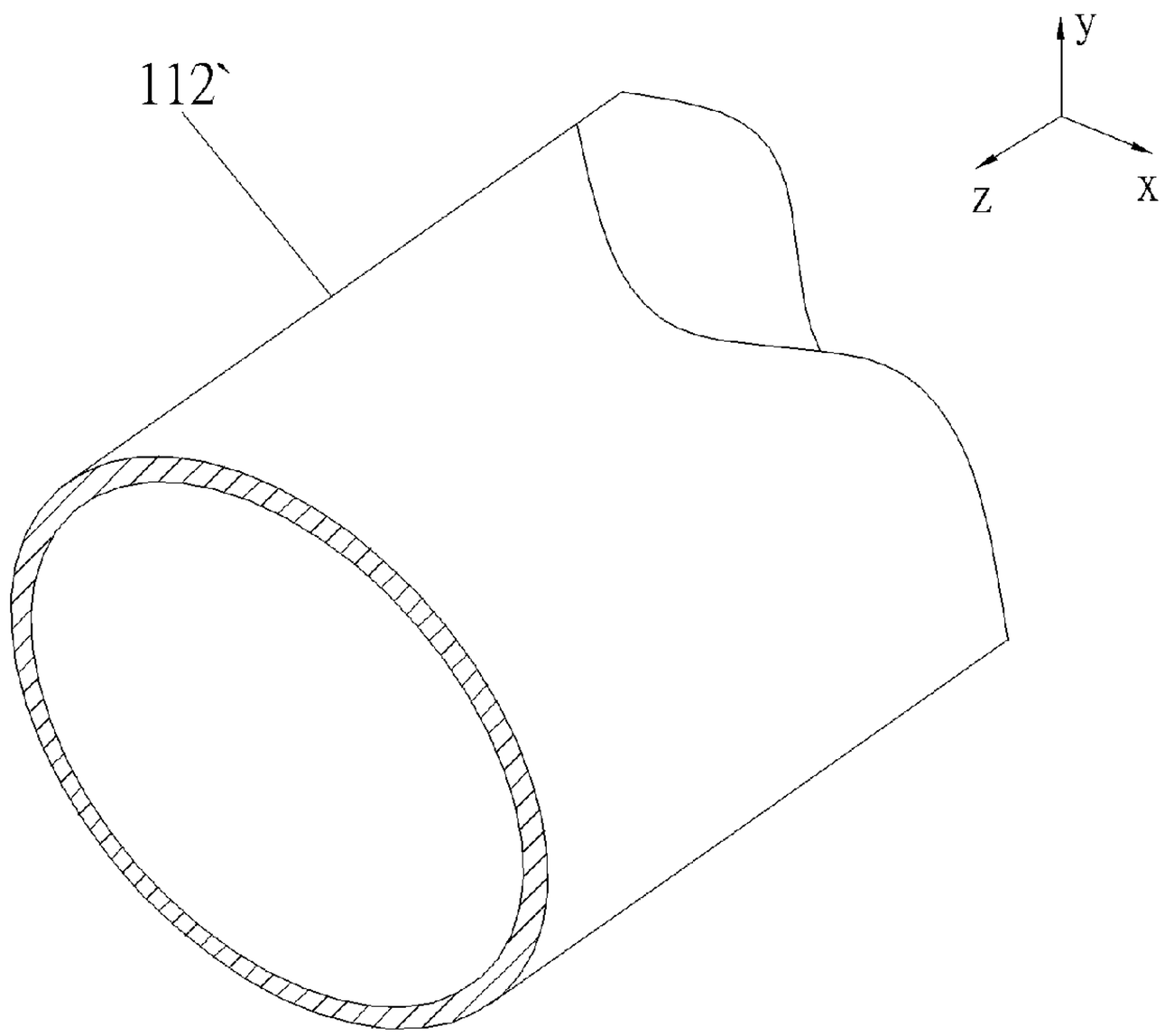

FIG. 2

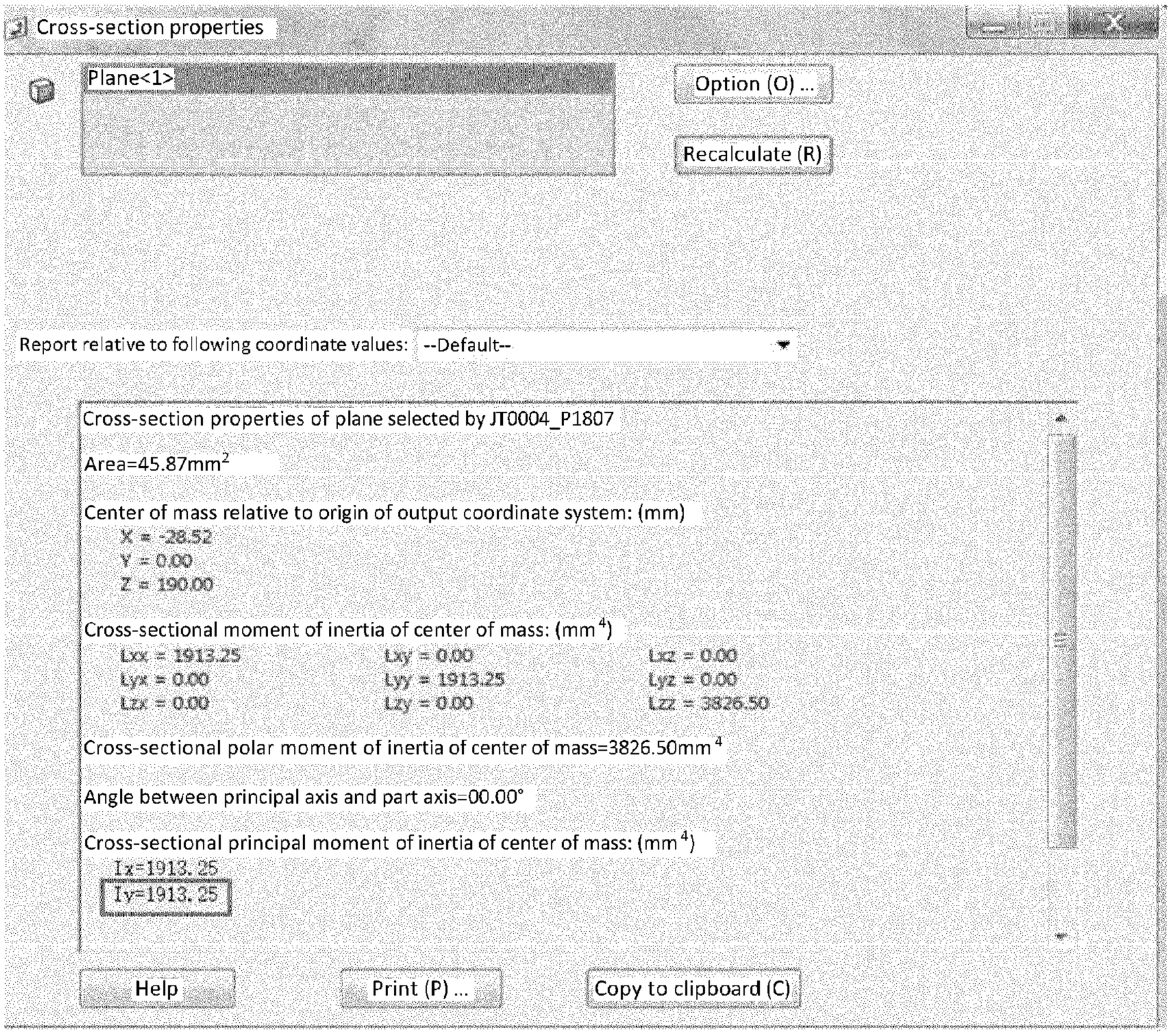
Cross-section properties
Plane<1>
Option (O) ...
Recalculate (R)
Report relative to following coordinate values: --Default--
Cross-section properties of plane selected by JT0004_P1807
Area=45.87mm2
Center of mass relative to origin of output coordinate system: (mm)
X = -28.52
Y = 0.00
Z = 190.00
Cross-sectional moment of inertia of center of mass: (mm4)
Lxx = 1913.25
Lxy = 0.00
Lxz = 0.00
Lyx = 0.00
Lyy = 1913.25
Lyz = 0.00
Lzx = 0.00
Lzy = 0.00
Lzz = 3826.50
Cross-sectional polar moment of inertia of center of mass=3826.50mm4
Angle between principal axis and part axis=00.00°
Cross-sectional principal moment of inertia of center of mass: (mm4)
Ix=1913.25
Iy=1913.25
Help
Print (P) ...
Copy to clipboard (C)

FIG. 3

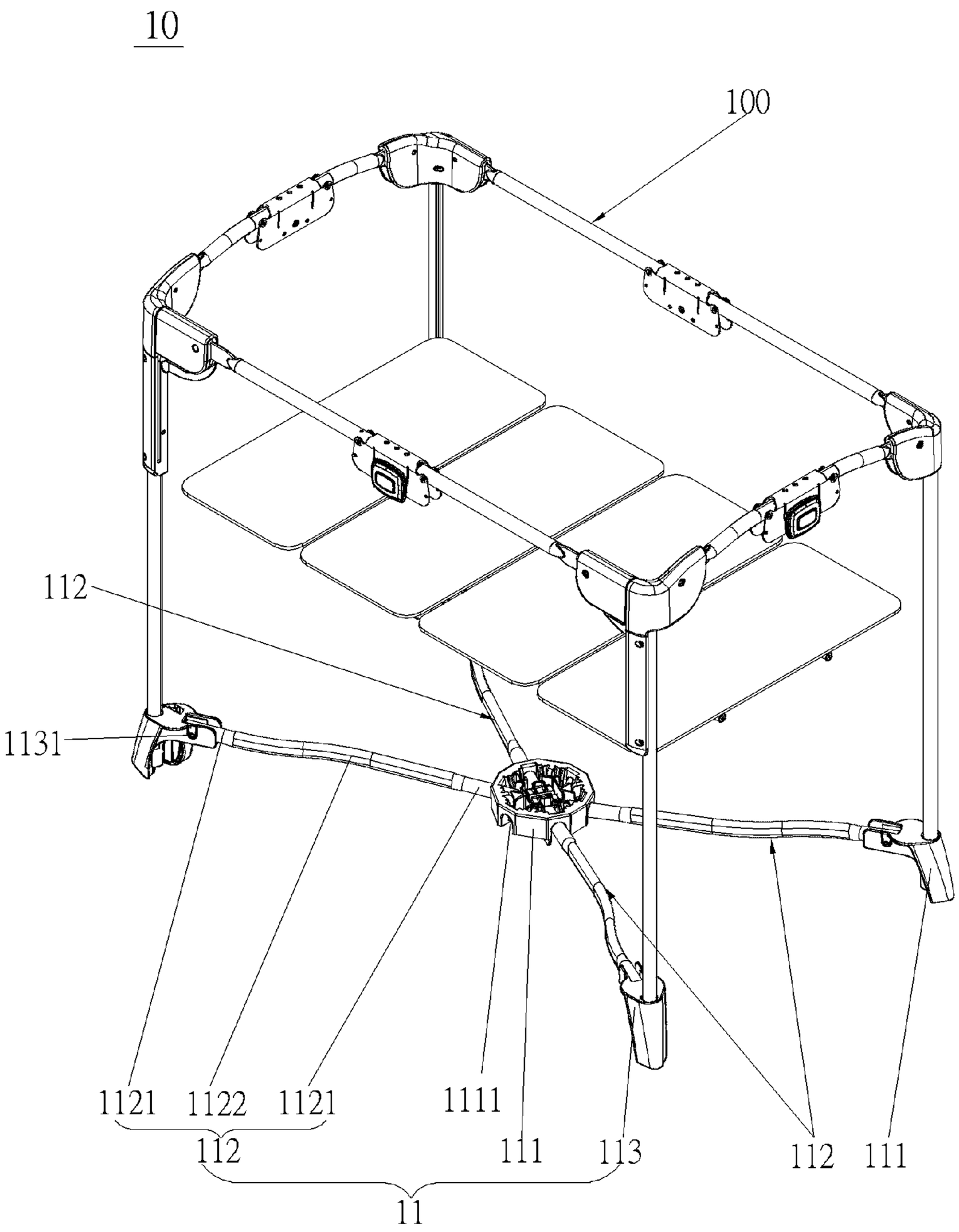

FIG. 4

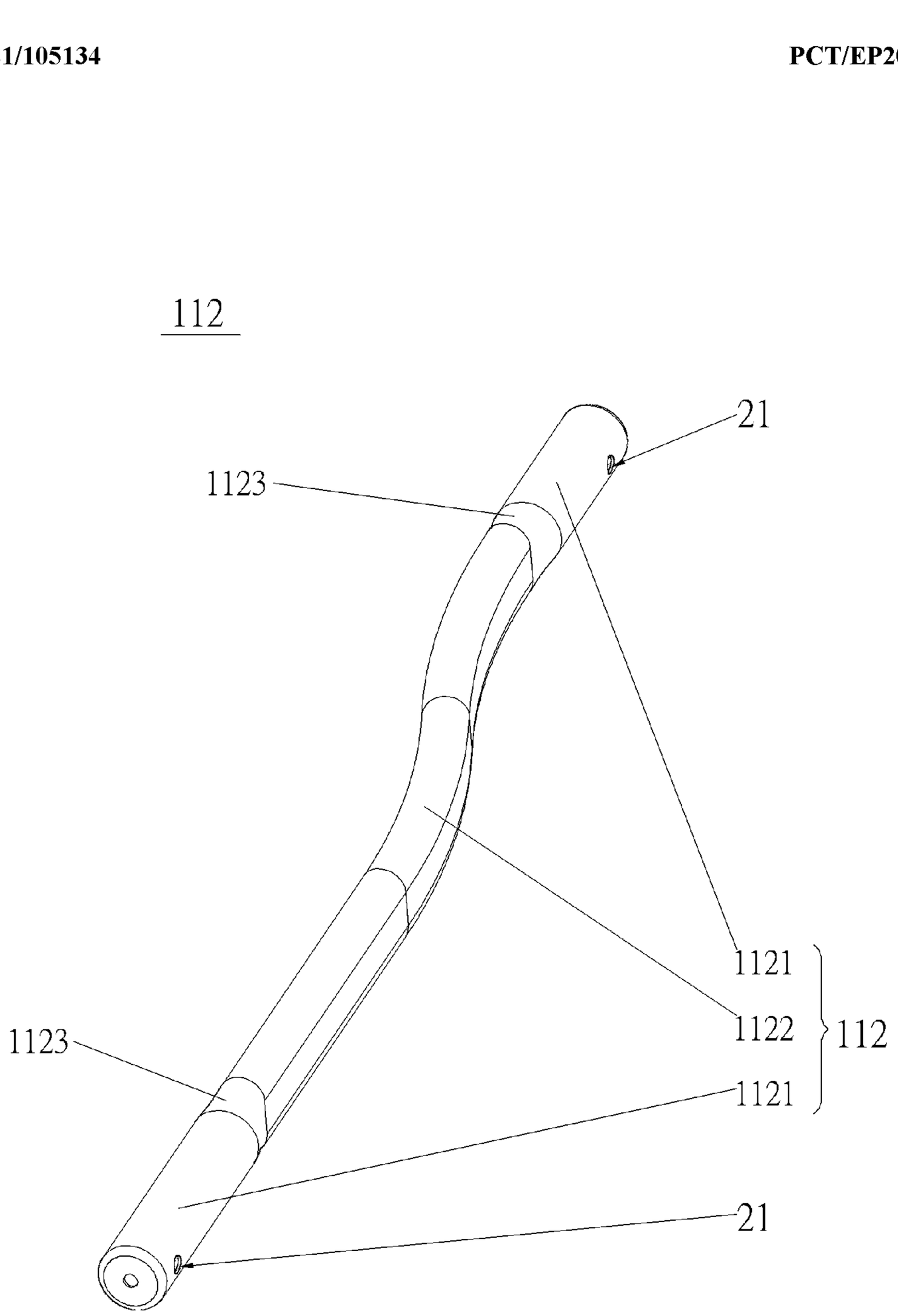

FIG. 5

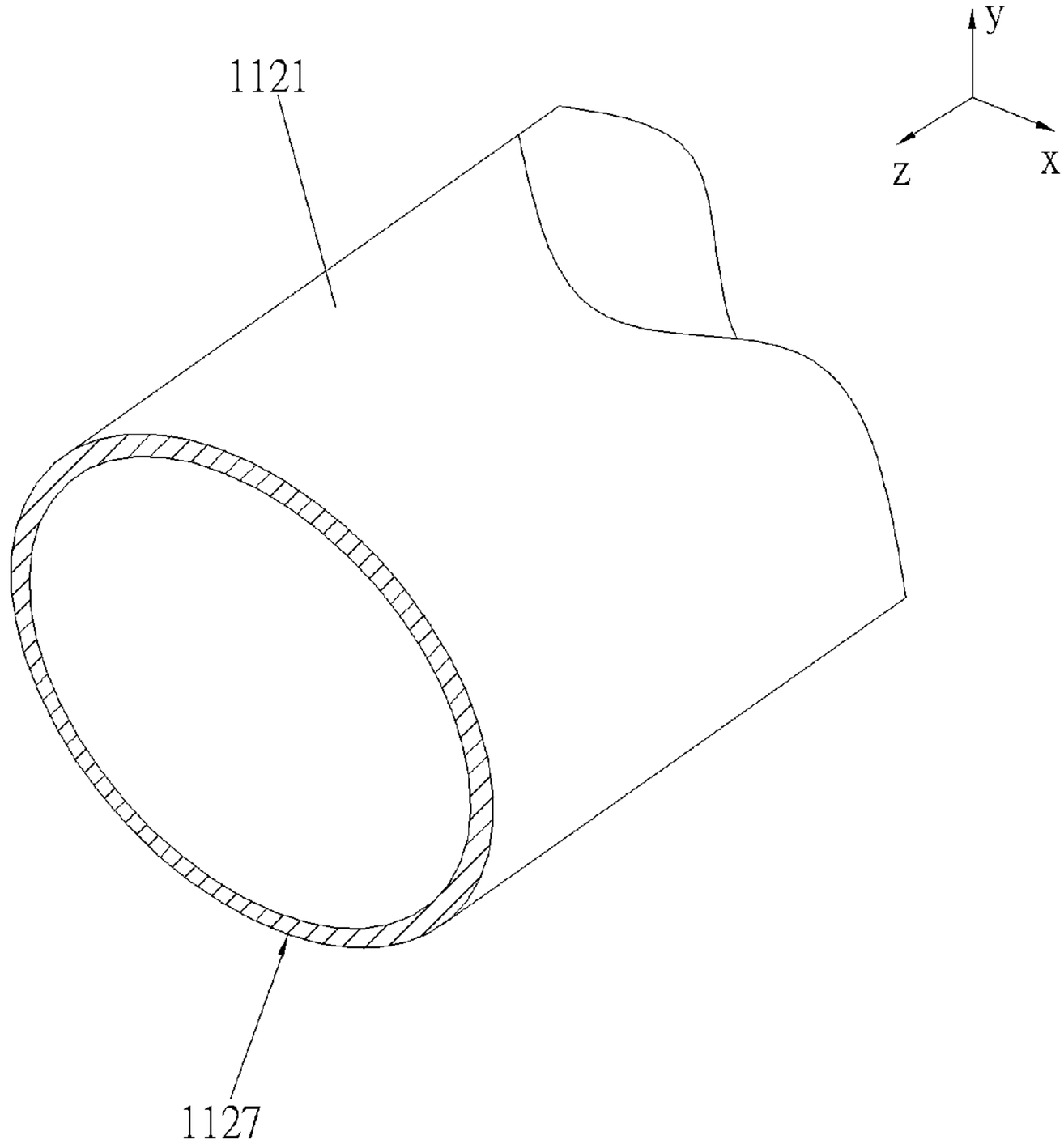

FIG. 6

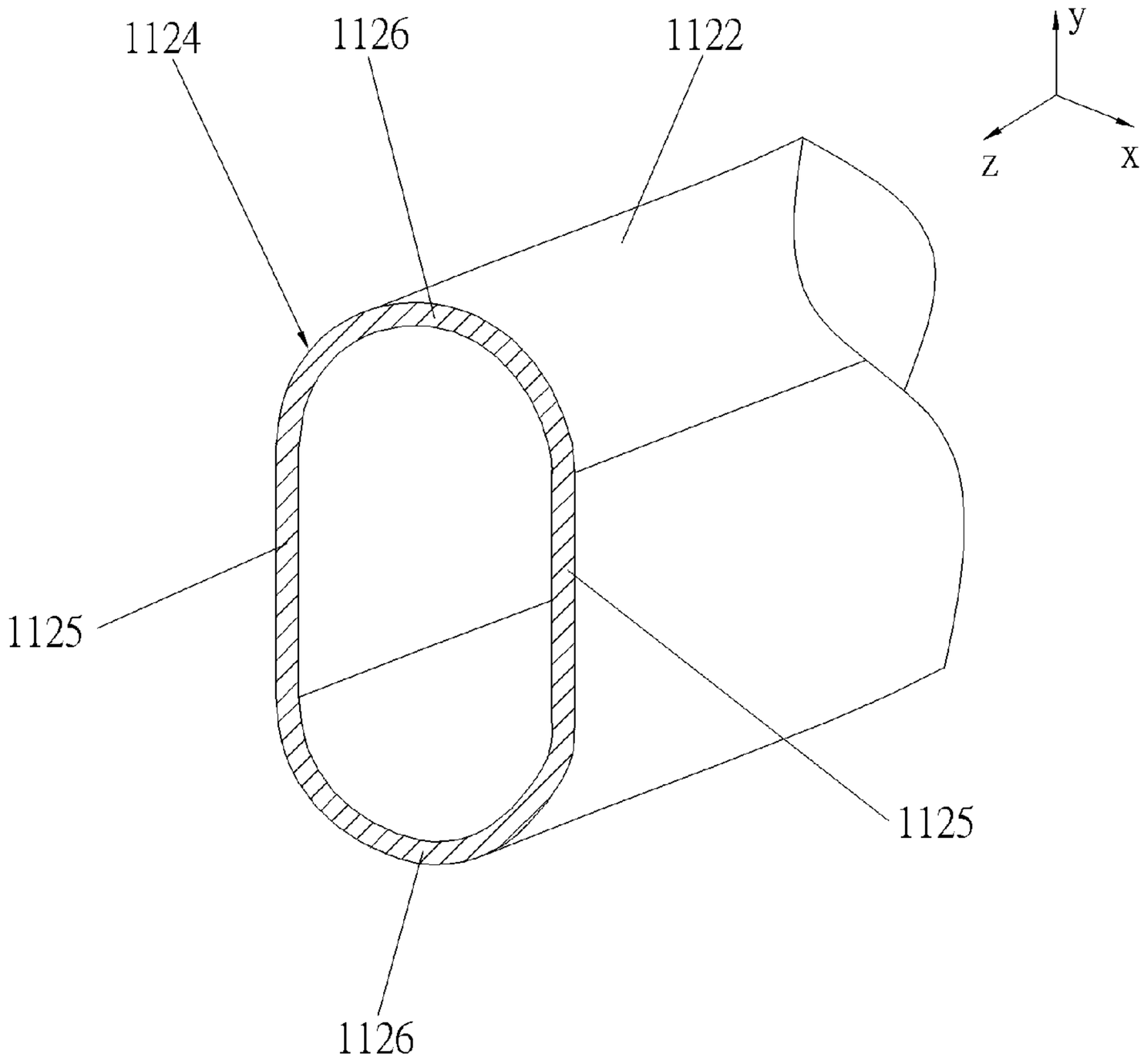

FIG. 7

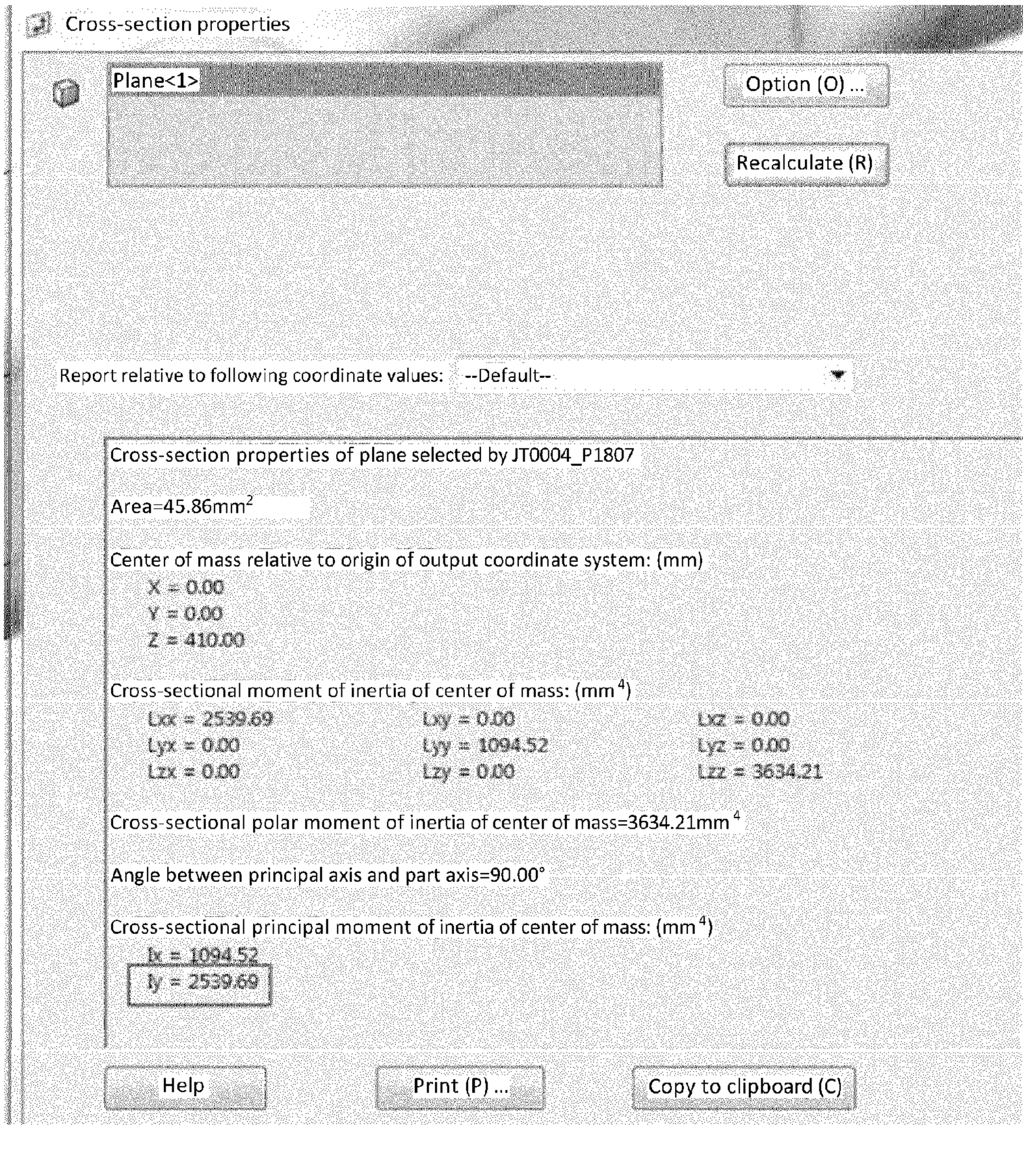
Cross-section properties
Plane<1>
Option (O) ...
Recalculate (R)
Report relative to following coordinate values: --Default--
Cross-section properties of plane selected by JT0004_P1807
Area=45.86mm²
Center of mass relative to origin of output coordinate system: (mm)
X = 0.00
Y = 0.00
Z = 410.00
Cross-sectional moment of inertia of center of mass: (mm⁴)
Lxx = 2539.69
Lxy = 0.00
Lxz = 0.00
Lyx = 0.00
Lyy = 1094.52
Lyz = 0.00
Lzx = 0.00
Lzy = 0.00
Lzz = 3634.21
Cross-sectional polar moment of inertia of center of mass=3634.21mm⁴
Angle between principal axis and part axis=90.00°
Cross-sectional principal moment of inertia of center of mass: (mm⁴)
Ix = 1094.52
Iy = 2539.69
Help
Print (P) ...
Copy to clipboard (C)

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/083235

A. CLASSIFICATION OF SUBJECT MATTER
INV. B62B3/02 B62B7/06
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B62B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	GB 2 469 619 A (CHEN OWEN [TW]) 27 October 2010 (2010-10-27) figures 1,4,9	1-3,6, 8-13 14 4,5,7

Y	CN 205 661 493 U (FOSHAN OSCAR MEDICAL INSTR CO LTD) 26 October 2016 (2016-10-26) figures 1-6	14

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 February 2021	05/03/2021
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Melnichi, Andrei

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2020/083235

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2469619 A	27-10-2010	NONE	
CN 205661493 U	26-10-2016	NONE	