PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

Assignment ID: PATI725497

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
Fengxiang YAN	05/08/2018
Kai-Wen CHENG	05/04/2018

RECEIVING PARTY DATA

Company Name:	Wonderland Switzerland AG
Street Address:	Beim Bahnhof 5
City:	Steinhausen
State/Country:	SWITZERLAND
Postal Code:	6312

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16941562

CORRESPONDENCE DATA

Fax Number:

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: (215)255-9261
Email: nlane@vklaw.com
Correspondent Name: Mrs. NANCY ANN LANE
Address Line 1: 30 S. 17th Street
Address Line 2: 18th Floor
Address Line 4: Philadelphia, PENNSYLVANIA 19103

ATTORNEY DOCKET NUMBER:	WON-PT012.1
NAME OF SUBMITTER:	Nancy Lane
SIGNATURE:	Nancy Lane
DATE SIGNED:	12/31/2024
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 28
source=Assignment#page1.tiff
source=Assignment#page2.tiff
source=Assignment#page3.tiff

source=Assignment#page4.tiff
source=Assignment#page5.tiff
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COMBINE DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) AND ASSIGNMENT

Title of Invention:
MANUFACTURING METHOD FOR A CAR SAFETY SEAT

As the below named inventor, I hereby declare that:
This declaration is directed to:

☑ The attached application, or

☐ United States application number _____ filed on _____, or

☐ PCT international application number _____ filed on _____

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

In consideration of the payment by **Wonderland Switzerland AG** having a postal address of

Beim Bahnhof 5, Steinhausen 6312, Switzerland

(referred to as "ASSIGNEE"below) to I of the sum of One Dollar ($ 1.00), the receipt of which is hereby acknowledged, andfor other good and valuable consideration.

I hereby sell, assign and transfer to ASSIGNEE and the successors and assignees of the ASSIGNEE the entire right, title and interest in and to any and all improvements which are disclosed in the invention as above-identified application and, in and to, all Letters Patent to be obtained for said invention by the above application or any continuations, continuation-in-part, divisions, renewals, substitutes, or extensions thereof, and as to Letters Patent any reissue or re-examination thereof.

I hereby covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this assignment;

I further covenant that ASSIGNEE will, upon its request, be provided promptly with all pertinent facts and documents relating to said invention and said Letters Patent and legal equivalents as may be known and accessible to I and will testify as to the same in any interference, litigation proceeding related thereto and will promptly execute and deliver to ASSIGNEE or its legal

representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue and enforce said application, said invention and said Letters Patent and said equivalents thereof which may be necessary or desirable to carry out the proposes thereof.
IN WITNESS WHEREOF, I have hereunto set hand and seal this MAY 0 8 2018 (Date of signing)

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use this form for each additional inventor.

LEGAL NAME OF INVENTOR(ASSIGNOR)

Inventor: **Fengxiang Yan** Date: 2018.05.08

Signature: Fengxiang Yan

COMBINE DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) AND ASSIGNMENT

Title of Invention:
MANUFACTURING METHOD FOR A CAR SAFETY SEAT

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This declaration is directed to:

☑ The attached application, or

☐ United States application number _____ filed on _____, or

☐ PCT international application number _____ filed on _____

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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Beim Bahnhof 5, Steinhausen 6312, Switzerland

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I hereby sell, assign and transfer to ASSIGNEE and the successors and assignees of the ASSIGNEE the entire right, title and interest in and to any and all improvements which are disclosed in the invention as above-identified application and, in and to, all Letters Patent to be obtained for said invention by the above application or any continuations, continuation-in-part, divisions, renewals, substitutes, or extensions thereof, and as to Letters Patent any reissue or re-examination thereof.

I hereby covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this assignment;

I further covenant that ASSIGNEE will, upon its request, be provided promptly with all pertinent facts and documents relating to said invention and said Letters Patent and legal equivalents as may be known and accessible to I and will testify as to the same in any interference, litigation proceeding related thereto and will promptly execute and deliver to ASSIGNEE or its legal

representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue and enforce said application, said invention and said Letters Patent and said equivalents thereof which may be necessary or desirable to carry out the proposes thereof.
IN WITNESS WHEREOF, I have hereunto set hand and seal this MAY 04 2018 (Date of signing)

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use this form for each additional inventor.

LEGAL NAME OF INVENTOR(ASSIGNOR)

Inventor: **Kai-Wen Cheng** Date: 2018. 3. 4

Signature: Kai-Wen Cheng

PTO/SB/02B (05-07)
Approved for use through 05/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

DECLARATION – Supplemental Priority Data Sheet

Foreign applications:

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
201710353283.1	P.R.C.	05/18/2017	The priority document of China application NO.201710353283.1 has been or will be retrieved via PDX/DAS in the parent application serial No.15/979,378.		
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This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CWNP0005USA1
	Application Number	
Title of Invention	MANUFACTURING METHOD FOR A CHILD CARRYING DEVICE	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Fengxiang		Yan	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

City	Country of Residence [i]
Dongguan, Guangdong	CN

Mailing Address of Inventor:

Address 1	No 1, Yin Hu Industrial Zone, Qing Xi Town
Address 2	
City	Dongguan, Guangdong
State/Province	
Postal Code	
Country [i]	CN

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Kai-Wen		Cheng	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Country of Residence [i]
Taipei	TW

Mailing Address of Inventor:

Address 1	10F, No.433, Rui Kwang Road, Neihu
Address 2	
City	Taipei
State/Province	
Postal Code	
Country [i]	TW

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CWNP0005USA1
	Application Number	
Title of Invention	MANUFACTURING METHOD FOR A CHILD CARRYING DEVICE	

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	27765		
Email Address	winstonhsu@naipo.com	Add Email	Remove Email

Application Information:

Title of the Invention	MANUFACTURING METHOD FOR A CHILD CARRYING DEVICE		
Attorney Docket Number	CWNP0005USA1	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	3	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	27765		

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CWNP0005USA1
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Title of Invention	MANUFACTURING METHOD FOR A CHILD CARRYING DEVICE	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Division of	15979378	2018-05-14

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
201710353283.1	CN	2017-05-18	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CWNP0005USA1
	Application Number	
Title of Invention	MANUFACTURING METHOD FOR A CHILD CARRYING DEVICE	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CWNP0005USA1
	Application Number	
Title of Invention	MANUFACTURING METHOD FOR A CHILD CARRYING DEVICE	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Wonderland Switzerland AG		
Mailing Address Information For Applicant:			
Address 1	Beim Bahnhof 5		
Address 2			
City	Steinhausen	**State/Province**	
Country	CH	Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CWNP0005USA1
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Title of Invention	MANUFACTURING METHOD FOR A CHILD CARRYING DEVICE	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Winston Hsu/			Date (YYYY-MM-DD)	2020-07-28
First Name	Winston	Last Name	Hsu	Registration Number	41526

Additional Signature may be generated within this form by selecting the Add button. Add

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Title

MANUFACTURING METHOD FOR A CHILD CARRYING DEVICE

Cross Reference To Related Applications

[0001] This application is a divisional application of U.S. Patent Application No. 15/979, 378, which is filed on 05/14/2018, and the entire contents of this application are hereby incorporated by reference.

Background of the Invention

1. Field of the Invention

[0002] The invention relates to a manufacturing method for a child carrying device, and more particularly, to a manufacturing method that saves the necessity to dispose a seat pad or a cushion on a main body of the child carrying device.

2. Description of the Prior Art

[0003] A child carrying device (i.e. a child safety seat) is a safety apparatus necessary for protecting a child during a car ride. A conventional manufacturing method of the child carrying device is to shape a main body of the child carrying device first and then to dispose a seat pad or a cushion onto the main body. The main body is often formed from thermoplastics, such as polypropylene (PP), injected into an injection mold via an injection molding procedure, where a hardness of the formed main body necessitates an addition of the seat pad or the cushion equipped with the main body to enhance comfort and safety thereof for the child to be seated in. However, for fixing the seat pad or the cushion to the main body, correspondent fixing structures need to be disposed thereon, which leads to a problem of increased cost and increased work-hour of assembly.

[0004] To solve the above-mentioned problem, it is necessary to provide a manufacturing method for the child carrying device that saves the necessity to dispose the seat pad or the cushion while preserves comfort and safety for the child carrying device.

Summary of the Invention

[0005] Therefore, the objective of the invention is to provide a manufacturing method for manufacturing a child carrying device, which saves the necessity to dispose a seat pad or a cushion while preserves comfort and safety for the child carrying device.

[0006] In order to achieve the aforementioned objective, the present invention discloses a manufacturing method for a child carrying device. The manufacturing method includes providing a mold and disposing a main body of the child carrying device into the mold; and injecting a foam material into a cavity of the mold and foaming the foam material in the cavity of the mold so as to form a flexible layer integrated with the main body, wherein an average particle diameter of the foam material after being foamed is from 1mm to 10 mm.

[0007] According to an embodiment of the present invention, the pressure in the cavity is from 2.0bar to 4.0bar during the foaming process.

[0008] According to an embodiment of the present invention, a wall thickness of the main body is substantially 1.5mm.

[0009] According to an embodiment of the present invention, the manufacturing method further includes injecting a vapor into the cavity of the mold after injecting the foam material into the cavity, for combining the foam material with the main body by temperature and the pressure.

[0010] According to an embodiment of the present invention, the manufacturing method further includes cooling the formed flexible layer; and demolding the mold to draw the child carrying device comprising the main body and the flexible layer manually or by an ejector pin.

[0011] According to an embodiment of the present invention, the manufacturing method further includes drying and cooling the child carrying device after drawing the child carrying device from the mold.

[0012] According to an embodiment of the present invention, the manufacturing method further includes deburring the child carrying device after cooling the child carrying device.

[0013] According to an embodiment of the present invention, the manufacturing method further includes disposing a fixing fixture into the child carrying device to shape the child carrying device before drying the child carrying device.

[0014] According to an embodiment of the present invention, the manufacturing method further includes disposing a sealing fixture onto the main body of the child carrying device to seal at least one hole or at least one groove on the main body of the child carrying device before disposing the main body of the child carrying device into the mold.

[0015] In order to achieve the aforementioned objective, the present invention further discloses a manufacturing method for a child carrying device. The manufacturing method includes providing a mold and disposing a main body of the child carrying device into the mold; and injecting a foam material into a cavity of the mold and foaming the foam material in the cavity of the mold so as to form a flexible layer integrated with the main body, wherein a wall thickness of the main body is substantially 1.5mm.

[0016] According to an embodiment of the present invention, the pressure in the cavity is from 2.0bar to 4.0bar during the foaming process.

[0017] According to an embodiment of the present invention, the manufacturing method further includes injecting a vapor into the

cavity of the mold after injecting the foam material into the cavity, for combining the foam material with the main body by temperature and the pressure.

[0018] According to an embodiment of the present invention, the manufacturing method further includes cooling the formed flexible layer; and demolding the mold to draw the child carrying device comprising the main body and the flexible layer manually or by an ejector pin.

[0019] According to an embodiment of the present invention, the manufacturing method further includes drying and cooling the child carrying device after drawing the child carrying device from the mold.

[0020] According to an embodiment of the present invention, the manufacturing method further includes deburring the child carrying device after cooling the child carrying device.

[0021] According to an embodiment of the present invention, the manufacturing method further includes disposing a fixing fixture into the child carrying device to shape the child carrying device before drying the child carrying device.

[0022] According to an embodiment of the present invention, the manufacturing method further includes disposing a sealing fixture onto the main body of the child carrying device to seal at least one hole or at least one groove on the main body of the child carrying device before disposing the main body of the child carrying device into the mold.

[0023] In order to achieve the aforementioned objective, the present invention further discloses a manufacturing method for a child carrying device. The manufacturing method includes providing a mold and disposing a main body of the child carrying device into the mold; and injecting a foam material into a cavity of the mold and foaming

the foam material in the cavity of the mold so as to form a flexible layer integrated with the main body, wherein injecting a vapor into the cavity of the mold after injecting the foam material into the cavity, for combining the foam material with the main body by temperature and the pressure.

[0024] According to an embodiment of the present invention, the pressure in the cavity is from 2.0bar to 4.0bar during the foaming process.

[0025] According to an embodiment of the present invention, the manufacturing method further includes cooling the formed flexible layer; and demolding the mold to draw the child carrying device comprising the main body and the flexible layer manually or by an ejector.

[0026] According to an embodiment of the present invention, the manufacturing method further includes drying and cooling the child carrying device after drawing the child carrying device from the mold.

[0027] According to an embodiment of the present invention, the manufacturing method further includes deburring the child carrying device after cooling the child carrying device.

[0028] According to an embodiment of the present invention, the manufacturing method further includes disposing a fixing fixture into the child carrying device to shape the child carrying device before drying the child carrying device.

[0029] According to an embodiment of the present invention, the manufacturing method further includes disposing a sealing fixture onto the main body of the child carrying device to seal at least one hole or at least one groove on the main body of the child carrying device before disposing the main body of the child carrying device into the mold.

[0030] In summary, the manufacturing method of the present application disposes the main body into the mold and directly forms a flexible layer on the main body via a foaming molding procedure, so that the flexible layer ensures safety and comfort of the car safety seat while saves the necessity to dispose a seat pad or a cushion and fixing structures on the main body. Therefore, the present application can achieve purposes of reducing the cost and the work-hour of assembly and reducing the overall weight of the car safety seat since the fixing structures are omitted.

[0031] These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

Brief Description of the Drawings

[0032] FIG. 1 is a main flow diagram illustrating a manufacturing method of a child carrying device according to an embodiment of the present application.

[0033] FIG.2 is a diagram of a child carrying device manufactured by the manufacturing method according to the embodiment of the present application.

[0034] FIG. 3 is a more detailed flow diagram illustrating the manufacturing method of the child carrying device according to the embodiment of the present application.

Detailed Description

[0035] In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. In this regard, directional terminology, such as "top," "bottom," "front," "back," etc., is used with reference to the orientation of the Figure(s) being described. The components of the present invention can be

positioned in a number of different orientations. As such, the directional terminology is used for purposes of illustration and is in no way limiting. Accordingly, the drawings and descriptions will be regarded as illustrative in nature and not as restrictive.

[0036] Please refer to FIG. 1 and FIG. 2. FIG. 1 is a main flow diagram illustrating a manufacturing method of a child carrying device 1 according to an embodiment of the present application. FIG.2 is a diagram of the child carrying device 1 manufactured by the manufacturing method according to the embodiment of the present application. The present application provides the manufacturing method for post forming a shaped polypropylene (PP) main body 11 for producing the child carrying device 1, without a need to dispose a seat pad or a cushion onto the main body 11. The manufacturing method includes two main steps of providing a mold and disposing the main body 11 into the mold before closing the mold, and injecting a foam material into a cavity of the mold and foaming the foam material in the cavity of the mold to form a flexible layer 12 covering and integrated with the main body 11.

[0037] After the foam material is injected into the cavity of the mold, a vapor is injected with high temperature into the cavity to provide the cavity with a particular environment of temperature and pressure. The foam material is foamed and combined with the main body 11 under the temperature and the pressure. The pressure in the cavity during the foaming process can be set from 1.5bar to 5.0bar, preferably can be set from 2.0bar to 4.0bar. After the foaming and post forming process, the child carrying device 1 can be kept and cooled in the cavity for a certain period before being drawn out of the mold. A wall thickness of the main body 11 can be substantially 1.5mm. It should be noticed that a clearance between the main body 11 and an inner wall of the mold can be restricted to avoid deformation of the main body 11.

[0038] During the foaming process, four important conditions of the

process are pressure, vapor temperature, foam expansion ratio, and cooling time. By adjusting the conditions, nine different foamed specimens are produced as shown in the following table:

		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9
Process conditions	Pressure (bar)	3.5	3.5	3.5	2	4	1.5	5	1	6
	Vapor temperature (°C)	125	125	125	125	125	110	150	100	170
	Foam expansion ratio	45	30	50	45	45	45	45		
	Cooling time (sec.)	55	55	55	55	55	55	55	55	55
quality of the formed sample		excellent	excellent	excellent	good	good	fair	fair	Failed to foam	Shrunk by overheating
Average particle diameter (mm)		6	1	10	6	6	6	6		

[0039] It can be concluded from the above table that the foam material is unable to foam if the pressure in the cavity is too low (lower than 1.5bar, specifically). While the foam material overly foams when the pressure in the cavity is too high (higher than 6bar, specifically), the foam particles shrink and the main body 11 deforms due to excessive pressurization. Therefore, the present application limits the pressure from 1.5bar to 5.0bar, and preferably from 2.0bar to 4.0bar.

[0040] Furthermore, quality of the formed child carrying device 1 is affected by the parameters of the foam expansion ratio and the average particle diameter of the foam material. A final product of the child carrying device 1 might have overweight if the foam expansion ratio is substantially lower than 30, while an otherwise lightweight product has poor impact resistance if the foam expansion ratio is substantially higher than 50. The average particle diameter of the foam material can be designed from 1mm to 10mm for producing a

lightweight child carrying device 1, and the average particle diameter is defined as an average value of measured diameters of all the foam particles within a $1cm^3$ volume. Specifically, the foam material of the embodiment can be expanded polypropylene (EPP).

[0041] Please refer to FIG. 3. FIG. 3 is a more detailed flow diagram illustrating the manufacturing method of the child carrying device 1 according to the embodiment of the present application. The detailed manufacturing method for the child carrying device 1 includes the following steps:

[0042] Providing the mold and disposing the main body 11 into the mold, and then closing the mold;

[0043] Injecting the foam material into the cavity of the mold;

[0044] Injecting the vapor with high temperature into the mold to provide an environment of particular temperature and pressure to combine the foam material with the main body 11, so as to form the flexible layer 12 covering the main body 11;

[0045] Cooling the formed flexible layer;

[0046] Demolding the mold to draw the child carrying device 1 manually or by an ejector pin;

[0047] Drying and cooling the child carrying device 1; and

[0048] Deburring the child carrying device 1.

[0049] After finishing the manufacturing method for the child carrying device 1, the child carrying device 1 is ready to be packaged.

[0050] There are many holes or grooves on the main body 11, and the holes or the grooves may be filled by the foam material during the foaming process if the main body 11 is directly put into the mold for the foaming process. Therefore, sealing fixtures can be utilized to be disposed on the main body 11 for temporarily sealing the desirable holes or grooves in advance before the main body 11 is put into the mold for the foaming process, so as to prevent the desirable holes or grooves from being filled by the foam material. The sealing fixtures can be plugs having shapes corresponding to the shapes of

the holes or grooves.

[0051] The demolded child carrying device might be deformed by heat in the step of drying, and hollow structures on the main body 11, such as holes, grooves, or trenches, are particularly easy to be deformed. Therefore, fixing fixtures can be utilized to be inserted in to the hollow structures to keep shapes of the hollow structures before the child carrying device is dried through the drying process. During the drying process, possible deformation is avoided as the fixing fixtures holds at these locations of the hollow structures to fix the shapes thereof. The fixing fixtures can be plugs having shapes corresponding to the shapes of the hollow structures.

[0052] In contrast to the prior art, the manufacturing method of the present application disposes the main body 11 into the mold and directly forms the flexible layer 12 on the main body 11 by the foaming process. The flexible layer 12 ensures the safety and comfort of the child carrying device 1 and saves the necessity to dispose a seat pad or a cushion and fixing structures on the main body 11. Therefore, the present application can achieve the purposes of reducing the cost and the work-hour of assembly. The overall weight of the child carrying device 1 is also reduced since the fixing structures are omitted.

[0053] 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

What is claimed is:

1. A manufacturing method for a child carrying device, the manufacturing method comprising:

providing a mold and disposing a main body of the child carrying device into the mold; and

injecting a foam material into a cavity of the mold and foaming the foam material in the cavity of the mold so as to form a flexible layer integrated with the main body, wherein an average particle diameter of the foam material after being foamed is from 1mm to 10 mm.

2. The manufacturing method of claim 1, wherein the pressure in the cavity is from 2.0bar to 4.0bar during the foaming process.

3. The manufacturing method of claim 1, wherein a wall thickness of the main body is substantially 1.5mm.

4. The manufacturing method of claim 1, further comprising:

injecting a vapor into the cavity of the mold after injecting the foam material into the cavity, for combining the foam material with the main body by temperature and the pressure.

5. The manufacturing method of claim 1, further comprising:

cooling the formed flexible layer; and

demolding the mold to draw the child carrying device comprising the main body and the flexible layer manually or by an ejector pin.

6. The manufacturing method of claim 5, further comprising:

drying and cooling the child carrying device after drawing the child carrying device from the mold.

7. The manufacturing method of claim 6, further comprising:

deburring the child carrying device after cooling the child

carrying device.

8. The manufacturing method of claim 6, further comprising:
disposing a fixing fixture into the child carrying device to shape the child carrying device before drying the child carrying device.

9. The manufacturing method of claim 1, further comprising:
disposing a sealing fixture onto the main body of the child carrying device to seal at least one hole or at least one groove on the main body of the child carrying device before disposing the main body of the child carrying device into the mold.

10. A manufacturing method for a child carrying device, the manufacturing method comprising:
providing a mold and disposing a main body of the child carrying device into the mold; and
injecting a foam material into a cavity of the mold and foaming the foam material in the cavity of the mold so as to form a flexible layer integrated with the main body, wherein a wall thickness of the main body is substantially 1.5mm.

11. The manufacturing method of claim 10, wherein the pressure in the cavity is from 2.0bar to 4.0bar during the foaming process.

12. The manufacturing method of claim 10, further comprising:
injecting a vapor into the cavity of the mold after injecting the foam material into the cavity, for combining the foam material with the main body by temperature and the pressure.

13. The manufacturing method of claim 10, further comprising:
cooling the formed flexible layer; and
demolding the mold to draw the child carrying device comprising the main body and the flexible layer manually or by an ejector pin.

14. The manufacturing method of claim 13, further comprising:
drying and cooling the child carrying device after drawing the child carrying device from the mold.

15. The manufacturing method of claim 14, further comprising:
deburring the child carrying device after cooling the child carrying device.

16. The manufacturing method of claim 14, further comprising:
disposing a fixing fixture into the child carrying device to shape the child carrying device before drying the child carrying device.

17. The manufacturing method of claim 10, further comprising:
disposing a sealing fixture onto the main body of the child carrying device to seal at least one hole or at least one groove on the main body of the child carrying device before disposing the main body of the child carrying device into the mold.

18. A manufacturing method for a child carrying device, the manufacturing method comprising:
providing a mold and disposing a main body of the child carrying device into the mold; and
injecting a foam material into a cavity of the mold and foaming the foam material in the cavity of the mold so as to form a flexible layer integrated with the main body, wherein injecting a vapor into the cavity of the mold after injecting the foam material into the cavity, for combining the foam material with the main body by temperature and the pressure.

19. The manufacturing method of claim 18, wherein the pressure in the cavity is from 2.0bar to 4.0bar during the foaming process.

20. The manufacturing method of claim 18, further comprising:
cooling the formed flexible layer; and
demolding the mold to draw the child carrying device comprising the main body and the flexible layer manually or by an ejector.

21. The manufacturing method of claim 20, further comprising:
drying and cooling the child carrying device after drawing the child carrying device from the mold.

22. The manufacturing method of claim 21, further comprising:
deburring the child carrying device after cooling the child carrying device.

23. The manufacturing method of claim 21, further comprising:
disposing a fixing fixture into the child carrying device to shape the child carrying device before drying the child carrying device.

24. The manufacturing method of claim 18, further comprising:
disposing a sealing fixture onto the main body of the child carrying device to seal at least one hole or at least one groove on the main body of the child carrying device before disposing the main body of the child carrying device into the mold.

Abstract of Disclosure

A manufacturing method for a child carrying device includes the following steps: providing a mold and disposing a main body of the child carrying device into the mold, and injecting a foam material into a cavity of the mold and foaming the foam material so as to form a flexible layer integrated with the main body. The manufacturing method disposes the main body into the mold and directly forms a flexible layer on the main body, so that the flexible layer ensures safety and comfort of the child carrying device while saves the necessity to dispose a seat pad or a cushion and fixing structures on the main body, and thereby reduces the cost and the work-hour of assembly, and the overall weight of the child carrying device can be reduced by omitting the fixing structures.