

Commonwealth of Australia
The Patents Act 1952
DECLARATION IN SUPPORT

In support of the (Convention) Application made by:

KABUSHIKI KAISHA SANKO VINYL KOGYOSHO, of 1184, Ishizuka,
Johoku-machi, Higashi Ibaraki-gun, Ibaraki-ken, 311-43, Japan

for a patent for an invention entitled:

Core structure and method of its manufacture

I (~~We~~) Fukuichi Miwa, President

of and care of the applicant company do solemnly and sincerely declare as follows:

~~a) I am (We are) the applicant(s) for the patent~~

~~or~~

b) I am (~~We are~~) authorised by the applicant(s) for the patent to make this declaration on its behalf.

Delete the following if not a Convention Application.

The basic application(s) as defined by section 141 (~~142~~) of the Act was (~~were~~) made

on 30 January 1986 in Japan

~~or~~

~~or~~

~~or~~

~~or~~

by KABUSHIKI KAISHA SANKO VINYL KOGYOSHO, of 1184, Ishizuka,
Johoku-machi, Higashi Ibaraki-gun, Ibaraki-ken, 311-43, Japan

The basic application(s) referred to in this paragraph is (~~are~~) the first application(s) made in
a Convention country in respect of the invention the subject of the application.

~~a) I am (We are) the actual inventor(s) of the invention~~

or

b) Fukuichi MIWA, c/o KABUSHIKI KAISHA SANKO VINYL KOGYOSHO,
of 1184, Ishizuka, Johoku-machi, Higashi
Ibaraki-gun, Ibaraki-ken, 311-43, Japan

is (~~are~~) the actual inventor(s) of the invention and the facts upon which

the applicant company

is (~~are~~) entitled to make the application are as follows:

the applicant is the assignee of the invention from the
said actual inventor.

Declared at Tokyo this 1st day of September 1987

Signed

Status President

Declarant's Name Fukuichi MIWA

(12) PATENT ABRIDGMENT (11) Document No. AU-B-68927/87
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 602503

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ARRANGEMENT FOR CONSTRAINING THE EXPANSION OF AN INFLATABLE DEVICE

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(56) Prior Art Documents
AU 458068 25099/71 46.1, 97.80, 06.7
AU 427214 52157/69 97.8, 88.7, 43.3, 46.1
AU 13133/55 7.8

(57) Claim

1. An inflatable article comprising:

upper and lower flexible side sheets defining at least in part an air-tight inner volume, and

a pair of core members intermediate the side sheets, the individual core members of the pair being coupled together at central portions thereof and each respective core member being joined at opposite edges thereof to a respective one of the side sheets so as to provide an interior tensile structure between said side sheets and wherein the sheets and core members are substantially identical twin layer sheets comprising a first layer being a cloth material and a second layer being a high frequency pressure weldable material, the second layers of joined side sheets and core members being in mutual contact and position so as to be joined simultaneously by high frequency pressure welding.

AU-AI-68927/87

PCT

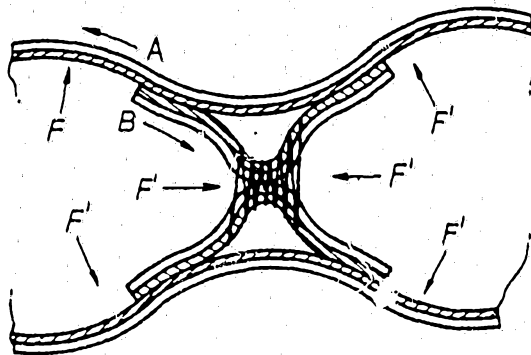
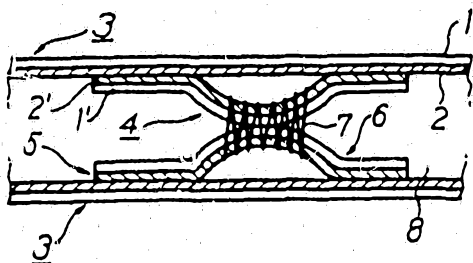
世界知的所有権機関
国際事務局

特許協力条約に基づいて公開された国際出願

(51) 国際特許分類 ⁴ A47C 27/08, B63C 7/08 B63C 9/00	A1	(11) 国際公開番号 WO 87/ 04603 (43) 国際公開日 1987年8月13日 (13.08.87)
(21) 国際出願番号 PCT/JP87/00043 (22) 国際出願日 1987年1月23日(23. 01. 87) (31) 優先権主張番号 特願昭61-19003 (32) 優先日 1986年1月30日(30. 01. 86) (33) 優先権主張国 JP (71) 出願人 (米国を除くすべての指定国について) 株式会社 三幸ビニール工業所 (KABUSHIKI KAISHA SANKO VINYL KOGYOSHOU) (JP/JP) 〒311-43 茨城県東茨城郡常北町石塚1184番地 Ibaraki, (JP) (72) 発明者; および (75) 発明者/出願人 (米国についてのみ) 三輪福一 (MIWA, Fukuichi) (JP/JP) 〒311-43 茨城県東茨城郡常北町石塚1184番地 株式会社三幸ビニール工業所内 Ibaraki, (JP) (74) 代理人 弁理士 富村 深 (TOMIMURA, Kiyoshi) 〒112 東京都文京区大塚4丁目1番12号 Tokyo, (JP) (81) 指定国 AU, DE(欧州特許), FR(欧州特許), GB(欧州特許), IT(欧州特許), US. 添付公開書類 国際調査報告書 This document contains the amendments made under Section 49 and is correct for printing. 602503 A.O.I.P. 24 SEP 1987 AUSTRALIAN 25 AUG 1987 PATENT OFFICE		

(54) Title: SUSPENDED CONSTRUCTION AND PREPARING METHOD THEREOF

(54) 発明の名称 中吊り構造とその製造方法



(57) Abstract

It is a technical problem of this invention to restrain swelling at an air cushion of an air-filled product which is subjected to an extremely large load F , and in which a high internal pressure of an air chamber is required. A pair of synthetic sheets (4) having a double layer construction (1', 2') similar to synthetic sheets (1, 2) is interposed as a suspended member between an upper side synthetic sheet and a lower side synthetic sheet, the middle portions (6) of said pair of suspended members (4) being joined by stitching with thread, either end (5) of the synthetic sheets (4) being fused to the upper and lower side synthetic sheets (3). The suspended construction as described above can be used for restraining swelling of a buoyancy-adjusting device of a scuba diving etc.

(57) 要約

この発明は、荷重Fが極めて大きくまた空気室の空気圧を大きくしなければならぬ空気充てん製品の空気クッション部の脹らみを押さえ付けることを技術的課題とするものであり、上側レザーシートと下側レザーシートの間中部に中吊り部材として該レザーシート(1、2)と同じような二層構造(1'、2')のレザーシート(4)を一对設け、この一对の中吊り部材(4)の中央部(6)の範囲を糸縫い結合し、各レザーシート(4)の両端部(5)をそれぞれ上側・下側レザーシート(3)と溶着して成る中吊り構造であって、スクーバダイビングの浮力調整具等の脹らみを押さえ付けるのに使用するものである(第1図および第2図)。

情報としての用途のみ

PCTに基づいて公開される国際出願のパンフレット第1頁にPCT加盟国を特定するために使用されるコード

AT オーストリア
AU オーストラリア
BB パルバドス
BE ベルギー
BG ブルガリア
BJ ベナン
BR ブラジル
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TG トーゴ
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CORE STRUCTURE AND METHOD OF ITS MANUFACTURE

TECHNICAL FIELD

This invention relates to a core structure for holding the shape of an inflated mattress, pillow case, rubber boat, life preserver and the like filled with pressured air and made of soft plastics or rubber.

BACKGROUND TECHNIQUE

In the core structure of air mattress and the like, the shape is held generally by an I-beam system (Fig. 3), X-beam system (Fig. 4) and deformed X-beam system (Fig. 5).

When producing an inflatable boat, mattress, life preserver and the like with leather-like (flexible) sheets produced by pasting cloth sheets made of Nylon, cloth and the like and sheets made of vinyl, urethane, rubber and the like together, in order to secure an air cushioned portion in a proper thickness by holding down its inflation, the upper and lower leather cloth sheets 3 were directly fused (FIGS. 4 and 5), or core members 4 were used which were produced by pasting both end portions of the core members to the upper and lower leather cloth sheets 3 by means of an adhesive (Fig. 3) whereby a core structure was produced. However, in the mattress and the like of the core structure by the conventional systems, when it was used for many years during which an anticipated load F was applied, the fused portion of the pasted together portion 10 was cut giving a cause of a leakage of air filled therein, and particularly, in case of using the core of the I-beam system the pasted together portion (bonded surface) of the leather-like cloth sheet and the core member was peeled apart to lose the operation of holding down the inflation in some cases. Let us to explain this phenomenon by referring to Fig. 3, in which in case of the mattress of the I-beam structure, when the load F was applied to the upper portion of the mattress, force F' worked towards the outside around the periphery

of an air chamber 8. Also, in case the load F was of magnitude more than the anticipated value, the force F' worked on the periphery of the air chamber 8 greatly. As a result, the bonded surface 10 of the core member 4 was peeled apart from the leather-like cloth sheet or the cut started from the pasted together portion. Also, in case of the mattress of the X-beam structure, similar to the I-beam system, when the load F was applied in the direction of the upper part, there was an apprehension that the force F' worked towards the outside around the periphery of the air chamber so that the fused surface 10 was broken to cause a leakage of air from the air chamber 8. The deformed X-beam structure had the similar drawback.

However, in the case of the air mattress, air pillow case and the like, the load F is not very large and thus, the pneumatic pressure F' of the air chamber 8 is not a high pressure so that the holding down of the inflation of an air cushioned portion could be obtained by the described conventional core structure. However if pressure of the air chamber with extremely high load F is required, the aforesaid structure is not suitable, for example, the core member in a buoyance adjusting apparatus for scuba diving, life preserver and the like.

This invention has been made in view of the foregoing points, and its object is to provide a core structure for air filled product capable of withstanding the large load and internal pressure.

DISCLOSURE OF THE INVENTION

Broadly speaking the present invention provides an inflatable article comprising:

upper and lower flexible side sheets defining at least in part an air-tight inner volume, and



a pair of core members intermediate the side sheets, the individual core members of the pair being coupled together at central portions thereof and each respective core member being joined at opposite edges thereof to a
5 respective one of the side sheets so as to provide an interior tensile structure between said side sheets and

wherein the sheets and core members are substantially identical twin layer sheets comprising a first layer being a cloth material and a second layer being a high frequency
10 pressure weldable material, the second layers of joined side sheets and core members being in mutual contact and position so as to be joined simultaneously by high frequency pressure welding.

Since the core structure according to this invention
15 is constituted in such a manner that the force of the bonded portion of the core member with the cloth sheet is held down by the surface, the strength of the bonding force is increased by several ten times compared with the core structure of the conventional products. When a
20 length of the yarn of the coupled portions of a pair of core members is adjusted, or a length of the core members, a length of the fused and coupled portions of the core members and a
25 length of the yarn of the coupled portions of the core members are respectively properly adjusted, whereby an inflation of the air filled product can be optionally changed. Since the strength of the bonding force is increased by several ten times compared with the



conventional products instead of the urethane sheet layer used heretofore in the buoyance adjusting apparatus, it can be replaced with a low cost vinyl sheet layer.

Furthermore, air does not leak from the air chamber in the case of the yarn sewn coupled portion breaking so that it is particularly suitable for life preservers and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 and Fig. 2 are cross sections of a core member according to this invention, Figs. 3 through 5 show the core structure of a conventional system, Fig. 3a being its perspective view, Fig. 3b being its lateral cross section, Fig. 3c being its partially enlarged view of Fig. 3b, Fig. 4a being its perspective view, Fig. 4b being its lateral cross section, Fig. 4c being its partially enlarged view of Fig. 4b, Fig. 5a being its perspective view, and Fig. 5b being its lateral cross section.

MOST PREFERRED EMBODIMENTS OF THE INVENTION

The core structure and the method of its manufacture according to this invention will be described in the following on the basis of the embodiments illustrated in Figs. 1 and 2.

Fig. 1 is a cross section of a core structure according to this invention used in a buoyance adjusting apparatus for use in scuba diving, and shows a condition before air is filled, and Fig. 2 is a cross section similar to Fig. 1 and shows a condition where air is filled. In the scuba diving, a buoyance adjusting apparatus for easy work several ten meters below the sea level is an important apparatus. This buoyance adjusting apparatus is generally constituted in such a manner that the inside 8 of the flexible cloth sheet 3 of a two layer structure consisting of the inside being Nylon cloth sheet layer 1 and the outside being a thin sheet layer 2 made of urethane. This buoyance adjusting apparatus is provided with a core structure functioning to hold its shape to.



facilitate an easy movement in the water. The conventional core structure was made by the deformed X-beam system as shown in Fig. 5, and an explanation is provided by referring to the part of this invention shown in Fig. 1, in which the upper side cloth sheet 3 and lower side cloth sheet 3 were fused directly by high frequency pressure welding by means of respective urethane sheet layers 2. The buoyance adjusting apparatus is fed air into the air chamber 8 for the adjustment of buoyance as the diver dived deeper below the water level. For this reason, in the deep diving condition, pneumatic pressure F' acts on the outside of the air chamber so that in the case of the conventional core structure, the fused portion of the urethane sheet layer 2 could be peeled apart or be broken in some cases.

In the core according to this invention, the structure is provided as the core members in which a pair of flexible cloth sheets 4 made of double layers, a urethane sheet layer 2' of identical structure with the cloth sheet 3 and a Nylon cloth sheet layer 1' is provided inside of the air chamber 8. In this case, a pair of core members 4 is sewn by a sewing machine and coupled with a yarn 7 at the middle portions 6, and both end portions 5 of the core members 4 are fused and coupled with the urethane sheet layer 2' of the core member 4 and the urethane sheet layer 2 of the cloth sheet 3. As the filling amount of air in the air chamber 8 is on the increase, as Fig. 2 shows, the pneumatic pressure F' acts strongly on the outside against the upper side and lower side cloth sheets 3 and a pair of core members 4 forming the periphery of the air chamber. However, the core structure of this invention is constituted in such a manner that a pair of core members 4 is sewn and coupled with a yarn 7, the coupled portions are not easily broken even if the strong pneumatic pressure F' is applied to the



coupled portions of a pair of core members 4. Also, in this case, the tensile forces A and B of opposite directions work on the fused surfaces of the cloth sheet 3 and the core member 4 to generate the operation of peeling apart the fused portions but there is an advantageous point that the surface fusing of the cloth sheet 3 and the core member 4 are not easily subjected to the peeling apart by a shift in the lateral direction mentioned above. Accordingly, when the core structure according to this invention is used, even if the strong pneumatic pressure F' is applied to the inside of the air chamber 8, the core member 4 seldom breaks.

The core structure according to this invention can be manufactured by sewing and coupling a pair of core members 4 made of double layers, a Nylon cloth sheet layer 1' and a urethane sheet layer 2 with a yarn 7 at the center portions 6 by setting the respective Nylon sheet layers 1' inside in the first place, disposing a pair of coupled core members at a desired portion of an air chamber where the core members are located, and applying a pressure with high frequency to the upper side cloth sheet 3 in the direction of the upper part, and fusing both end portions 5 of the core members 4 to the upper side and lower side cloth sheets 3.

By the way, the core structure according to this invention can be applied to the air filled product made of a single layer film sheet of rubber or synthetic resin and the like. In this case, the core members by this invention can be made of a single layer film sheet of identical material or a cloth sheet prepared by pasting the single layer film sheet and cloth sheet layer together.

Also, a pair of core members can be coupled by providing rivet holes on the coupled portions and riveting instead of the coupling with yarn sewing.



INDUSTRIAL UTILIZATION

By the way, the core structure according to this invention is particularly suitable for holding down the inflation by particularly strong pneumatic pressure. For
5 example, buoyance adjusting apparatus for rubber boat, scuba diving, and life preserver and the like.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. An inflatable article comprising:

upper and lower flexible side sheets defining at least in part an air-tight inner volume, and

a pair of core members intermediate the side sheets, the individual core members of the pair being coupled together at central portions thereof and each respective core member being joined at opposite edges thereof to a respective one of the side sheets so as to provide an interior tensile structure between said side sheets and wherein the sheets and core members are substantially identical twin layer sheets comprising a first layer being a cloth material and a second layer being a high frequency pressure weldable material, the second layers of joined side sheets and core members being in mutual contact and position so as to be joined simultaneously by high frequency pressure welding.

2. An article as defined in Claim 1 wherein the core members are coupled at their central portions by stitching.

3. A method of manufacturing an inflatable article comprising assembling a core structure by coupling pairs of core members one to the other at central portions thereof, and fixing the core structure to, and intermediate, upper and lower flexible side sheets by joining opposite edges of each respective core member to a respective upper or lower side sheet to provide an interior tensile structure between said side sheets and wherein the core structure is fixed simultaneously to the upper and lower side sheets by high frequency pressure welding, both said core members and side sheets being twin layer sheets comprising a first layer being a cloth material and a second layer being a high frequency pressure weldable material, the joined side sheets and core members being disposed with their high frequency pressure weldable material layers being adjacent.



4. A method as defined in Claim 3 wherein said core members are coupled one to the other by stitching between their central portions.
5. An inflatable article substantially as described herein with reference to Figs. 1 and/or 2 of the drawings.
6. A method of constructing an inflatable article being substantially as described herein with reference to Figs. 1 and/or 2 of the drawings.

DATED this 24th day of July 1990

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KOGYOSHO

Patent Attorneys for the
Applicant:

F.B. RICE & CO.



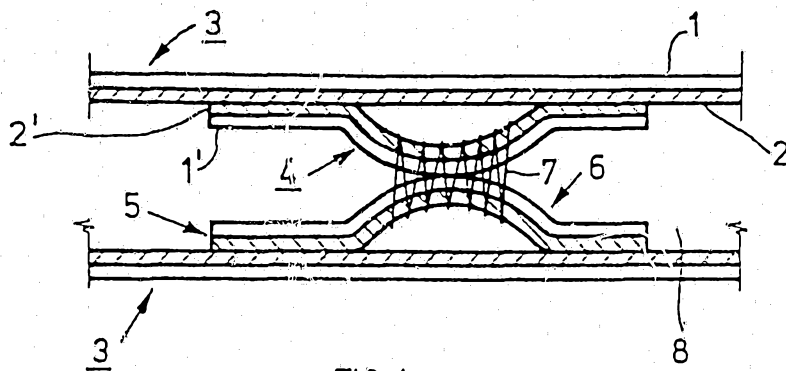


FIG. 1

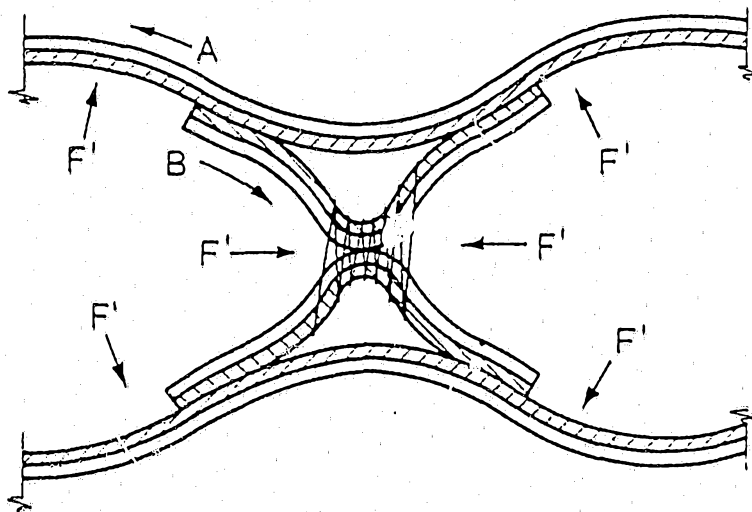


FIG. 2

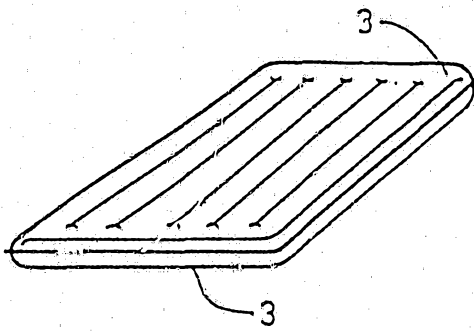


FIG. 3a

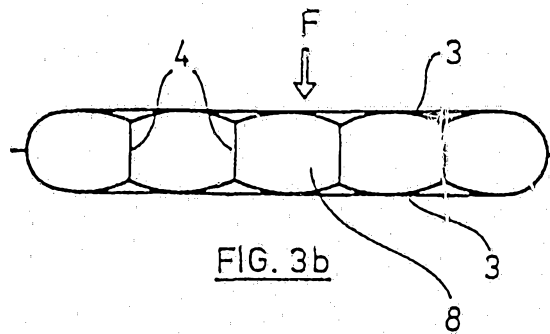


FIG. 3b

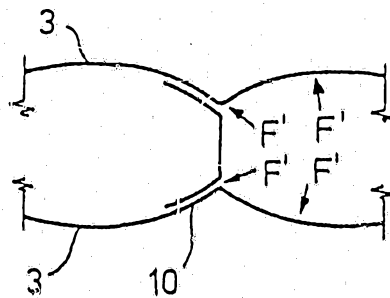


FIG. 3c

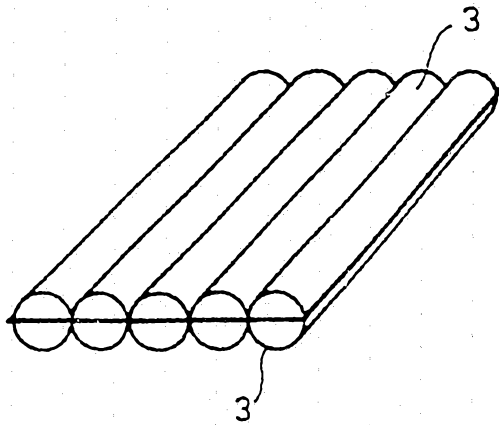


FIG. 4a

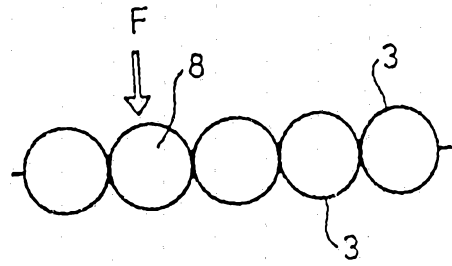


FIG. 4b

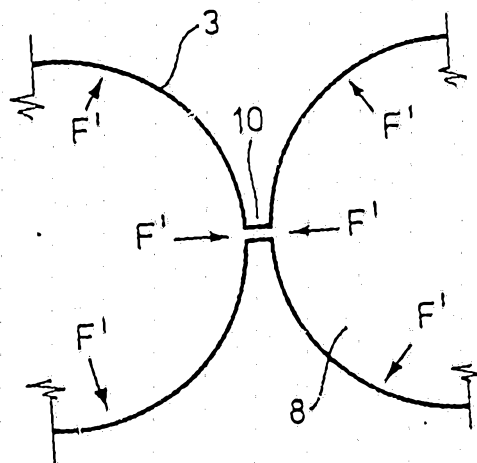


FIG. 4c

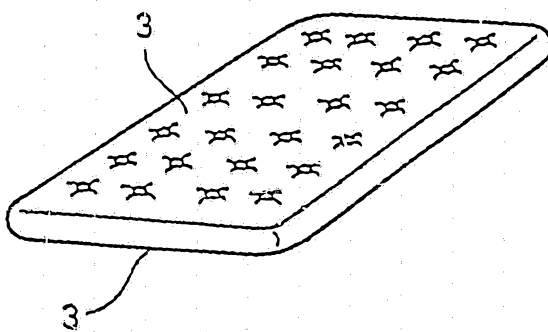


FIG. 5a

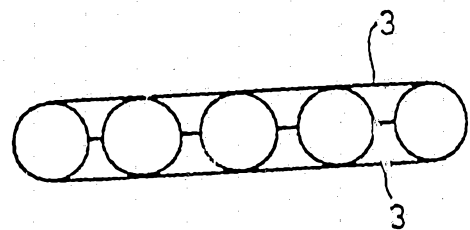


FIG. 5b

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/JP87/00043

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ¹		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl ⁴ A47C27/08, B63B7/08, B63C9/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System	Classification Symbols	
IPC	A47C27/08, B63B7/08, B63C9/00	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵		
Jitsuyo Shinan Koho		1926 - 1987
Kokai Jitsuyo Shinan Koho		1971 - 1987
III. DOCUMENTS CONSIDERED TO BE RELEVANT ^{7, 11}		
Category ⁶	Citation of Document, ¹² with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
A	JP, Y1, 38-19540 (Naigai Gomu Kabushiki Kaisha) 19 September 1963 (19. 09. 63) (Family: none)	1-2
A	JP, Y1, 36-30244 (Furuyama Hiroshi) 17 November 1961 (17. 11. 61) (Family: none)	1-2
* Special categories of cited documents: ¹⁶ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document 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 "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		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search ¹		Date of Mailing of this International Search Report ²
April 3, 1987 (03. 04. 87)		April 20, 1987 (20. 04. 87)
International Searching Authority ¹		Signature of Authorized Officer ²⁰
Japanese Patent Office		

国 際 調 査 報 告

国際出願番号PCT/JP 87/ 00043

I. 発明の属する分野の分類			
国際特許分類 (IPC) Int. Cl. A47C27/08, B63B7/08, B63C9/00			
II. 国際調査を行った分野			
調 査 を 行 っ た 最 小 限 資 料			
分 類 体 系	分 類 記 号		
IPC	A47C27/08, B63B7/08, B63C9/00		
最小限資料以外の資料で調査を行ったもの			
日本国実用新案公報		1926-1987年	
日本国公開実用新案公報		1971-1987年	
III. 関連する技術に関する文献			
引用文献の カテゴリー	引用文献名 及び一部の箇所が関連するときは、その関連する箇所の表示		請求の範囲の番号
A	JP, Y1, 38-19540 (内外ゴム株式会社) 19. 9月. 1963 (19. 09. 63) (ファミリーなし)		1-2
A	JP, Y1, 36-30244 (古山 博) 17. 11月. 1961 (17. 11. 61) (ファミリーなし)		1-2
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IV. 認 証			
国際調査を完了した日 03. 04. 87		国際調査報告の発送日 20.04.87	
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