



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 566 229 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
24.08.2005 Bulletin 2005/34

(51) Int Cl.7: **B21D 41/04, F16B 12/40**

(21) Application number: **05100742.5**

(22) Date of filing: **03.02.2005**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL BA HR LV MK YU

(72) Inventor: **MARINI, Giuliano**
25030, CASTELCOVATI (Brescia) (IT)

(74) Representative: **Crippa, Paolo Ernesto**
JACOBACCI & PARTNERS S.p.A.
Piazzale Arnaldo, 2
25121 Brescia (IT)

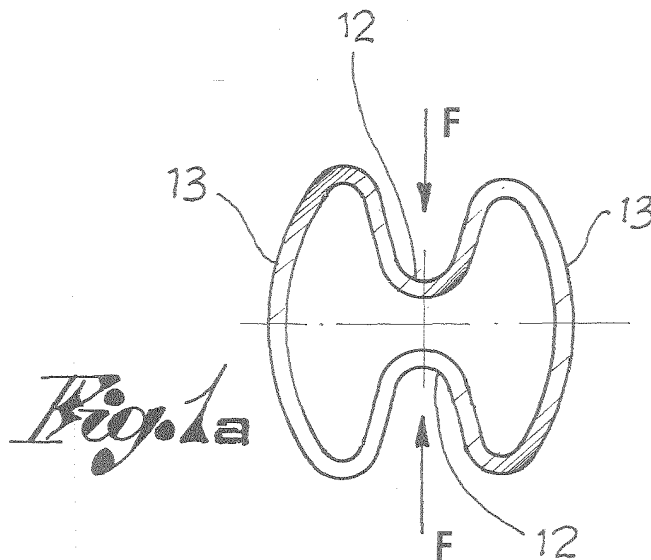
(30) Priority: **20.02.2004 IT BS20040021**

(71) Applicant: **RETI GRITTI S.p.A.**
I-25030 Castelvati (Brescia) (IT)

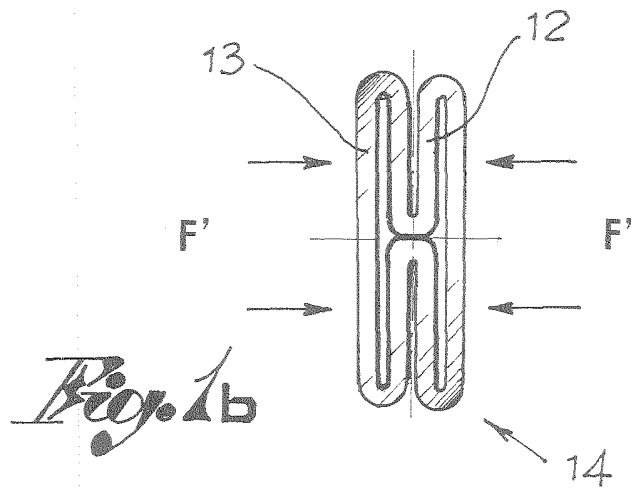
(54) **Method for flattening a portion of a tubular element**

(57) The present invention relates to a method for flattening a tubular element (11) which provides for the radial deformation of said portion (10) of tubular element by applying two radial forces (F) on two longitudinal portions (12) opposed relative to the main axis of the tubular element, so as to cause an approach of said two longi-

tudinal portions leaving the remaining opposed parts (13) of the portion to be flattened substantially non-deformed, and for squashing the portion of tubular element on said non-deformed parts with opposed and converging forces (F'), directed orthogonally relative to the radial forces.



EP 1 566 229 A1



Description

[0001] The object of the present invention is a method for flattening a portion of a tubular element, in particular but not exclusively, adapted for obtaining a bending support of a sunbed, a deck chair or similar item.

[0002] In fact, it is known that these supports have flattened end portions, that is, shaped as plates, crossed by a hole to be hinged to other parts of a frame.

[0003] At present, said flattened portions are obtained by squashing the ends of the tubular element. A plate is obtained in this way, having a thickness equal to about twice the thickness of the initial tubular element. Said plate is then drilled and optionally cut or shaped, according to its use.

[0004] In case of use on deck chairs, armchairs or sunbeds, the flattened ends of the support elements are subject to considerable side stresses, so the need of making these flattened portions as sturdy as possible is much felt.

[0005] The object of the present invention is to meet such need in a simple, low-cost way without the addition of material or other external means.

[0006] The object is achieved, according to the invention, with a method for flattening a tubular element which provides for the radial deformation of said portion of tubular element by applying two radial forces on two longitudinal portions opposed relative to the main axis of the tubular element, so as to cause an approach of said two longitudinal portions leaving the remaining opposed parts of the portion to be flattened substantially non-deformed, and for squashing the portion of tubular element on said non-deformed parts with two mutually opposed forces and directed orthogonally relative to the radial forces.

[0007] A flattened portion is obtained in this way, having a thickness substantially equal to four times the thickness of the tubular element, or twice that of the current plates.

[0008] Advantageously, moreover, the fact of radially deforming the portion of tubular element with two opposed and converging forces before it is squashed allows reducing also the final overall dimensions of the flattened portion compared to what is possible with the current processing method.

[0009] Further features of the invention will appear more clearly from the following description, made with reference to the annexed indicative and non-limiting drawings, wherein:

[0010] figures 1, 1a and 1b schematically show the method for flattening a portion of a tubular element;

[0011] figure 2 shows a front view of the flattened end of a tubular element;

[0012] figure 3 shows the same flattened end in a side view;

[0013] figure 4 shows a front view of another example of the flattened end of a tubular element;

[0014] figure 5 shows a perspective of a bending support of a sunbed having the ends flattened by the method of the invention.

port of a sunbed having the ends flattened by the method of the invention.

[0015] With reference to figures 1-1b, reference numeral 10 denotes a plan view of a portion of a tubular element 11, for example with circular section, that must be flattened.

[0016] The tubular element 11, for example, could be intended for obtaining a bending support for a sunbed, as shown in figure 5.

[0017] The method of the present invention provides for the radial deformation of said portion 10 of the tubular element 11 by applying two opposed and converging radial forces F on two diametrically opposed longitudinal portions 12 of portion 10.

[0018] Such deformation must be carried out in such way as to cause an approach of said two longitudinal portions 12, leaving the remaining opposed parts 13 of portion 10 substantially non-deformed.

[0019] In other words, forces F must be preferably applied on very narrow longitudinal portions 12, tending to a line.

[0020] Preferably, moreover, forces F must be such as to push the longitudinal portions 12 inwards until they touch each other at the level of the tubular element axis.

[0021] Once such radial deformation has been applied, portion 10 is squashed acting on the entire surface of the non-deformed parts 13 with opposed and converging forces F', directed orthogonally relative to the radial forces F.

[0022] Advantageously, this squashing is such as to make the radially deformed longitudinal portions 12 and parts 13 deformed by squashing parallel and adjacent.

[0023] The resulting flattened portion, denoted with reference numeral 14, virtually along its entire cross section, exhibits a thickness substantially equal to four times the thickness of the tubular element, as is clear in particular in figure 1b.

[0024] The flattened portion 14 can then be drilled and optionally cut so as to obtain the desired shape according to its use, as shown in the examples of figures 2, 3 and 4.

Claims

1. Method for flattening a portion (10) of a tubular element (11), **characterised in that** it comprises the following sequence of steps:

- radially deforming said portion (10) of tubular element (11) by applying two converging radial forces (F) on two opposed longitudinal portions (12) relative to the main axis of the tubular element, so as to cause an approach of said two longitudinal portions leaving the remaining opposed parts (13) of the portion to be flattened substantially non-deformed,
- squashing the portion of tubular element acting

on the entire surface of said non-deformed parts (13) with opposed and converging forces (F'), directed orthogonally relative to the radial forces.

5

2. Method according to claim 1, wherein the radial deformation of the first step is such as to cause the tangency of the two longitudinal portions (12) at the level of the axis of the tubular element.

10

3. Method according to claim 1 or 2, wherein the squashing of the second step is such as to make the radially deformed longitudinal portions and the parts deformed by squashing parallel and adjacent.

15

4. Tubular element, particularly but not exclusively for obtaining frames of folding sunbeds, deck chairs and similar items, comprising at least one flattened portion (14) for coupling with another element of the frame, **characterised in that** said flattened portion exhibits, along its entire cross section, a thickness substantially equal to four times the thickness of the tubular element.

20

5. Tubular element according to claim 4, wherein said flattened portion (14) is obtained with the method according to any one of claims from 1 to 3.

25

30

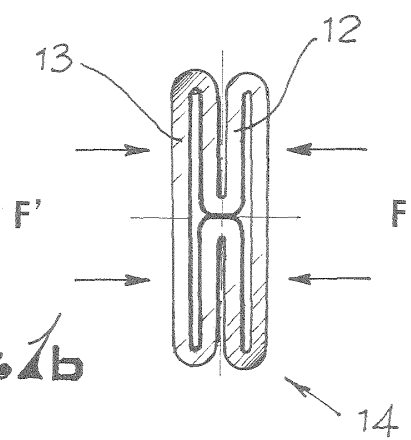
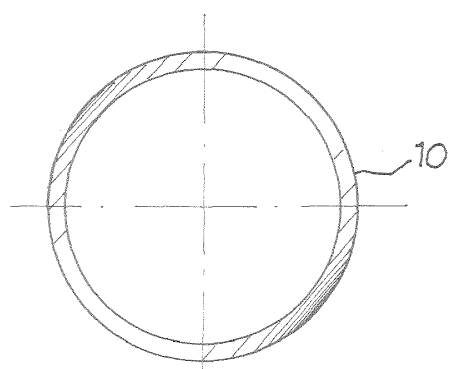
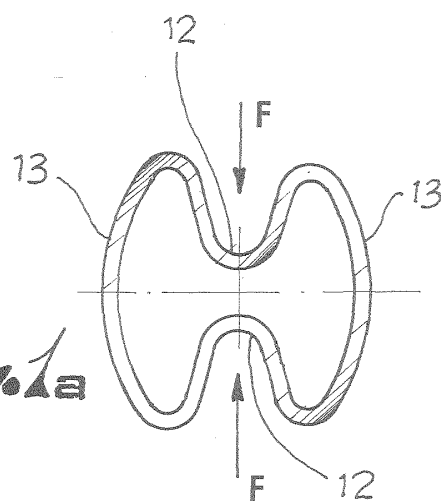
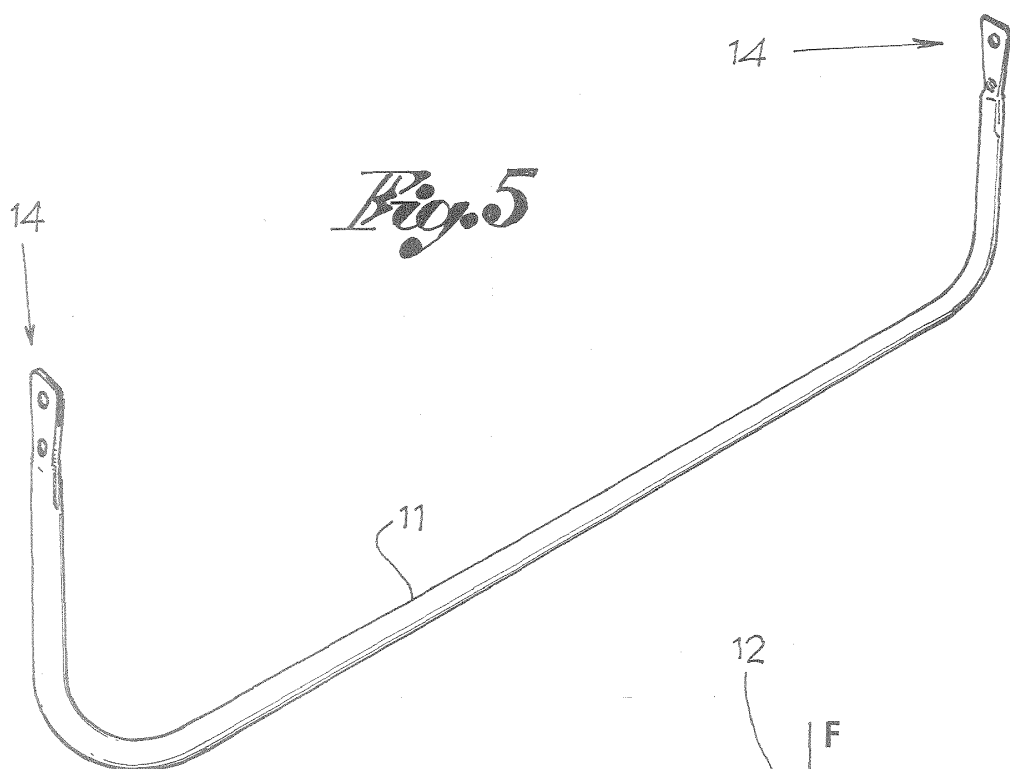
35

40

45

50

55



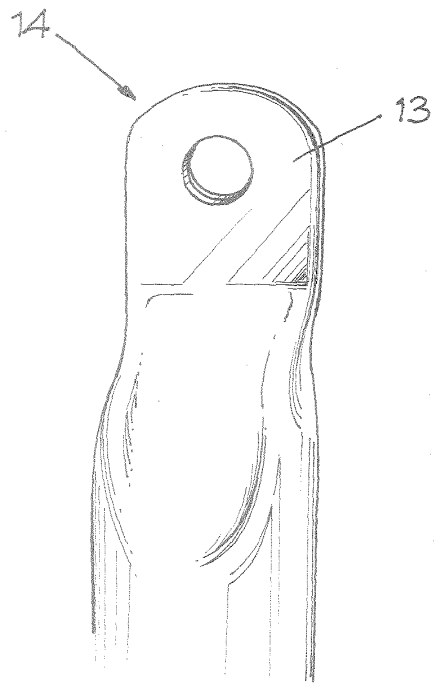


Fig. 2

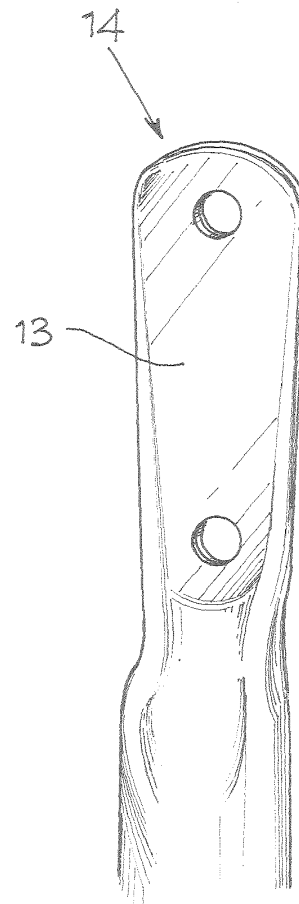


Fig. 4

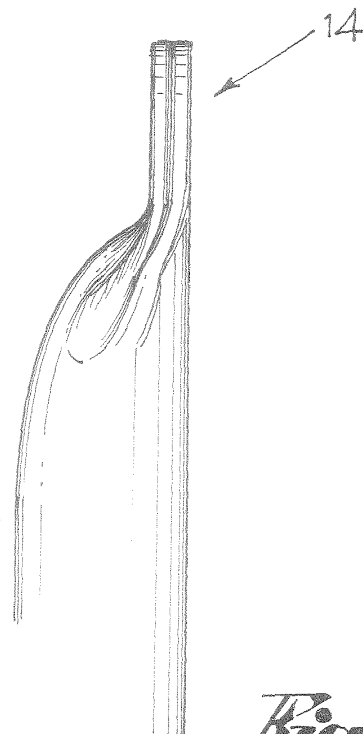


Fig. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 10 0742

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GB 121 352 A (RUDGE-WHITWORTH, LIMITED; JOHN VERNON PUGH) 16 December 1918 (1918-12-16) * the whole document *	1-5	B21D41/04 F16B12/40
X	DE 198 57 589 A1 (HONSEL PROFILPRODUKTE GMBH, 59494 SOEST, DE; HONSEL PROFILPRODUKTE GMB) 15 July 1999 (1999-07-15) * figures 4,5 *	1-5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B21D F16B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		21 April 2005	Ris, M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

1
EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 10 0742

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

21-04-2005

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 121352	A	16-12-1918	NONE	

DE 19857589	A1	15-07-1999	NONE	
