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

(11) **EP 4 442 164 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.10.2024 Bulletin 2024/41

(21) Application number: **24168261.6**

(22) Date of filing: **03.04.2024**

(51) International Patent Classification (IPC):
A47C 23/06 *(2006.01)* ***A47C 19/02*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A47C 23/061; A47C 19/025

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

(30) Priority: **07.04.2023 IT 202300006921**

(71) Applicant: **VBN S.p.A.**
31048 San Biagio Di Callalta (TV) (IT)

(72) Inventors:
- **VAZZOLER, Marcello**
  31048 San Biagio di Callalta TV (IT)
- **VAZZOLER, Alberto**
  31048 San Biagio di Callalta TV (IT)
- **NASCIMBEN, Michele**
  31048 San Biagio di Callalta TV (IT)

(74) Representative: **De Sandre, Emanuele**
Società Italiana Brevetti S.p.A
Stradone San Fermo 21 sc B
37121 Verona (IT)

(54) SLAT STRUCTURE, PARTICULARLY FOR BED BASES

(57) The present invention relates to a slat structure (10), particularly for bed frames, comprising a body (11) having a predominantly longitudinal development, developing along a longitudinal development line (L), said body (11) comprising in turn:
- an upper surface (12), for support,
- an opposite lower surface (13),
- two opposite side surfaces (14, 15),

characterised by the fact that on the upper surface (12) is defined a plurality of recesses configured to allow the passage of air between two opposing parts of the same slat structure (10).

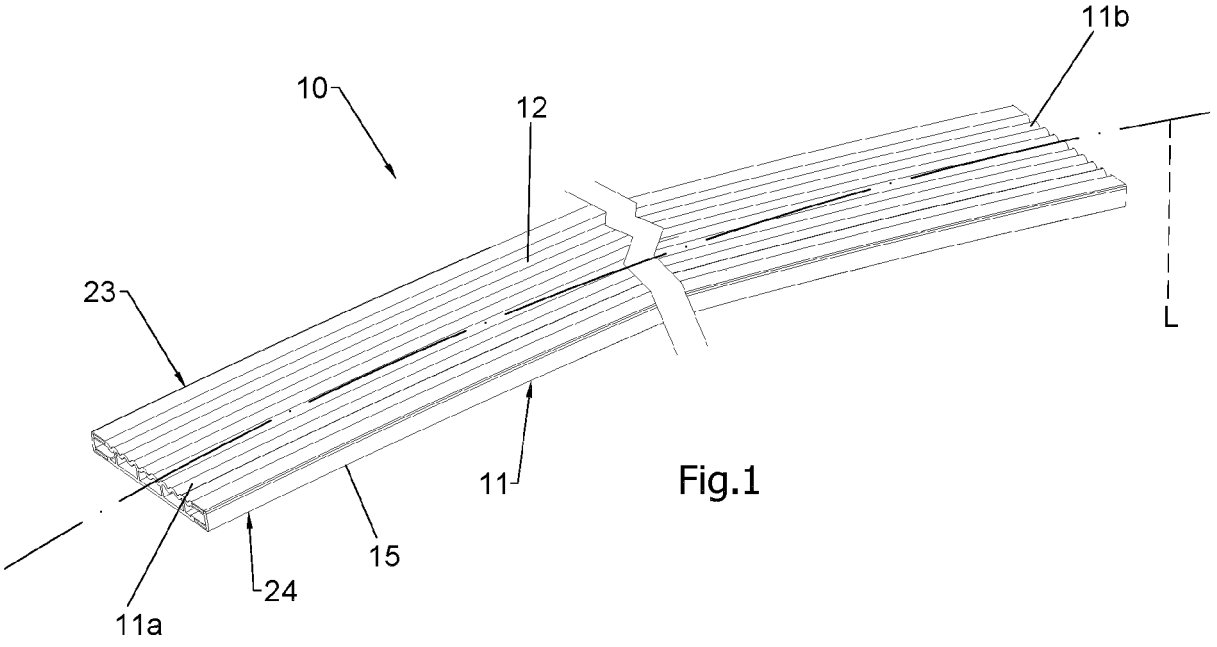

Fig.1

EP 4 442 164 A1

Description

Technical field

[0001] The present invention relates to a slat structure, particularly for bed frames.

[0002] A slatted frame comprising such a slat structure is also an object of the invention.

Background

[0003] Today, slatted bed frames, for supporting mattresses, comprise a frame whose axes have rows of slots, each slot comprising a housing insert, the latter configured to directly accommodate one end of a slat, or configured to accommodate a shock-absorbing device for one end of a slat.

[0004] The slats are typically defined by curved planks of wood material.

[0005] It is also known today that wooden material is an increasingly expensive commodity on the market, which is why bed slats made of plastic are becoming more and more popular.

[0006] While known plastic slats are an interesting alternative to wooden slats, they are not without their limitations and drawbacks.

[0007] A first limitation of known plastic slats is related to poor breathability.

[0008] In fact, while wooden slats possess certain inherent breathability characteristics of the material they are made of, plastic slats are made by extruding a profile, so the surfaces are continuous and smooth, and consequently do not allow any breathability.

[0009] Overall, therefore, bed bases comprising a series of side-by-side plastic slats are not very comfortable, particularly during the hottest times of the year as well as in the hottest parts of the earth.

[0010] Another limitation of the known type of plastic slats is related to the fact that in order to be strong enough to be able to provide mechanical performance comparable to the mechanical performance of slats made of wood material, today's known plastic slats are made with a greater overall thickness than slats made of wood material, as they are hollow longitudinal profiles with thin external walls and therefore have longitudinal reinforcement ribs that require a certain amount of space to be made.

[0011] This thickness of the known plastic slats is incompatible with the dimensions of the housings for the ends of the wooden slats known and popular today.

[0012] To overcome this drawback, the plastic slats known today are flattened at the ends in order to reduce them to a size where they can fit into the seats of today's bed bases.

[0013] The crushing of the ends is done mechanically, which results in an extra cost in terms of labour.

[0014] Moreover, mechanical crushing of the ends makes the plastic slat unattractive and risks compromising the structural integrity of the plastic slat itself.

Summary of the invention

[0015] The main task of the present invention is therefore to develop a slat structure, particularly for bed frames, that can overcome the above-mentioned drawbacks with reference to the known technique.

[0016] A particular aim of the present invention is to develop a slat structure that promotes greater breathability than known slats.

[0017] Another aim of the present invention is to develop a slat structure that is not inferior in strength to the slats made of wooden material known today.

[0018] Yet another aim of the present invention is to develop a slat structure that is easier to set up than known plastic slats.

[0019] Another aim of the invention is to develop a slatted frame that can overcome the drawbacks of the known technique.

[0020] The above-mentioned task and purposes are achieved by a slat structure, particularly for beds, according to claim 1.

[0021] Preferred features of the present invention are the subject of dependent claims. Other advantages, features and ways of using the present invention will be evident from the following detailed description of a form of realisation, presented for illustrative and non-limiting purposes.

Short description of the figures

[0022] Reference will be made to the figures in the attached drawings, where:

- Figure 1 represents a perspective view of a slat structure according to the invention;
- Figure 2 a cross-section of the slat structure according to the invention;
- Figure 3 represents a perspective view of a slat structure component according to the invention;
- Figure 4 represents an exploded perspective of the view in figure 3;
- Figure 5 represents a different perspective view of the exploded view in figure 4;
- Figure 6 shows a perspective view of a slat structure according to the invention set up in a utilisation configuration;
- Figure 7 represents a schematic perspective view of a slatted bed frame according to the invention.

[0023] The thicknesses and curvatures depicted in the figures introduced above should be understood as purely illustrative, are generally magnified and not necessarily shown in proportion.

Detailed description of preferred forms of realisation

[0024] Various forms of realisation and variants of the invention will be described next, with reference to the figures introduced above.

[0025] Similar components are denoted in the different figures with the same numerical reference.

[0026] In the detailed description that follows, additional forms of realisation and variants to those already dealt with in the description itself will be illustrated only insofar as they differ from what has already been set out.

[0027] Furthermore, the different forms of implementation and variants described below are likely to be used in combination where compatible.

[0028] Referring initially to Figure 1, a slat structure according to a form of embodiment of the invention is collectively denoted by the number 10.

[0029] The slat structure 10, particularly for bed frames, comprises a body 11 with predominantly longitudinal development, developing along a longitudinal development line L.

[0030] In the present example, the longitudinal development line L is curved and essentially describes an arc of a circle; in this way, the slat structure 10 takes on an arched shape in the same way as the most common slats in wooden material known today.

[0031] In an embodiment variant of the slat structure according to the invention, not illustrated for simplicity's sake, the longitudinal development line of the body 11 is a straight line; such a straight development slat structure finds particular uses, such as, but not limited to, in camper and caravan nets.

[0032] The body 11 in turn comprises:

- an upper surface 12,
- an opposite lower surface 13,
- two opposing lateral surfaces 14 and 15.

[0033] The peculiarity of the invention lies in the fact that a plurality of recesses 40 configured to allow the passage of air between two opposite parts of the same slat structure 10 is defined on said upper surface 12.

[0034] The term 'recesses' is intended to mean basreliefs that develop inwards from body 11 with respect to support zones P1, P2, PX belonging to a support plane P, as exemplified in the section of figure 2.

[0035] Figure 2 shows a schematic of a generic mattress M resting on top of the slat structure 10 according to the invention.

[0036] In the present example, the upper surface 12 is substantially corrugated.

[0037] In particular, the upper surface 12 is undulated, where the undulations are defined by a series of side-by-side longitudinal reliefs, indicatively indicated as 16, 16a, 16b each developing along a line L1 parallel to the longitudinal development line of said body 11.

[0038] In particular, the upper surface 12 has a cross-sectional line that is substantially sinusoidal.

[0039] The slat structure 10 comprises an upper wall 17, on which said upper surface 12 is defined, an opposite lower wall 18, on which said lower surface 13 is defined, and two lateral walls 19, 20, on which said lateral surfaces 14, 15 are respectively defined.

[0040] The body 11 is essentially tubular.

[0041] The body 11 is preferably made by extrusion of plastic material.

[0042] The same body 11 is also intended to be capable of being realised in accordance with other methods and processes of construction, e.g. by assembling walls that have previously been made separately and then joined by welding, gluing, interlocking or other similar joining systems.

[0043] A plurality of reinforcing ribs 22 develops between said upper wall 17 and said lower wall 18; said reinforcing ribs 22 reinforce the slat structure 10 according to the invention.

[0044] The reinforcing ribs 22 are made in one piece with the upper wall 17 and the lower wall 18, during the same extrusion operation.

[0045] Advantageously, the slat structure 10 comprises at least one reinforcing insert 25.

[0046] Such at least one reinforcing insert 25 develops longitudinally along a development line substantially parallel to the longitudinal development line L of said body 11.

[0047] In particular, in the present non-limiting embodiment of the invention, the slat structure 10 has two opposing longitudinal reinforced lateral portions 23, 24.

[0048] Each of said reinforced longitudinal lateral portions 23, 24 incorporates at least one reinforcing insert 25, 25a.

[0049] More particularly, each of said reinforced longitudinal lateral portions 23, 24 comprises a lateral wall 19, 20, a first perimeter flap 17a, 17b of said upper wall 17 and a second perimeter flap 18a, 18b of said lower wall 18.

[0050] An upper reinforcing insert 25b, 25c is embedded into each of the first perimeter flaps 17a, 17b of said upper wall 17.

[0051] A lower reinforcing insert 25, 25a is embedded in each of the perimeter flaps 18a, 18b of said lower wall 18.

[0052] Such at least one reinforcing insert is incorporated into the body 11 by coextrusion; it is therefore to be understood that the reinforcing inserts are extruded substantially together with the extrusion operation that results in the formation of the body 11.

[0053] Such at least one reinforcing insert 25, 25a, 25b, 25c is made of a fibre-reinforced plastic material, e.g. a plastic material filled with glass fibres or similar.

[0054] Advantageously, the body 11 is made of recycled plastic material, e.g. regenerated PVC; this technical solution thus allows benefits in terms of ecological awareness and reuse of raw materials.

[0055] In general, the slat structure 10 comprises, for each of the opposite ends 11a and 11b of its body 11, a

portion of restricted cross-sectional area with respect to the cross-sectional area of the body 11, such portion of restricted cross-sectional area being shaped and configured for connection with an element E of quadrangular frame of a bed frame.

[0056] Further advantageously, the slat structure 10 comprises, for each of the opposite ends 11a and 11b of its body 11 , a connection header 30 comprising:

- a first coupling portion 31 configured for connection to a corresponding end 11a, 11b of said body 11,
- and a second coupling portion 32 configured for connection with an element E of a bed frame.

[0057] In particular, in the embodiment of the invention described herein by way of example and not limitation of the invention itself, the first portion 31 is defined by a lid shaped to surround a said corresponding end 11a, 11b of said body 11. The second portion 32 is defined by a flat-shaped appendage developing from said shaped lid.

[0058] The connection header 30 consists of a single plastic body.

[0059] In an alternative embodiment of the invention, not illustrated for the sake of simplicity, the connection header is integrated into each of the opposite ends 11a and 11b of the body 11, i.e. it is a part of each of the opposite ends 11a and 11b of its body 11.

[0060] In such an executive variant, the second coupling portion 32, which is configured for connection to an element E of a quadrangular frame of a bed frame, is realised by plastic deformation of the same end 11a and 11b of which it is a part, e.g. by a crushing operation of the same end 11a and 11b.

[0061] A slatted frame 80 for beds, as exemplified in Figure 7, is also an object of the invention.

[0062] This slatted frame 80 for beds comprises:

- a quadrangular frame 81 defined by a frame of rods or planks 82, 82a, wherein two opposite of said rods or planks 82a have a rows of seats 83, each seat 83 being configured to accommodate one end of a slat, or being configured to accommodate an intermediate support element E for one end of a slat,
- and a series of slats, each of which is bound to two corresponding opposite seats 83,

characterised in that the slats comprise one or more slat structures 10, 10a, 10b, 10x like the slat structure 10 described above.

[0063] In particular, such a slatted frame 80 comprises a series of slat structures 10, 10a, 10b, 10x as described above.

[0064] Slat structures 10a, 10b, 10x are understood to be equal to slat structure 10 described above.

[0065] As described above, each slat structure 10, 10a, 10b, 10x includes, for each of the opposite ends 11a and 11b of its body 11, a connection header 30 as described above.

[0066] The generic element E, configured to be inserted into a slot or seat of a frame frame, is to be understood as a known type in itself.

[0067] Element E is intended to comprise a hollow body whose cavity is configured to accommodate the end of a slat.

[0068] The hollow body may also comprise one or more fastening appendages, shaped to allow the connection of the element E itself to a groove or a seat of a quadrangular frame.

[0069] In practice, it has been seen how the invention achieves its intended task and purpose.

[0070] In particular, the invention developed a slat structure that promotes greater transpiration than known slats.

[0071] In fact, the side-by-side longitudinal reliefs 16, 16a, 16b define between them a series of air circulation channels, indicated by C in figure 2, which allow air to pass underneath mattress M.

[0072] In the realisation example described here, the longitudinal reliefs 16, 16a, 16b have an external cross-sectional profile, as shown in Figure 2, that is substantially sinusoidal; it is to be understood that these longitudinal reliefs may have an external cross-sectional profile of another shape, for example 'Greek', or saw-tooth, or dovetail.

[0073] Furthermore, the present invention has developed a slat structure that is not inferior in strength to the slats made of wooden material known today.

[0074] In addition, the present invention has resulted in a slat structure that is easier to set up than the known plastic slats, since, thanks to the connection heads, there is no need to mechanically crush the ends of the plastic slat to adapt its dimensions to those of the coupling seats defined on the frame frames of today's known slats.

[0075] Last but not least, the present invention has developed a slatted frame that makes use of the advantages of a series of slat structures as according to the invention.

[0076] The present invention has been described so far with reference to preferred forms of realisation.

[0077] It is to be understood that there may be other forms of realisation pertaining to the same inventive nucleus, as defined by the scope of protection of the claims below.

Claims

1. Slat structure (10), particularly for bed frames, comprising a body (11) having a predominantly longitudinal development, developing along a longitudinal developement line (L), said body (11) comprising in turn

   - an upper surface (12), for support,
   - an opposite lower surface (13),
   - two opposite lateral surfaces (14, 15),

characterised in that
a plurality of recesses configured to allow the passage of air between two opposite parts of the same slat structure (10) is defined on said upper surface (12).

2. Slat structure according to claim 1, **characterised in that** said upper surface (12) is substantially corrugated.

3. Slat structure according to claim 1 or 2, **characterised in that** said upper surface (12) is undulated, wherein the undulations are defined by a series of side by side longitudinal reliefs (16, 16a, 16b) each developing according to a development line (L1) parallel to the longitudinal development line of said body (11).

4. Slat structure according to one or more of the preceding claims, **characterised in that** it comprises an upper wall (17), on which said upper surface (12) is defined, an opposite lower wall (18), on which said lower surface (13) is defined, and two lateral walls (19, 20), on which said lateral surfaces (14, 15) are respectively defined.

5. Slat structure according to one or more of the preceding claims, **characterised in that** said body (11) is substantially tubular, and is made by extrusion of plastic material.

6. Slat structure according to one or more of the preceding claims, **characterised in that** a plurality of reinforcing ribs (22) develops between said upper wall (17) and said lower wall (18).

7. Slat structure according to one or more of the preceding claims, **characterised in that** it comprises at least one reinforcing insert (25).

8. Slat structure according to any preceding claim, **characterised in that** said at least one reinforcing insert (25) develops longitudinally along a line of development substantially parallel to the longitudinal development line (L) of said body (11).

9. Slat structure according to one or more of the preceding claims, **characterised in that** it has two opposing reinforced longitudinal lateral portions (23, 24), each of said reinforced longitudinal lateral portions (23, 24) incorporating at least one reinforcing insert (25, 25a).

10. Slat structure according to the preceding claim, **characterised in that** each of said reinforced longitudinal lateral portions (23, 24) comprises a lateral wall (19, 20), a first perimeter flap (17a, 17b) of said upper wall (17) and a second perimeter flap (18a, 18b) of said lower wall (18), an upper reinforcing insert (25b, 25c) being embedded in each of said first perimeter flaps (17a, 17b) of said upper wall (17), a lower reinforcing insert (25, 25a) being embedded in each of said second perimeter flaps (18a, 18b) of said lower wall (18).

11. Slat structure according to one or more of claims 7 to 10, **characterised in that** said at least one reinforcing insert is incorporated into the body (11) by coextrusion.

12. Slat structure according to one or more of claims 7 to 11, **characterised in that** said at least one reinforcing insert (25, 25a, 25b, 25c) is made of a fibre-reinforced plastic material.

13. Slat structure according to one or more of the preceding claims, **characterised in that** said body (11) is made of recycled plastic material, for example regenerated PVC.

14. Slat structure according to one or more of the preceding claims, **characterised in that** it comprises, for each of the opposite ends (11a, 11b) of said body (11), a connection header (30) comprising

- a first coupling portion (31) configured for connection to a corresponding end (11a, 11b) of said body (11),
- and a second coupling portion (32) configured for connection with an element (E) of a bed frame.

15. Slat structure according to the preceding claim, **characterised in that** said first portion (31) is defined by a lid shaped to surround a said corresponding end (11a, 11b) of said body (11), said second coupling portion (32) being defined by a flat-shaped appendage developing from said shaped lid.

16. Slatted frame (80) for beds, comprising:

- a quadrangular frame (81) defined by a frame of rods or planks (82, 82a), wherein two opposite of said rods or planks (82a) each have a row of seats (83), each seat (83) being configured to accommodate one end of a slat, or being configured to accommodate an intermediate support element (E) for one end of a slat,
- and a series of slats, each of which is bound to two corresponding opposite seats (83),

characterised in that said series of slats comprises one or more slat structures (10, 10a, 10b, 10x) according to claims 1 to 15.

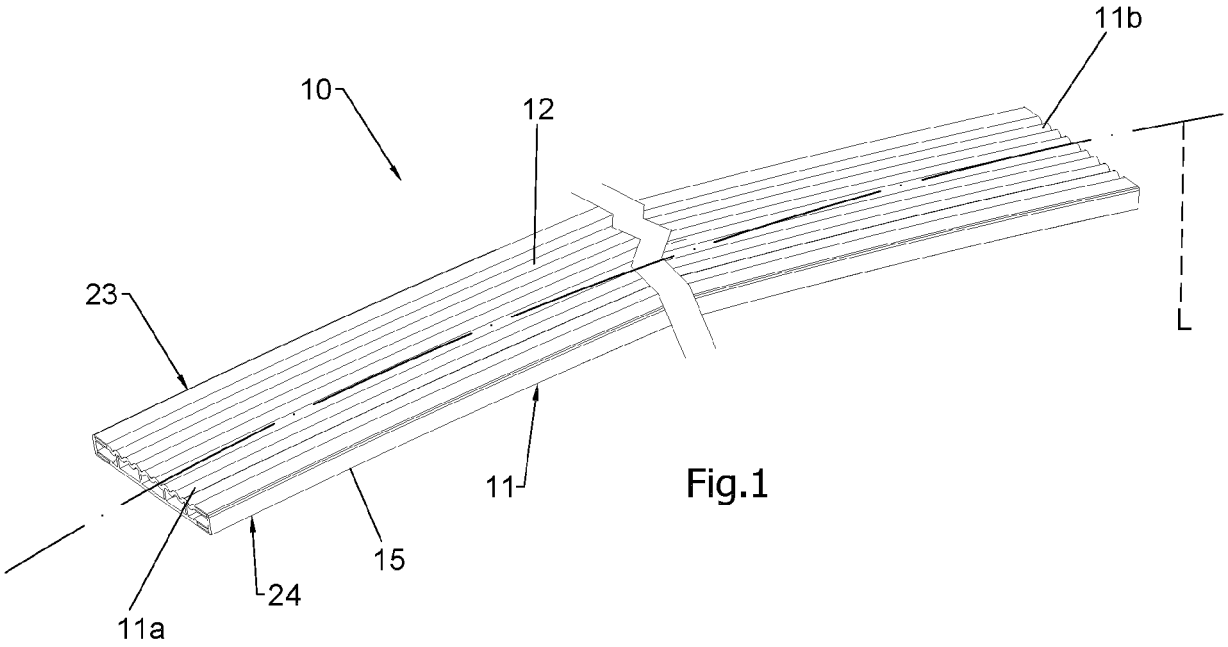
11b
10
12
23
L
11
15
24
11a

Fig.1

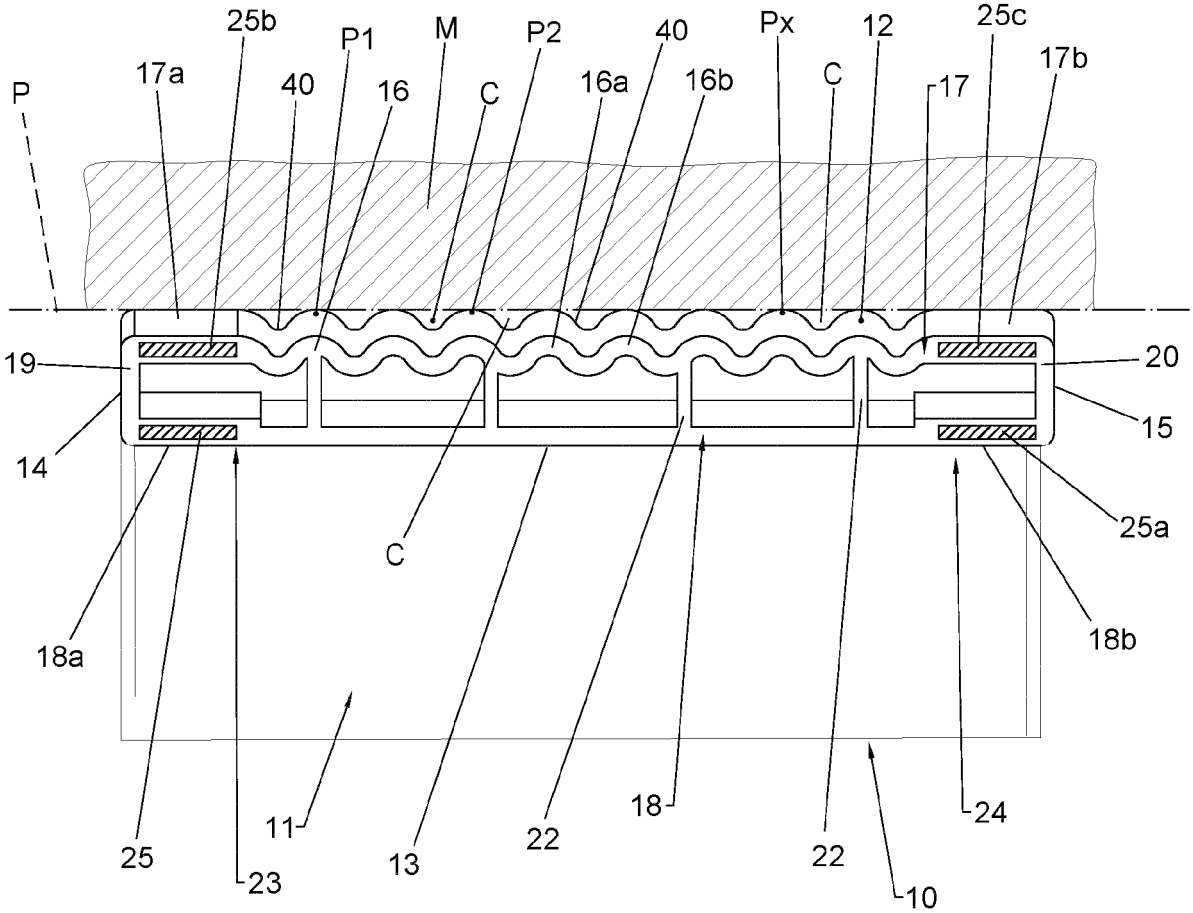
P
17a
25b
40
P1
16
M
C
P2
16a
40
16b
Px
C
12
17
25c
17b
19
20
14
15
25a
C
18a
18b
11
25
23
13
22
18
22
24
10

Fig.2

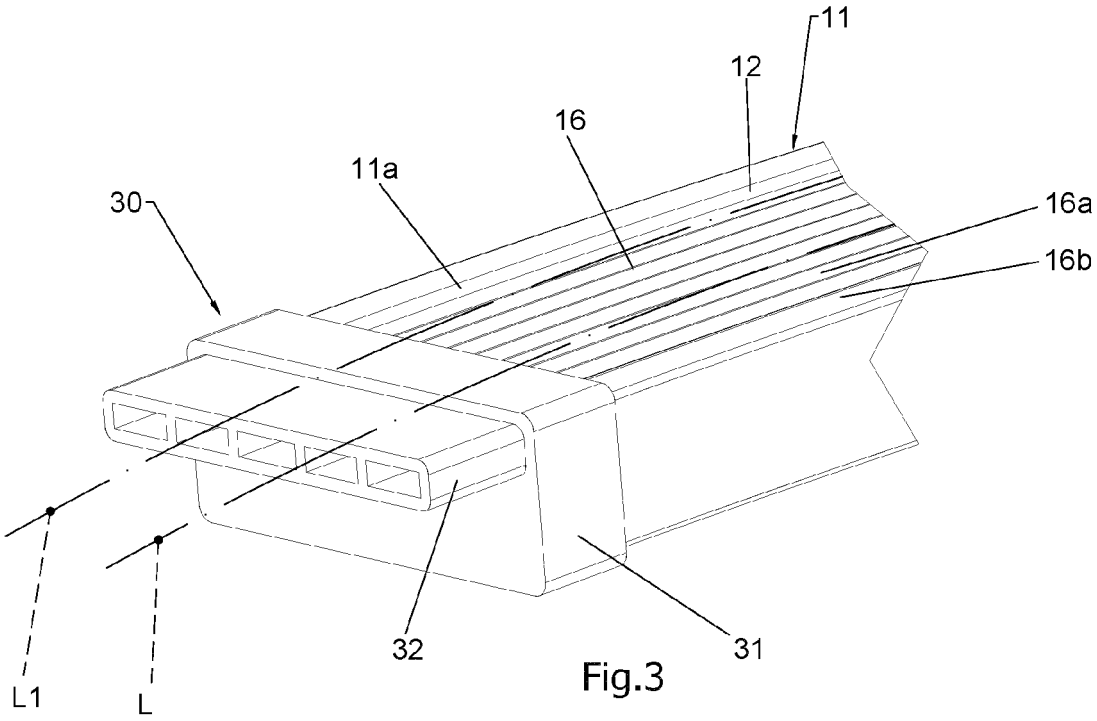

Fig.3

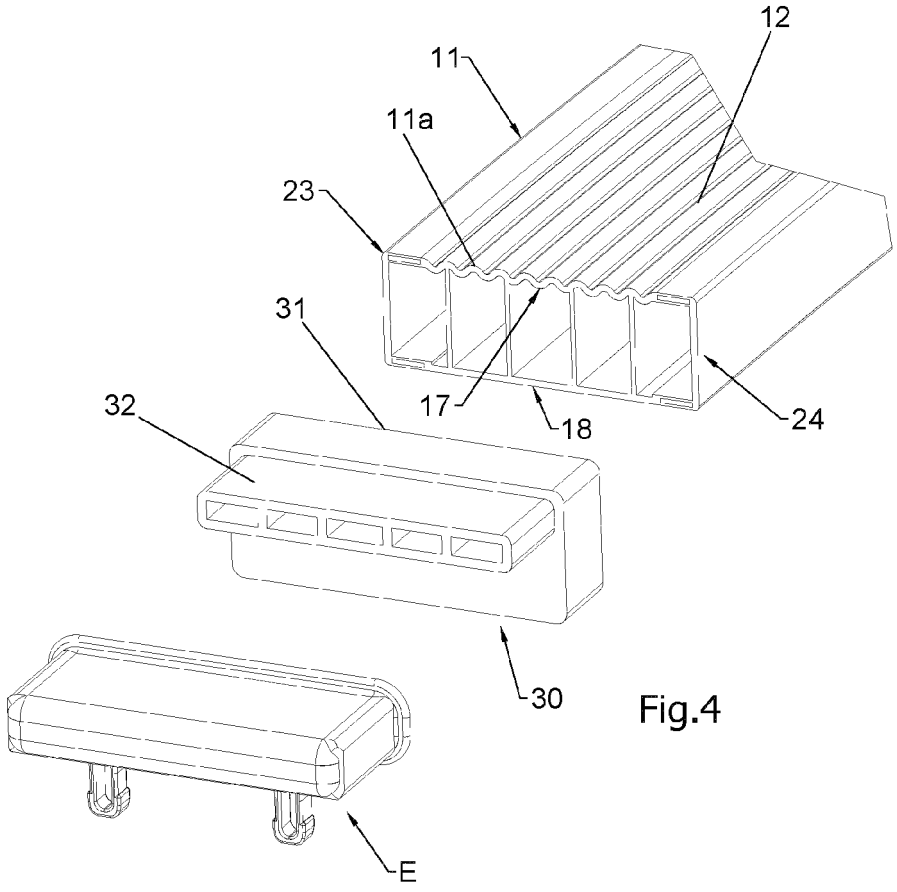

Fig.4

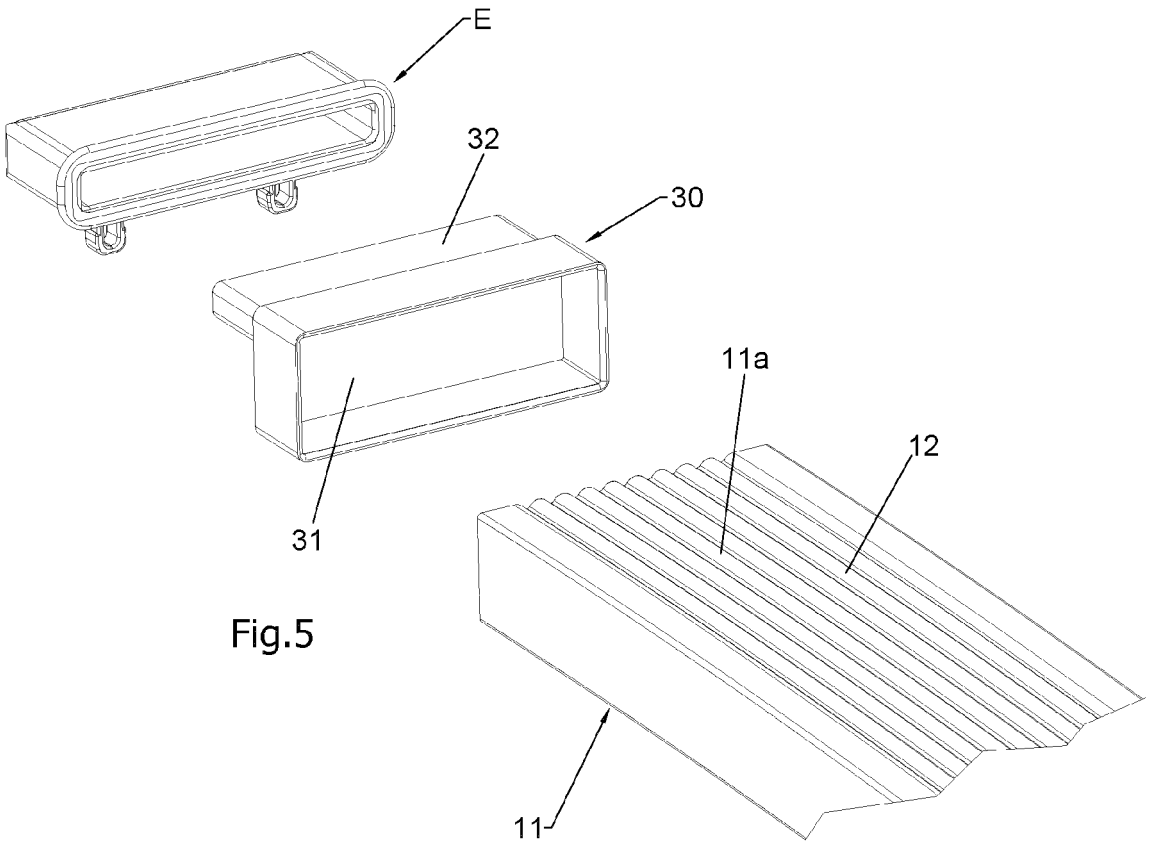

Fig.5

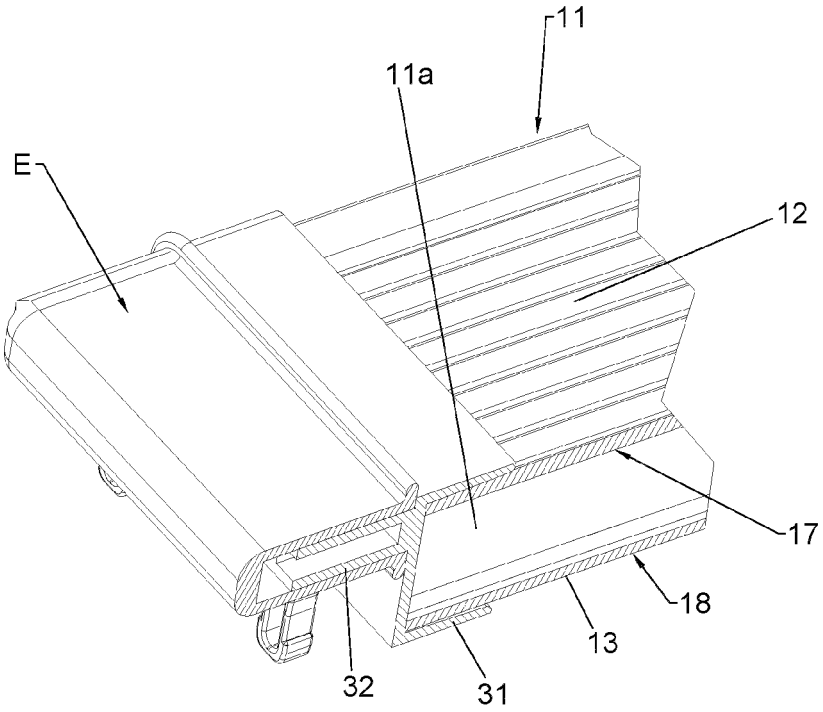

Fig.6

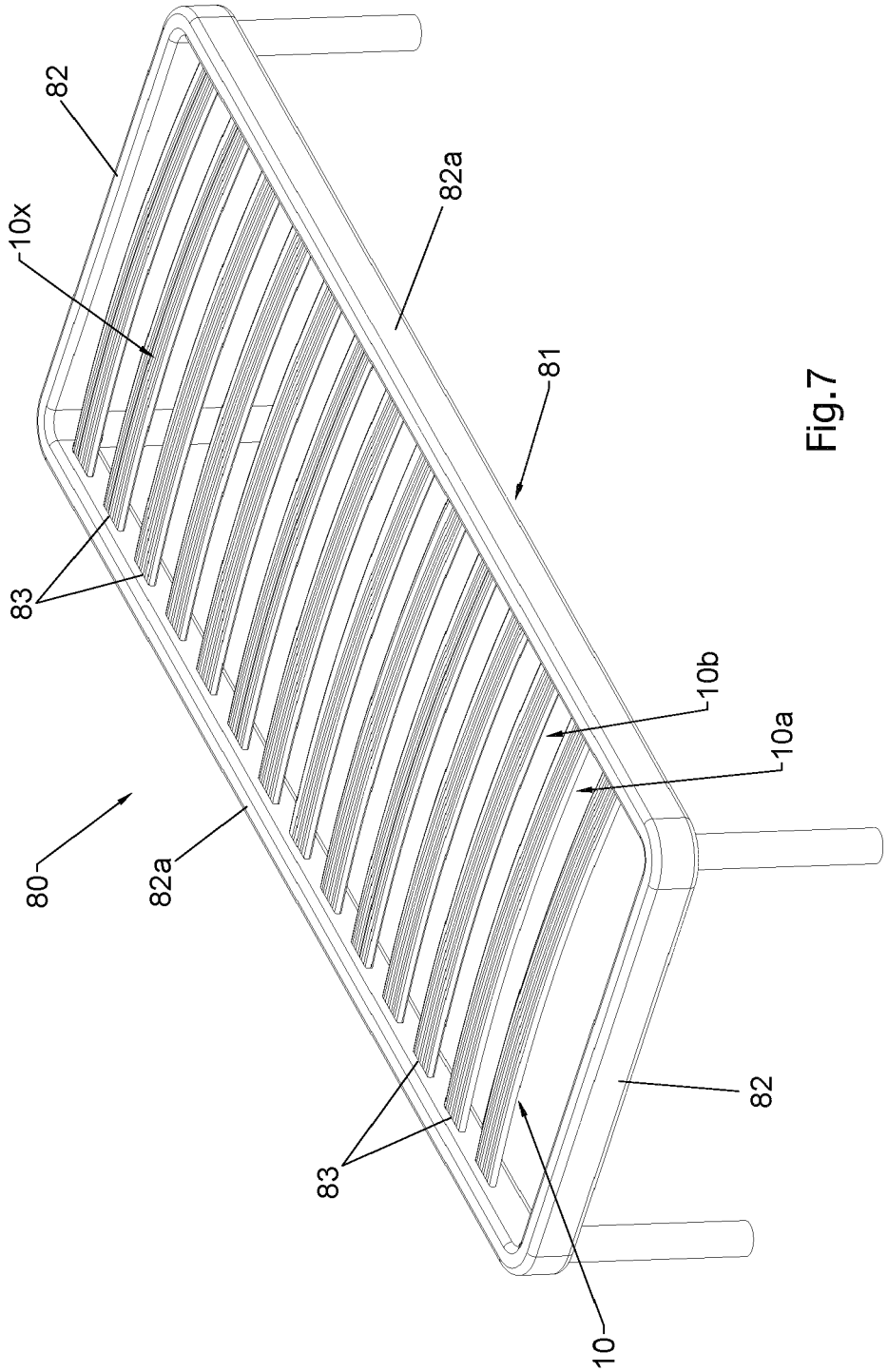

Fig.7

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 24 16 8261

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y A	EP 2 865 296 A1 (OKE KUNSTSTOFFTECHNIK GMBH & CO KG [DE]) 29 April 2015 (2015-04-29) * paragraphs [0015], [0016], [0028], [0032], [0033]; figures *	1-9, 11-14,16 15 10	INV. A47C23/06 A47C19/02
X	US 4 106 140 A (KIEVITS ANTON) 15 August 1978 (1978-08-15) * column 1, lines 56-61; figures * * column 2, lines 41-53 *	1-4,7-9, 11,13-16	
X	FR 2 715 280 A1 (PATURLE COMPOSITES [FR]) 28 July 1995 (1995-07-28) * page 5, paragraph 6; figure 1 *	1-4,7,8, 11-13,16	
X	DE 81 14 853 U1 (DUNLOP AG) 24 September 1981 (1981-09-24) * page 6, paragraph 4; figures *	1-4	
Y	EP 1 066 778 A1 (TANCREDI S P A [IT]) 10 January 2001 (2001-01-10) * figures *	15	TECHNICAL FIELDS SEARCHED (IPC) A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 August 2024	Kis, Pál

CATEGORY OF CITED DOCUMENTS

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

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

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 24 16 8261

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.

20-08-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2865296 A1	29-04-2015	DE 202013104754 U1	04-02-2014
		EP 2865296 A1	29-04-2015
US 4106140 A	15-08-1978	BE 838669 R	16-06-1976
		CA 1037165 A	22-08-1978
		CH 610194 A5	12-04-1979
		DE 2707046 A1	25-08-1977
		FR 2341288 A1	16-09-1977
		GB 1510952 A	17-05-1978
		JP S5943163 B2	20-10-1984
		JP S52123761 A	18-10-1977
		LU 76793 A1	06-07-1977
		NL 7701651 A	22-08-1977
		US 4106140 A	15-08-1978
FR 2715280 A1	28-07-1995	NONE	
DE 8114853 U1	24-09-1981	DE 8114853 U1	24-09-1981
		GB 2098474 A	24-11-1982
EP 1066778 A1	10-01-2001	EP 1066778 A1	10-01-2001
		IT VI990144 A1	09-01-2001

EPO FORM P0459

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