



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.04.2008 Bulletin 2008/18

(51) Int Cl.:
B65B 27/12 (2006.01)

(21) Application number: **06022281.7**

(22) Date of filing: **25.10.2006**

(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 LV MC NL PL PT RO SE SI SK TR
 Designated Extension States:
AL BA HR MK RS

(72) Inventor: **Lopes, José Carlos Gomes**
06950-000 Juquitibia SP (BR)

(74) Representative: **Ferreira Magno, Fernando Antonio et al**
A.G. da Cunha Ferreira Lda.,
Rua das Flores, 74 - 4
1200-195 Lisboa (PT)

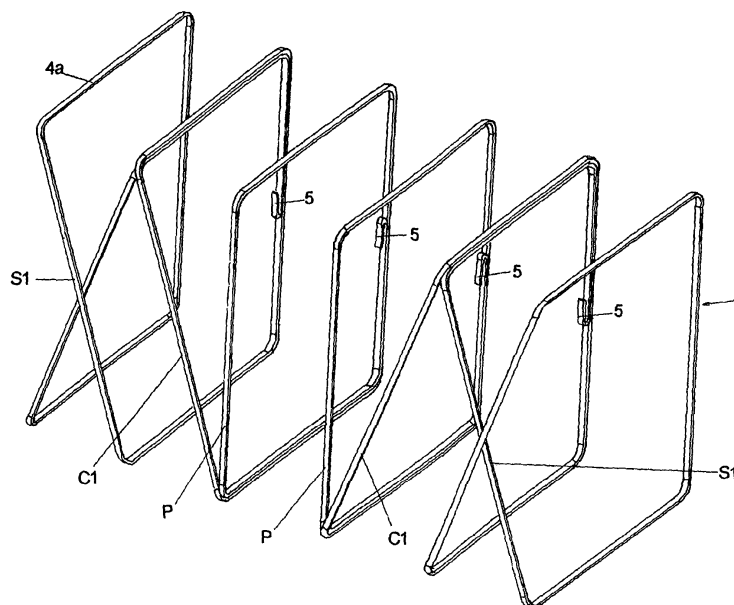
(71) Applicant: **Lopes, José Carlos Gomes**
06950-000 Juquitibia SP (BR)

(54) **Method for fixing expansive fiber bale and bale made with such method**

(57) System to fix expansive fiber bale and bale with applied system applicable to expansive fibers in general, such as a. g. cotton, wool, cork and other similar materials which fibers are naturally expansive, which should be compacted for transport and storage; to compose the expansive fiber bale (1), a conventional press (2) which can be provided with different numbers of trays (3) is used; the system requires the use of a press (2) in which a given volume of expansive fibers compressed and compacted to form the expansive fiber bale (1), being the press (2) plates provided with a number of trays (3); the system includes plastics. bands (4) developing paths defining parallel (P) and crossed (C1) contours, forming

sections (8) at each given quantity of trays (3); the system allows to obtain an expansive fiber bale (1) from the operation of the press (2) which plates define trays (3) in confronting positions, so to configure with the press (2) a folding side (L) and feeding side (L1). The resulting bale (1) is an expansive fiber bale fixed by plastic bands applied to corresponding trays (3), following as many sections (S) as required, following parallel and crossed contours and with the locking of said plastic bands (4) being assured by claw type edges (5) always inserted between a band (4) and the bale (1), being the location of said edges (5) inverted at the two ends defining each section (S).

FIG 11



Description

[0001] The present application for a patent of invention deals with a novel SYSTEM TO FIX EXPANSIVE FIBER BALE AND BALE WITH APPLIED SYSTEM, particularly a fully new system, applicable to each and every field in which expansive fibers need to be compressed to make bales to be appropriately fixed so that, once compression is released, its expansion is limited by the tie elements. For better understanding, we can define cotton, wool, cork and other similar fiber which tend to expand when compressed as expansive.

STATE OF THE ART

[0002] Expansive fiber bales are well known in the current state of the art. Basically, such bales are made to facilitate the transport and storage of said materials, since, when not pressed or compacted, they configure excessive volumes, which handling are transportation become provided with high difficulty levels.

[0003] It is therefore a known procedure in the state of the art to compact a predetermined volume of expansive fibers, so to compose bales of different sizes and weights, with the consequent purpose to facilitate handling, transport and storage operations.

[0004] The skills to make out such bales is based on the use of presses compressing a predetermined volume of fibers until compacted blocks of expansive fibers are formed, which should be fixed still on the press, since, once the mechanical compression force is released, there is strong expansion of such fibers, so that, in case such fixing is not efficient, there will be a trend to loose or disrupt the means employed for said fixing, thus causing various problems in both stock or transport means places.

[0005] Various forms to fix these bales are known and widely used in various countries with the same purpose, i. e. to compact and fix the expansive fiber bale. We can basically highlight as the fixing systems known worldwide those systems with wires (quick-link), with steel bands and plastic bands.

[0006] It is important to stress, however, that the state of the art has a natural trend to the use of fixing systems employing metallic means, notably for reasons of mechanical resistance, since, as stated, the disruption of the fixing system causes serious problems.

[0007] Bearing this in mind, the wire system is essentially based upon the use of wires to involve and fix the obtained bale by means of the compression given by a press. Although largely employed in the current state of the art, this system presents a series of inconveniences which are known by those skilled in the art, among them we highlight:

- a. oxidation due to the metal characteristics of the wire, which can generate fiber contamination;
- b. products used to preserve the metal, such as

greases and oils, can also determine possible contamination;

c. When various bales are fixed with wires located side by side, the unavoidable friction between the metallic materials, notably during transport procedures, may generate sparks which end up by firing the fibers; a particularity in this kind of burning is the fact that, once started, it becomes very difficult to be extinguished before all the matter is burned out;

d. Due to the risk of fire, insurance costs become very high, with consequences to the commercial cycle of the products;

e. The weight of the becomes equally high, thus causing related increases in freight; and

f. Risk of accidents with press operators, notably when wires are cut

[0008] The system using so-called steel bands instead of wires to involve and fix the bale, using mechanical systems based on staples or seals, also made of metal, to fix said bands, by means of smashing, pneumatic systems or even a few electric systems. Basically, all the problems inherent to wires are present in the so-called wire bands, notably because they are the use of metal material.

[0009] The system employing plastic bands is mainly used in developed countries and is based on the use of plastic bands of high mechanical resistance. In the system, the main problem is related to joining or fixing the edges of the plastic bands. The used skill is usually welding. However, to weld with appropriate resistance, the use of high-cost special soldering equipment becomes required. Besides having high cost, the manufacturer only supplies soldering machines jointly with presses, thus making this system become financially unfeasible. Furthermore, said system could never meet medium and small-sized companies, not leaving any expectation to commercially strengthen them.

THE NEW SYSTEM

[0010] The system created by the inventor makes use of plastic bands, particularly high mechanical resistance bands preferably made with PET, nylon or any compatible plastic material, in which said band can have their dimensions vary in terms of width and thickness, as a function of the desired applications which are linked to the features of the bales to be fixed.

[0011] It is a feature of this invention to present a system to fix plastic bands to an expansive fiber bale in which edges are fixed without the use of any equipment and without the inconveniences of metal bands or wires.

[0012] It is also a feature of invention the fact that the bands are located in trays existing in the press itself, while the bale is compressed and compacted by it, in which the passage and contour of said bands follows specific configuration, i. e. on a press with a predetermined quantity of trays, bands used for fixing are divided into sec-

tions, whit the band sometimes in parallel contour and sometimes with crossed contour, being said contours as many as the number of trays per section. Closing each section, the edges of the band are folded similarly to inverted claws and introduced one under the other band, generating fixing increasing in direct proportion to the expansion of the bale, once the pressure exerted by the press is released.

[0013] Basically, the system can be developed upon the location of bands in continuous sequence, or upon the location of bands in opposed symmetric sequence, being the option done determined according to the specific conditions of each bale or press, or upon option of the user.

[0014] The resulting bale is a bale which is compatible with the measurements if compared with bales fixed according to conventional systems, also having a three times lower tare in comparison with the wire system (six wires).

[0015] The fact that the band is applied in sections causes that, when a given band is eventually disrupted, only section is prejudiced, with the others being kept intact.

[0016] We therefore have a system with low execution cost, which is fully efficient and produces a highly resistant expansive fiber bale, with plastic bands applied by sections, also reducing the final weight of the set. Furthermore, the system does not need any kind of equipment as currently required to join and lock the edges of plastic bands conventionally used in expansive fiber bales.

DESCRIPTION OF FIGURES

[0017] The invention will now be explained with reference to the attached drawings, which represent:

Figure 1: perspective view of an expansive fiber bale positioned on the press, with plastic bands applied by sections in continuous sequence, showing the side of band folding and their feeding side, detailing folds and band roll, also in perspective;

Figure 2: perspective view of the expansive fiber bale of Figure 1 with the starting release of press compression, analogously showing the side of folding the bands and their feeding side, detailing folds and band roll, also in perspective;

Figure 3: perspective view of the expansive fiber bale highlighting the path of plastic bands applied by sections in continued sequence;

Figure 4: perspective view of plastic bands with details of crossing, overlaying and folds of the edges for locking, in continued sequence;

Figure 5: perspective view of the expansive fiber bale shown in dotted lines, jointly with the press, with plastic band in full lines applied by sections in continued sequence;

Figure 6: perspective view of the expansive fiber bale

in full lines, jointly with the press, being plastic bands represented in dotted lines applied by sections in continued sequence;

Figure 7: perspective view of plastic bands following the path made in the expansive fiber bale as applied by sections in continued sequence;

Figure 8: perspective view of an expansive fiber bale positioned on the press, with the plastic bands applied in symmetric sequence opposed by sections, showing the side of folding the bands and their feeding side, detailing the folds and band roll, also in perspective;

Figure 9: perspective view of the expansive fiber bale highlighting the path of plastic bands in symmetric sequence opposed by sections, being the bands represented in dotted line;

Figure 10: perspective view of plastic bands detailing crossing, overlaying and folds of edges for locking in opposed symmetric sequence; and

Figure 11: perspective view of plastic bands the path they make on the expansive fiber bale, in opposed symmetric sequence by sections.

DETAILED DESCRIPTION

[0018] The system to fix expansive fiber bale and bale with applied systemobject of this application for a Patent of Invention is applicable to expansive fibers in general, such as e. g. cotton, wool, cork and other similar materials which fibers are naturally expansive, and should be compacted for reasons of transport and storage.

[0019] To compose the expansive fiber bale (1), a conventional press (2) is used and may be provided with different quantities of trays (3). It is common practice in this field to use six or eight trays; and, as an example, we show in this patent figures with six trays (3).

[0020] The system as properly said requires the use of a press (2) in which a given volume of expansive fibers is pressed and compacted to form the expansive fiber bale (1). The plates of the press (2) are provided with a number of trays (3) in which plastic bands (4) are applied in paths defining parallel (P) and crossed (C1) contours, forming sections (S) at each given quantity of trays (3).

[0021] Said plastic bands (4) may be made of various plastic materials with appropriate mechanical resistance for the application at issue and, in a preferential embodiment, we mention PET and nylon, as well as similar materials with compatible properties. Field tests and studies have shown that plastic bands (4) should preferably be 10 to 32 mm wide and 0,5 to 2 mm thick.

[0022] In further detail, the system allows to obtain an expansive fiber bale (1) from the activation of the press (2) which plates define trays (3) in confronting positions, so to configure with the press (2) a folding side (L) and a feeding side (L1). As previously stated, plastic bands (4) are applied along the previously compressed bale (1) from sections (S), and each one of the mentioned sections may be composed by a given variable quantity of

trays (3). In the attached figures, we exemplify bales (1) with trays (3), divided into two sections of three trays each; however, it is common practice in the market to compose bales with eight trays (3), and in this case we would have end sections of three trays and on intermediate section with two trays, or two sections of four trays. Obviously, said market feature does not exclude the possibility to produce bale with more or less trays (3).

[0023] Therefore, once compressed and compacted, the expansive fiber bale (1) should start, in the continuous sequence by sections (Figures 1 to 7), from the end and higher trays (3a) at the left of the operator, to feed the plastic band (4a), starting from the first section, so that said band, with its end folded in a claw, passes from the feeding side (L1) to the folding side (L), developing a parallel contour, returning to the feeding side (L1) through the end lower tray (3b). Subsequently, the edge of the band is inserted into the second higher tray (3a), forming a diagonal which again goes to the folding side (L) and returns to the feeding side (L1) through the second lower tray (3b); diagonally again, it is inserted in the third higher tray (3a), going again to the folding side (L1) and returning through the third lower tray (3b) to the feeding side (L1). At this point, the band is again inserted in the third higher tray (3a) still with the edge folded in a claw (5), but this time under the band located therein up to about 10 cm below the higher vertex of the bale on the folding side (L) where the first lock will be made. After locking, since it is continuous and still being dispensed from the roll (R1) (not cut yet), the band should be adjusted with return of the excessive quantity, then keeping the bale within desirable measurements after the press is opened. When the adjustment is made, the band is cut in enough size to, with the edge folded in a claw, again enter the first left lower tray (3b) above the already existing band, until arriving at the folding side (L) 10 cm above the lower vertex of the bale (1), with the claw shaped band fold remaining inside the already existing band, where the second lock will be made, completing and ending the section. All this procedure is done with slightly loose bands (allowing them to be relatively easily handled), being the tension adjustment promoted at the end of each section (S), with the new section always starting the same way, keeping the above described sequence. The plastic bands (4) at the ends of each section are always locked with the claw edges (5) inverted so to reach full efficiency.

[0024] As previously described, the quantity of trays (3) per section may vary as desired, with the same applying to the total sections (S), but the application and fixing procedure through plastic bands always follows the described sequence.

[0025] It is a conventional procedure, e.g. inherent to the already existing wire systems, to use two operators, i. e. one at the feeding side (L1) and another at the folding side (L), which is maintained in the present system.

[0026] Once the plastic bands (4) are fixed, the press (2) releases the pressure over the expansive fiber bale (1), so that such bale (1) is inclined to be taken off. In

that moment, fibers expand and force the full locking of plastic bands (4), which naturally increase somewhat the measurements of the bale (1), but keeping high compact, i.e. resulting in a bale (1) within the desired measurements.

[0027] In the opposed symmetric sequence (Figures 8 to 11), plastic bands (4) have a different contour, and the feeding of each plastic band (4a) starts on the intermediate higher tray (3a) of each section (S), following a parallel sequence (P) on the folding side (L) and an "X" crossed sequence (S1) on the feeding side (L1), while the claw edges (5) are obviously on the folding side (L) and locked according to the same previous skill, i. e. by underlay said bands (4a) with the claw folded edges (5) to the external parallel bands (4a), so to confine said claw folds (5) between the bands and the bale (1). More specifically, feeding starts from the central higher tray (3a) of each section (S) (in the case of six trays, the third one, and, in case of eight trays, the fourth from the end), so that said band (4) with the claw folded edge (5) follows from the feeding side (L1) to the folding side (L) to return to the feeding side (L1) through the lower tray (3b) and follows crosswise to the subsequent higher tray (3a), where it is introduced and taken up to the folding side (L) and from there goes down in parallel up to the lower tray (3b), returning to the feeding side (L1) through said tray, from which it elevates, again crosswise, up to the end higher tray (3a), passing to the folding side (L) where it goes down in parallel up to the end lower tray (3b), returning to the feeding side (L1), being then taken crosswise inverted up to the intermediate higher tray (3a), forming an "X", and being again passed to the folding side (L), but under the band existent therein until about 10 cm below the higher vertex of the bale on the folding side (L), where the first locking will occur. After being locked, the band (4), since it is continuous and still being dispensed from the roll (R1) (it was not cut), should be adjusted by returning the excess and still keep the bale (1) under desirable measurements after the press is open. After the adjustment, the band is cut in enough size to, with the claw folded edge (5), again enter the first central lower tray (3b) over the already existent band, until arriving at the folding side (L) 10 cm above the lower vertex of the bale, with the claw shaped band fold (4) being inside the already existent band (4), where the second locking will be made, completing and ending the section.

[0028] The resulting bale (1) is an expansive fiber bale fixed by plastic bands applied over corresponding trays (3), following as many sections (S) as required, following parallel and crossed contours and locking said plastic bands (4) as guaranteed by claw type edges (5) always inserted between one band (4) and the bale (1), being the location of said edges (5) inverted in both ends defining each section (S); on the feeding side (L1), the bale (1) presents, when plastic bands (4) are applied in continuous sequence, parallel end bands, limiting each section (S), and crossed or oblique intermediary bands, con-

necting trays (3b) and (3a) at each section (S) as mentioned, while the folding side (L) is composed by parallel (vertical) bands (4).

[0029] When the bands (4) are applied in opposed symmetric sequence, the bale (1) presents, at each section (S), on the feeding side (L1), end bands crossed in an "X" (S1), followed by oblique or crossed bands and parallel (vertical) central bands which are the origin of feeding from each section (S), while, on the folding side (L), parallel (vertical) bands are planned.

[0030] One of the most important features of the present systems is that, in the case of an eventual disruption of a plastic band (4) (which can occur due to material failures), only that section will be compromised and all the others will be kept intact.

Claims

1. System to fix expansive fiber bale applicable to expansive fibers in general, e. g. cotton, wool, cork and other similar materials which fibers are naturally expansive, which should be compacted for transport and storage; to compose the expansive fiber bale (1), a conventional press (2) which can be provided with different numbers of trays (3) is used; the system requires the use of a press (2) in which a given volume of expansive fibers is compressed and compacted to form the expansive fiber bale (1), being the press (2) plates provided with a number of trays (3), in which plastic bands (4) are applied in paths defining parallel (P) and crossed (C1) contours, in two forms of sequence, i.e. continuous and opposed symmetric, forming sections (S) at each given quantity of trays (3); the system allows to obtain an expansive fiber bale (1) from the operation of the press (2) which plates define trays (3) in confronting positions, so to configure with the press (2) a folding side (L) and a feeding side (L1).
2. System to fix expansive fiber bale of claim 1, in which the plastic bands (4) are applied alongside the previously compressed bale (1) from sections (S) which, at each mentioned section, may be composed by a given variable quantity of trays (3); once the expansive fiber bale (1) is compressed and compacted, the feeding of the plastic band (4a) should start in continuous sequence from the higher end tray (3a) on the left of the operator, starting the first section, so that said band, with its claw folded edge, passes from the feeding side (L1) to the folding side (L), developing the parallel contour, returning to the feeding side (L1) through the lower end tray (3b); in sequence, the edge of the band is inserted in the second higher tray (3a) forming a diagonal line going again to the folding side (L) and returning to the feeding side (L1) through the second lower tray (3b); it is again diagonally inserted in the third higher tray (3a), going again to the folding side (L1) and returning through the third lower tray (3b) to the feeding side (L1); at this point, the band, still with the claw folded edge (5), is again inserted in the third higher tray (3a), but this time under the band existent therein until about 10 cm below the higher vertex of the bale at the folding side (L) in which the first locking will be made; after locking, the band, since it is continuous and still being dispensed from the roll (R1) (it was not cut), should be cut with excess return and thus keep the bale within desirable measurements after the press is opened; after the adjustment, the band is cut under enough size to, with the claw folded edge, again enter the first left lower tray (3b) over the already existent band, until arriving at the folding side (L) 10 cm above the lower vertex of the bale (1), with the claw shaped band fold staying inside the already existent band, where the second locking will be made, completing and ending the section.
3. System to fix expansive fiber bale of claims 1 and 2, in which, in the opposed symmetric sequence, the plastic bands (4) have different contour, the feeding of each plastic band (4a) starts on the intermediary higher tray (3a) of each section (S), following a parallel sequence (P) on the folding side (L) and a crossed sequence in "X" (S1) on the feeding side (L1), while the claw edges (5) are obviously on the folding side (L) and locked according to the same previous skill, i.e. by underlay both bands (4a) with the claw folded edges (5) to the parallel and external bands (4a), so to confine said claw folds (5) between the bands and the bale (1); the feeding of each plastic band (4a) starts on the higher intermediate tray (3a) of each section (S), following a parallel sequence (P) on the folding side (L) and an "X" crossed sequence (S1) on the feeding side (L1), while the claw edges (5) are obviously on the folding side and are locked following the same previous skill, i.e. by underlay said bands (4a) with the claw folded edges (5) to the parallel and external bands (4a), so to confine said claw folds (5) between the bands and the bale (1); feeding starts from the central higher tray (3a) of each section (S) (in the case of six trays the third one and, in case of eight trays, the fourth one from the end), so that said band (4) with the claw folded edge (5) follows from the feeding side (L1) to the folding side (L) to return to the feeding side (L1) through the lower tray (3b) and follows crosswise to the subsequent higher tray (3a) (towards the edge), where it is introduced and taken up to the folding side (L) and from there goes down in parallel up to the lower tray (3b), returning to the feeding side (L1) through said tray, from which it elevates, again crosswise, up to the end higher tray (3a), passing to the folding side (L) where it goes down in parallel up to the end lower tray (3b), returning to the feeding side (L1) being then taken crosswise inverted up to the

intermediate higher tray (3a), forming an X", and being again passed to the folding side (L), but under the band existent therein until about 10 cm below the higher vertex of the bale on the folding side (L), where the first locking will occur, after being locked, the band (4), since it is continuous and still being dispensed from the roll (R1) (it was not cut), should be adjusted by returning the excess and still keep the bale (1) under desirable measurements after the press is open; after the adjustment, the band is cut in enough size to, with the claw folded edge (5), again enter the first central lower tray (3b) over the already existent band, until arriving at the folding side (L) 10 cm above the lower vertex of the bale, with the claw shaped band fold (4) being inside the already existent band(4), where the second locking will be made, completing and ending the section.

4. System to fix expansive fiber bale of claims 1, 2 or 3, in which the procedure to apply plastic bands (4) is made with slightly loose bands, being the tension adjustment promoted at the end of each section (S) and the new section always starting in the same way and keeping the same sequence; the locking of the plastic bands (4) at the ends of each section is always made with inverted claw edges (5);
5. System to fix expansive fiber bale of claims 1, 2 or 3 in which said plastic bands (4) are made of plastic materials with mechanical resistance, with PET and nylon being used in a preferential embodiment;
6. System to fix expansive fiber bale of claims 1, 2, 3 or 4, in which the plastic bands (4) are preferable 10 to 32 mm wide and 0,5 to 2mm thick;
7. Bale with applied system obtained as per the systems of the previous claims, in which the resulting bale (1) is an expansive fiber bale fixed by plastic bands applied in respective trays (3), following as many sections (S) as required, following parallel and crossed contours and locking said plastic bands (4) as guaranteed by claw type edges (5) always inserted between one band (4) and the bale (1), being the location of said edges (5) inverted in both ends defining each section (S); when plastic bands (4) are applied in continuous sequence, the bale (1) discloses parallel end bands, limiting each section (S), and crossed or oblique intermediary bands, connecting trays (3b) and (3a) at each section (S) as mentioned, while the folding side (L) is composed by parallel (vertical) bands (4);
8. Bale with applied system of claim 7, in which the bands (4) are located in opposed symmetric sequence and, for that, the bale (1) presents, a each section (S), on the feeding side (L1), "X" crossed end bands (S1) followed by crossed or oblique bands

and parallel (vertical) central bands which are the origin of feeding of each section (S), while, on the folding side (L), parallel (vertical) bands are planned.

9. Bale with applied system of claims 7 and 8, in which the bale (1) is provided with isolated sections (S) between themselves.

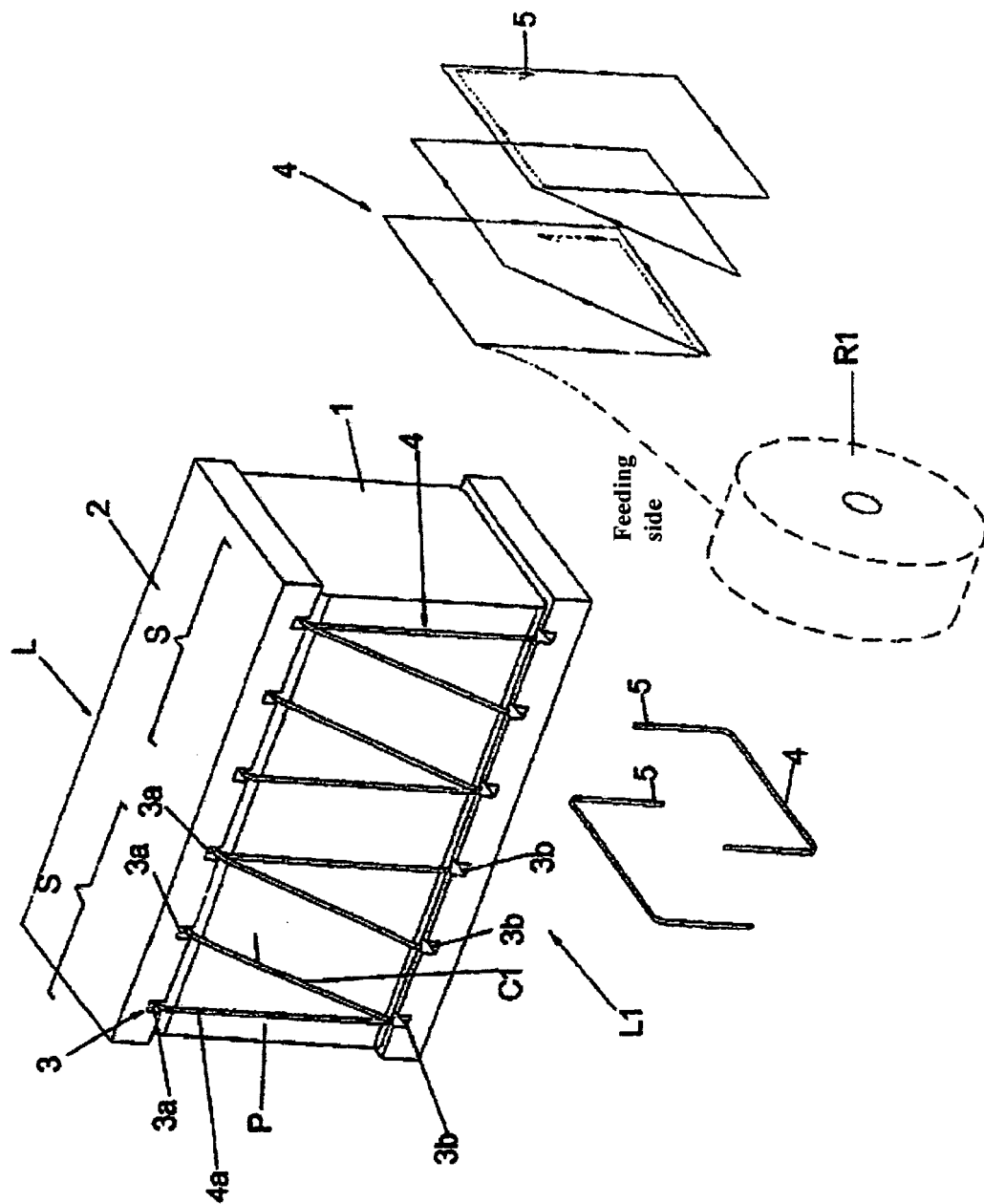
FIG 1

FIG 2

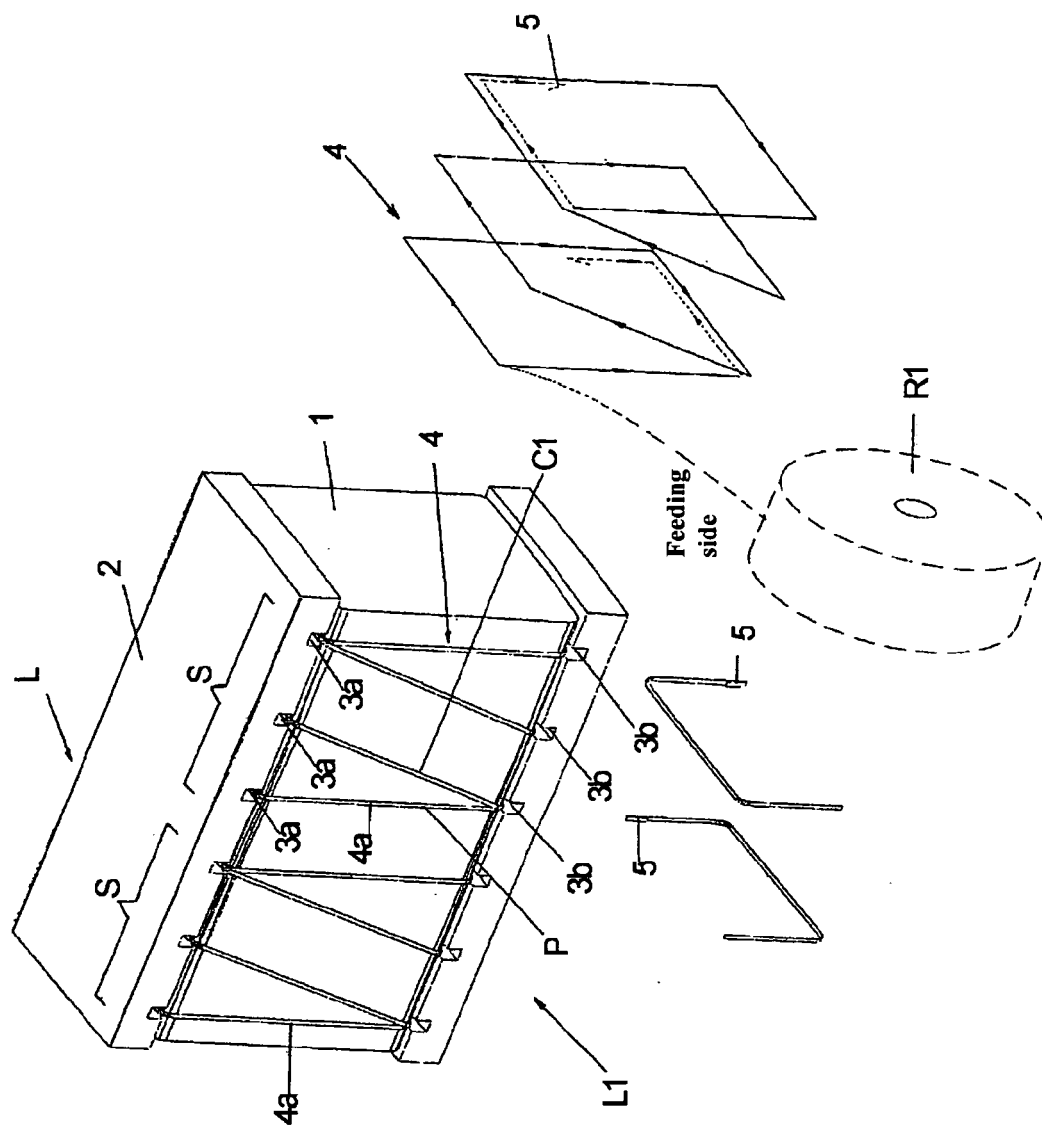
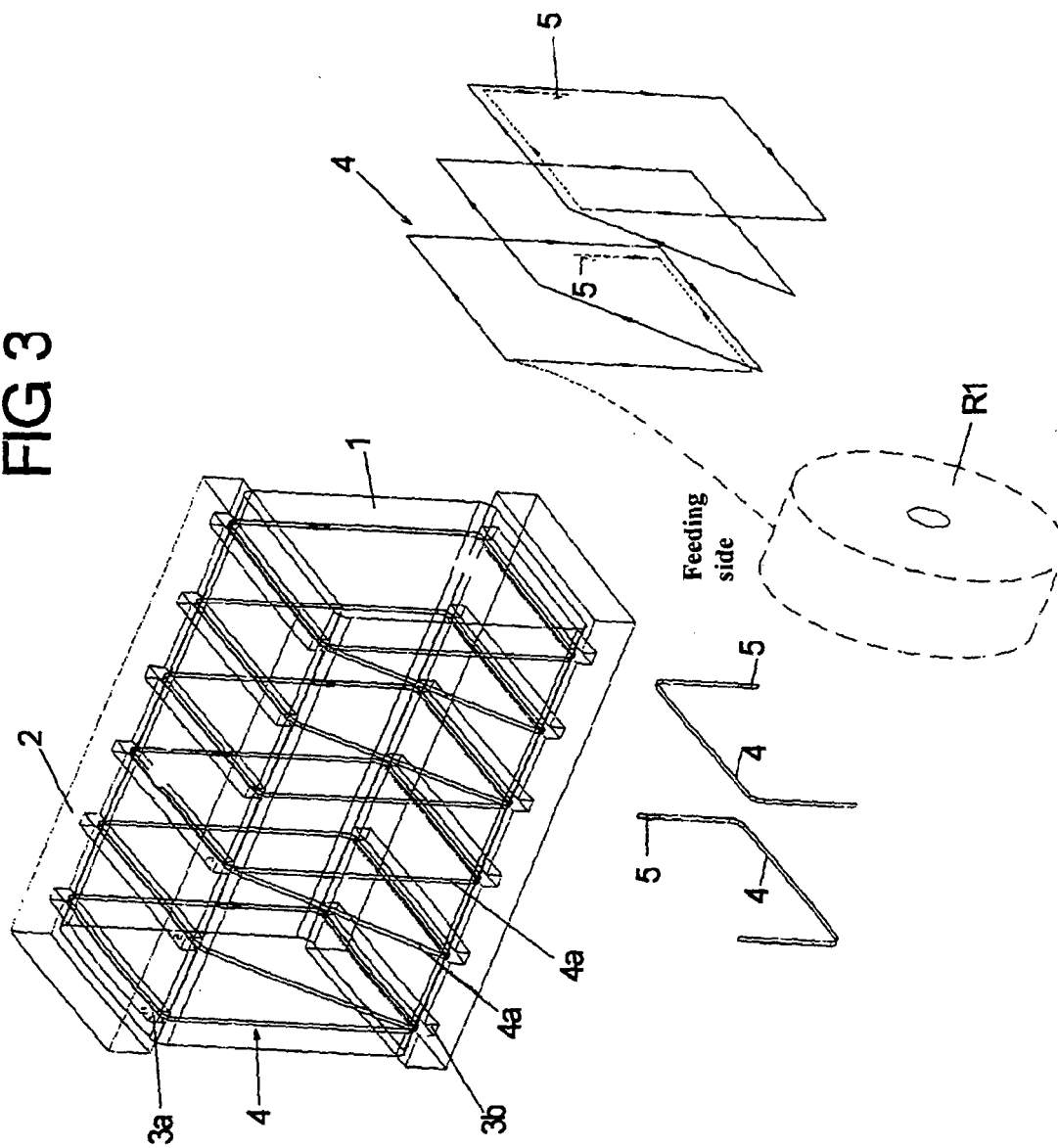


FIG 3



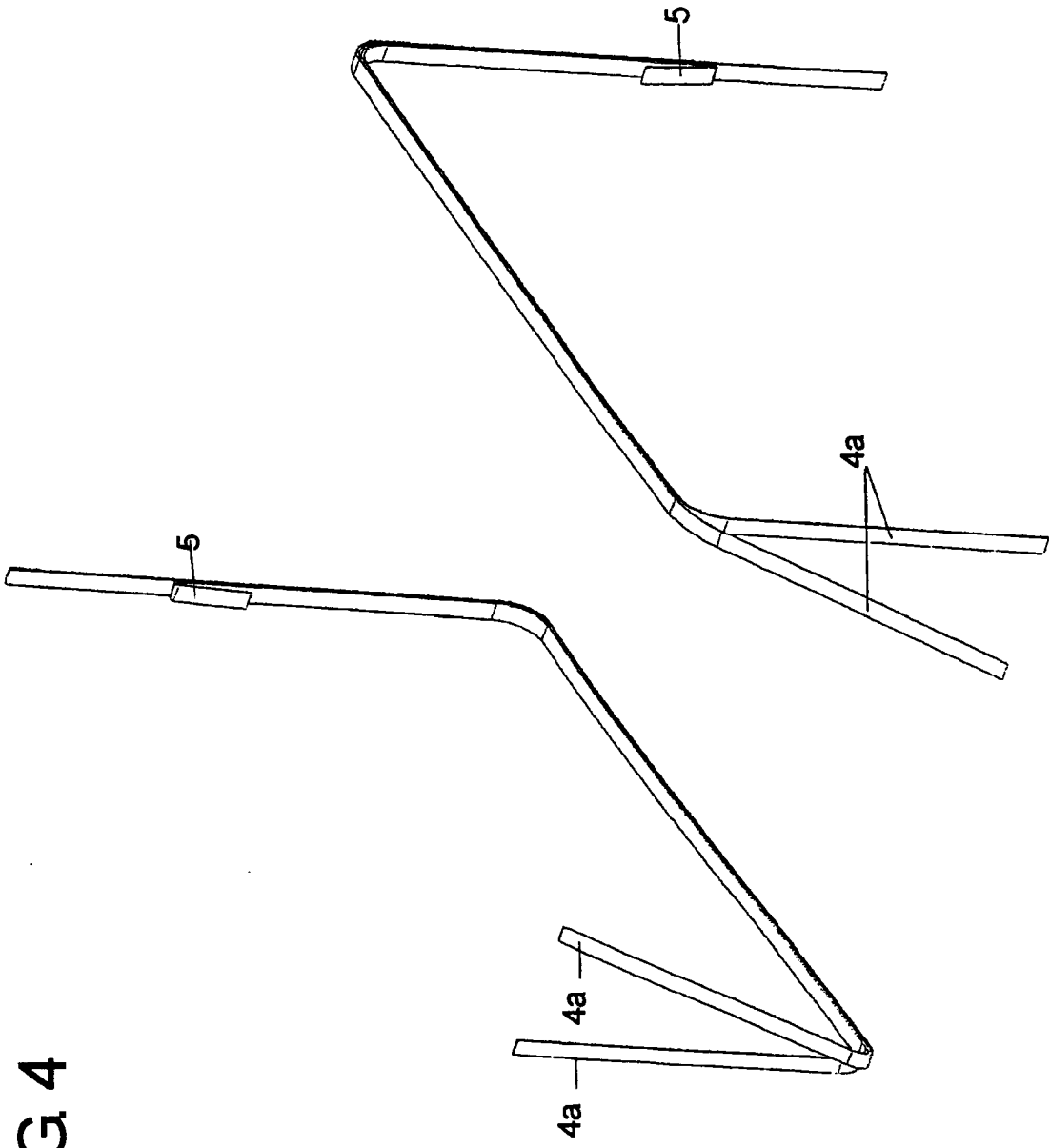


FIG. 4

FIG 5

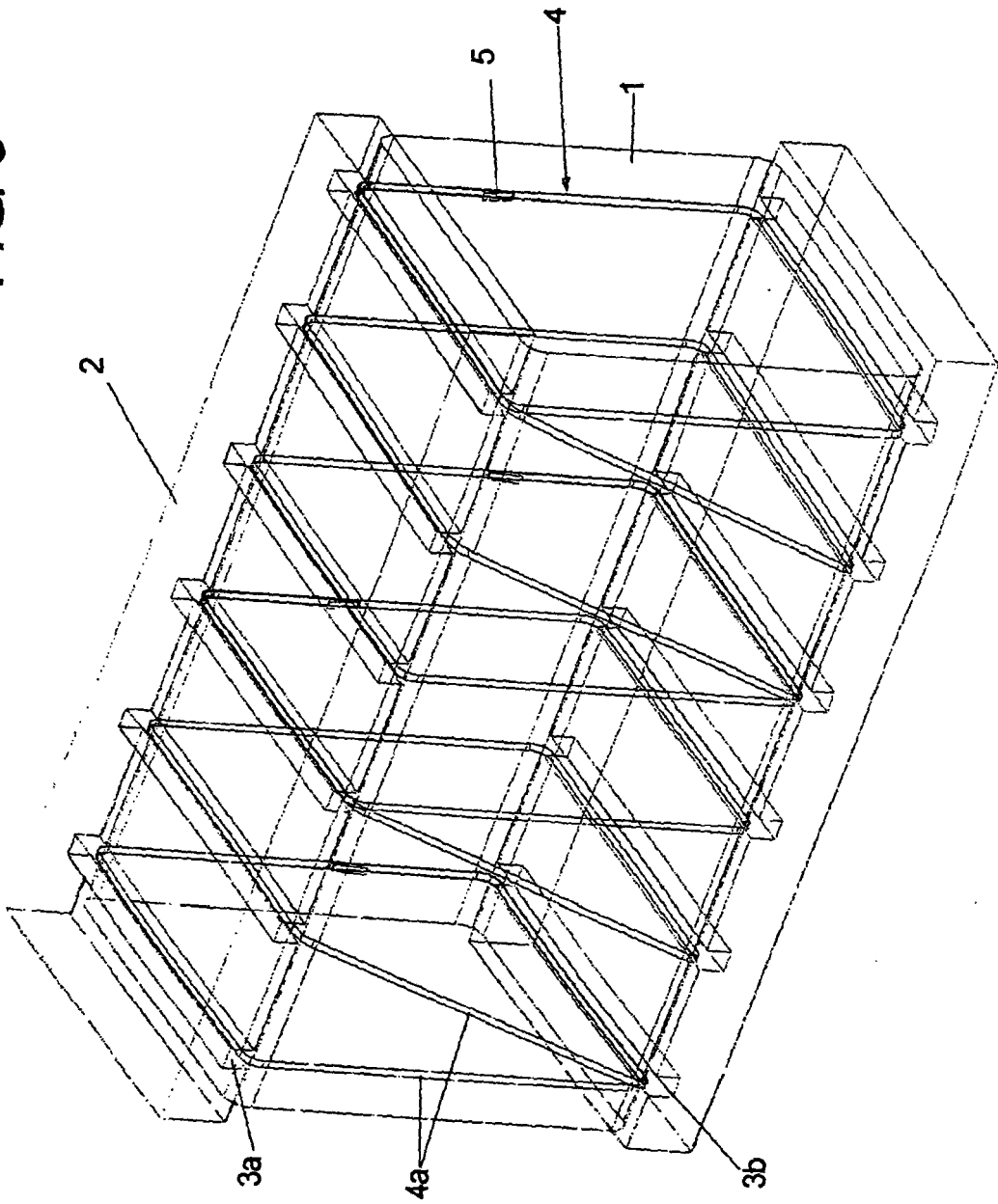


FIG 6

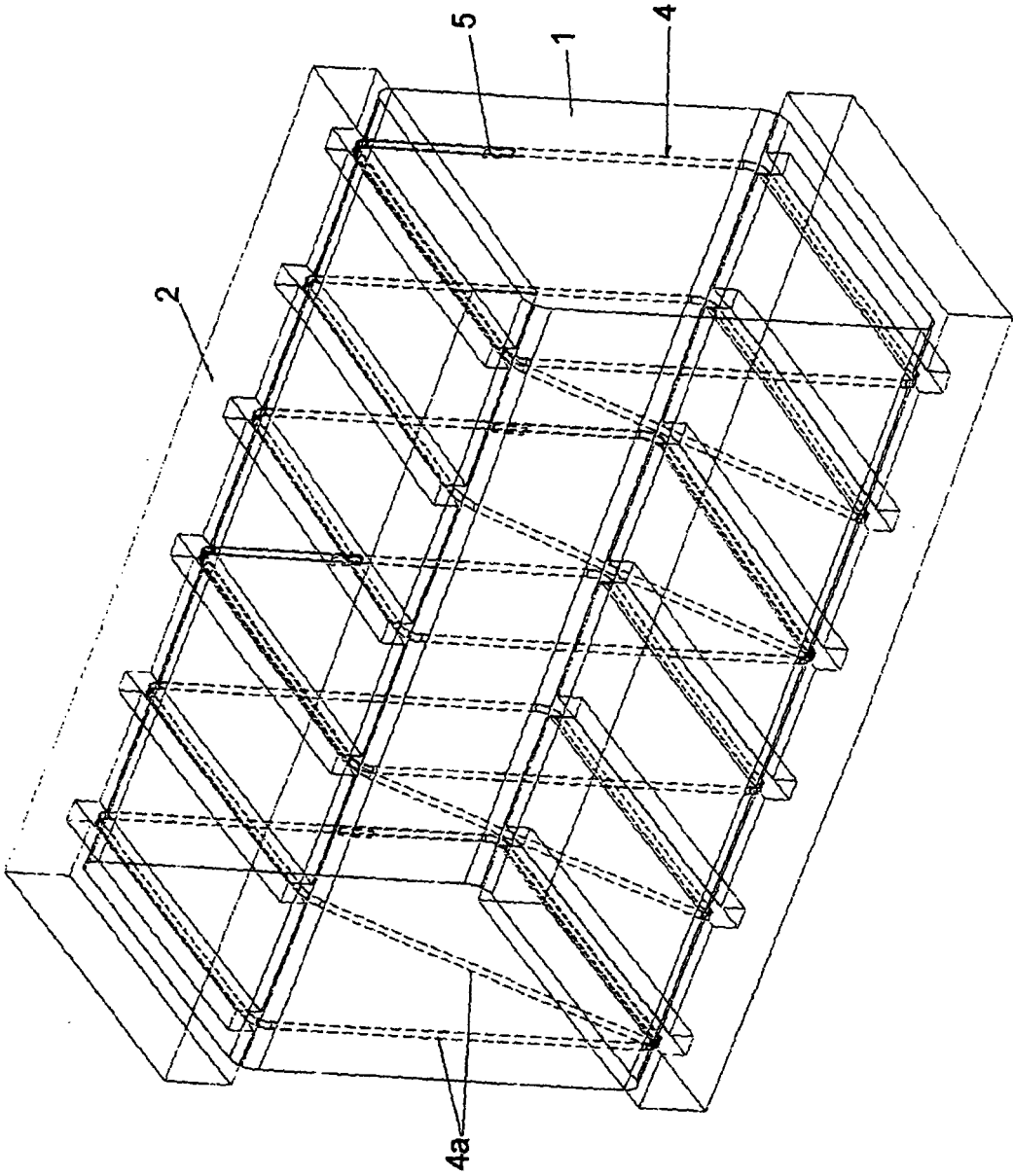


FIG 7

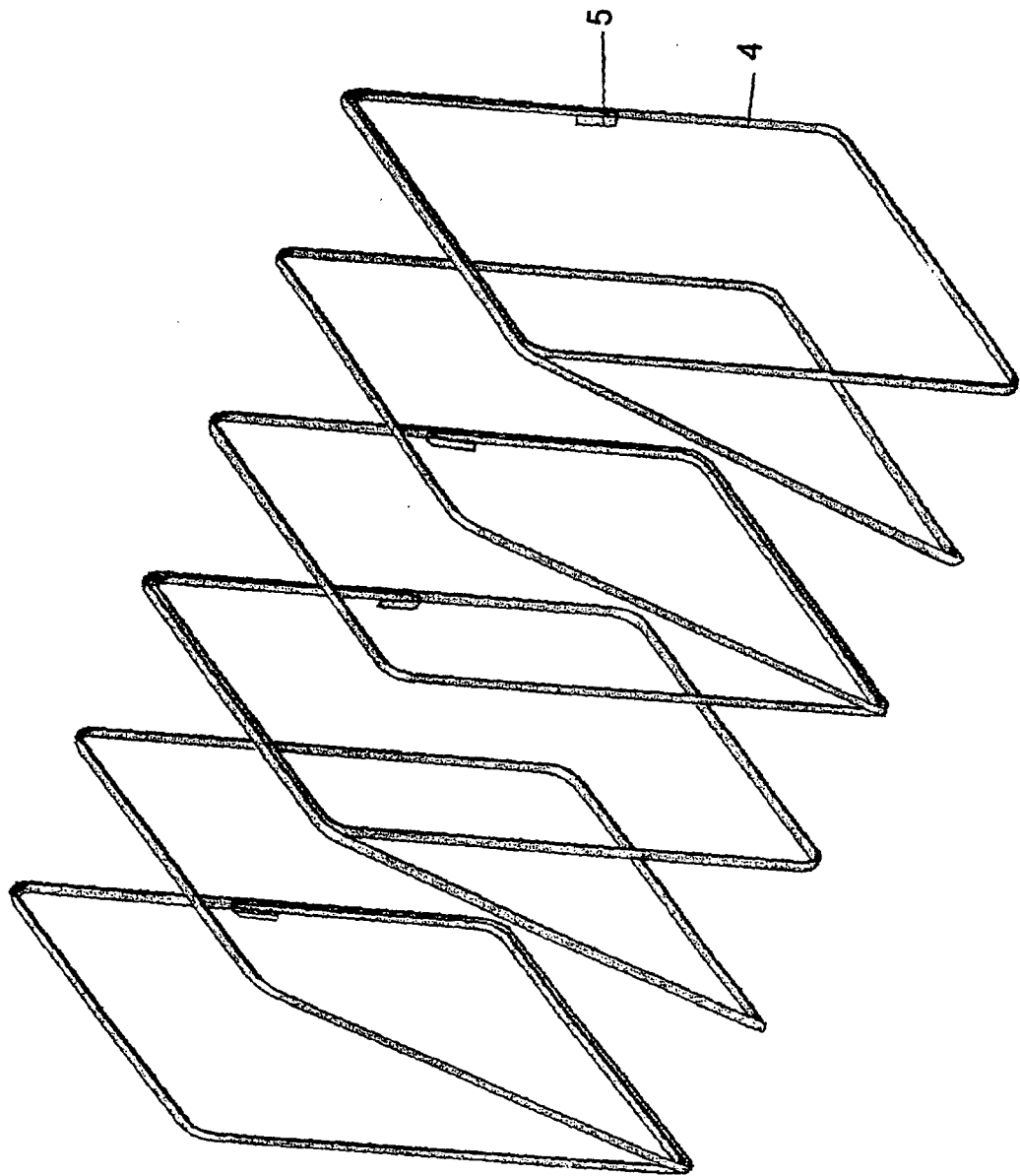


FIG 8

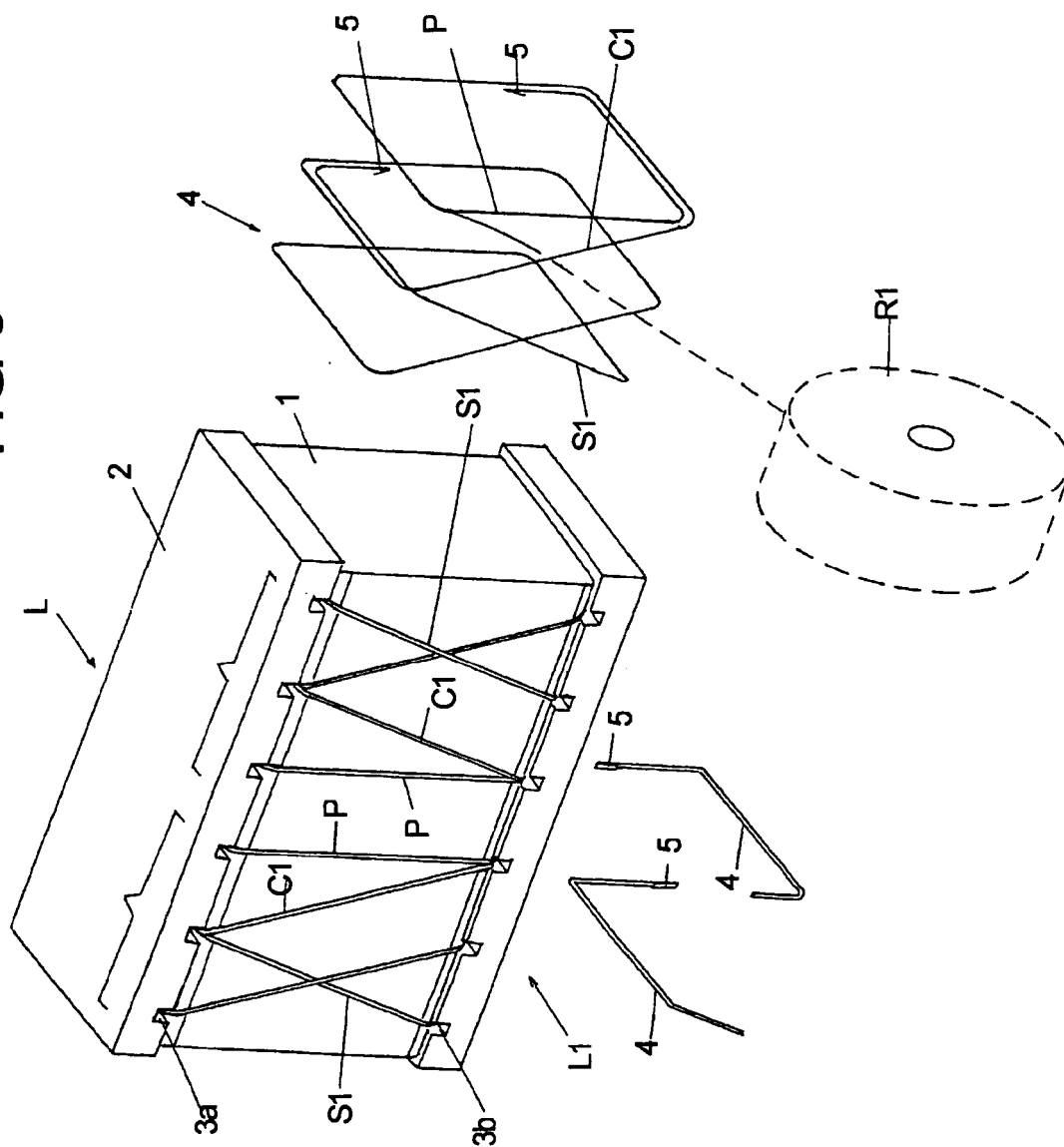
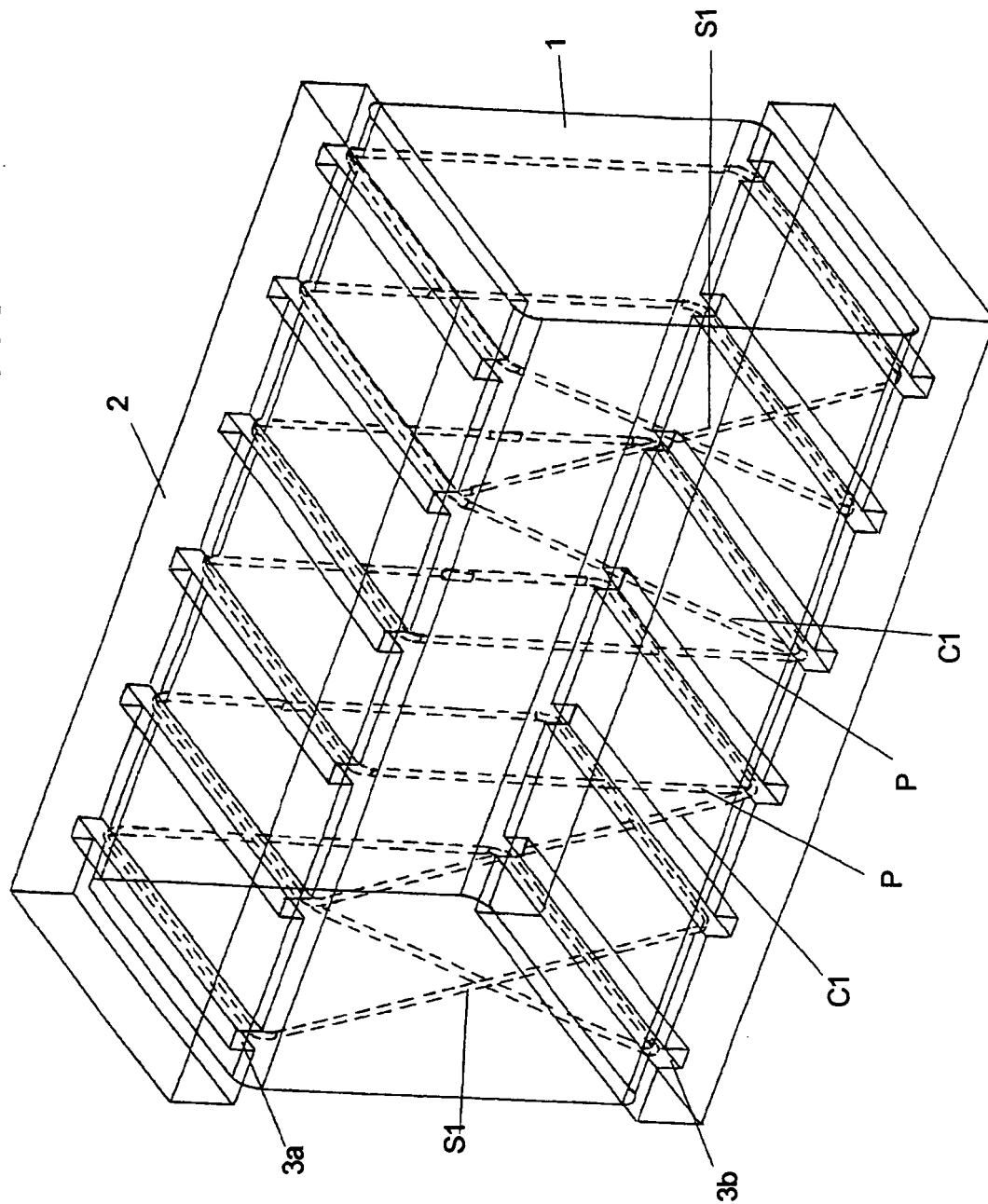


FIG 9



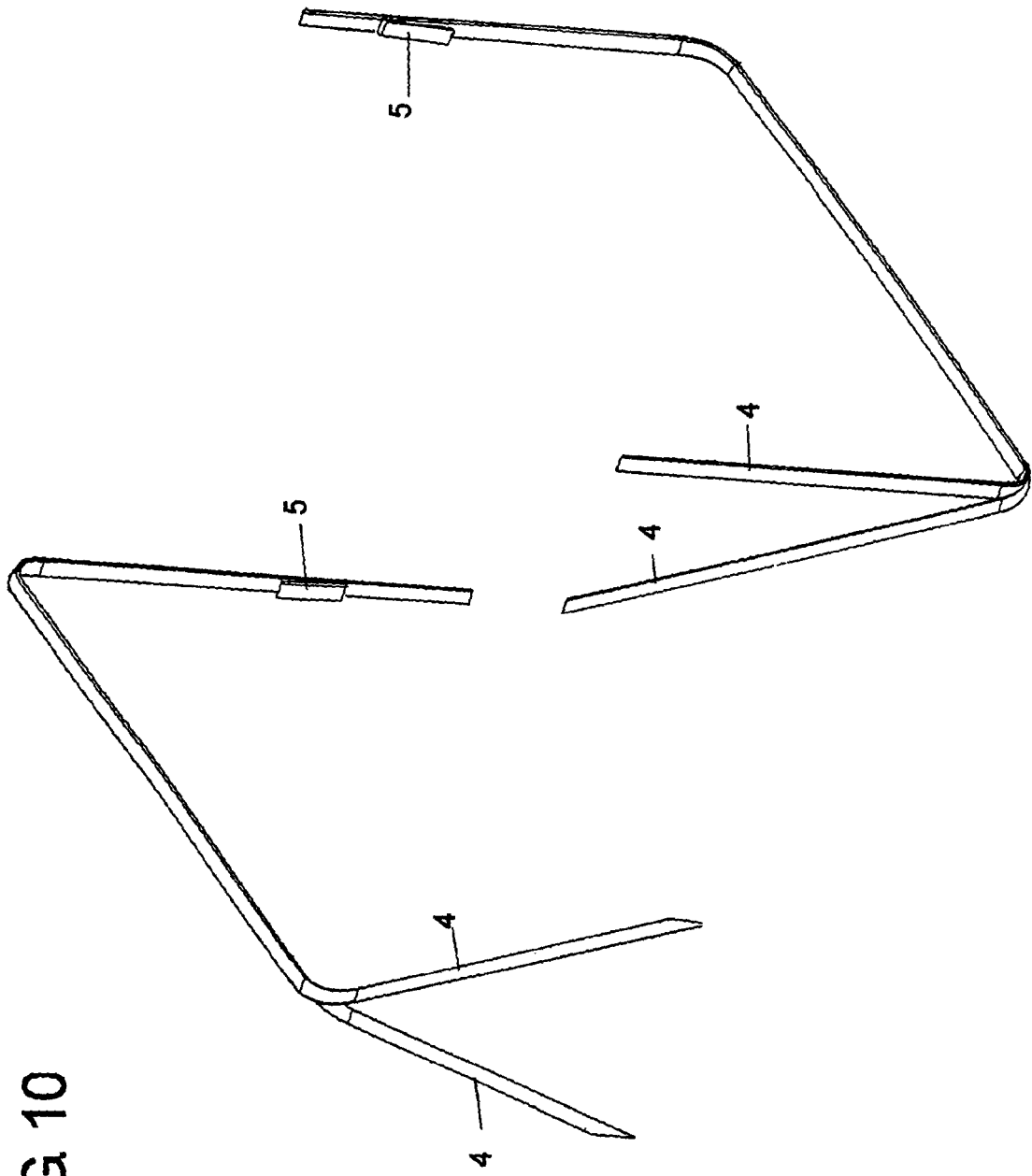
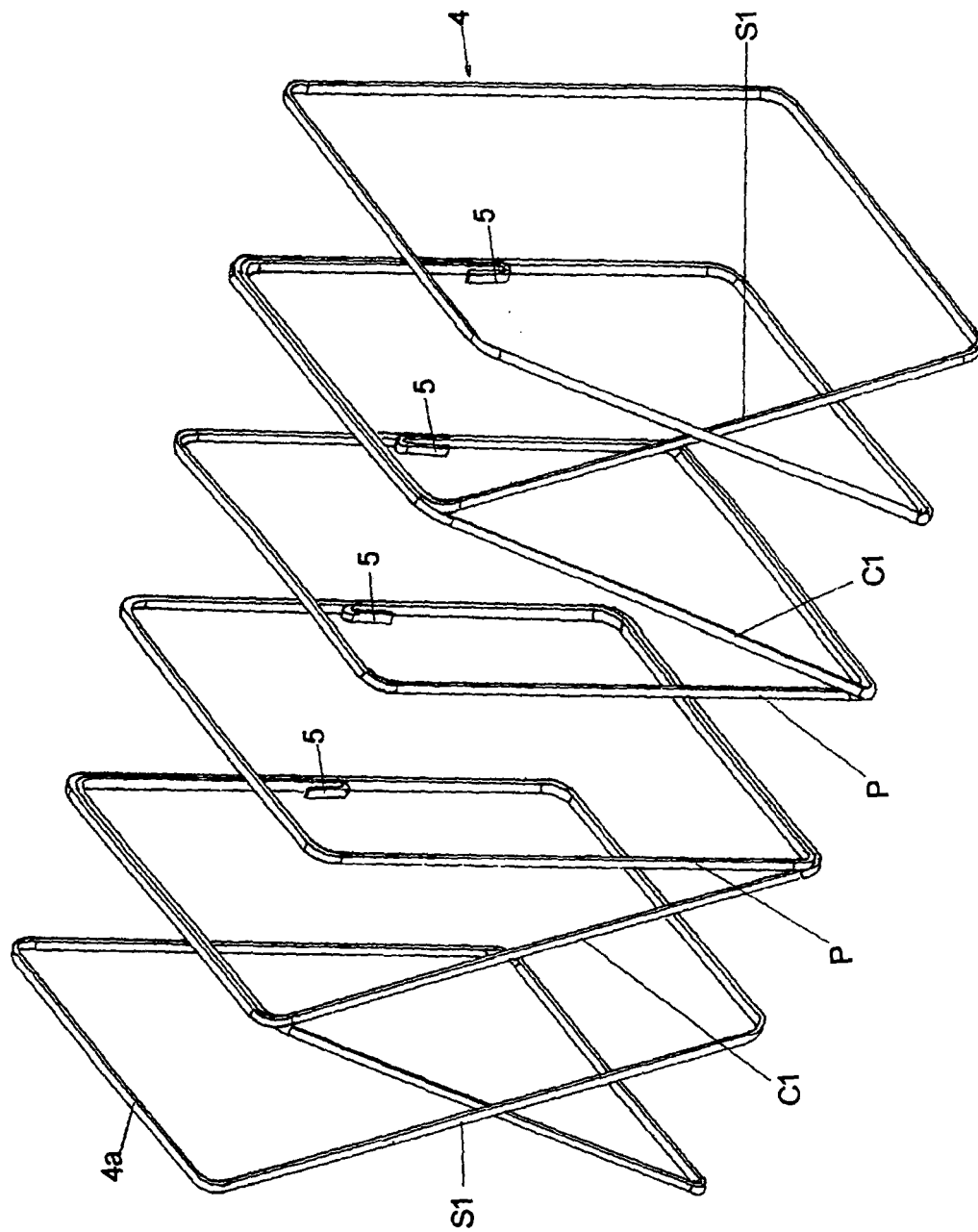


FIG 10

FIG 11





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 02 2281

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	WO 2005/059209 A (LOPES JOSE CARLOS GOMES [BR]) 30 June 2005 (2005-06-30) * the whole document *	1-9	INV. B65B27/12
X	----- US 4 599 939 A1 (FLEISSNER GEROLD [CH]) 15 July 1986 (1986-07-15) * the whole document *	1-9	
X	----- US 505 580 A1 (WATSON J.) 26 September 1893 (1893-09-26) * figure 11 *	1,7	
A	----- US 2003/028289 A1 (DANIEL BART [US] ET AL) 6 February 2003 (2003-02-06) * paragraph [0100] *	1-9	
A	----- US 7 111 547 B1 (DANIEL BARTON W [US]) 26 September 2006 (2006-09-26) * the whole document *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65B B30B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 13 March 2007	Examiner Vigilante, Marco
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			

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EPO FORM 1503 03.82 (P04C01)

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

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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