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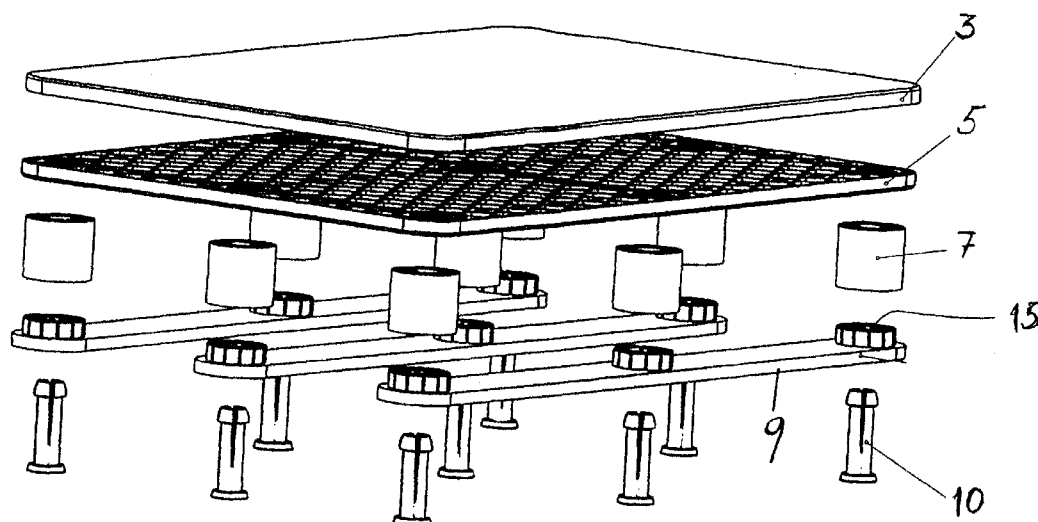
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(54) Title: PALLET

FIG 1



(57) Abstract: The present invention relates to a pallet (1), which comprises a plurality of parts (3, 5, 7, 9) made of plastic, and cohesive means (10) for holding together said parts (3, 5, 7, 9) being included in the pallet (1). Characterizing for the pallet (1) according to the present invention is that each of the cohesive members (10) comprises a post (20) with a thickening (24) which in assembled position locks the parts (3, 5, 7, 9) against each other.

PALLET**Technical Field of Invention**

The present invention relates to a pallet comprising a number of plastic parts and means for holding together the parts included in the pallet.

State of the art

WO 00/68100 discloses a plastic pallet. The pallet parts are held together by a number of threaded joints, a screw engaging with an internally threaded sleeve. Generally, however, thread gangs in plastic present disadvantages, especially with regard to the function.

US-A-4,843,976 discloses a plastic pallet comprising a plurality of connecting elements which in turn exhibit a number of resilient tongues provided with heels and, in assembled state of the pallet parts, secure upper and lower load decks to the connecting members.

US-A-5,483,899 discloses a pallet built up of modules. In order to hold the modules together, the pallet has connecting elements, which in turn exhibit stems provided with longitudinal slots at their free ends.

SE 521 852 discloses a plastic pallet, consisting of individual parts, which are held together by cohesive means.

Objects and features of the invention

A primary object of the present invention is to provide a pallet made of a number of parts in a plastic material, the parts comprising means being particularly suitable for being made of plastic material.

A further object of the present invention is that assembly of the pallet to a working unit should be possible in an extremely user-friendly manner.

Yet another object of the present invention is that the pallet in assembled condition should exhibit good characteristics in terms of load-taking ability, for example twisting stiffness and bending stiffness. These features of the pallet are accomplished by bringing the parts into cooperation with each other in a functionally favorable manner.

A further object of the present invention is that if any part of the pallet is damaged, said part should be easily replaceable.

Yet another object of the invention is that the pallet in its entirety should be recoverable in a simple manner by preferably all the parts of the pallet being made in a plastic material.

At least the primary purpose of the pallet is achieved by means of a pallet which has the characteristics defined in the below independent claim. Preferred embodiments of the invention are defined in the dependent claims.

The pallet according to the present invention has the following main advantages over a pallet according to SE 521 852 - it does not need any springs with reference number 11, which itself has no locking in the expander 10, which itself has no locking in the pallet 1 and therefore can be loosened, the expander 10 being pulled out and losing its locking function; - expander 10 forms upon locking an indivisible bore joint.

Brief Description of the Drawings Below,

An embodiment of the invention will be described with reference to the accompanying drawings, in which:

Fig. 1 is an exploded perspective view of the parts included in the pallet according to the invention;

Fig. 2 is a top plan view of a corner of a lower load deck plan included in the pallet according to the present invention;

Fig. 3 is a bottom view of a corner of a lower load deck plan included in the pallet according to the present invention;

Fig. 4 shows a plan view of a rocker in a pallet according to the present invention;

Fig. 5 shows a side view of a rocker in a pallet according to the present invention;

Fig. 6 shows a plan view of a spacing element included in the pallet according to the present invention;

Fig. 7 shows a perspective view of the pallet according to the present invention in assembled state;

Fig. 8 is a bottom view of the pallet according to the present invention;

Fig. 9 shows a side view of the pallet according to the present invention;
Fig. 10 shows a side view of an expander member included in the pallet according to the present invention as unloaded individual part;
Fig. 11 shows a side view of the expander member of Fig. 10 in the narrowest part of the passageway into its locking position;
Fig. 12 is a side view of the expander member of Fig. 10 in its locking position;
Fig. 13 shows the locking function of the expander means;
Fig. 14 shows a detail of Fig. 13;
Fig. 15 shows a section of an expander member inserted into a load deck.

Detailed description of a preferred embodiment of the pallet according to the present invention

In this application reference numbers 11, 27 and 28 are not used.

As can be seen from the exploded view of Fig. 1, pallet 1 consists of a number of parts which when joined together form pallet 1 according to Fig. 7.

The pallet 1 according to the present invention comprises an upper load deck plan 3, a lower load deck plan 5, nine spacers 7, three rockers 9 and nine expander members 10. Both the upper load deck plan 3 and the lower load deck plan 5 are provided with reinforcing ribs which form a honeycomb structure within the edge portions of the load deck plan 3, 5.

In Fig. 2, a corner of the lower load deck plan 5 is shown from above, i.e. in plan view, showing how reinforcing ribs 4 are arranged in a honeycomb structure. Such an arrangement of reinforcement ribs 4 brings about an optimal turning stiffness relative to the weight of the lower load deck plan 5. As shown in Fig. 3, which shows a corner of the lower load deck plane 5 from below, the lower load deck plan 5 is also provided with first guide means 12 which are intended to interact with the spacers 7. Each of these first guide means 12 comprises a first groove 13 and a second groove 14, the grooves 13, 14 being concentric. Between the grooves 13, 14, a plurality of radial first slots 8 extend, the function

of which will be explained below in connection with the distance elements 7 being described in more detail.

As for the reinforcing ribs of the upper loading deck plan 3, these are arranged in a honeycomb structure which is basically similar to the honeycomb structure of the lower load deck plan 5.

As shown in Fig. 1, the pallet according to the present invention is provided with three rockers 9. Figs. 4 and 5 show that each one of rockers 9 has three other guide means 15 which generally have the form of drops. In order to be adapted to the spacers 7, the pins 15 have radial second slots 16, the meaning of which will be described below in connection with the description of the spacers 7. The spacer element 7 shown in Fig. 6 comprises an outer circular cylindrical first ring 17 and an inner circular cylindrical second ring 18, the first ring 17 having a larger diameter than the second ring 18. Between the first ring 17 and the second ring 18, number of radial ribs 19, in the illustrated embodiment, twelve reinforcement ribs 19. When joining the spacers 7 with the rockers 9, each reinforcement rib 19 is received in the associated radial second slot 16 of the pins 15, which means that each pin 15 has equal number of radial slots 16 as the cooperating spacer element 7 has reinforcement ribs 19, i.e. in the illustrated embodiment, twelve pieces. When joining the spacer elements 7 with the first guide members 12 correspondingly, the reinforcing rib 19 of the spacer members 7 is received in the first slots 8 of the first guide members 12.

In Figures 7, 8 and 9 different views of pallet 1 according to the present invention are shown in composite state. Assembly of the loading deck plans 3, 5 preferably takes place by mirror welding, which means that the sides of respective load deck plans 3, 5 which are intended to abut each other are heated strongly, after which the load cover plans 3, 5 are pressed together and adhered to each other. Thereby, a load deck 6 of the load deck plan 3 is formed. Since the honeycomb structures of the respective load deck plans 3, 5 are essentially identical, corresponding reinforcing ribs 4 of said respective load deck plans 3, 5

will meet edge-to-edge in the mirror welding, which means that reinforcing ribs are formed with a rib height, which, in principle, corresponds to the total height of the two loading deck plane 3, 5. This is obviously favorable to the twisting stiffness of the cargo deck 6 of the pallet 1 of the present invention.

The assembly of a spacer element 7 with an associated first control means 12 and an associated second control means 15 is already partially described above in connection with the description of the spacer elements 7, i.e., how the rib 19 of the spacer members 7 is received in the slots 8 and 16 of the guide members 12 and 15 respectively. In order to provide a mutual locking between the cargo deck 6, the spacer elements 7 and the members 9, a rod-shaped expander 10 is used, which is shown in detail in Figs. 10-12. As shown in Figs. 10-12, expander 10 comprises a post 20 being supported by a bottom plate 21. The post 20 is preferably divided into four parts by a third slot 22 and a fourth slot 23 extending longitudinally of the post 20 between the free end of the post 20 and the bottom plate 21. The slots 22 and 23 are located in two perpendicular planes. It is also possible to divide the post 20 into only two parts by means of a third slot 22 without a slot 23.

The posts 20 also exhibit a thickening 24 at their free ends, the thickening 24 defining a first abutment surface 25 in the transition between the thickening 24 and the rest of the post 20. A second abutment surface 26 is defined in the transition between the bottom plate 21 and the post 20.

Fig 10-12 show the post 20 in three positions. Fig. 10 shows the stand 20 in unloaded position before it is mounted in the pallet 1. Fig. 11 shows the post 20 at the location of the lower load deck 5 where the insertion space for the thickening 24 is as narrow as possible. Fig. 12 shows the post 20 when it has been brought to take its locking position.

Figs. 13 and 14 illustrate how the mutual locking of the load deck 6, the spacer elements 7 and the rockers 9 is achieved. After that the spacer member 7 with its respective ends has been received in the guide members 12 and 15, the expander 10 is applied, the bottom plate 21 being received in

a recess 29 on the underside of the associated rocker 9, the second abutment surface 26 abutting the bottom of the recess 29. The thickening 24 occupies a space 30 in the load deck 6.

The outer surface 31 of the thickening 24 forms where it meets the first abutment surface 25 a first angle 32, which is less than 90 degrees. The inner surface 33 of the circular portion defining inwardly the second concentric groove 14 forms where it meets the third abutment surface 31 a second angle 34, which is less than 90 degrees.

As the angles 32 and 34 are formed as above, the thickening 24, when inserted into the space 30, together with the spacer element 7 forms a bore joint, which can not be taken apart without damaging pallet 1.

Between the inside of the cavity 30 and the most adjacent part of the thickening 24 there is a clearance 35, which is preferably between 0.5 mm and 10 mm. The clearance 35 secures that the thickening 24 does not touch any other part before the first abutment surface 25 is placed against the third abutment surface 31.

As can be seen in Figs. 10-13, the spacing point 36 of the post 20 may be below the level of the top of the pins 15. This location of the spacing point 36 is preferred when the spacer element 7, for example, in the event of replacement of broken part, is not at risk when cutting the spacer element 7 below the splitting point 36, whereby it would have been more difficult to remove the post 20 from the space 30.

Possible modifications of the invention

In a preferred embodiment of the present invention, in principle, the entire pallet is made of HDPE (high density polyethylene). This is beneficial when recycling pallet 1. However, within the scope of the present invention it is also conceivable that the pallet is composed of parts of different types of plastic material, in which case the type of plastic is adapted to the function of the part. In this context, it should be noted that it is not absolutely necessary that all parts included in the pallet be made in the same material. For example, the expander 10 may be made of metal or of polyamide, preferably PA 6 or nylon. Polyamides have greater durability against, for example, UV radiation than HDPE. Similarly,

polyamides have greater resilience than HDPE. Upon recovery of a pallet 1 according to the invention in which the expander 10 is made of material other than the rest of the pallet 1, the expander 10 is given a different color or other characteristic to facilitate scrap sorting. Black staining is preferred as black paint increases resistance to UV radiation. In describing the preferred embodiment above, it has been stated that the loading deck plans 3, 5 are joined by mirror welding. However, within the scope of the present invention, it is also contemplated that the loading deck plans 3, 5 are joined in alternate ways, by way of exemplary and not limiting purpose, may be mentioned ultrasonic welding and melt bonding.

The requirement for traceability is increasing, for example in the pharmaceutical industry. To increase traceability, RFID, Radio Frequency Identification, can be used. Transponders, often called tags, can be attached to pallet 1. Information from the tags can be read on hold using radio signals. Examples of uses for RFID are bus cards, lift passes, customs passes, payment stations, passports, anti-theft stores and libraries.

In order to facilitate handling pallets 1, these may be provided with one or more carrier handles.

In order to reduce the risk that goods placed on a pallet 1 will slide or otherwise be displaced, pallet 1 can be provided with support strips, preferably on upper loading deck 3, and friction-increasing means such as patterned and rubbered coating, preferably also on top loading deck plan 3.

Claims

1. A pallet (1) comprising upper loading deck plan (3), lower cargo deck plan (5), spacer elements (7) and rockers (9) made of plastic, and expansion means (10) for holding together said pallet (1) parts (3, 5, 7, 9), each of the expander means (10) comprising a post (20) provided with at least one slot (22, 23) extending in the longitudinal direction of the post (20) and protruding the free end of the post (20)

characterized in that

the post (20) has a thickening (24) at its free end, in the transition between the thickening (24) and the rest of the post (20) is defined a first abutment surface (25) which, in the mounted position of the post (20), abuts a third abutment surface (31) of a lower loadbreaking plane (5) the first abutment surface (25) against the adjacent part of the post (20) forms a first angle (32) being less than 90 degrees, the inner surface (33) of the circular portion defining inwardly a second concentric groove (14) forms where it meets the third abutment surface (31), a second angle (34), which is less than 90 degrees.

2. Pallet (1) according to claim 1, **characterized** in that the first angle (32) and the second angle (34) are equal.

3. Pallet (1) according to claim 1 or 2, **characterized** in that the parts included in the pallet (1) comprise cargo deck plans (3, 5), spacer elements (7) and rockers (9), and that the post (20) is part of an expander (10), which further comprises a bottom plate (21).

4. Pallet (1) according to claim 1, 2 or 3, **characterized** in that the lower load-bearing plan (5) has a first guide means (12) for one end of the spacer element (7) and that the associated rocker (9) exhibits a second guide means (15) for the other end of the spacer member (7).

5. Pallet (1) according to claim 4, **characterized** in that the spacer element (7) has radial reinforcement ribs (19) and that the control means (12, 15) have radial slots (8, 16), which

are intended to receive the radial reinforcement ribs (19) when the spacers (7) are joined to the lower load deck plan (5) and the associated rocker (9).

6. Pallet (1) according to any one of the preceding claims, **characterized** in that in the transition between the bottom plate (21) and the post (20) a second abutment surface (26) is defined, which in active position of the expander means (10) abuts the bottom of a recess (29) being provided in the associated rocker (9).

7. Pallet (1) according to any one of the preceding claims, **characterized** in that the expander means (10) is made of polyamide, preferably PA6, especially nylon.

8. Pallet (1) according to any one of the preceding claims, **characterized** in that in case parts of the pallet (1) are made in different materials those parts which are made in the same material are provided with a color being different from other parts or provided with other characteristics.

9. Pallet (1) according to any one of the preceding claims, **characterized** in that when the post (20) is in its locked position in the lower load deck (5) there is a clearance (35) which preferably is between 0.5 mm and 10 mm.

10. Pallet (1) according to any of the preceding claims, **characterized** in that the spacing point (36) for the parts of the post (20) is below the upper end of the pin (15).

11. Pallet (1) according to any one of the preceding claims, **characterized** in that it is provided with carrier handles, RFID tags, support strips and/or friction increasing means.

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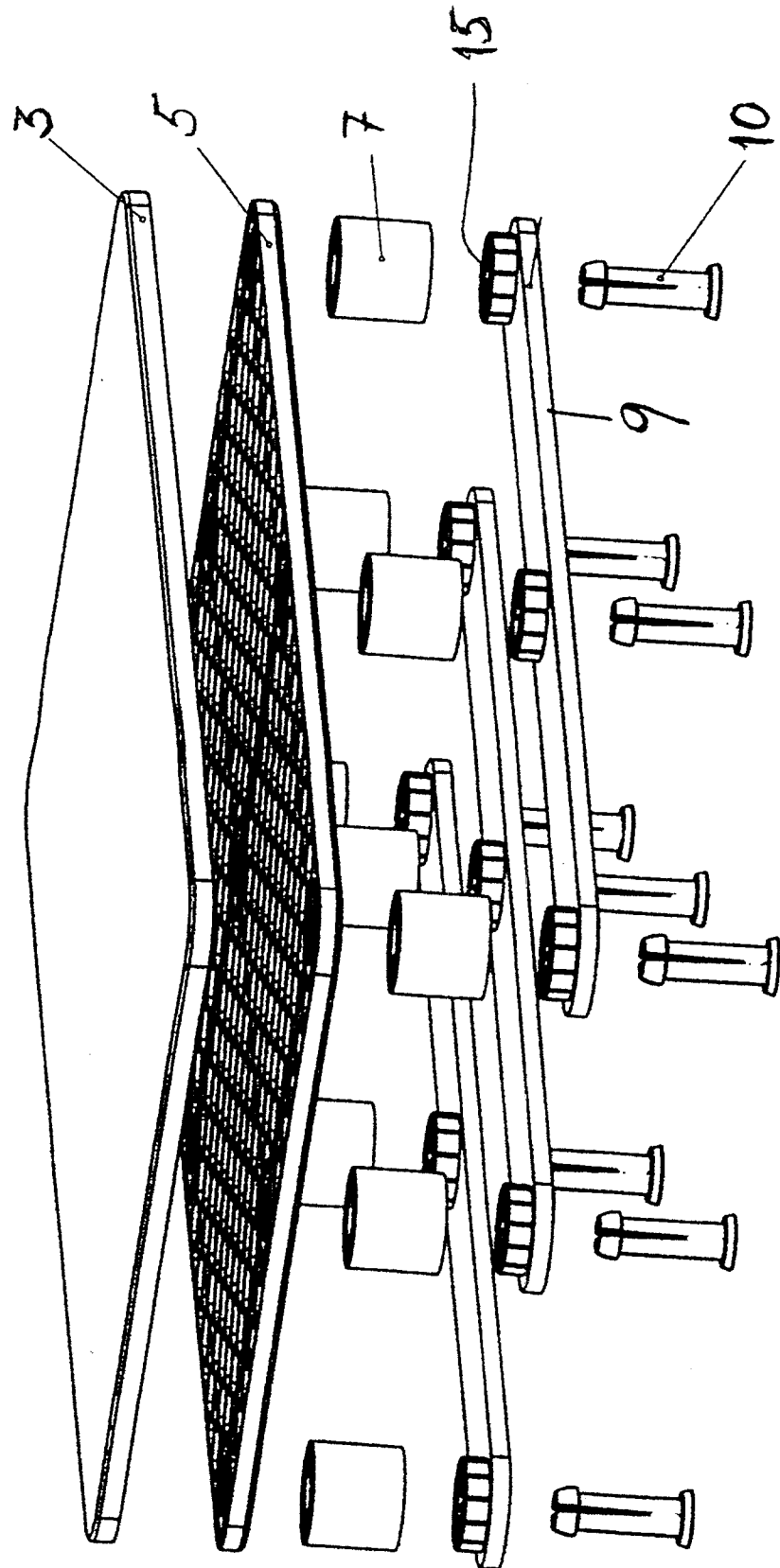


FIG 3

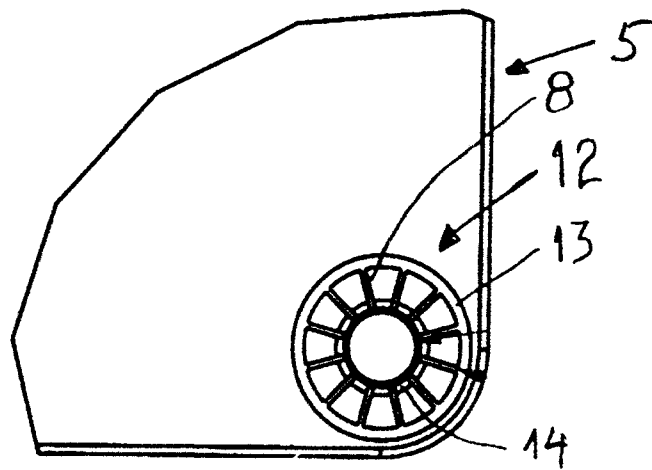
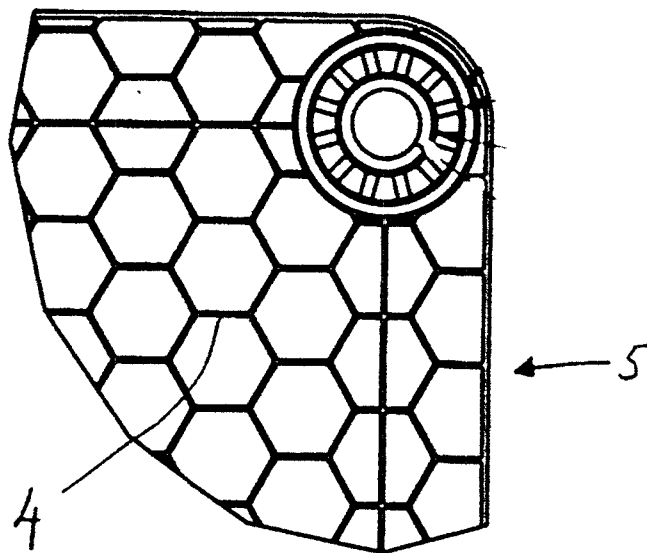


FIG 2



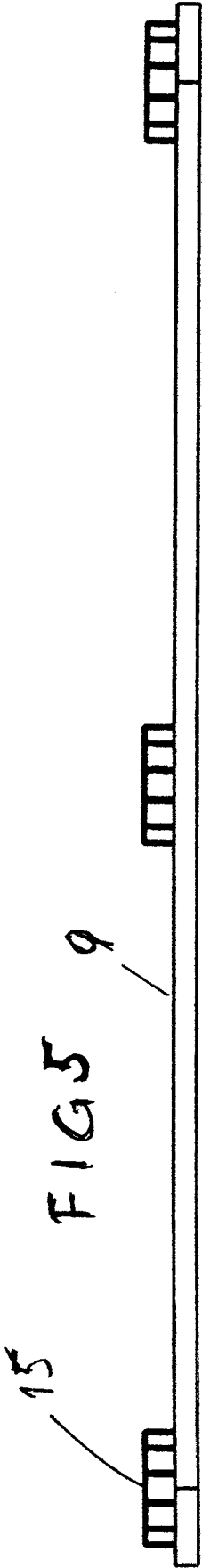
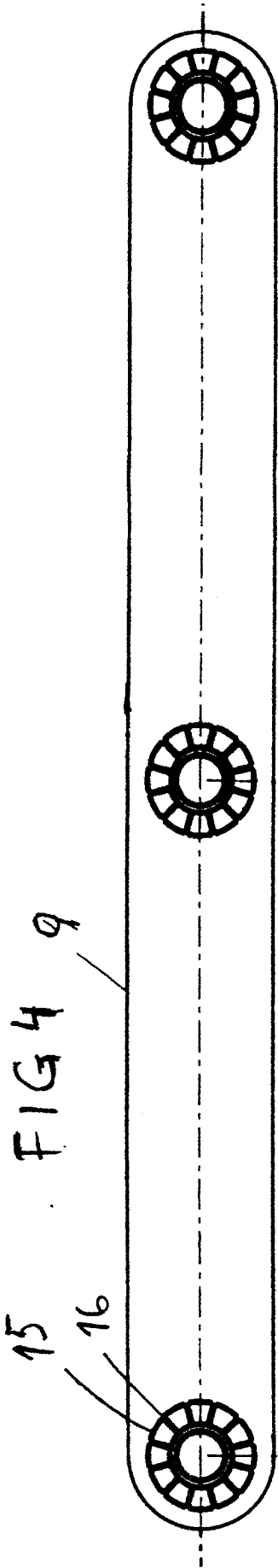


FIG 6

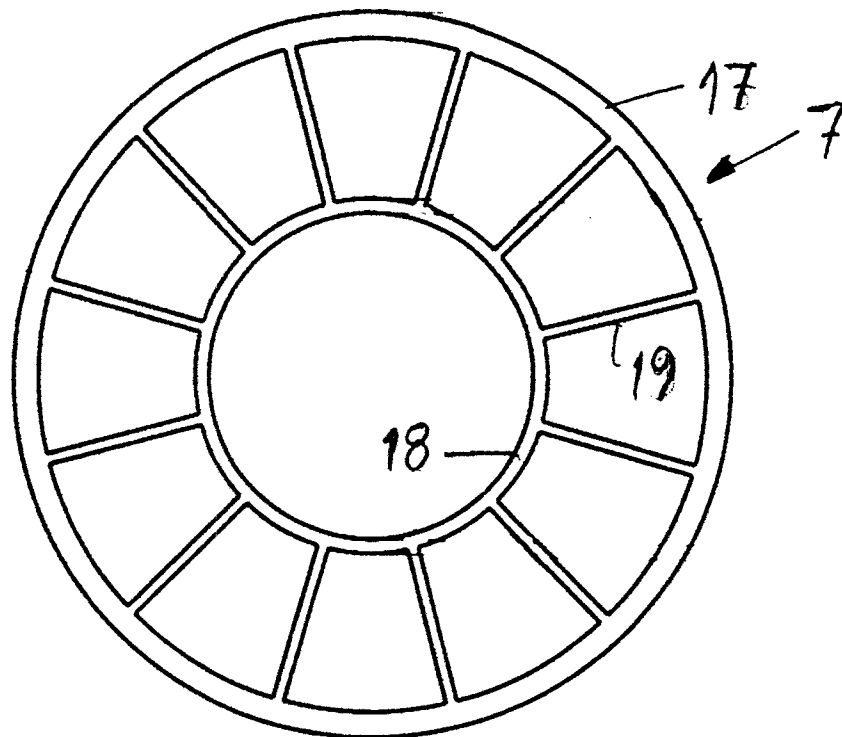


FIG 7

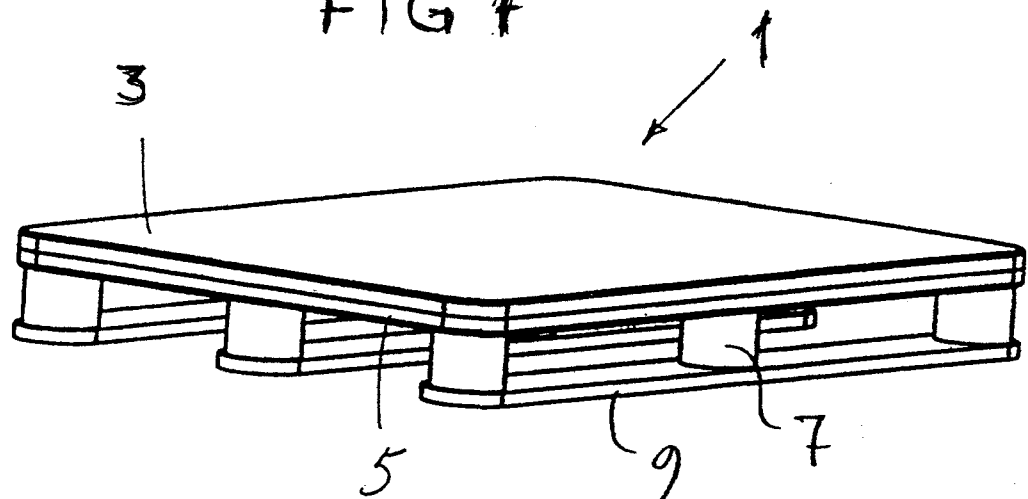


FIG 15

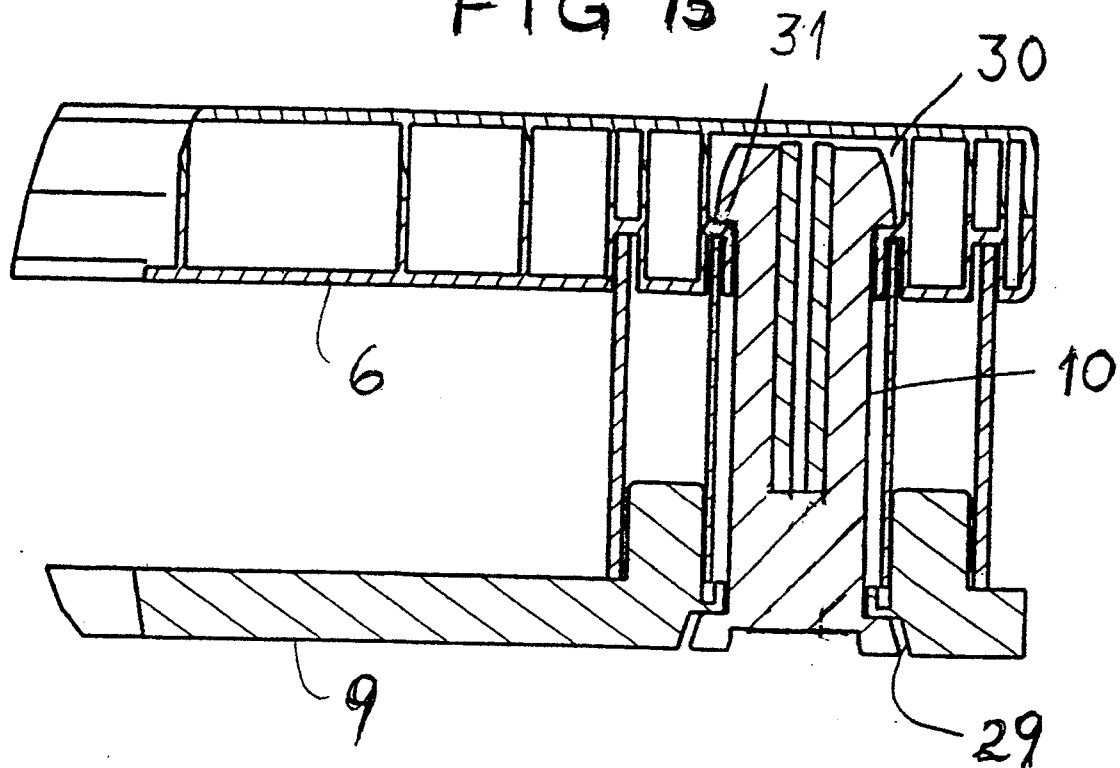
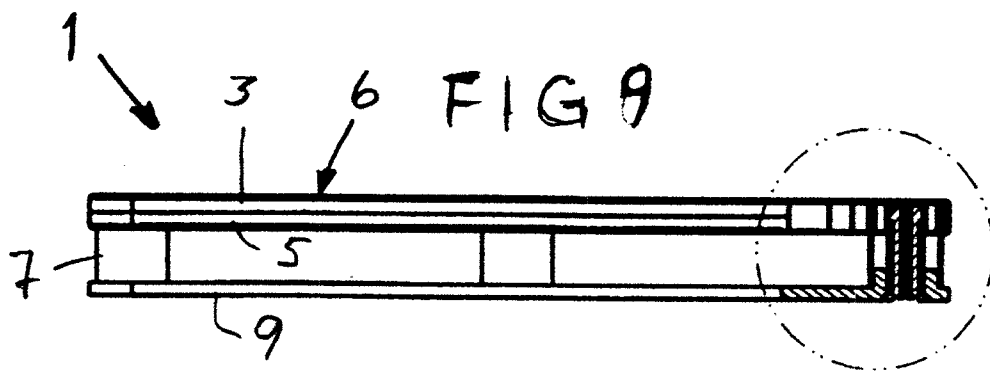
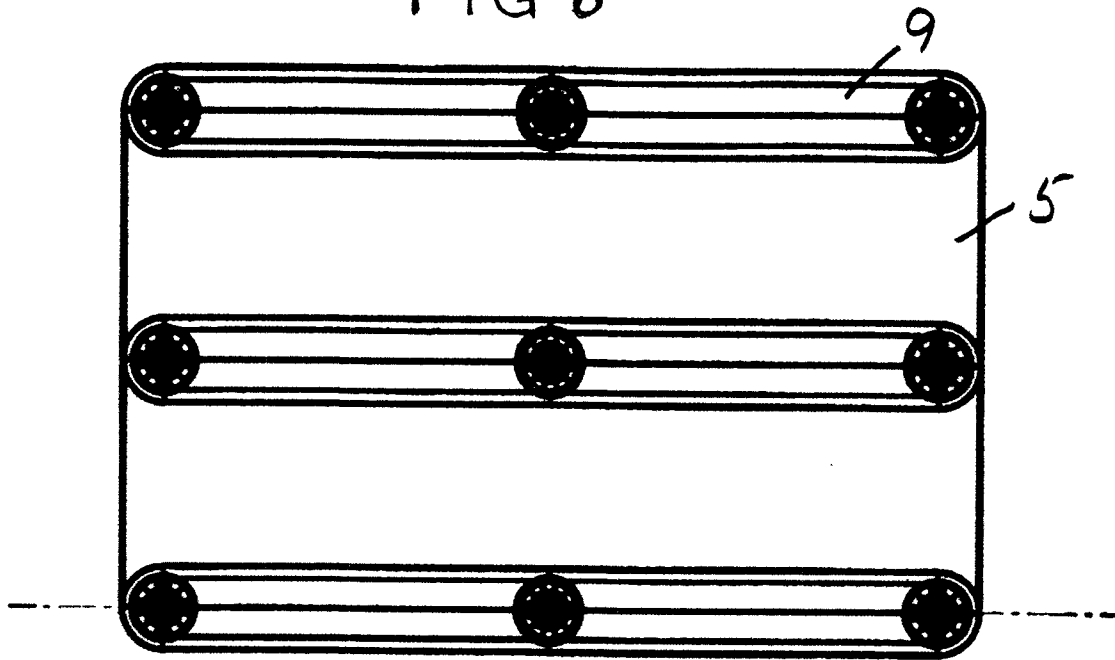


FIG 8



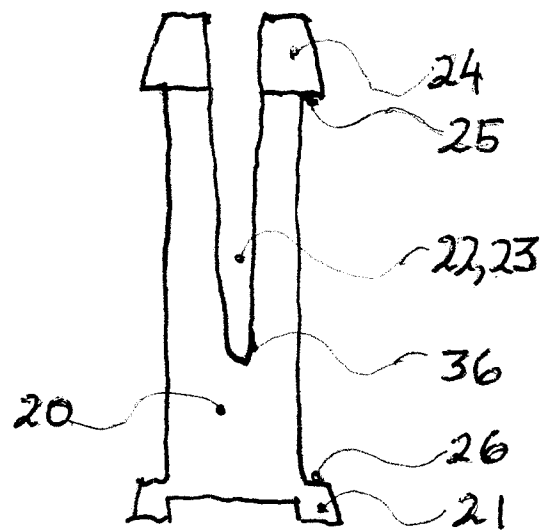


FIG 10

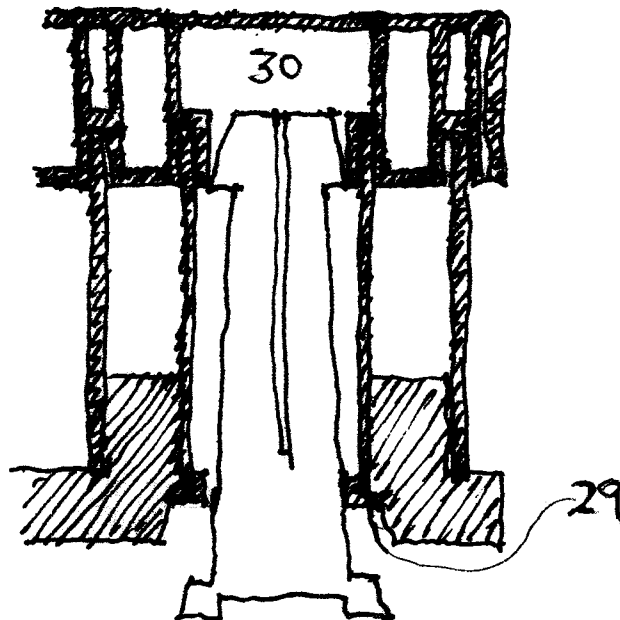


FIG 11

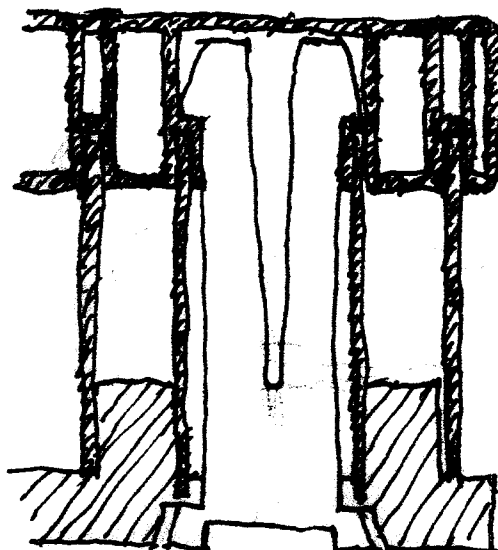
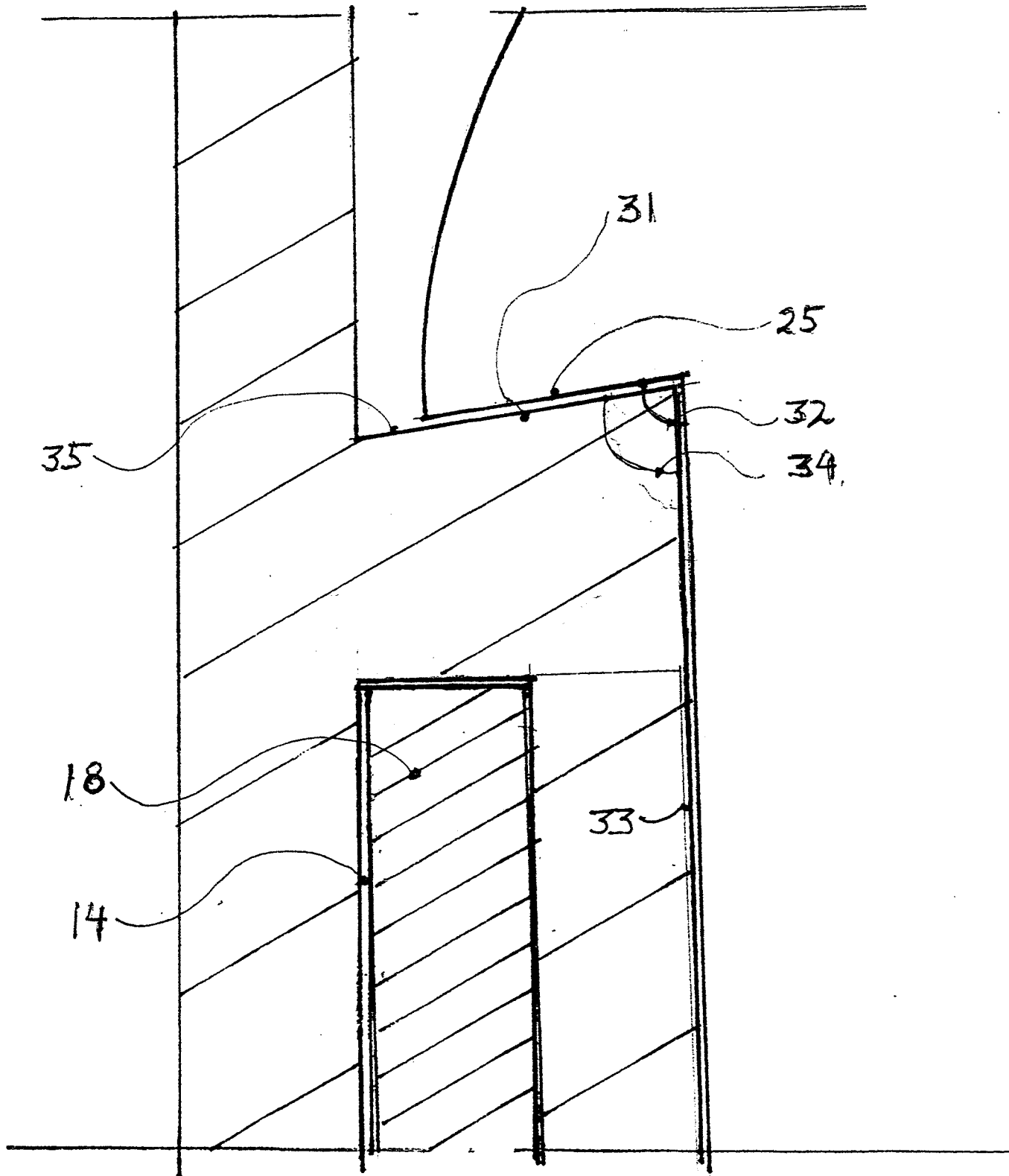


FIG 12

FIG 14



INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SE 521852 C2 (PALLSAFE AB), 30 September 2002 (2002-09-30); whole document --	1-11
A	US 4843976 A (PIGOTT MAURICE J ET AL), 4 July 1989 (1989-07-04); abstract; figures --	1-11
A	US 5483899 A (CHRISTIE EUGENE P), 16 January 1996 (1996-01-16); abstract; figures 2-5 --	1-11
A	US 20080236454 A1 (NAIDU VISHNU ET AL), 2 October 2008 (2008-10-02); abstract; figures 5-7 --	1-11



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

16-08-2018

Date of mailing of the international search report

17-08-2018

Name and mailing address of the ISA/SE

Patent- och registreringsverket

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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2013022400 A1 (HAGLUND JOERGEN), 14 February 2013 (2013-02-14); abstract; figures 6-8 --	1-11
A	WO 0068100 A1 (PALLSAFE AB ET AL), 16 November 2000 (2000-11-16); abstract; figures 3,5,8 -- -----	1-11

Continuation of: second sheet
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Information on patent family members

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