(19) ORGANISATION AFRICAINE DE LA PROPRIETE INTELLECTUELLE

(51) Inter. Cl.[8] B65D 19/32 (06.01)

(11) N° 17115

FASCICULE DE BREVET D'INVENTION

(21) **Numéro de dépôt : 1201400478**
(PCT/EP12/001831)

(22) **Date de dépôt : 27/04/2012**

(30) **Priorité(s) :**

(24) **Délivré le : 29/06/2015**

(45) **Publié le : 23.03.2016**

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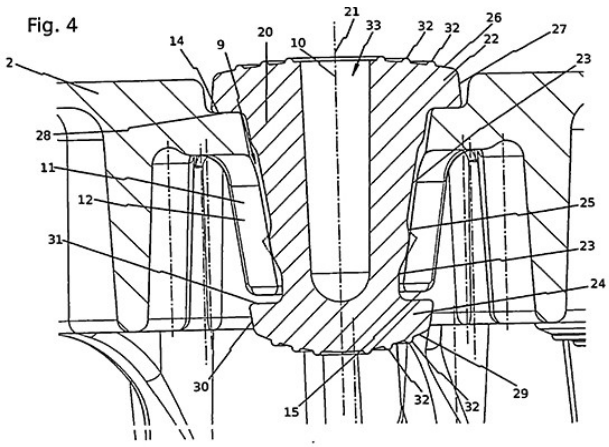
(54) **Titre : Transport pallet of plastics material having stoppers acting on both sides to inhibit sliding**

(57) **Abrégé :**

A transport pallet made from plastic, comprising an upper deck including a top side with a loading surface for product and goods and bottom side, wherein engagement openings for lifting devices like forks of forklifts are provided below the upper deck which engagement openings are defined by support bases and/or a pallet base, wherein receivers are configured in the upper deck in which receivers plugs made from a material with a higher friction coefficient than the pallet material are provided, wherein the plugs extend from the top side the bottom side of the upper deck and protrude in outward direction with their face ends from the upper deck at the top side and at the bottom side.

Fig. 4



TRANSPORT PALLET OF PLASTICS MATERIAL HAVING STOPPERS ACTING ON BOTH SIDES TO INHIBIT SLIDING

The Invention relates to a transport pallet made from plastic material for transportation of goods, including an upper deck Including a loading surface for products and goods on a top side. Below the upper deck engagement openings for lifting devices like e.g. forks from forklifts are configured, wherein the engagement openings are defined by support bases and/or a plate base.

Transport pallets made from plastic material are picking up market share from transport pallets made from wood or metal due to their positive properties, in particular high stability, long service life, ease of cleaning, cost-effectiveness, resistance against corrosion and many acids and bases, good recycling properties and low tare weight.

Due to the hardness of their plastic material, plastic pallets have a low friction coefficient which bears the risk that products loaded on the loading surface of the plastic pallet slide during transportation and can even fall from the pallet. Furthermore, there Is a risk that the pallet slides from the lifting device, thus from forks from a forklift engaging the engagement openings of the pallet so that a pallet including cargo received by the lifting device can fall off the lifting device during transportation by the lifting device. There is another risk in the pallet sliding on slick and/or inclined ground, in particular on humid, contaminated or greasy ground.

In order to reduce these dangers and risks, a plurality of technical solutions is known. Thus, DE 10 2005 003 725 A1 describes a slide inhibiting coating of the loading surface of a plastic pallet. Furthermore, DE 10 2006 054 358 A1 describes a plastic pallet in which the loading surface, stand surface and engagement surface for the lifting device is provided with a slide inhibiting layer.

The slide inhibiting layers are respectively applied to the pallet through a complex multi-step injection molding process. Furthermore, these layers can only be regenerated with high complexity should they wear out in particular through abrasion.

Thus, it is an object of the present invention to provide a transport pallet made from plastic material with slide inhibiting surfaces which does not have the disadvantages recited supra and which can be produced in a cost-effective manner.

This object is achieved according to the invention through the features of claim 1, wherein advantageous embodiments are characterized by the features of the dependent claims.

The transport paliet according to the Invention made from plastic material includes an upper deck with an upper side and a bottom side. A loading surface for products and goods is configured on the top side. Below the bottom side, engagement openings for lifting devices like e.g. forks of forklifts are provided, wherein the engagement openings are laterally defined by support bases. In downward direction, the engagement openings can be open or defined by a plate bottom, in particular a lower deck, a frame or skids. In the upper deck, receivers with an inner receiving opening are configured in which plugs are arranged, wherein the plugs are formed from an elastic compressible material with a higher friction value than the pallet material, so that they are slide inhibiting compared to the plastic material. The plugs include an upper face at a longitudinal end and a lower face at another longitudinal end and extend from a top side of the upper deck to a bottom side of the upper deck when arranged in the pallet. Thus, the upper face and/or the lower face of the plugs protrude from the upper deck at least partially. Since the plugs are configured slide inhibiting, in particular with a higher friction value than the plastic pallet, they simultaneously provide an improvement of the slide inhibition of the loading surface for products and the engagement surface for the lifting device. The elastic material of the plugs has another advantage in that it is particularly well deformable in an elastic manner, so that the plug is better adaptable to the geometry of the receiver than a comparable plug from a less elastic material. This facilitates greater manufacturing tolerances and easier assembly of the plug. Furthermore, damages to the goods to be carried through the protruding plugs are prevented since the plugs also have a dampening effect.

Preferably the plugs are formed from rubber or rubber type material. Rubber has a higher elasticity and a higher friction coefficient than the material of the plastic plate and is therefore particularly suited for achieving the object according to the invention.

According to another aspect of the invention, the plugs preferably have a Shore hardness in a range of A 60 to A 90. While a rubber mix that Is too soft creates the risk that the plugs get worn too quickly, a rubber mix that Is too hard does not provide sufficient slide hemming through the plugs.

According to the invention, the plugs can have a plurality of shapes, in particular an oval, circular, rectangular or other polygonal cross-section. Preferably an Inner contour of the receiver

substantially corresponds to an outer contour of the plug, wherein the plug can also have contours which differ from the inner contour of the receiver.

In a preferred embodiment of the invention, the plug includes at least one receiver which extends substantially on the plug longitudinal axis or parallel thereto from the upper face into the interior of the plug, preferably into a portion that is adjacent to the lower shoulder. Thus, it is provided according to the invention that the recess is configured as a dead hole that is open towards the upper face. The recess improves the elastic deformability of the plug and thus facilitates the assembly of the plug.

According to another aspect, the plugs can taper conically from the top side to the bottom side of the upper deck. Preferably, the receiver includes a respective taper. This improves assembly of the plug and stiffness of the receiver. Furthermore, the risk of the plug being pressed out from the receiver by the lifting device is substantially reduced.

In another embodiment of the invention, the plugs include a clamping rib which extends transversal to the longitudinal direction of the plug. The clamping rib is configured to impart lateral pressure against the receiver when the plugs are inserted into the receiver so that the plugs essentially undergo an elastic deformation. This way, a centering of the plug in the receiver is achieved. Thus, it is facilitated that the plugs remain in the receiver and wear of the plug is reduced. Furthermore, the clamping rib facilitates greater manufacturing tolerances for the plug and the receiver. Furthermore, embodiments are provided according to the invention which include plural clamping ribs in order to further improve centering of the plug in the receiver. The clamping rib is advantageously sized so that it is elastically deformed when inserted into the receiver, wherein reset forces are built up which provide a firm and/or centered seat of the plug in the receiver also for tolerance deviations.

Preferably, the clamping rib is circumferentially configured about the plug in order to optimize the centering of the plug in the receiver. From a manufacturing point of view, a continuous configuration of the clamping ribs is preferable to a configuration in sections which, however, can be implemented as an alternative.

In a preferred embodiment, the clamping ribs have a wedge shaped cross-section. The tapering direction of the clamping rib thus corresponds to the tapering direction of the plug. This way,

inserting the plug into the receiver is facilitated and the elastic deformation of the clamping rib is facilitated.

According to another aspect, the clamping rib is arranged in a lower third of the plug oriented towards the bottom side. This positively influences centering the plug and is of particular importance during assembly.

According to a preferred embodiment of the invention, the plugs include a radially outward protruding, in particular annular shoulder at least at one end. This can be an upper shoulder which is arranged at a portion of the plug that is oriented towards the top side of the upper deck and also a lower shoulder which is arranged at a portion of the upper deck which is arranged at a portion that is oriented to a bottom side of the upper deck. A radially outward protruding upper shoulder also has the advantage that a slide inhibiting surface towards the product is increased in size. A radially protruding lower shoulder increases the slide inhibiting surface at the contact surface for the forks of the lifting device and furthermore prevents the plug from being pressed out, in particular through the lifting device for unloaded or only partially loaded pallets. An upper or lower shoulder is preferably configured so that it reaches over an adjacent portion of the receiving recess in order to limit an axial protrusion of the shoulder into the receiver through form locking.

It is furthermore preferred that at least one receiver includes a particularly annular shoulder for at least partially receiving a shoulder. The shoulder formed by an annular recess is arranged between the loading surface and the bottom surface of the upper deck. This way, a portion of the shoulder of the plug is sunk into the upper deck and thus a risk of a lateral sheer off of the shoulder from the remaining portion of the plug is reduced. Preferably a shoulder of this type is arranged on the top side of the upper deck.

Another aspect of the invention provides that the upper face and/or the lower face of the plug at least partially includes a convex, in particular slightly convex shape. A convex shape of the upper face leads to a reduction of the loading of the plugs through forces acting transversal to the longitudinal direction of the plug and to a reduction of wear without negatively influencing the slide impeding effect of the plug. Furthermore, the loading and unloading of the pallet is facilitated. Furthermore, a convex shape of the lower face of the plug facilitates pressing the plug into the receiver. Therefore, a preferred embodiment of the invention provides that both contact surfaces of the plugs are configured convex.

According to other aspects of the invention, a profile with at least one protrusion is formed at the upper face and/or at the lower face. Embodiments with a plurality of local protrusions, e.g. knobs, are feasible. Furthermore, a protrusion can have an elongated shape and can extend in any direction over the surface. Accordingly, embodiments are provided according to the invention in which the protrusion extends about a longitudinal axis of the plug, in particular in an annular or spiral shape. The respective face of the plug goes through an increase friction in coefficient through profiling and is thus used for increasing the slide inhibition caused by the plug.

According to another aspect, at least a portion of the upper face of the plug protrudes between 0.5 mm and 4 mm, in particular up to 3 mm or further, preferably up to 2 mm beyond the pallet surface. This provides on the one hand side that the plug provides sufficient contact surface for the goods transported on the pallet in order to provide sufficient slide inhibition. On the other hand side, limiting the protrusion of the upper face of the plug is advantageous for providing sufficient service life for the plug and for usability of the pallet according to the invention.

According to other aspects of the invention, the plugs are arrangeable in a lower deck, skids, frames and/or support bases. This is used for improved slide hemming of a pallet placed on a surface, in particular a base surface or the loading surface of another pallet.

Subsequently, a preferred embodiment of the invention is described with reference to schematic drawing figures, wherein:

FIG. 1	illustrates a perspective view of an embodiment of a plastic pallet in its typical use position, wherein the loading surface is oriented in upward direction;
FIG. 2	illustrates a perspective detail view from below of an embodiment of a receiver configured in the upper deck;
FIG. 3	illustrates a perspective view of an embodiment of a plug according to the invention, wherein the upper face of the plug is visible; and
FIG. 4	illustrates a sectional side view of an embodiment of a plug supported in a receiver.

The plastic pallet illustrated in FIG. 1 is used as an illustrating embodiment for typical commercial pallets. It includes a plate shaped essentially continuous upper deck 2 which is connected with a plate base 8 through plural support bases 7, wherein the pallet base 8 in this embodiment is configured as a continuous lower deck. In alternative non-illustrated embodiments, the plate base 8

can be formed from skids connecting the support bases or from a frame. Also other embodiments which do not include a pallet base 8 are feasible within the scope of the invention.

Between the upper deck 2, the support bases 7 and the plate base 6, engagement openings 6 for typical lifting devices, for example the forks of a forklift are provided. The upper deck 2 includes an upper side 3 and a bottom side 4, wherein the bottom side 4 is oriented towards the support bases 7 and the plate base 8. On the upper side 3 of the upper deck 2, a loading surface 5 for receiving the transported or storage goods is configured on the transport paliet 1. Plural receivers 9 for receiving non-illustrated plugs 20 are distributed on the upper deck 2, wherein the receivers are only schematically illustrated in this depiction and are subsequently described in more detail in FIG. 2 and FIG. 4. Furthermore, the upper deck 2 in alternative embodiments can define plural, for example bar shaped components which are arranged closely together or offset from one another and which define a common loading surface 5.

The enlarged cutout of a portion of the bottom side 4 of the upper deck 2 illustrated in FIG. 2 illustrates a receiver 9 in a center for a plug 20 according to FIGs. 3 and 4 which is not depicted in this illustration. A receiving wall 11 is configured about a receiver longitudinal axis 10 and defines a cone shaped receiver cavity which expands towards the upper side 3. The receiving wall 11 is configured from plural ribs 12 which are arranged along the circumference and at a distance from one another and include four ribs 12 in this embodiment which are separated from one another through slots 13.

FIG. 3 illustrates an embodiment of a plug 20 according to the invention in a perspective view. The plug 20 is configured rotation symmetrical about the plug longitudinal axis 21 and is defined in longitudinal direction at an upper end through an upper face 26 and at a lower end through a lower face 29. In non-illustrated embodiments, the plug can have a plurality of different cross-sections, in particular square, triangular, circular or oval. The plug 20 includes a radially protruding upper shoulder 22, an intermediary portion 23 and a lower shoulder 24 radially protruding from the intermediary portion 23. In the intermediary portion 23, the plug 20 includes a conical taper extending from the upper shoulder 22 to the lower shoulder 24. In a third of the intermediary portion 23 that is adjacent to the lower shoulder 24, a radially protruding and circumferential clamping rib 25 is arranged which is configured wedge shaped in this embodiment and which tapers towards the lower shoulder 24. The upper shoulder 22 includes an upper inner surface 28 and an upper edge portion 27. At the lower shoulder 24, a lower inner surface 31 and a lower edge portion 30 are

configured. In the advantageous embodiment illustrated in FIG. 3 and 4, the circumferential upper shoulder 22 of the plug 20 has a larger diameter than the circumferential lower shoulder 24.

The plug 20 preferably includes a cylindrical recess 33 which extends coaxial to the plug longitudinal axis 21 and which is open towards the upper face 26 of the plug 20. The recess 33 is configured as a dead hole in this embodiment and terminates in a portion of the plug 20 that is adjacent to the shoulder 24. In an alternative embodiment, the recess 33 can also be configured as a pass through hole or terminate at another location in the plug 20. The cross-section of the recess 33 is not necessarily circular and can for example also be oval, triangular or rectangular. In an alternative embodiment, the plug 20 can have plural recesses which preferably extend parallel to the longitudinal axis 21 of the plug.

Protrusions 32 are arranged on an upper face 26 of the embodiment of the plug 20 illustrated in FIG. 3, wherein the embodiments extend in an annular coaxial manner about the plug longitudinal axis 21. In alternative embodiments, also the lower face 29 can have protrusions 32 of this type. The upper face 26 and the lower face 29 are essentially configured convex in this embodiment. Alternatively also the upper face 26 and the lower face 29 can have a circumferential bevel which is preferably configured in an edge portion of the face.

The plug 20 illustrated in FIG. 4 with a conical intermediary portion 23 is centrally inserted into the conical receiver 9 so that the receiver longitudinal axis 10 and the plug longitudinal plug axis 21 coincide. The plug 20 reaches over the shoulder 14 of the receiver 9 with the upper shoulder 22 and contacts the shoulder 14 with the upper inner surface 28. This prevents an additional penetration of the plug 20 into the upper deck 2 in a form locking manner. The radially protruding lower shoulder 24 radially reaches beyond the receiving end 15 and thus prevents the plug 20 from sliding out of the receiver 9. Between the lower inner surface 31 and the lower shoulder 24 and the receiver end 15, a gap is configured in axial direction which is advantageously provided for manufacturing and assembly reasons. When mounting the plug 20 the lower shoulder 24 comes in contact with the ribs 12 of the receiver wall 11 and is progressively and elastically deformed during further axial movement of the plug 20 in the receiver 9. Thus the lower shoulder 24 is bent in particular in a direction of the upper shoulder 22. At the end of the assembly process, the lower shoulder 24 slides completely through the receiver end 15 and jumps back again into the starting position illustrated in FIG. 4.

During the assembly process, the circumferential clamping rib 25 also comes in contact with the ribs 12 of the receiving wall 11 and thus undergoes elastic deformation. The reset forces thus created are pressure forces which facilitate a centering and fixation of the plug 20 in the receiver 9. Thus, a secure seating of the plug 20 in the receiver 9 can be facilitated also for greater manufacturing tolerances. A center recess of the plug 20 is configured as a dead hole and extends from the upper face 26 of the plug into a portion that is adjacent to the lower shoulder 24. The central recess helps to increase an elasticity of the plug 20 with respect to forces acting transversal to the plug longitudinal axis 21 and thus facilitates pressing the plug 20 into the receiver 9.

Reference Numerals and Designations

1	transport pallet
2	upper deck
3	top side
4	bottom side
5	loading surface
6	engagement opening
7	support base
8	pallet base
9	receiver
10	receiver longitudinal axis
11	receiving wall
12	rib
13	slot
14	shoulder
15	receiver end
20	plug
21	plug longitudinal axis
22	upper shoulder
23	intermediary portion
24	lower shoulder
25	clamping rib
26	upper face
27	upper edge portion
28	upper inner surface
29	lower inner surface
30	lower edge portion
31	lower inner surface
32	protrusion
33	recess

PATENT CLAIMS

1. A transport pallet (1) made from plastic material, comprising an upper deck (2) including a top side (3) with a loading surface (5) for products and goods and a bottom side (4), wherein engagement openings (6) for lifting devices like forks of forklifts are provided below the upper deck (2) which engagement openings are defined by support bases (7) and/or a pallet base (8), wherein receivers (9) are configured in the upper deck (2) in which receivers plugs (20) made from a material with a higher friction coefficient than the pallet material are provided, wherein the plugs (20) extend from the top side (3) to the bottom side (4) of the upper deck (2) and protrude in outward direction with their face ends from the upper deck at the top side and at the bottom side, wherein the plugs are configured conical and taper from the top side (3) of the upper deck (2) to the bottom side (4) of the upper deck (2), wherein the plug includes one or plural clamping ribs (25) which extend transversal to the longitudinal direction of the plug (20), and wherein the clamping rib(s) (25) are respectively inserted in a conical receiver (9) or their wall (11) is formed from plural ribs (12) arranged over a circumference at a distance from one another and separated from one another by slots (13).

2. The transport pallet according to claim 1, wherein the plugs (20) are made from elastic compressible material, in particular rubber, and wherein the plugs (20) have a Shore hardness of A 60 to A 90.

3. The transport pallet according to one of the preceding claims, wherein the plugs (20) include a recess (33) which extends essentially in a direction of the plug longitudinal axis (21) and which is preferably configured as a dead hole.

4. The transport pallet according to one of the preceding claims, wherein the plugs include one or plural clamping ribs (25) which protrude radially in outward direction and are sized so that the clamping rib (25) is elastically deformed in an inserted position of the plug (20), wherein reset forces are built up.

5. The transport pallet according to claim 4, wherein the clamping rib (25) is configured annular circumferential or circumferential in sections.

6. The transport pallet according to one of the claims 4 or 5, wherein the clamping rib (25) has a wedge shaped cross-section.

7. The transport pallet according to one of the claims 4 through 6, wherein a clamping rib (25) is arranged in a third of the plug (20) adjacent to the bottom side (4).

8. The transport pallet according to one of the preceding claims, wherein the plugs (20) include a radially outward protruding upper shoulder (22) at an upper longitudinal end and/or a radially outward protruding lower shoulder (24) at a lower longitudinal end, which respectively extend transversal to the longitudinal extension of the plug (20) and which are preferably configured annular, and wherein the receiver (9) includes at least one shoulder (14) which provides a contact surface for a shoulder (22, 24) and which is arranged between the loading surface (5) and the bottom side (4) of the upper deck (2).

9. The transport pallet according to one of the preceding claims, wherein at least one longitudinal end of the plugs (20) includes an at least partially convex face (26, 29).

10. The transport pallet according to one of the preceding claims, wherein a profile with at least one protrusion (32) is configured at the upper face (26) and/or at the lower face (29) of the plugs (20).

11. The transport pallet according to claim 12, wherein the protrusion (32) is circumferentially configured over the upper face (26) and/or the lower face (29) of the plugs (20).

12. The transport pallet according to one of the preceding claims, wherein the faces (26, 29) of the plugs protrude beyond the plate surface by 0.5 to 4 mm, in particular by 3 mm, preferably by up to 2 mm.

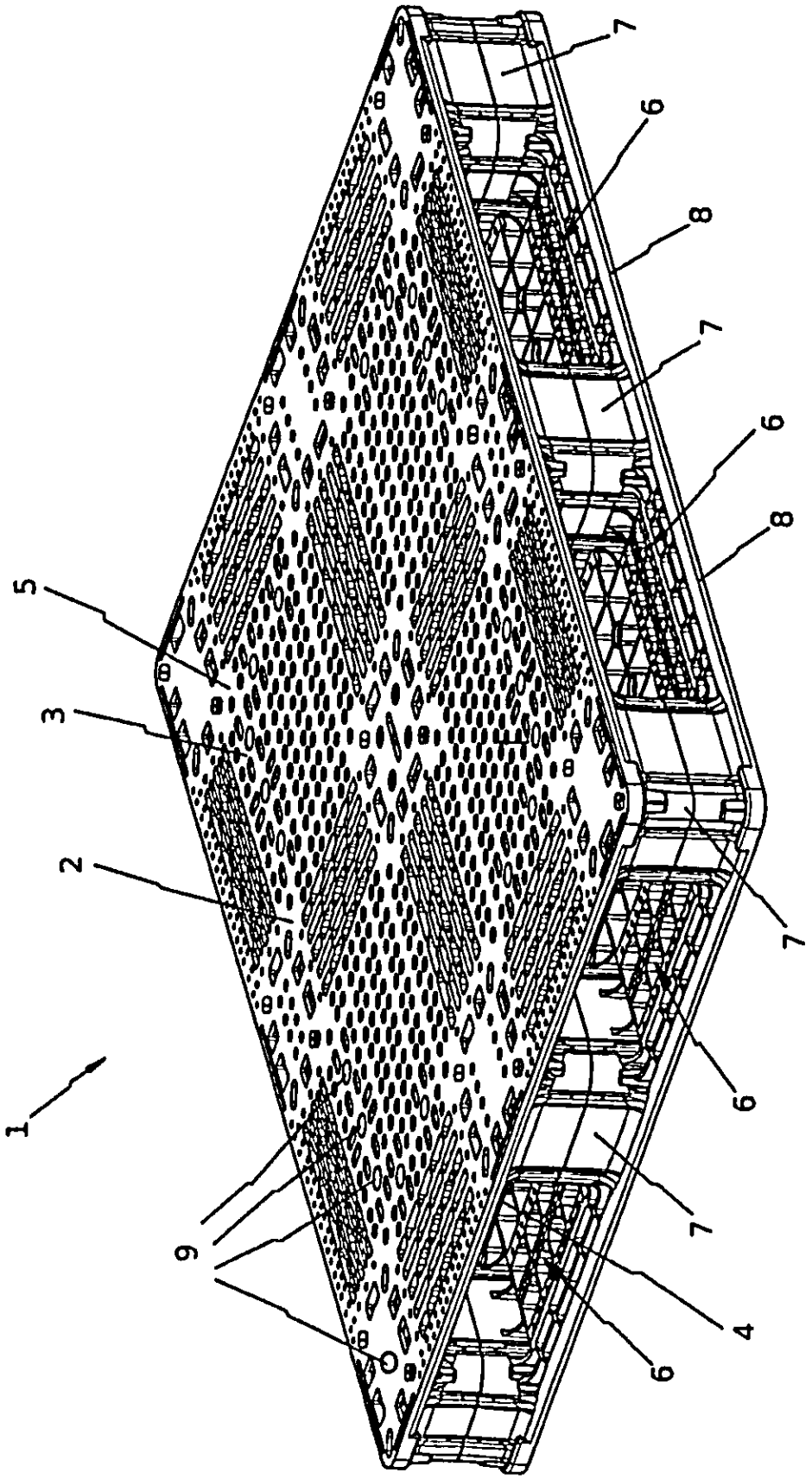


Fig. 1

Fig. 2

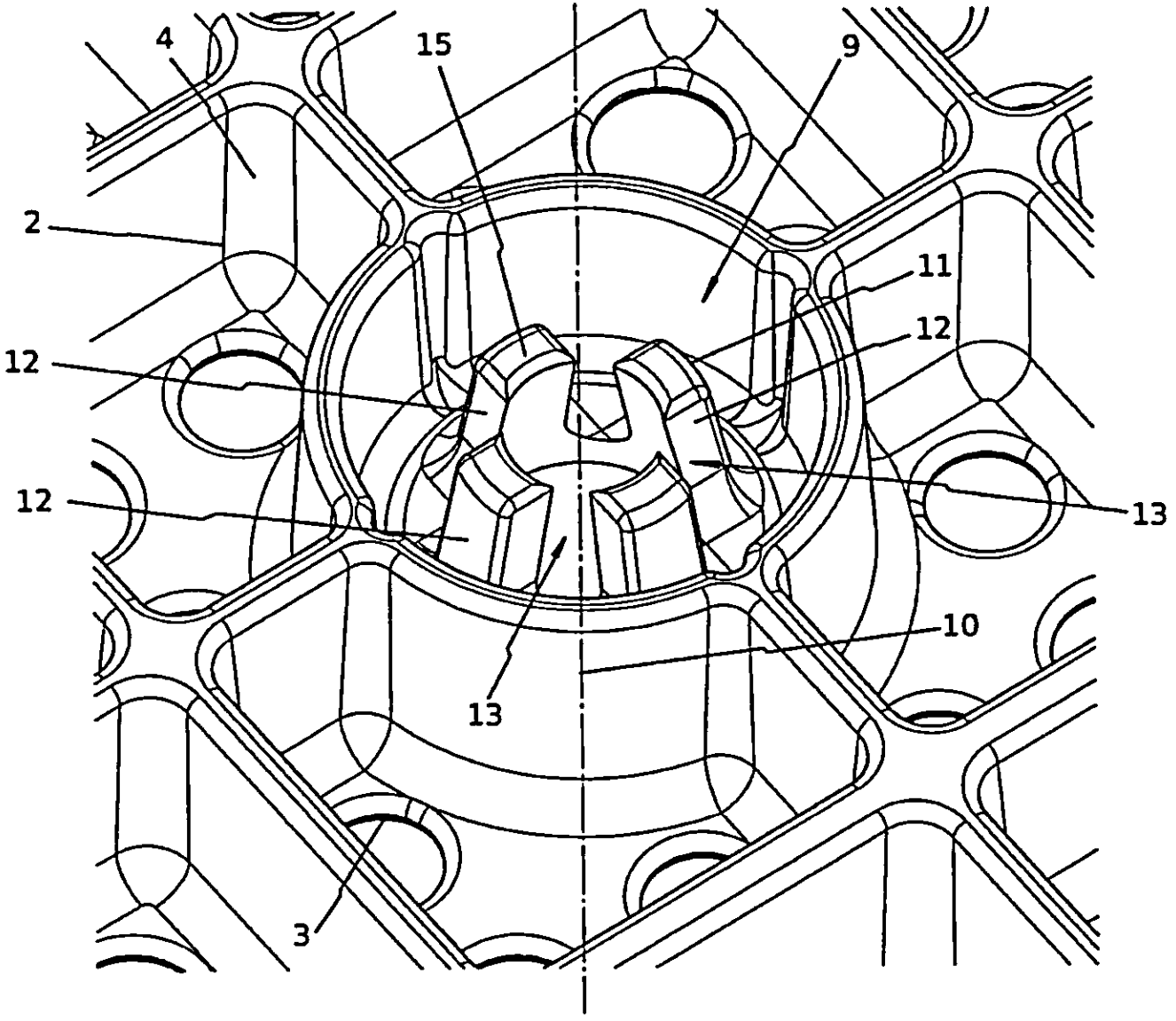


Fig. 3

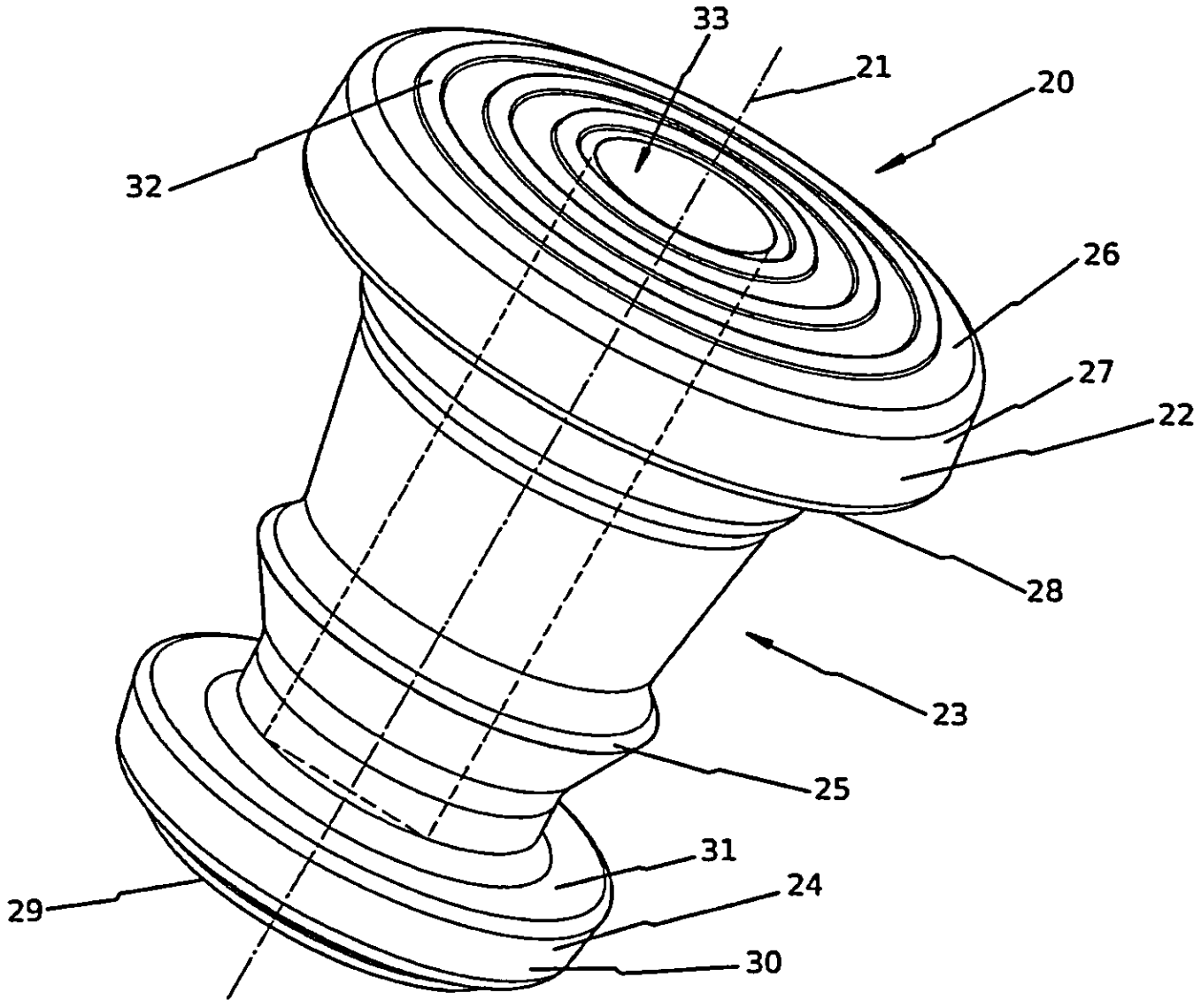


Fig. 4