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

(11) EP 4 574 704 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.06.2025 Bulletin 2025/26

(21) Application number: **23218492.9**

(22) Date of filing: **20.12.2023**

(51) International Patent Classification (IPC):
B65D 71/02 *(2006.01)* ***B65D 71/06*** *(2006.01)*
B65D 63/10 *(2006.01)* ***B65D 85/07*** *(2017.01)*

(52) Cooperative Patent Classification (CPC):
B65D 85/07; B65D 63/109

(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:
KH MA MD TN

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(54) MODULE FOR THE TRANSPORT AND STORAGE OF INSULATION ROLLS OR INSULATION PANELS, STORAGE AND TRANSPORT UNIT

(57) The invention relates to a module (5) for the transport and storage of insulation rolls (3) or insulation panels (11), the module (5) comprising at least two insulation rolls (2) or insulation panel packets (10) arranged in one layer adjacent to each other and combined by a film covering (6), wherein each insulation roll (2) or insulation panel packet (10) is hold in its configuration by at least two ribbons (3), which are arranged spaced apart from each other circumferentially around the insulation roll (2) or insulation panel packet (10) and transversely to the longitudinal axis of the insulation roll (2) or insulation panel packet (10). The invention also relates to a storage and transport unit (1) comprising a set of at least two of such modules (5) arranged side by side and/or stacked and tied by wrapping elements (12).

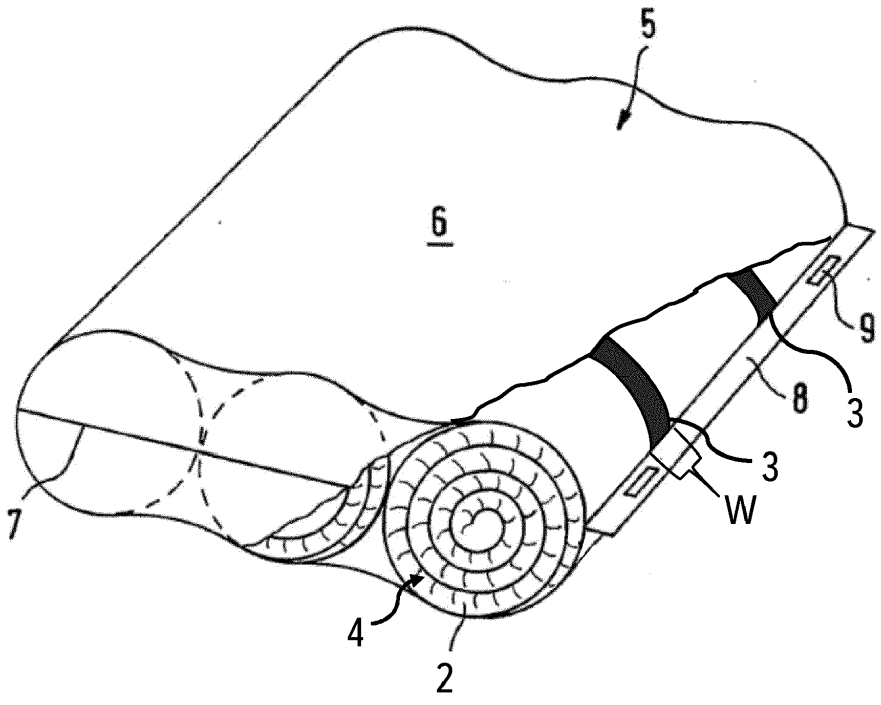

Fig. 2

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Description

[0001] The invention relates to a module for the transport and storage of insulation rolls or insulation panels and a storage and transport unit.

[0002] Insulation elements such as insulation rolls or insulation panels are very bulky products with a limited mass, and their storage and transport are relatively costly, especially given their value.

[0003] For the transport and storage of insulation elements, especially fiber-based insulation rolls and insulation panels, standard are storage and transport units, that are large packages comprising a plurality of so-called modules arranged beside each other or stacked one above the other, with each module itself comprising a number of insulation rolls or insulation panel packets. Both the insulation rolls and the insulation panel packets, in which several panels are combined, are packaged in film, preferably in compacted form. The film covers at least the circumferential outer surface of the roll respectively the insulation panel packet. The ends of the insulation elements are for the most part exposed. Packaging a set of insulation rolls or insulation panel packets to form a module and packaging a set or modules to form a storage and transport unit is effected by means of a covering, predominantly in the form of wrapping film, such that the storage and transport unit can be handled with a fork lift or the like.

[0004] Storage and transport units of this kind are known, for example, from EP 0 220 980 A1, in which insulation rolls or insulation-panel packets are packaged to modules, these modules are stacked one above the other and are then covered with a hood-like plastic-film wrapping. In this way, the largely exposed ends of the individual insulation rolls or insulation panel packets are covered and protected on the outside by a hood-like covering or else by wrapping film, as a rule stretch film.

[0005] WO 2004/092039 A1 discloses a large package for the transport and storage of mineral-wool insulation elements, especially insulation rolls and insulation panels, which is made up of adjacent and/or stacked modules that each comprise several, preferably two-to-five or more insulation rolls or insulation-panel packets combined by a film covering, and in which the modules are tied by wrapping elements such as hoods or strap retainers to form a storage and transport unit, the modules are each protected in their entirety against water ingress by a waterproof covering that is preferably permeable to water vapor.

[0006] WO 01/10737 A1 discloses a packaging unit for a mineral-wool product having a wrapping made of sheeting material, paper or the like, with a carrying aid which is arranged on the outside of the packaging unit and beneath which the user can grip.

[0007] EP 1 283 181 A1 discloses a packaging, comprising a rolled-up product and a wrapping having characteristics suitable for physical implementation as a vapour barrier. Due to further use of the wrapping as vapour barrier on the construction site, packaging waste shall be limited.

[0008] EP 0 287 177 A1 discloses a packaging, comprising a rolled-up product and a wrapping which consists of shrink-wrapping applied around said rolled-up product, having a carrying strap passed axially over the wrapping round said rolled-up product. Preferably tied transversely round the rolled-up product underneath the wrapping is a locking strap securing against unwinding of said rolled-up product.

[0009] DE 100 62 038 C1 discloses a packaging unit for a mineral wool product formed in rolls, comprising in each case at least two adjacent rolls, which are arranged one above the other and next to one another and are stored or stacked with their respective longitudinal sides and a gap between the rolls, the gap extending in the longitudinal direction of the rolls, forming a cavity between the adjacent rolls, and intended and adapted for engagement by a transport means, and wherein the rolls forming the gap are firmly fixed in their lateral position relative to one another.

[0010] DE 10 2005 054 865 A1 discloses a pallet for transporting stacks of panels made of insulation panels, in particular mineral wool insulation panels, consisting of at least one pressure-resistant and bending-resistant insulation panel, preferably made of rock wool, which are arranged on two spaced-apart elongated support bodies made of insulation material, in particular made of rock wool, wherein the insulation panel is connected to the support bodies to form a unit.

[0011] All these packaging elements used in the known modules and storage and transport units constitute a large amount of packaging material, which after unpackaging leads to waste at the processing side. The removal of the waste can cause difficulties at the processing site. Moreover, with regard to sustainability it is desirable to reduce the generation of waste.

[0012] The aim of the invention is to provide a module for the transport and storage of insulation rolls or insulation panel packets and a storage and transport unit in which the amount of packaging material is reduced.

[0013] The object of the present invention is accomplished according to the invention by a module according to the independent claim 1 and a storage and transport unit according to independent claim 11. Preferred embodiments emerge from the subclaims.

[0014] The invention relates to a module for the transport and storage of insulation rolls or insulation panels, the module comprising at least two insulation rolls or insulation panel packets arranged in one layer adjacent to each other and combined by a film covering, wherein each insulation roll or insulation panel packet is hold in its configuration by at least two ribbons. According to the invention the ribbons are arranged spaced apart from each other circumferentially around the insulation roll or insulation panel packet and transversely to the longitudinal axis of the insulation roll or insulation panel packet.

[0015] The main function of the at least two ribbons is to

uphold an insulation blanket that has been rolled to an insulation roll in the rolled form or to uphold a stack of insulation panels of an insulation panel packet in stacked form during transport and storage, so that it needs as little space as possible during transport and storage.

[0016] The inventor has found that the amount of packaging material can be significantly reduced by replacing a complete cover of the circumferential outer surface of the insulation roll or insulation panel packet, i.e. the cylindrical outer surface of the insulation roll or the outer surface of the insulation panel packet, by at least two ribbons.

[0017] According to the invention the at least two ribbons are arranged spaced apart from each other. Thus, the ribbons do not completely cover the cylindrical outer surface of the insulation roll or the outer surface of the insulation panel packet, the ribbons only cover a part of the cylindrical outer surface of the insulation roll or the outer surface of the insulation panel packet. Therefore, less material is needed for the spaced apart ribbons than for a complete cover of the cylindrical outer surface of the insulation roll or the outer surface of the insulation panel packet. With regard to sustainability, this is one main advantage of the module according to the invention.

[0018] Each ribbon is preferably made from a band which length is greater that the circumference of the insulation roll or insulation panel packet, wherein each band is preferably glued in an overlap area to form a ribbon arranged circumferentially around the insulation roll or insulation panel packet and transversely to the longitudinal axis of the insulation roll or insulation panel packet.

[0019] As described above, the film covering combines the least two insulation rolls or insulation panel packets arranged in one layer adjacent to each other. The film covering counteracts a bulging of the insulation roll or insulation panel packet. Thus, a module is realized that is dimensionally stable, in particular dimensionally stable for the formation of a storage and transport unit.

[0020] In a preferred embodiment of the module each insulation roll or insulation panel packet is hold in its configuration by three to ten ribbons, particularly preferably by five to seven ribbons.

[0021] The ribbons may be arranged evenly over the length of the roll or insulation panel packet, i.e. the extension of the insulation roll or insulation panel packet along the longitudinal axis. This means the distances between two neighboring ribbons as well as the distance of the ribbons nearest to the ends to the respective nearest end are preferably equal. In the embodiment of the module in which each insulation roll or insulation panel packet is hold in its configuration by three ribbons, preferably one ribbon is located in each section, if the length of the insulation roll or insulation panel packet is mentally divided in three equal sections.

[0022] In order to prevent bulging at the ends of the insulation roll or insulation panel packet, especially if packaged under compression, there is preferably at each end area of the insulation roll or insulation panel packet one ribbon arranged no further than 100 mm, preferably no further than 50 mm away from the respective end. Alternatively or additionally, in order to prevent bulging in the middle area of the insulation roll or insulation panel packet there is one ribbon arranged in the middle area of the insulation roll or insulation panel packet. In the context of the invention the term "middle area" denotes the area of the insulation roll or insulation panel packet along the longitudinal axis which expands at most 100 mm around the center.

[0023] Preferably each ribbon has a width of at least 30 mm, preferably of at least 50 mm.

[0024] In a preferred embodiment the sum of the widths of the ribbons arranged spaced apart from each other circumferentially around the insulation roll or insulation panel packet is 8 % to 50 % of the length of the insulation roll or insulation panel packet, preferably 10 % to 50 %, particularly preferably 15 % to 30 %.

[0025] The ribbons can be composed of a film, a foil or paper.

[0026] In a preferred embodiment the ribbons are composed of a film or a foil and the film or foil is preferably made of polyethylene, polyvinylchloride, polypropylene, polyester or polyamide. Suitable film or foil materials and thicknesses are known to the skilled artisan. Typically, film thickness is in the range of 20 μm to 100 μm, while the film thickness is optimized to securely withstand restoring forces due to compression of the insulating material to reduce foil weight.

[0027] In an alternative preferred embodiment the ribbons are composed of paper, preferably Kraft paper. Suitable paper materials and thicknesses are known to the skilled artisan. Ribbons composed of paper are particularly preferred with regard to sustainability. As for the film material, typical paper thickness is in the range of 20 μm to 100 μm, the paper thickness being optimized to securely withstand restoring forces due to compression of the insulating material to reduce paper weight.

[0028] Suitable materials and thicknesses of the film covering are known to the skilled artisan. In a preferred embodiment the film covering is made of polyethylene, polyvinylchloride, polypropylene, polyester or polyamide. Preferably the film covering has a thickness of 50 μm (micrometer) to 150 μm, particularly preferably 50 μm to 100 μm.

[0029] The insulation rolls or insulation panels are preferably made of mineral wool.

[0030] The insulation rolls or insulation panels have preferably common dimensions. Preferably the insulation rolls have a length of 1000 mm to 1250 mm, especially 1200 mm. The diameter is adapted to the size of the pallet used, eventually considering a second compression step as described in EP0220980. For a standard euro pallet (Europalette) of 1200 mm x 1200 mm, typically a roll diameter is about 400 mm ± 30 mm. Preferably the insulation panels of the insulation panel packets have a length of 1000 mm to 1250 mm, particularly 1200 mm and

a width of 500 mm to 625 mm, in particular 600 mm.

[0031] Insulation rolls or insulation panels made of mineral wool are often hydrophobic as a result of a water repellent agent having been added. However, non-uniform distribution of the water repellent agent and resultant capillary water uptake by the covered mineral wool can never be completely ruled out. Water uptake impairs the properties of the insulation material. Moreover, in view of the fact that owing to pollution in the air, rain water can show a certain degree of aggressiveness towards the fibers of the insulation elements. With time, this can even cause damage to the fiber structure and lead to impairment of the insulation elements' properties.

[0032] Moreover, in embodiments in which the ribbons are composed of paper, water could cause damage to the ribbons and the ribbons could soften and tear.

[0033] Therefore, in a preferred embodiment the film covering is waterproof and completely encasing the insulation rolls or insulation panel packets of the module and preferably permeable to water vapor.

[0034] It is advantageous if the film covering is composed of moisture-adaptive material whose water vapor diffusion resistance is dependent on the relative humidity of the surrounding atmosphere.

[0035] In a preferred embodiment water is prevented from ingressing into the module by a waterproof i.e. watertight film covering that is preferably permeable to water vapor, but not permeable to water or other fluids. The film covering encases the insulation rolls or insulation panel packets of the modules completely, so that they are completely secured against water ingress. It is advantageous if the film covering is composed of a shrink film. Alternatively, the film covering completely encasing the insulation rolls or insulation panel packets of the module can also be closed by overlapping the ends of a film and then bonding or welding them together in the overlap area.

[0036] The invention also relates to a storage and transport unit comprising a set of at least two modules arranged side by side and/or stacked and tied by at least one wrapping element. The at least two modules can be configured as described above.

[0037] In a preferred embodiment the at least one wrapping element is completely encasing the set of modules and waterproof and preferably permeable to water vapor. Preferable in this embodiment the at least one wrapping element is composed of moisture-adaptive material whose water-vapor diffusion resistance is dependent on the relative humidity of the surrounding atmosphere.

[0038] In an alternative preferred embodiment of the storage and transport unit the set of modules is tied by a wrapping element in form of a hood-like covering. Preferably the hood-like covering is made of a film and particularly preferable waterproof i.e. watertight and especially permeable to water vapor, thus, a moisture exchange from the interior to the exterior is possible. This permeability to water vapor ensures that in the case of inevitable water condensation during storage of the storage and transport unit the moisture can escape at elevated temperatures to the outside.

[0039] In another alternative preferred embodiment of the storage and transport unit the set of modules is tied by at least two wrapping elements in the form of strap retainers.

[0040] A set of modules comprises preferably four to twelve modules.

[0041] In a preferred embodiment of the storage and transport unit the insulation rolls or insulation panel packets are packaged in each case under a compression ratio up to 1:7, in particular above 1:3.5 .

[0042] If the film covering of the module is completely encasing the insulation rolls or insulation panel packets of the module and waterproof, i.e. watertight but particularly preferably permeable to water vapor, a moisture exchange from the interior to the exterior is possible. This permeability to water vapor ensures that in the case of inevitable water condensation during storage of the storage and transport unit or the module, the moisture within the modules can escape at elevated temperatures to the outside.

[0043] In embodiments in which the at least one wrapping element is completely encasing the set of modules and waterproof i.e. watertight and preferably permeable to water vapor, a moisture exchange from the interior to the exterior is possible. This permeability to water vapor ensures that in the case of inevitable water condensation during storage of the storage and transport unit, the moisture within the storage and transport unit can escape at elevated temperatures to the outside.

[0044] In a particularly preferable embodiment not only the film covering of the module is completely encasing the insulation rolls or insulation panel packets of the module and waterproof and preferably permeable to water vapor but also the at least one wrapping element is completely encasing the set of modules and waterproof and preferably permeable to water vapor. Of further advantage here is that should the wrapping element completely encasing the set of modules be damaged, water is prevented from ingressing into any of the undamaged modules because they are effectively protected by the film covering.

[0045] As described above in preferred embodiments the film covering and/or the wrapping element can be composed of a material which is moisture-adaptive, i.e. the permeability to water vapor varies as a function of the ambient humidity. Preferably the material is configured such that when the relative humidity of the atmosphere surrounding the covering and/or wrapping element is in the range from 30 % to 50 %, the material has a water-vapor diffusion resistance of 2 to 5 m diffusion-equivalent air-layer thickness, and when the relative humidity is in the range from 50 % to 80 %, which corresponds to summer conditions, it has a water-vapor diffusion resistance of less than 1 m diffusion-equivalent air-layer thickness. When such a material is used, the perfect drying out of moisture and condensation water within the modules

and/or storage and transport unit is ensured at all times. As a result, a sound guarantee that the insulation elements of the insulation rolls or insulation panel packets will retain their insulation properties even over extensive storage periods can be given. In the case of a moisture adaptive film covering and/or wrapping element, it is expedient if this, too, is composed of a polyamide, film, preferably, polyamide 3, polyamide 4 or polyamide 6 are particularly suitable. It is also possible to use other moisture-adaptive materials, in particular of polyester, polypropylene, or polyethylene, or materials of copolyamide, or polyvinylchloride. If the film used is of this kind, it need not be thrown away but can be used for another purpose, for example as an adaptive vapor barrier for high-pitched roofs. Such embodiments of the modules and storage and transport units according to the invention are particularly preferred due to their advantages regarding sustainability.

[0046] Water-vapor diffusion resistance of moisture-adaptive material used for the film covering and/or the wrapping elements is measured according to ISO 12572, e.g. DIN EN ISO 12572.

[0047] It is beneficial to configure the film covering and/or the wrapping elements used such that they are also UV-resistant, this being of particular advantage when the storage and transport units are used in countries with a lot of sun. The film covering and/or the wrapping elements can advantageously be rendered resistant to UV light by coloring the base material, for example with soot. UV stabilizers such as hydroxybenzophenone or hydroxyphenylbenzotriazole can also be used to enhance the light resistance.

[0048] The invention is now explained in detail using exemplary embodiments and referring to the accompanying figures. The figures in no way restrict the invention. In a simplified, not to scale representation, they depict:

Fig. 1 a perspective view of an embodiment of an insulation blanked rolled to an insulation roll 2,

Fig. 2 a perspective view of an embodiment of a module 5 according to the invention,

Fig. 3 a perspective view of an embodiment of an insulation panel packet 10,

Fig. 4 a perspective view of another embodiment of a module 5 according to the invention,

Fig. 5 a perspective view of an embodiment of a storage and transport unit 1 according to the invention,

Fig. 6 a perspective view of another embodiment of a storage and transport unit 1 according to the invention,

Fig. 7 a perspective view of another embodiment of a storage and transport unit 1 according to the invention,

Fig. 8 a perspective view of another embodiment of an insulation blanked rolled to an insulation roll 2,

Fig. 9 a perspective view of another embodiment of an insulation blanked rolled to an insulation roll 2,

Fig. 10 a perspective view of another embodiment of an insulation panel packet 10, and

Fig. 11 a perspective view of another embodiment of an insulation panel packet 10,

[0049] Fig. 1 shows a perspective view of an embodiment of an insulation blanket that has been rolled to an insulation roll 2 and is retained in the rolled form during transport and storage by two ribbons 3 which are arranged spaced apart from each other around the insulation roll 2. Each of the two ribbons 3 is arranged transversely to the longitudinal axis of the insulation roll 2. The ribbons 3 are arranged circumferentially around the insulation roll 2. The ends of the insulation roll 2 are indicated by the reference numeral 4. The insulation roll 2 is hold in its configuration by the two ribbons 3. The insulation blanket is made for example of mineral wool, in particular glass fibers. In the embodiment shown in Fig. 1, the length L of the insulation roll 2, i.e. the extension of the insulation roll 2 along the longitudinal axis, is for example 1200 mm and the width W of each ribbon 3 is 50 mm. Thus, only 8 % of the cylindrical outer surface of the insulation roll 2 is covered by the two ribbons 3 and 92 % of material can be saved compared to a full coverage of the cylindrical outer surface of the insulation roll 2. The material for the ribbons 3 is for example paper or a film or foil. Suitable paper material is Kraft paper, for example. Suitable film or foil materials include polyethylene, polyvinyl chloride, polyester, polypropylene and/or polyamide.

[0050] Fig. 2 shows a perspective view of an embodiment of a module 5 according to the invention, which is illustrated here as a packaging unit for three insulation rolls 2 of the type shown in Fig. 1. Alternatively, insulation rolls 2 of the modules 5 can each be configured, for example, as shown Fig. 8 or Fig. 9. The module 5 shown in Fig. 2 is formed by encasing the insulation rolls 2, each of which, is retained in rolled form by two ribbons 3, in a completely closed film covering 6. The film covering 6 covers the exterior circumferential surfaces of the adjacent insulation rolls 2 as well as the ends 4 of the insulation rolls 2. In other words, to form the embodiment of the module 5 shown in Fig. 2, the packaging unit of three insulation rolls 2 is completely enclosed or packaged in the film covering 6. To illustrate the arrangement more clearly, the individual insulation rolls 2 of module 5 are shown with dashed lines, so that arrangement of the insulation rolls 2 in the module 5 is evident. For additional clarity, parts of the film covering 6 of the module 5 are broken away to show the interior.

[0051] The module 5 as such can also be subjected to a preceding compaction step. In the seam area, denoted by 7, overlapping areas of film of the film covering 6 are bonded or otherwise suitably joined together. As is shown on the right of Fig. 2, the film covering 6 is expediently

configured such that an exposed edge 8, formed by film overlap, projects outwards and serves for handling the module 5 during transport and storage. To this end, it is useful to provide additional handling means in the rib-like projecting edge 8, for example eyelets 9, which facilitate manual gripping and handling of the module 5. This film excess for the formation of the edge 8 can, if necessary, be suitably reinforced - for example by interposing a nonwoven fabric such as glass-fiber nonwoven fabric. It is advantageous, however, to use the film excess at the end of the packet, in the area denoted by 7, to form a rib-like or tongue-like edge corresponding to the illustrated edge 8.

[0052] Although three insulation rolls 1 are packaged to a module 5 in the embodiment illustrated in Fig. 2, it is within the scope of the invention for a module 5 to comprise two to five insulation rolls 2, or more.

[0053] In the embodiment shown in Fig. 2 the film covering 6 is completely enclosing the packaging unit of three insulation rolls 2. The film covering 6, is for example, waterproof so that the ingress of any water whatsoever, especially rainwater, is prevented by the waterproof film covering 6.

[0054] Fig. 3 shows a perspective view of an embodiment of an insulation panel packet 10. In the embodiment shown in Fig. 3, the insulation panel packet 10 contains eight insulation panels 11 which are stacked fully adjacent to each other. The insulation panel packet 10 is retained in stacked form during transport and storage by two ribbons 3 which are arranged spaced apart from each other circumferentially around the insulation panel packet 10. Each of the two ribbons 3 is arranged transversely to the longitudinal axis of the insulation panel packet 10. The ends of the insulation panel packet 10 are indicated by the reference numeral 4. The insulation panel packet 10 is hold in its configuration by the two ribbons 3. The insulation panels 11 are made for example of mineral wool, in particular glass fibers. In the embodiment shown in Fig. 3, the length L of the insulation panel packet 10, i.e. the extension of the insulation panel packet 10 along the longitudinal axis, is for example 1200 mm and the width W of each ribbon 3 is 50 mm. Thus, only 8 % of the outer surface of the insulation panel packet 10 is covered by the two ribbons 3 and 92 % of material can be saved compared to a full coverage of the outer surface of the insulation panel packet 10. The material for the ribbons 3 is, for example, paper or a film or foil. Suitable paper material is Kraft paper, for example. Suitable film or foil materials include polyethylene, polyvinyl chloride, polyester, polypropylene and/or polyamide.

[0055] Fig. 4 shows a perspective view of an embodiment of a module 5 according to the invention, which is illustrated here as a packaging unit for three insulation panel packets 10 of the type shown in Fig. 3. Alternatively, insulation panel packets 10 of the modules 5 can each be configured, for example, as shown Fig. 10 or Fig. 11. The module 5 is formed by encasing the insulation panel packets 10, each of which, is retained in the stacked form by two ribbons 3, in a completely closed film covering 6. The film covering 6 covers the exterior circumferential surfaces of the adjacent insulation panel packets 10 as well as the ends 4 of the insulation panel packets 10. In other words, to form the module 5, the packaging unit of three insulation panel packets 10 is completely enclosed or packaged in the film covering 6. To illustrate the arrangement of the insulation panel packets 10 in the module 5 more clearly, the individual insulation panel packets 10 of the modules 5 are shown with dashed lines, so that arrangement of the insulation panel packets 10 in the module 5, is evident. For additional clarity, parts of the film covering 6 of the module 5 are broken away to show the interior.

[0056] The module 5 as such can also be subjected to a preceding compaction step. In the seam area, denoted by 7, the overlapping areas of film of the film covering 6 are bonded or otherwise suitably joined together. As is shown on the right of Fig. 4, the film covering 6 is expediently configured such that an exposed edge 8, formed by film overlap, projects outwards and serves for handling the module during transport and storage. To this end, it is useful to provide additional handling means in the rib-like projecting edge 8, for example eyelets 9 (not shown in Fig. 4), which facilitate manual gripping and handling of the module 5. This film excess for the formation of the edge 8 can, if necessary, be suitably reinforced - for example by interposing a nonwoven fabric such as glass-fiber nonwoven fabric. It is advantageous, however, to use the film excess at the end of the packet, in the area denoted by 7, to form a rib-like or tongue-like edge corresponding to the illustrated edge 8.

[0057] In the embodiment shown in Fig. 4 the film covering 6 is completely enclosing the packaging unit of three insulation panel packets 10. The film covering 6, is for example, waterproof so that the ingress of any water whatsoever, especially rainwater, is prevented by the waterproof film covering 6.

[0058] Fig. 5 shows a perspective view of an embodiment of a storage and transport unit 1 according to the invention. In the embodiment shown in Fig. 5, the storage and transport unit 1 is made up of a set of seven modules 5 each consisting of three insulation rolls 2 combined by a film covering 6. Three modules 5 stand upright and on top of this bottom module layer formed by the three modules 5 is a horizontally positioned module 5, i.e. a middle module, comprising three adjacent insulation rolls 2 and on top of this horizontally positioned module 5 a top module layer comprising three adjacent modules 5 standing upright is located. A storage and transport unit 1 of this kind, in which the modules are arranged crosswise, i.e. with intersecting axes, is characterized by very high stability. In an alternative embodiment, high stability can also be achieved by omitting the middle module and, instead, arranging the top module layer such that it is offset by 90° relative to the bottom module layer. Of course, the storage and transport unit 1 is not restricted

to a crosswise arrangement of this kind. The modules 5 can also be stacked in other ways in a storage and transport unit 1 according to the invention. In the embodiment shown in Fig. 5, the modules 5 are combined to a storage and transport unit 1 by a wrapping element 12 in form of a hood-like covering. To illustrate the arrangement more clearly, the individual insulation rolls 2 of the individual modules 5 are shown with dashed lines, so that the crosswise arrangement, i.e. the orientation of the modules in vertical and horizontal manner, is evident. For additional clarity, parts of the wrapping element 12 of the storage and transport unit 1 are broken away to show the interior. The storage and transport unit 1 can be transported on a pallet 16 which, if necessary, can also be integrated in the wrapping element 12. The insulation rolls 2 of the modules 5 can each be configured, for example, as shown in Fig. 1, Fig. 8 or Fig. 9. For simplified illustration the film covering 6 is not shown in Fig. 5. As written above, in the embodiment shown in Fig. 5, the modules 5 are combined to a storage and transport unit 1 by a wrapping element 12 in form of a hood-like covering. The hood-like covering is, for example, waterproof. Alternatively, the wrapping element 12 can be in form of a waterproof covering completely encasing the set of modules 2. If necessary, a pallet 16 can also be integrated in the wrapping element 12.

[0059] Fig. 6 shows a perspective view of another embodiment of a storage and transport unit 1 according to the invention. In the embodiment shown in Fig. 6, the storage and transport unit 1 is made up of a set of four modules 5, each composed of four insulation panel packets 10 combined by a film covering 6. The modules 5 are stacked one above the other on a pallet 16 and held on the pallet 16 by two wrapping elements 12 in form of strap retainers. The insulation panel packets 10 of the modules 5 can each be configured, for example, as shown in Fig. 3, Fig. 10 or Fig. 11. For simplified illustration the film covering 6 is not shown in Fig. 6. In the embodiment shown in Fig. 6, the storage and transport unit 1 can be transported by means of a crane or a hook on a fork lift, as indicated by reference numeral 13. If the film covering 6 of each module 5 of the storage and transport unit 1 shown in the embodiment according to Fig. 6 is waterproof and completely encasing the module 5, the storage and transport unit 1 can be left on damp ground without any risk of water ingress, since the individual modules 5 and hence also the bottom layer thereof have a waterproof packaging. Moreover, if the film covering 6 of each module 5 of the storage and transport unit 1 shown in the embodiment according to Fig. 6 is waterproof and completely encasing the module 5, once the wrapping elements 12 in form of strap retainers have been unfastened at a construction site or in a D.I.Y store, the individual modules 5 can be conventionally handled and displayed without danger of their being exposed to the weather before they are processed or sold.

[0060] Fig. 7 shows a perspective view of another embodiment of a storage and transport unit 1 according to the invention. In the embodiment shown in Fig. 7, the storage and transport unit 1 is made up of a set of four modules 5, each composed of three insulation panel packets 10 combined by a film covering 6. The modules 5 are stacked one above the other on a pallet 16 and held on the pallet 16 by two wrapping elements 12 in form of strap retainers. The embodiment shown in Fig. 7 does not require a pallet at the bottom. Instead, an interposing layer 14 is provided in the middle, with two layers of modules 5 on each side, as a lifting point for a lift. The interposing layer 14 can be made of cardboard, for example, with insert openings 15, or is formed by a separate insulation panel of mineral wool or plastic, into which the prongs of a fork lift can penetrate. The modules 5 can each be configured for example as shown in Fig. 4, wherein the insulation panel packets are configured as shown in Fig. 3. Alternatively, the insulation panel packets 10 of the modules 5 can each be configured, for example, as shown in Fig. 10 or Fig. 11. If the film covering 6 of each module 5 of the storage and transport unit 1 shown in the embodiment according to Fig. 7 is waterproof and completely encasing the module 6, the storage and transport unit 1 can be left on damp ground without any risk of water ingress, since the individual modules 5 and hence also the bottom layer thereof have a waterproof packaging.

[0061] Fig. 8 shows a perspective view of another embodiment of an insulation blanked rolled to an insulation roll 2. The embodiment shown in Fig. 8 differs from the embodiment shown in Fig. 1 only in that instead of two ribbons 3, three ribbons 3 are arranged spaced apart from each other around the insulation roll 2. At each end area of the insulation roll 2 one ribbon 3 is arranged at a distance of 50 mm from the respective end. In order to prevent bulging in the middle area of the insulation roll 2 there is one ribbon 3 arranged in the middle area of the insulation roll 2. In the embodiment shown in Fig. 8, the length L of the insulation roll 2, i.e. the extension of the insulation roll 2 along the longitudinal axis, is, for example, 1200 mm and the width W of each ribbon 3 is 50 mm. Thus, only 13 % of the cylindrical outer surface of the insulation roll 2 is covered by the three ribbons 3 and 87 % of material can be saved compared to a full coverage of the cylindrical outer surface of the insulation roll 2.

[0062] Fig. 9 shows a perspective view of another embodiment of an insulation blanked rolled to an insulation roll 2. The embodiment shown in Fig. 9 differs from the embodiment shown in Fig. 1 only in that instead of two ribbons 3, seven ribbons 3 are arranged spaced apart from each other around the insulation roll 2. In the embodiment shown in Fig. 9, the length L of the insulation roll 2, i.e. the extension of the insulation roll 2 along the longitudinal axis, is, for example, 1200 mm and the width W of each ribbon 3 is 30 mm. Thus, only 18 % of the cylindrical outer surface of the insulation roll 2 is covered by the seven ribbons 3 and 82 % of material can be saved compared to a full coverage of the cylindrical outer surface of the insulation roll 2.

[0063] Fig. 10 shows a perspective view of another embodiment of an insulation panel packet 10. The embodiment shown in Fig. 10 differs from the embodiment shown in Fig. 3 only in that instead of two ribbons 3, three ribbons 3 are arranged spaced apart from each other circumferentially around the insulation panel packet 10. Thus, if in the embodiment shown in Fig. 10 the length L of the insulation panel packet 10 is mentally divided in three equal sections, in each section one ribbon 3 is located. In the embodiment shown in Fig. 10, the length L of the insulation panel packet 10, i.e. the extension of the insulation panel packet 10 along the longitudinal axis, is, for example, 1200 mm and the width W of each ribbon 3 is 50 mm. Thus, only 11 % of the outer surface of the insulation panel packet is covered by the three ribbons 3 and 87 % of material can be saved compared to a full coverage of the outer surface of the insulation panel packet 10.

[0064] Fig. 11 shows a perspective view of another embodiment of an insulation panel packet 10. The embodiment shown in Fig. 11 differs from the embodiment shown in Fig. 3 only in that instead of two ribbons 3, seven ribbons 3 are arranged spaced apart from each other circumferentially around the insulation panel packet 10. In the embodiment shown in Fig. 11, the length L of the insulation panel packet 10, i.e. the extension of the insulation panel packet 10 along the longitudinal axis, is, for example, 1250 mm and the width W of each ribbon 3 is 50 mm. Thus, only 26 % of the outer surface of the insulation panel packet is covered by the seven ribbons 3 and 74 % of material can be saved compared to a full coverage of the outer surface of the insulation panel packet 10.

References:

[0065]

1	storage and transport unit
2	insulation roll
3	ribbon
4	end
5	module
6	film covering
7	seam area
8	edge
9	eyelet
10	insulation panel packet
11	insulation panel
12	wrapping element
13	transport suspension
14	interposing layer
15	insert opening
16	pallet
W	width of the ribbon
L	length

Claims

1. Module (5) for the transport and storage of insulation rolls (3) or insulation panels (11), the module (5) comprising at least two insulation rolls (2) or insulation panel packets (10) arranged in one layer adjacent to each other and combined by a film covering (6), wherein each insulation roll (2) or insulation panel packet (10) is hold in its configuration by at least two ribbons (3), which are arranged spaced apart from each other circumferentially around the insulation roll (2) or insulation panel packet (10) and transversely to the longitudinal axis of the insulation roll (2) or insulation panel packet (10).

2. Module (5) according to claim 1, wherein each insulation roll (2) or insulation panel packet (10) is hold in its configuration by three to ten ribbons (3), preferably five to seven ribbons (3).

3. Module (5) according to claim 1 or 2, wherein each ribbon (3) has a width (W) of at least 30 mm, preferably of at least 50 mm.

4. Module (5) according to one of claims 1 to 3, wherein the sum of the widths of the ribbons (3) arranged spaced apart from each other circumferentially around the insulation roll (2) or insulation panel packet (10) is 8 % to 50 % of the length of the insulation roll (2) or insulation panel packet (10), preferably 10 % to 50 %, particularly preferably 15 % to 30 %.

5. Module (5) according to one of claims 1 to 4, wherein the ribbons (3) are composed of a film or a foil, preferably made of polyethylene, polyvinylchloride, polypropylene, polyester or polyamide.

6. Module (5) according to one of claims 1 to 4, wherein the ribbons (3) are composed of paper, preferably Kraft paper.

7. Module (5) according to one of claims 1 to 6, wherein each module (5) contains two to five insulation rolls (2) or insulation panel packets (10), with each insulation panel packet (10) containing two to ten insulation panels (11).

8. Module (5) according to one of claims 1 to 7, wherein the insulation rolls (2) or insulation panels (11) are made of mineral wool.

9. Module (5) according to one of claims 1 to 8, wherein the film covering (6) is waterproof and completely encasing the insulation rolls (2) or insulation panel packets (10) of the module (5) and preferably permeable to water vapor.

10. Module according to claim 9, wherein the film covering (6) is composed of moisture-adaptive material whose water-vapor diffusion resistance is dependent on the relative humidity of the surrounding atmosphere.

11. Storage and transport unit (1) comprising a set of at least two modules (5) according to one of claims 1 to 10 arranged side by side and/or stacked and tied by at least one wrapping element (12).

12. Storage and transport unit (1) according to claim 11, wherein the at least one wrapping element (12) is completely encasing the set of modules (5) and waterproof and preferably permeable to water vapor.

13. Storage and transport unit (1) according to claim 12, wherein the at least one wrapping element (12) is composed of moisture-adaptive material whose water-vapor diffusion resistance is dependent on the relative humidity of the surrounding atmosphere.

14. Storage and transport unit (1) according to one of claims 11 to 13, wherein the set of modules (5) comprises four to twelve modules (5).

15. Storage and transport unit (1) according to one of claims 11 to 14, wherein the insulations rolls (2) or insulation panel packets (10) are packaged in each case under a compression ratio up to 1:7, in particular above 1:3.5 .

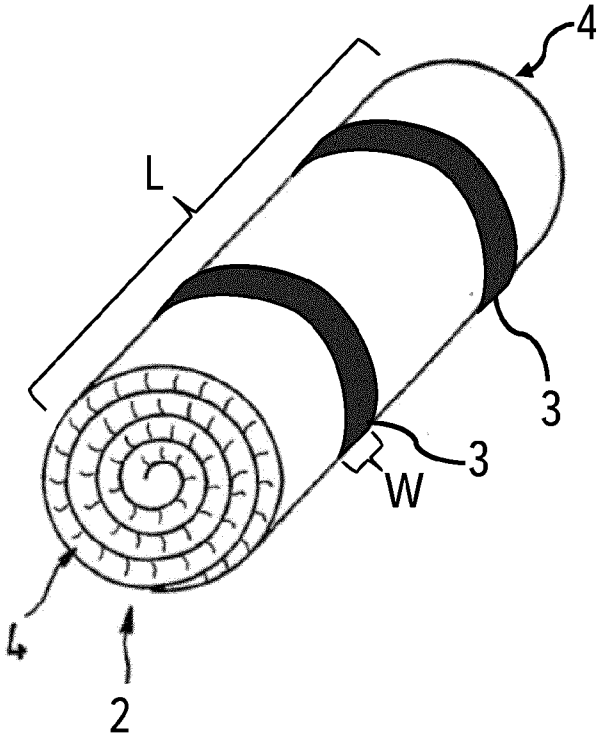

Fig. 1

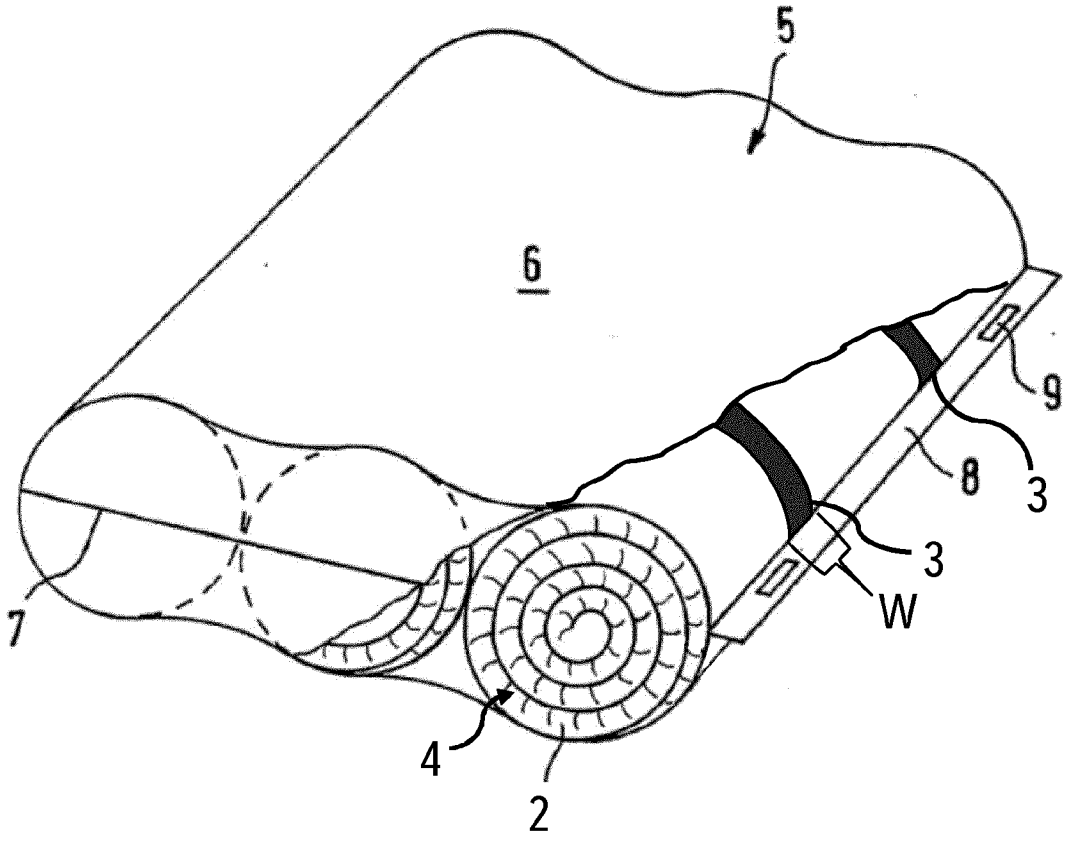

Fig. 2

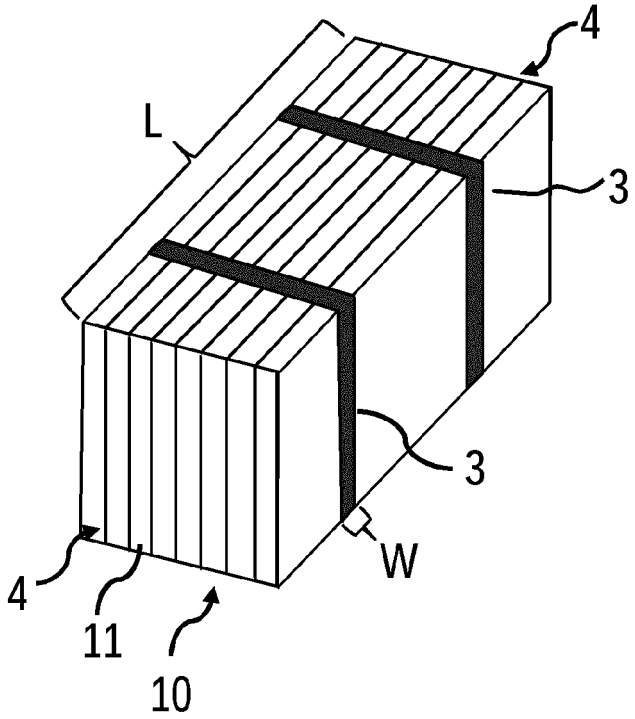

Fig. 3

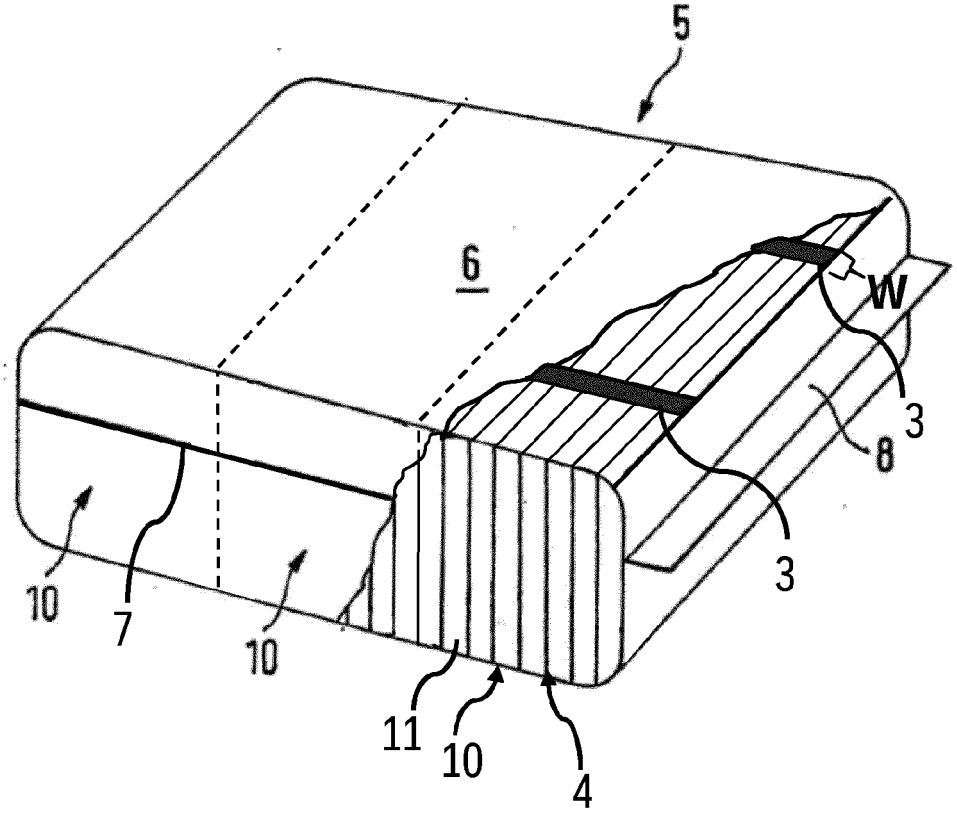

Fig. 4

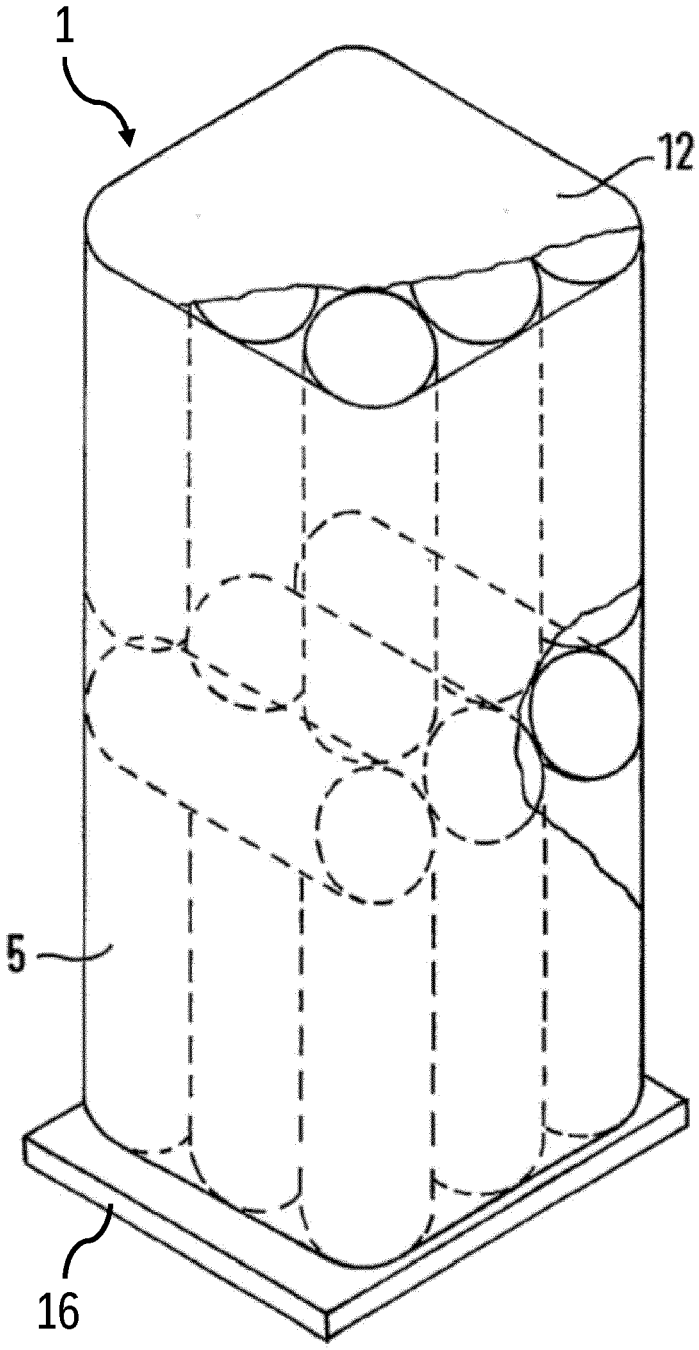

Fig. 5

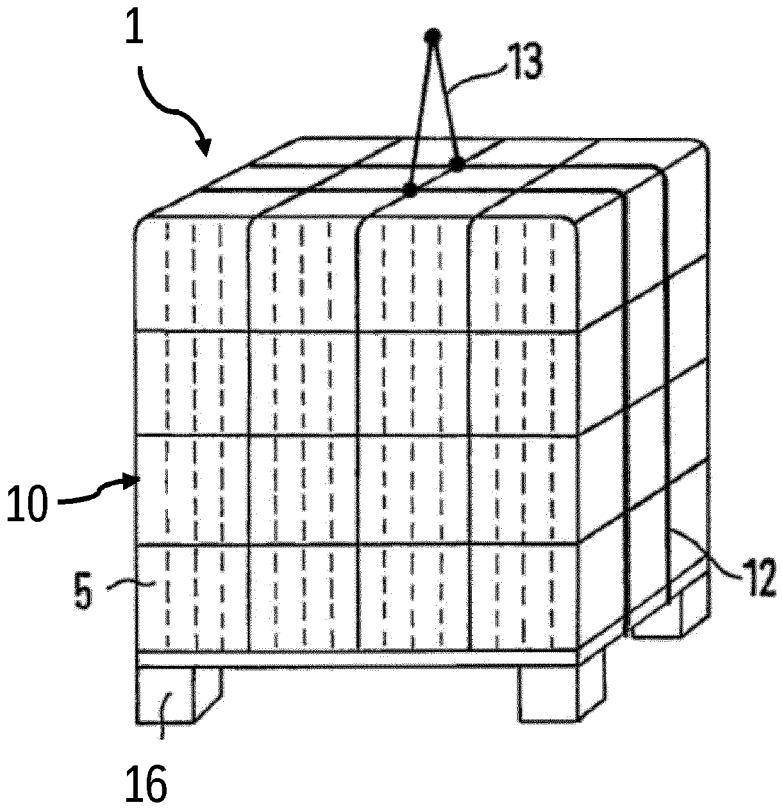

Fig. 6

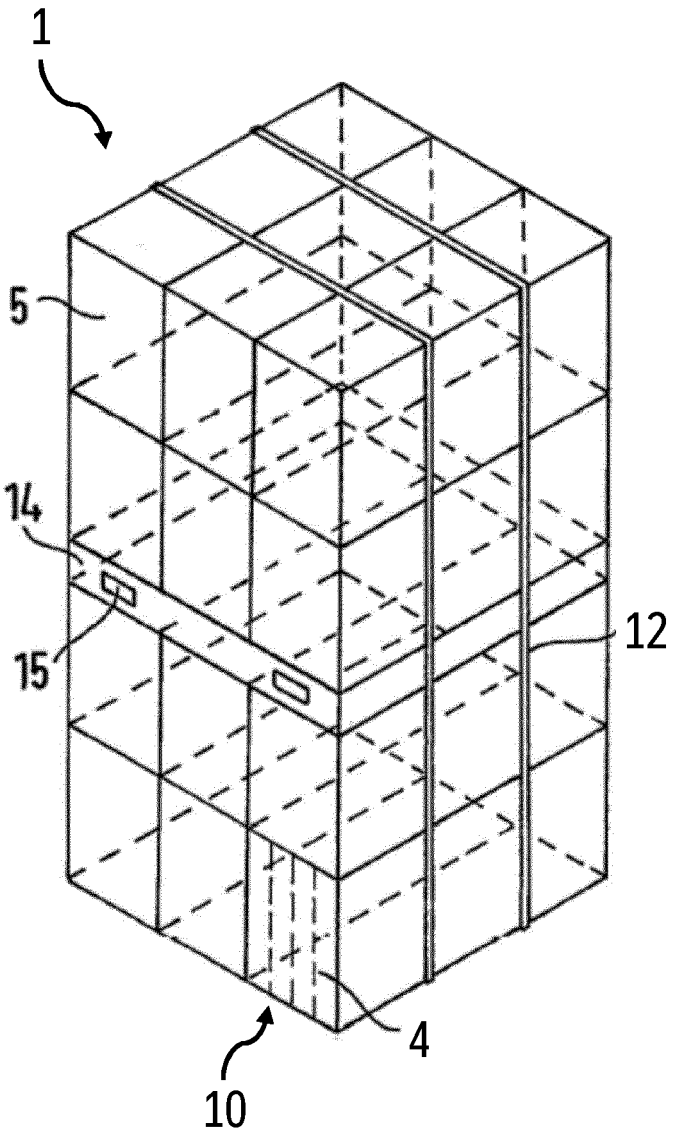

Fig. 7

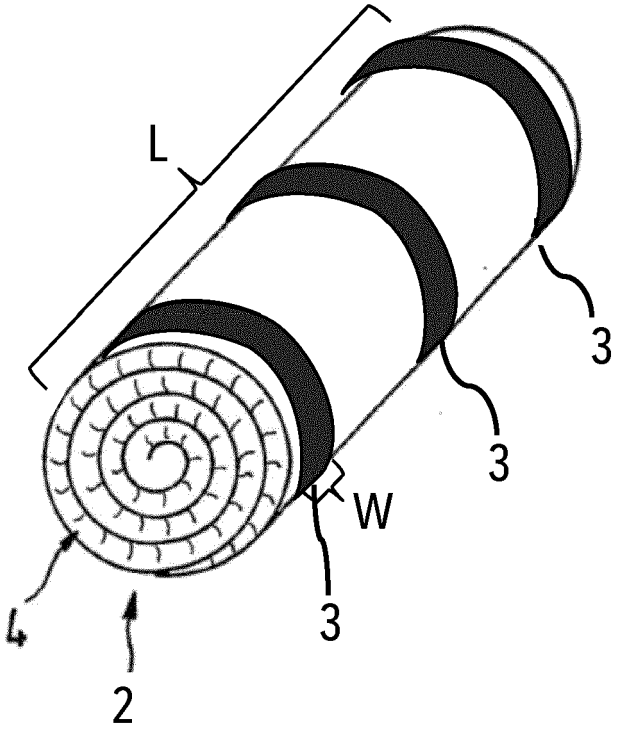

Fig. 8

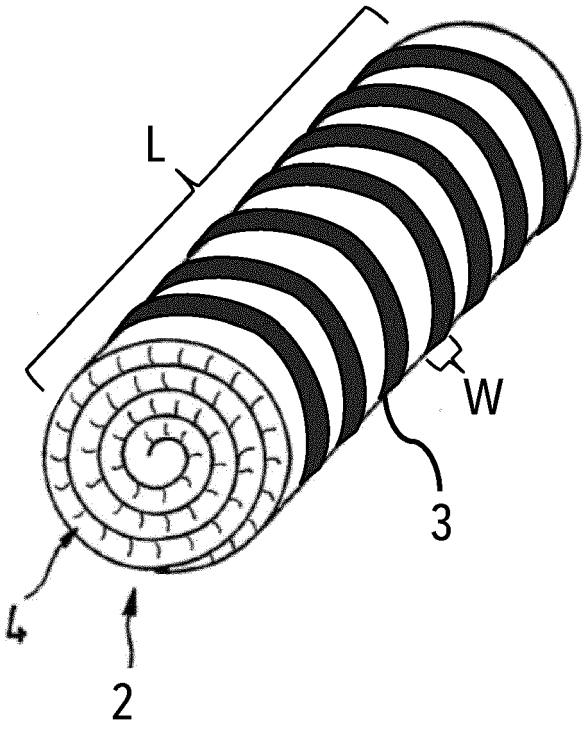

Fig. 9

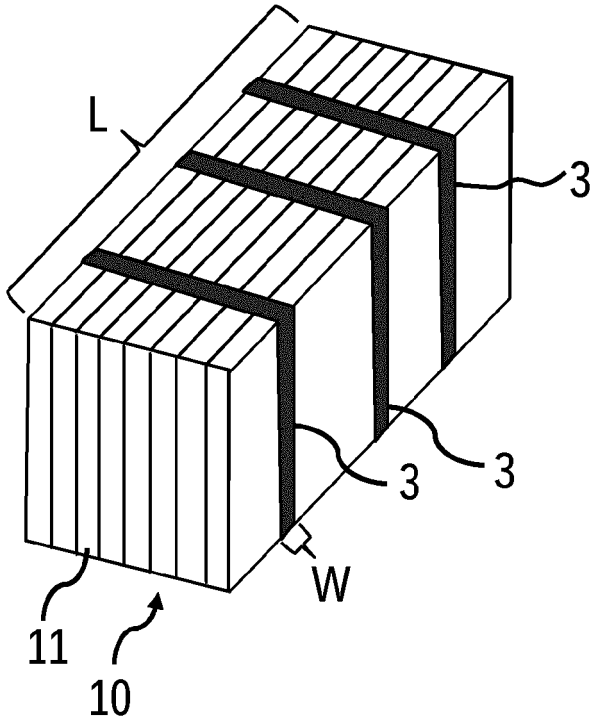

Fig. 10

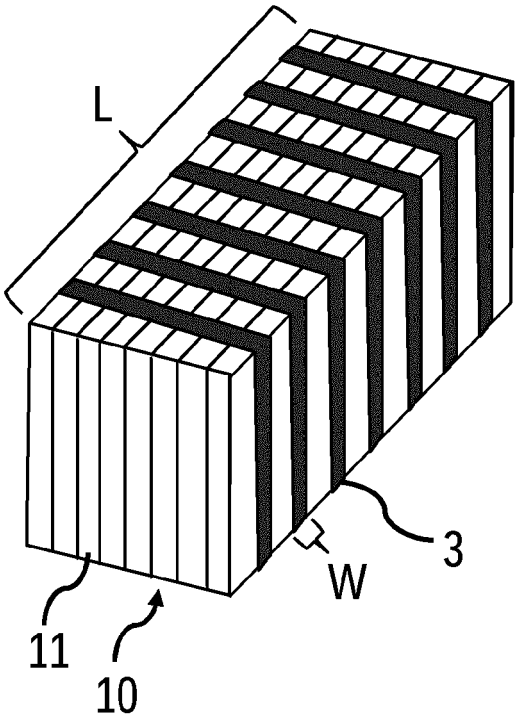

Fig. 11

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Application Number
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Place of search	Date of completion of the search	Examiner
Munich	15 May 2024	Lämmel, Gunnar

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