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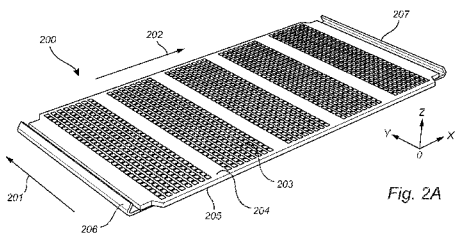


Fig. 2A

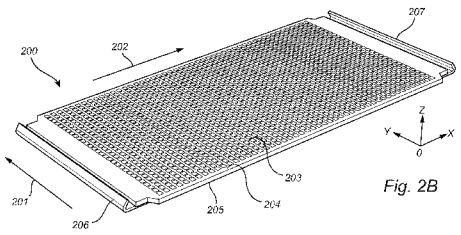


Fig. 2B

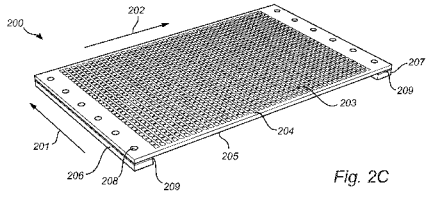


Fig. 2C

(57) Abstract: Screening module (200) adapted to be arranged in a screening equipment (400) for screening material, the module comprising a screening media having a main body extending in a first (201) and second (202) directions, and a pair of support members (206, 207) being spaced apart and arranged substantially parallel to the first or second direction, the support members (206, 207) are connected to the screening media via adhesion. The support members (206, 207) are preferably of hook-shaped structure. Such a configuration facilitates to reduce manufacture costs and extend life span of the screening module (200).

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SCREENING MODULE AND METHOD OF MANUFACTURING THE SCREEN MODULE

Field of invention

The present invention relates to screening module to screen bulk material and in particular, although not exclusively, to a screening module having a specifically designed screen fastener, as well as a screening equipment incorporating the screening module.

Background art

Screen decks are commonly used for separating the bulk material fed onto them, into different grades. Screen decks are usually releasably mounted onto a vibratory screen apparatus, when they get damaged or worn out, then are detached and replaced with new ones. For facilitating the replacement, screen decks are preferred to have a modular design, ideally having a configuration that facilitates easy installation. One design is that the screen decks employ a hook-shaped screen holding rail.

Figure 1A shows an existing screening module in a perspective view, Figure 1B presents a magnified cross sectional view of a part of a screening equipment incorporating an existing screening module 100. The rubber screen cloth 101 having a plurality of holes thereon is fixed at each side onto a steel screen rail 102, each screen rail 102 includes an elongate upper rail 103 and lower strip 104 for clamping the screen cloth therebetween via metal lock pins 109. Usually a row of holes are punched along the longitudinal direction of the rail and strip, through which the pins pass, the upper rail has hook shape in transverse vertical plane.

Further, rests 107 are commonly included for supporting a screen deck. Side rails 105 are removably attached to the upright side walls or panels 108 by screws 106 which extend through apertures in the side rails 105 and corresponding apertures in the side walls, a fastener 110 is then used to secure the screw in place, it may be used for tensioning the screen cloth in a secure manner.

A conventional solution involves the use of extruded aluminium or steel hooks that are installed in terms of screws, bolts or pins when installing screen cloths. Usually a relatively dense number of holes are required on the metal rail to facilitate the installation. Such construction is expensive and demands long installation time, thus needs to be simplified. Further, the screws and hooks are exposed to wear. Moreover, screen clothes are more easily damaged when working in a tensioned state.

Summary of the Invention

It is an objective of the present invention to provide a screening module that facilitates the reduction of manufacturing costs. It is a further objective of the present invention to provide a screening module having extended life span. It is an additional objective of the present invention to provide a screening module which in operation provides homogenous tensioning on the screening media.

The objectives are achieved by providing a screening module having a specifically configured screen fastener. The idea is to connect the screen fastener with the screening

media via adhesion, rather than via any mechanical fastening means such as the widely used metal bolts, screws or pins. The screen fastener can be in the form of an elongated screen rail, which defines a receiving channel that is adapted to operably co-operate with a retaining means of a screening equipment when the screening module is mounted onto the screening equipment. The screen fastener may be bonded to the contact face (adapted to contact material to be screened) or the back face of the screening media using an adhesive material such as glue. The adhesion or the adhesive material is continuously provided or provided continuous in space, i.e. without interruption along the longitudinal direction of the screen fastener. Viewing in the longitudinal direction, the screen fastener shall be bonded at the side edges of the screening media with a certain overlap width, in this way, the adhesion or bonding between the screen fastener and the screening media is tight and strong enough, such that they will not be broken off and get detached from each other under tensioning in operation, the adhesion shall be sufficiently strong to withstand the tensioning force and other possible extra stress resulted from bulk material gravity and/or vibration of the screening media. This may be ensured by choosing a specific adhesive material depending on the material of the screen fastener and of the screening media, the size of the screening media, and the overlap width between the screen fastener and the screening media. Overlap herein means the presence of a common portion or projection in one or more dimensions, for example, the screen fastener may be bonded to the screening media at a contact area, extension of the contact area in width direction is called as overlap width.

Throughout the description a longitudinal direction 201 (referring to figure 2) is also called a length direction corresponding to axis Y of the coordination system, the width direction 202 is indicated as a horizontal direction corresponding to axis X, the height direction corresponding to Z axis, the plane defined by axis X and axis Z is indicated as a transverse vertical plane.

Advantageously, the screening module is inexpensive as compared to existing solution, because there is no need to manufacture screws, bolts, rivets and the like, and no need to punch a number of holes along the elongated metal screen rail, which metal machining operation is time consuming in regards of manufacturing and installation effort either by

labor power or by machine; in addition, a metal strip is not required on the opposite face of the screening media as a washer or bushing (such as strip 104 in Fig. 1B) through which a bolt or screw passes and secures the screen fastener onto the screening media, the screen is thus cheap and light since less metal material is consumed in manufacturing; the use of a special tool or machine, e.g. lifting tools, is avoided; higher consumption of energy in manufacturing is avoided; moreover, the manufacturing process is significantly simplified. Instead, a thermal compression bonding process can be employed to secure the screen fastener onto the screening media.

Another advantage is the considerably extended life span of the screening module, since the solution improves the wear-resistant properties of the screening module. It is known that there is a problem in the conventional screening module, i.e. metal components such as screen rail and/or bolts are subject to undue wear when exposed to the running bulk material. Material particles that are freshly crushed often have irregular surfaces, sometimes they even have sharp edges, this causes heavy abrasion on the screen rail and/or the bolts. However, using the solution in this invention this problem no longer exists, since no bolts are used. The metal screen rails may be disposed at the back face and instead completely decked by the screening media, therefore the screening module experiences the same extent of wear over the entire surface, rather than been excessively worn in a localized area of the screening module. Accordingly, this helps to reduce the frequency that the worn-out screening module needs to be replaced, which in turn reduces the downtime of a screening operation, and meanwhile improves the machine screening efficiency.

Still a further advantage is, in operation, that a uniform or even stress distribution is achievable on the screening media along its longitudinal direction. Another problem known in the conventional screening module is that a limited number of bolts or screws serve to transmit the entire force from the screening media to the screen rail at a number of limited contacting areas on the shank surface. Whilst the force, which includes the tensioning force and other possible extra stress resulted from bulk material gravity or vibration of the screen media, may be large, the side edges of the screening media at the limited contacting areas suffer from greater stress and often get torn or broken over a

period of operation. The tearing accelerates after an initial rip occurs, then it must be replaced by a new screening module. Based on the invention, the force is transferred from the screen media to the the screen rail via the even and homogeneous adhesion along the entire side edges of the screening media, wherein no stress concentration occurs, thus the screening media is not prone to damage and its life cycle is prolonged. This also contributes to reduce the frequency of replacing the worn-out screening module, which in turn reduces the downtime of a screening operation, and improves the machine screening efficiency.

According to a first aspect of the present invention there is provided a screening module adapted to be arranged in a screening equipment for screening material, the module comprising: a screening media having a main body extending in a first direction and a second direction, the main body having a contact face adapted to contact material to be screened and a back face opposite to the contact face, comprising a plurality of openings extending through the main body between the contact and back faces; and a pair of support members
being spaced apart and arranged substantially parallel to the first or second direction, characterized in that the support members are connected to the screening media via adhesion.

Preferably the support members are elongate, and preferably connected to the side edges of the screening media using an adhesive material or an intermediate layer having an adhesive material on the connection surfaces.

In one embodiment, in order to improve the bonding effect, the support members and/or the screening media may comprise a bonding surface that is made rough or coarse or provided with micro burrs thereon. A bonding surface is understood as a contacting surface or an interface where the support member and the screening media are bonded together.

Preferably the respective support member is adapted to be connected to the screening media such that a tensioning force that is operably applied to the screening media is partly or entirely carried by the adhesion.

Preferably, the adhesion or the adhesive material is provided continuous along the longitudinal direction of the respective support member. Preferably the support members are adapted to be adhered to the screening media such that the force operably received by the screening media is uniform along longitudinal direction of the respective support member.

Preferably, the respective support member comprises a bonding formation and a retaining formation projecting out of the bonding formation, preferably the bonding formation, is an elongate strip and is formed with the retaining formation as an integral structure. When viewed in longitudinal direction, a retaining formation may project out of the bonding formation.

Preferably, the respective support member comprises an elongated rail having a group of through-holes formed thereon, the elongated rail is adhered onto the contact face and/or back face of the screening media in a way that a group of through-holes of the elongated rail are respectively aligned vertically with a group of through-holes in the side edges of the screening media.

Preferably, the respective support member is a hook-shaped structure. It may be in generally V-shaped, generally L-shaped or generally U-shaped structure. Such a configuration is beneficial in that, its adaptability to be installed on a screening equipment is improved. The screening module can be conveniently fixed onto a screening equipment having simplified installation structure, what is needed is a complementary or co-operating retaining means (e.g. a rail) to engage the hook-shaped support member of the screening module, the screening equipment is not required to provide a special support frame. Via the hook-shaped support member the screening media is easily tensioned without using complicated tensioning fixtures such as a complicated mating or cooperating sub-frame. When tensioning is required, the support member is just moved outwards to pull the screening media, thus is convenient; again, with hook-shaped support member, the module is easily expanded e.g. multiple screening modules may be cascaded in series, this may be

easily implemented by direct or indirect coupling or engaging the hooks of adjacent screening modules with each other.

In one embodiment, the retaining formation is an elongate formation or comprises separated individual portions spaced apart along the longitudinal direction of the respective support member. In another embodiment, the apertures may be allocated on the screening media close to the border of the respective support members, preferably being present immediately at the border of the respective support member, i.e. no 'spare' portion of the screening media is required to be reserved between the start of the apertures and the border of the respective support member, so as to have as many apertures as possible on the screening media. In another embodiment, the apertures are formed to cover the entire area of the screening media, this allows to achieve a maximal amount of openings.

Optionally, the bonding formation comprises a bonding surface that is substantially parallel to the tensioning force operably applied to the screening media.

Optionally, the retaining formation comprises a retaining surface projecting at an angle of 90° or substantially less than 90° relative to the bonding surface of the bonding formation.

Optionally, the support members, the screening media and the adhesive material are made of different material, preferably, each support member is made of metal or plastic or reinforced polymeric material, the screening media is made of flexible material preferably a polymeric material including rubber and polyurethane.

Optionally, the support members are respectively bonded to the side edges of the screening media with an overlap in transverse vertical plane, preferably at least 50% of the bonding formation being covered by the adhesive material in transverse vertical plane. To keep the adhesion sufficiently strong to withstand the tensioning force and other possible extra stress, the overlap width between the screen fastener and the screening media may be designed as depending on a specific adhesive material, the material of the screen fastener and of the screening media, and the size of the screening media.

Preferably, the inwardly curved surface of the hook-shaped structure is partly or entirely covered by the screening media in the transverse vertical plane (or when viewed in the longitudinal direction). When the inner surface of the hook is entirely covered by the screening media, the metal flange is subject to less wear.

Preferably, the inwardly curved surface of the hook-shaped structure is entirely or partly adhered to the screening media, viewed in transverse vertical plane. When the outer flange of the hook is adhered to the screening media, the horizontal portion of the hook is short and free of adhesive material, the screening media may have more apertures thereon for improving screening performance (see figure 3E); or when the outer flange of the hook is adhered to the screening media, the horizontal bonding portion of the hook may be less wide, this similarly makes space for more apertures to be arranged on the screening media (see figure 3A).

Preferably, the bonding formation and the retaining formation are disposed at the same side of the screening media, the bonding formation is bonded to the back face of the screening media.

According to a second aspect of the present invention there is provided a screening equipment for screening bulk material, the equipment comprising: a pair of sidewalls; a plurality of support means, wherein the plurality of support means together with the pair of sidewalls form a frame structure; and a screening module as described in any preceding embodiment mounted or indirectly mounted upon the frame structure and extending between the sidewalls; wherein the screening equipment comprises a pair of retaining means co-operating with the pair of support members of the screening module for coupling the screening module onto the screening equipment.

Optionally, the equipment comprises a tensioning means being directly or indirectly coupled to the screening module for applying tensioning force onto the screening module.

According to a third aspect of the present invention there is provided a method for manufacturing a screening module according to any embodiment as described above, the

method comprising: providing a screening media having a main body extending in a first and second directions; bonding a pair of support members to the screening media using an adhesive through a thermal compression bonding process, wherein the support members are spaced apart and are arranged substantially parallel to the first or second directions; preferably the support members are elongate and preferably connected to the side edges of the screening media using an adhesive material or an intermediate layer having an adhesive material on the connection surfaces; punching the main body of the screening media to form a plurality of openings extending through the main body.

Brief description of drawings

A specific implementation of the present invention will now be described, by way of example only, and with reference to the accompanying drawings in which:

Figure 1A is a perspective view of an existing screening module;

Figure 1B is a magnified cross sectional view of a part of a screening equipment comprising an existing screening module;

Figure 2A is a perspective view of a screening module according to a specific implementation of the present invention;

Figure 2B is a perspective view of a screening module according to another specific implementation of the present invention;

Figure 2C is a perspective view of a screening module according to a further specific implementation of the present invention;

Figures 3A to 3G are schematics showing respectively a cross section of a part of a screening module according to a specific implementation of the present invention;

Figure 3H is a schematic showing a perspective view of a part of a screening module according to a specific implementation of the present invention;

Figure 4 is a perspective view of a screening equipment according to a specific implementation of the present invention;

Figure 5 is a magnified perspective view of a part of a screening equipment of figure 4;

Figure 6 is schematic showing a perspective view of a part of a screening equipment according to a further specific implementation of the present invention.

Detailed description of preferred embodiment of the invention

Figure 2A shows a perspective view of a screening module 200 according to a preferred implementation of the present invention, Figure 3A shows schematically a cross section of a part of the screening module of figure 2, the screening module includes a screening media (also called a screen cloth or a screen mat) 203 having a main body extending in a longitudinal direction 201 and transverse direction 202, and having a generally rectangular profile. The main body has a contact face 204 adapted to contact material to be screened and a back face 205 opposite to the contact face, and comprises a plurality of openings extending through the main body between the contact and back faces; the screening module further includes a pair of elongate screen rails 206 and 207 that are arranged along and substantially parallel to the longitudinal direction 201, the screen rails 206 and 207 are bonded to the screening media 203 via an adhesive material 304, in particular the screen rails have hook-shaped profile viewed in longitudinal direction 201. The respective screen rail includes an elongate planar strip 301 (see figure 3) as a bonding formation and an elongate planar or curved strip 302 as retaining formation, the bonding formation and retaining formation can be welded together or simply bended from a single strip. Each screen rail is formed as a V-shaped hook-like structure, the inner angle of the hook-shaped structure may vary, preferably in the ranges of 30° to 90°. In Figure 2A the screening media has areas that are not punched with apertures, several blank columns of area are free of apertures. In another embodiment, the openings are formed to cover the entire area of

the screening media, this character is illustrated in figure 2B, it allows to achieve a maximal amount of openings.

The screen rails are bonded respectively to the side edges of the screening media with an overlap on the planar strip, the overlap width W preferably amounts to about 70% or more of the width of the bonding formation 301, leaving a free space near the inner apex for contacting with a counter engaging means of a screening equipment for installing purpose. Importantly, the adhesive material is provided continuous without interruption along the longitudinal direction 201 of the respective screen rails such that the operational force from the screening media is transmitted substantially uniformly along the longitudinal direction onto the screen rails. The apertures 305 may be arranged at a position starting immediately from the border of the bonding formation 301.

The screening media 203 is made of flexible material preferably a polymeric material including rubber and polyurethane such as 65 Shore A rubber. The screen rails are made of metal or plastic or reinforced polymeric material, preferably it is aluminium or steel. The adhesive material may be a glue generally available on the market, for example a super glue from the Cyanoacrylate family may be used. It can be applied directly to the bonding surfaces. Alternatively, two-component adhesives may be used where the components are mixed before they may be used.

The width extension of the screening module is typically around 1500 mm, the length extension is typically around 3000mm, the bonding formation 301 has a width in the range of 25 mm to 100 mm, the retaining formation 302 may be slightly narrower than the bonding formation. The retaining formation may be decked in its inwardly curved surface by a rubber or coated with a protection layer, or hidden from bulk material by a counter engaging means of the screening equipment.

To assemble the preferred form of the screening module 200, the outer end of rail is bent over to form a V-shaped hook, the next step is to superimpose the screening media 303 over the bonding portion 301 of the screen rail. Then tightly bond the screen media to the bonding portion using an adhesive 304 through a thermal compression bonding process.

Such screening module may be employed in cross tensioned applications - tensioned along a horizontal direction 202.

Figure 2B illustrates a further embodiment of the screening module, the screening module has similar construction as shown in figure 2A, except that the openings extending through the main body between the contact and back faces are allocated and formed on the entire exposing area of the screening media 203 between the screen rails 206 and 207.

Referring to figure 2C, another embodiment of the screening module is shown, the screening module 200 includes a screening media 203 extending in a longitudinal direction 201 and transverse direction 202, and a pair of elongate screen rails 206 and 207 that are arranged substantially parallel to the longitudinal direction 201. The screen rails 206 and 207 have respectively a substantially planar bonding surface that are bonded to the screening media 203 via an adhesive material 209. Further, a group of through-holes 208 are formed in the screen rails, and respectively aligned vertically with a group of through-holes 208 in the side edges of the screening media 203. The respective screen rail is an elongated plate or strip bonded on the back face 205, optionally it may be arranged onto the contact face 204 of the screening media 203, optionally the respective screen rail may comprise strips adhered to both of the contact face and back face.

Figure 3B shows schematically a cross section of a part of another embodiment of the screening module, where the screening media is imposed on the entire inwardly curved surface of the hook-shaped screen rail. Meanwhile, the entire inwardly curved surface of the hook-shaped screen rail is adhered to the screening media via adhesive material. The screening module may be cross tensioned along a horizontal direction 202.

Figure 3C illustrates a further embodiment of the screening module, that is similar to Figure 3B except that only the planar bonding formation 301 is adhered to the screening media via adhesive material.

Figure 3D shows an embodiment of the screening module suitable for longitudinal tensioning. The bonding formation 301 and the retaining formation 302 are disposed at the

same side i.e. back face of the screening media 303, the bonding formation 301 is bonded to the back face 205 of the screening media. The screening media 303 protrudes outwards beyond the outer range of the screen rail 300 as indicated by the section 306.

Figure 3E shows a variant of the screen rail suitable for cross tensioning. The screen rail 300 bends inwards and extends in the width direction by a relative short protrusion 302, the bonding formation 301 is positioned at the outer end, this design leaves more room for allocating more apertures on the screen. Optionally the protrusion 302 may extend longer in the width direction than the protrusion 302 shown in figure 3E, similar to the screen rail of figure 3A.

Referring to Figure 3F, another design variant of the screen rail is shown, where the screen rail has the retaining surface 310 that is normal to the bonding surface 311. Preferably it creates a L-shape corner.

Figure 3G represents two screening modules according to an embodiment suitable for longitudinal tensioning. The screen rails 300 are located at the back face of the screening media 303, and having U-shaped hook. Further, the screening media protrudes beyond the screen rail by a lap 306, the lap serves to protectively shield the screen rail and guide the bulk material to fall onto the successive screening module that may be assembled together (as indicated by arrow), where the right screening module which is located at downstream of the material flow is arranged lower than the left.

Referring to Figure 3H, the screening module differs from Figure 3A in that the retaining formation is simplified as multiple discrete fingers 312. Metal material consumption is reduced without negative impact on its support functionality.

Referring to Figure 4, a perspective view of a screening equipment 400 is shown, which includes a pair of opposing spaced-apart upright disposed side walls 401 and 402, a set of cross beams 403 extending transverse between and coupling to the side walls, a group of support ribs 404 in turn held by the cross beams 403, accordingly, the side walls, the cross beams together with the support ribs form a rigid frame structure. Further, the equipment

incorporates a screening module 405 arranged between the side walls and coupled onto the rigid frame structure. A pair of clamp rails 406 and 407 are provided for securing the screening module 405 in place onto the frame structure. The screening media is supported via rubber caps 408 on the frame structure.

Fig 5 is a magnified perspective view of a part of the screening equipment of figure 4, showing greater details of a screening module 501 and its connection to a screening equipment. The screening module 501 includes a screening media and a screen rail 511 being adhered to the screening media. The clamp rail 506 is shaped to define an elongate angled flange 510 which can be arranged facing downward such that it cooperates and is in hooked-engagement with the groove of the screen rail 511 of the screening module, clamp rail 506 may be generally L-shape or V-shape, viewed in longitudinal direction. The angled flange 510 may be in the form of a continuous flange, which extends along the entire length of the clamp rail.

A group of lock screws 512 are provided to secure the screening module onto the side wall 513 via generally L-shape or V-shape gasket or washer 514, lock screws 512 are generally cylindrical and inserted into mounting apertures 515 on the side walls and through apertures 516 on the clamp rail 506. Nuts 517 are adjustable on the screw 512 such that the screening module can be tensioned.

The equipment may further include generally L-shape rest 518 mounted or welded on the side wall 513 as a rack for supporting screening module vertically.

After the screening module 501 is clamped in place, it is then tensioned which can be implemented by tightening the screws 512 i.e. by causing an outward movement of the clamp rail 506, and urge it toward the side wall, so as to achieve the proper degree of tension on the screening media.

A further embodiment of a screening equipment is illustrated in figure 6. The screening equipment includes a screening module as shown in figure 2C, the screening module includes a screening media 601 and a substantially longitudinally arranged screen rail 602

adhered to the screening media. A group of aligned through-holes 603 are provided on the screen rail 602 and the screening media. A set of L-shaped bolts or pins 605 are employed to support the screening module by passing through the through-holes 603 and holding the screening module. The pins extend through apertures in a frame 607 and are mounted on the frame via fasteners 606 (e.g. nuts cooperate with threads on the bolts 605), the fasteners 606 may be tightened such that a tensioning is applied on the screening media. In this example, a major part or the entirety of the tensioning force from the screening media is carried by the adhesion.

It is to be understood that the embodiments of the invention disclosed herein are not limited to the particular structures, process steps, or materials disclosed herein, but are extended to equivalents thereof as would be recognized by those ordinarily skilled in the relevant arts. It should also be understood that terminology employed herein is used for the purpose of describing particular embodiments only and is not intended to be limiting. The forgoing examples are illustrative of the principles of the present invention in one or more particular applications, accordingly, it is not intended that the invention be limited.

Claims

1. A screening module (200) adapted to be arranged in a screening equipment (400) for screening material, the module comprising:

a screening media having a main body extending in a first and second directions (201, 202), the main body having a contact face (204) adapted to contact material to be screened and a back face (205) opposite to the contact face, comprising a plurality of openings extending through the main body between the contact and back faces; and

a pair of support members (206, 207);

the support members being spaced apart and arranged substantially parallel to the first or second direction (201, 202), characterized in that the support members are connected to the screening media via adhesion.

2. The module as claimed in claim 1, wherein the respective support member (206, 207) is adapted to be connected to the screening media such that a tensioning force operably applied to the screening media is partly or entirely carried by the adhesion.

3. The module as claimed in claim 1 or 2, wherein the adhesion or the adhesive material is provided continuous along the longitudinal direction of the respective support member.

4. The module as claimed in any preceding claim, wherein the respective support member (206, 207) comprising a bonding formation (301) and a retaining formation (302) projecting out of the bonding formation, preferably the bonding formation (301) is an elongate strip and is formed with the retaining formation (302) as an integral structure.

5. The module as claimed in any preceding claim, wherein the respective support member (206, 207) is a hook-shaped structure.

6. The module as claimed in claim 4 or 5, wherein the bonding formation of the respective support member is adapted to be arranged with the screening media to create a sandwiched structure.

7. The module as claimed in any one of claims 4 to 6, wherein the bonding formation (301) comprising a bonding surface (311) that is substantially parallel to the tensioning force operably applied to the screening media.

8. The module as claimed in any one of claims 4 to 7, wherein the retaining formation (302) comprising a retaining surface (310) projecting at an angle of 90° or substantially less than 90° relative to the bonding surface (311) of the bonding formation (301).

9. The module as claimed in any preceding claim, wherein the support members (206, 207) are respectively bonded to the side edges of the screening media with an overlap (W) in transverse vertical plane, preferably at least 50% of the bonding formation (301) being covered by the adhesive material in transverse vertical plane.

10. The module as claimed in any one of claims 5 to 9, wherein the inwardly curved surface of the hook-shaped structure is partly or entirely covered by the screening media in transverse vertical plane.

11. The module as claimed in any one of claims 5 to 10, wherein the inwardly curved surface of the hook-shaped structure is entirely or partly adhered to the screening media in transverse vertical plane.

12. The module as claimed in any one of claims 4 to 10, wherein the bonding formation (301) and the retaining formation (302) being disposed at the same side of the screening media, the bonding formation (301) is bonded to the back face (205) of the screening media.

13. A screening equipment (400) for screening bulk material, the equipment comprising:

a pair of sidewalls (401, 402);

a plurality of support means (403, 404), wherein the plurality of support means together with the pair of sidewalls form a frame structure; and

a screening module (405, 501) as claimed in any preceding claim mounted or indirectly mounted upon the frame structure and extending between the sidewalls (211, 212);

wherein the screening equipment comprises a pair of retaining means (406, 407, 506) co-operating with the pair of support members (511) of the screening module (405, 501) for coupling the screening module (405, 501) onto the screening equipment (400).

14. A screening equipment (400) as claimed in claim 13, the equipment comprising a tensioning means (512, 517) being directly or indirectly coupled to the screening module (405, 501) for applying tensioning force onto the screening module (405, 501).

15. A method for manufacturing a screening module as claimed in any one of claims 1 to 12, the method comprising:

providing a screening media (203) having a main body extending in a first and second directions (201, 202);

bonding a pair of support members (206, 207) to the screening media using an adhesive through a thermal compression bonding process, wherein the support members being spaced apart and being arranged substantially parallel to the first or second directions;

punching the main body of the screening media to form a plurality of openings extending through the main body.

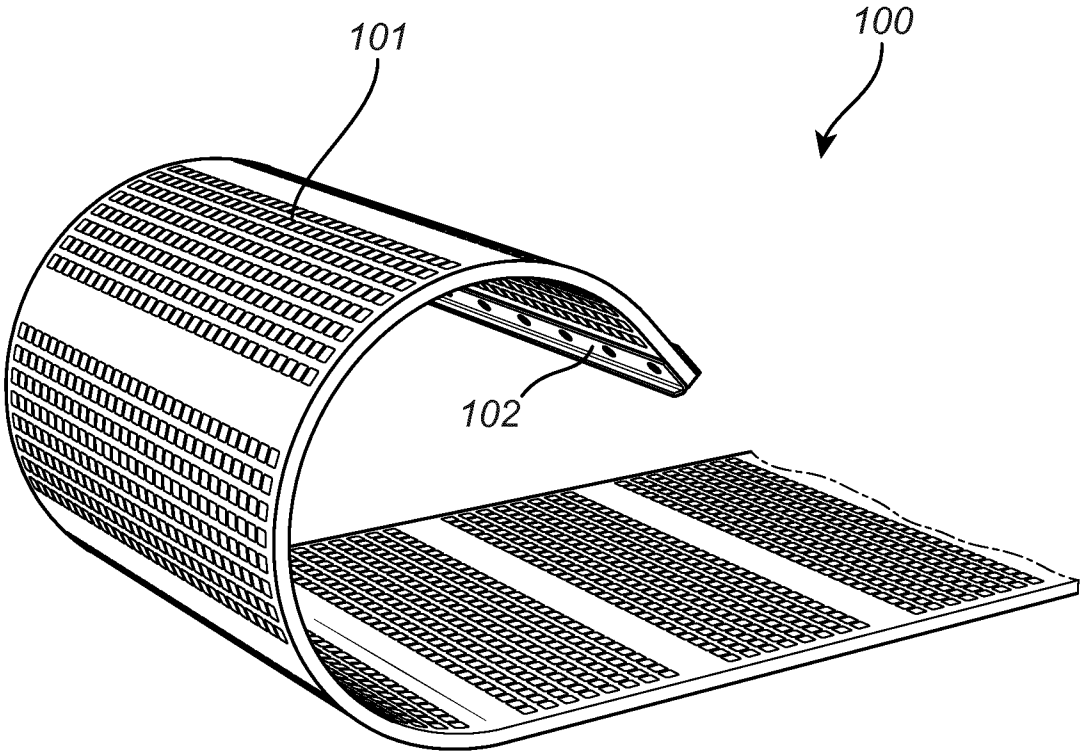


Fig. 1A

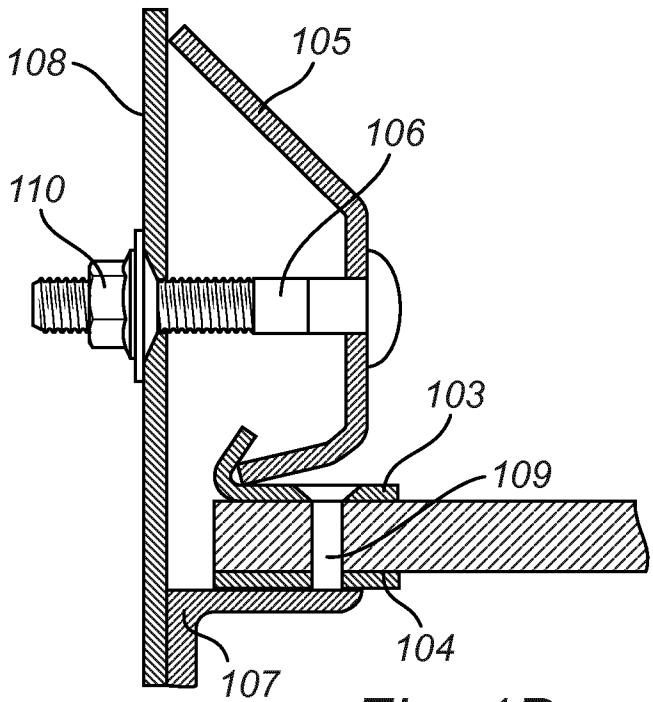


Fig. 1B

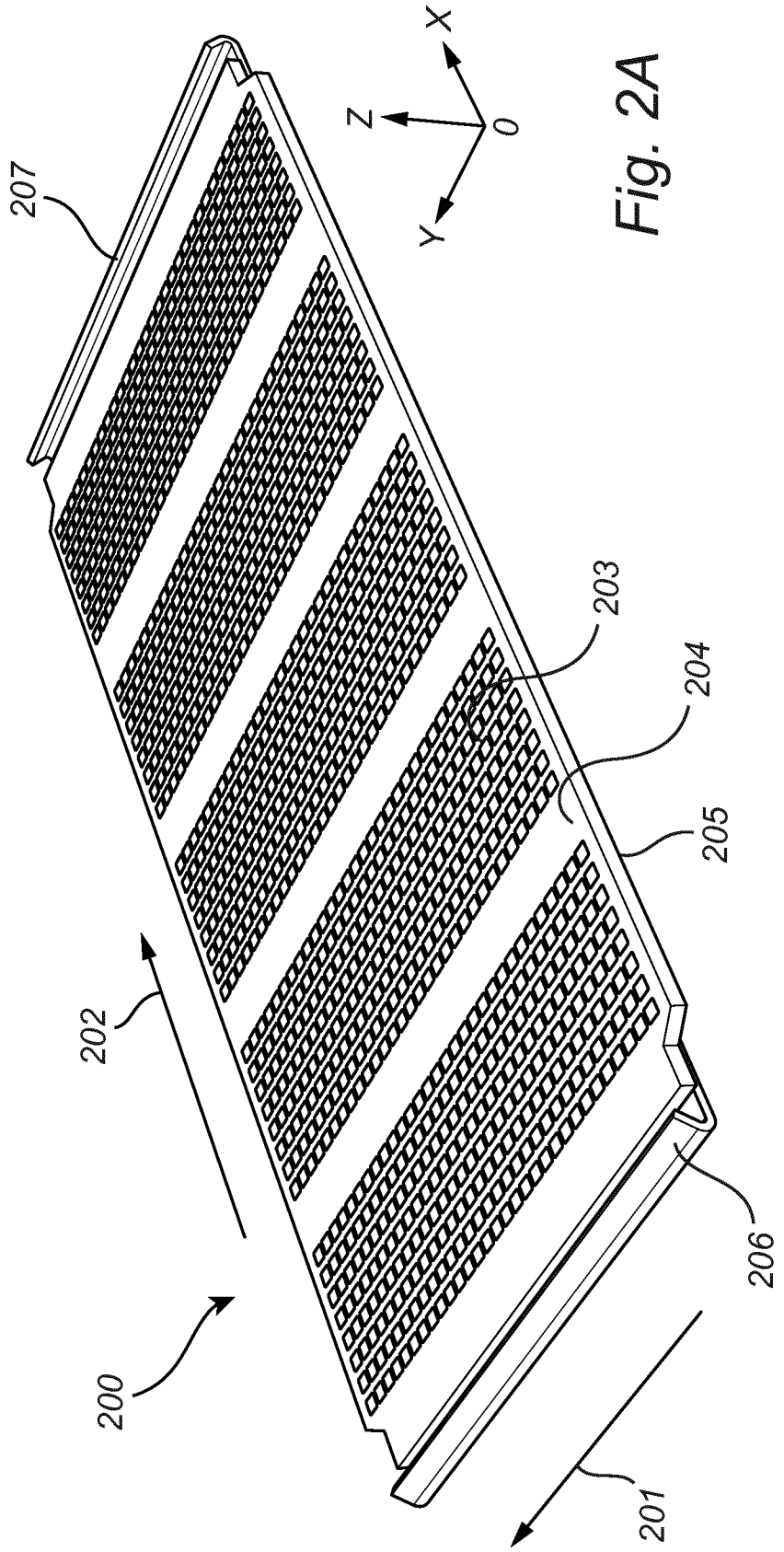


Fig. 2A

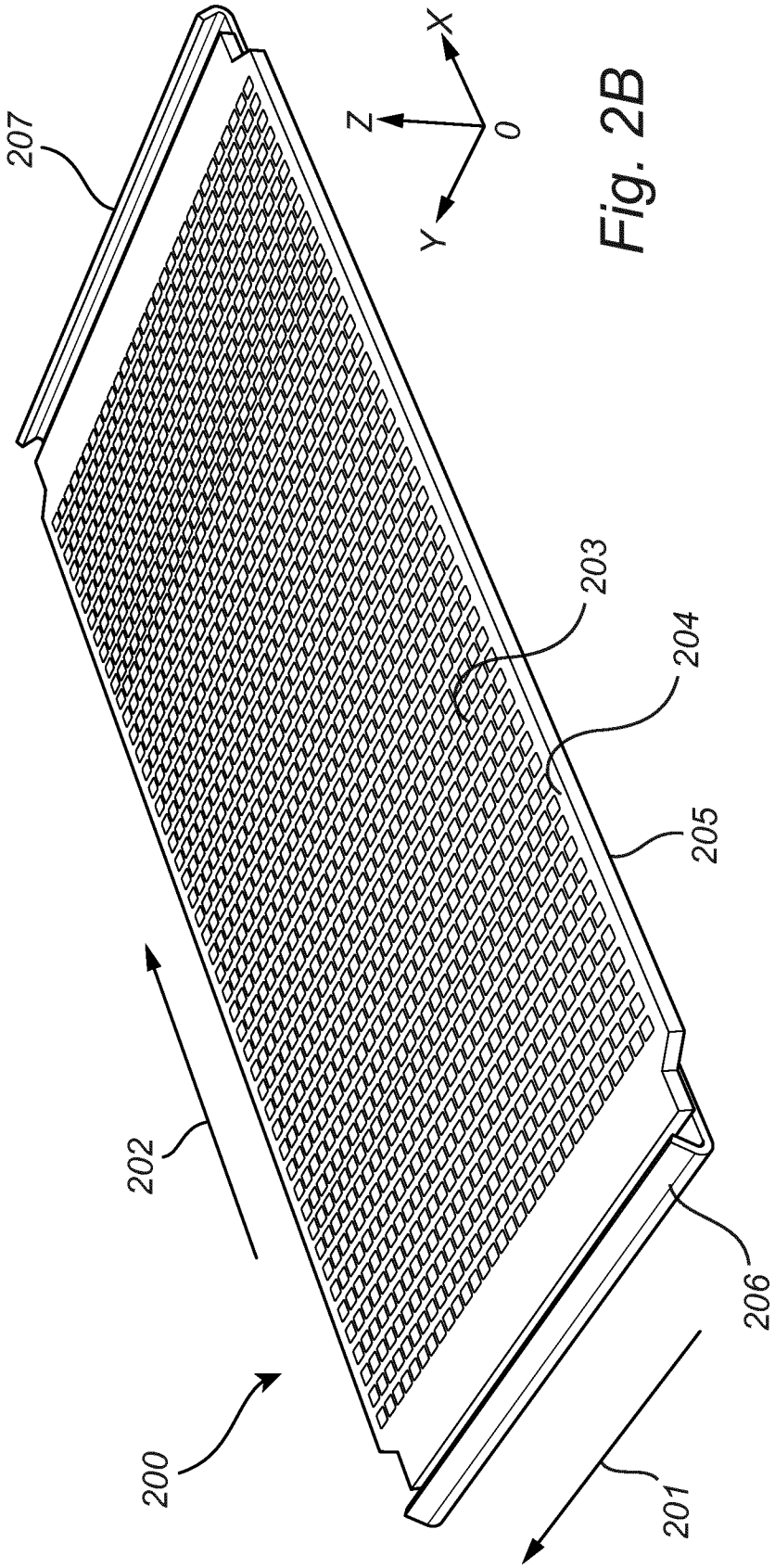


Fig. 2B

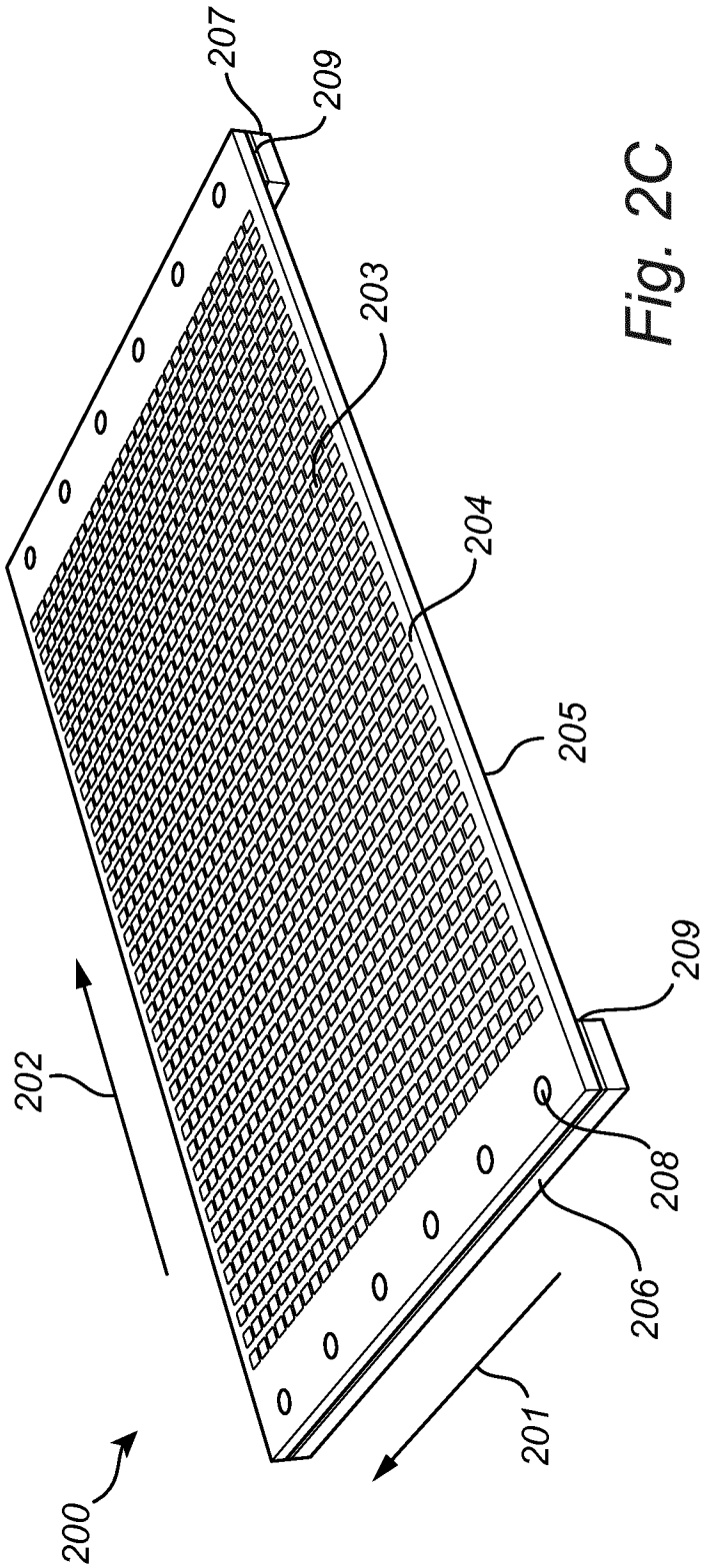


Fig. 2C

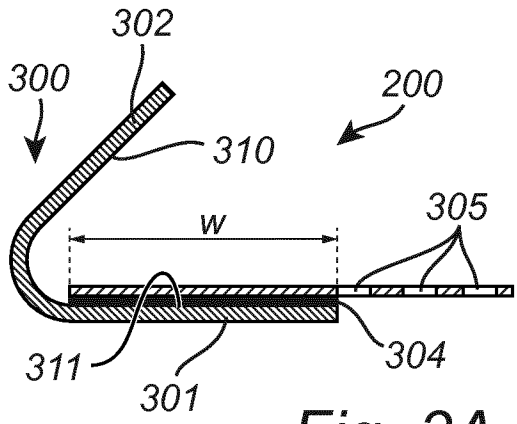


Fig. 3A

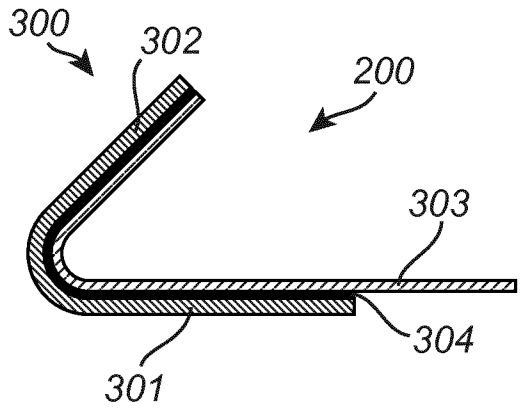


Fig. 3B

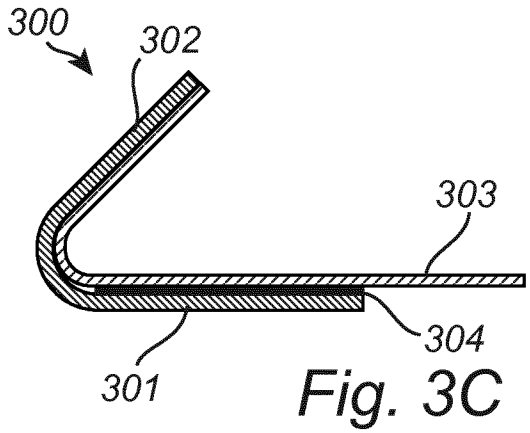


Fig. 3C

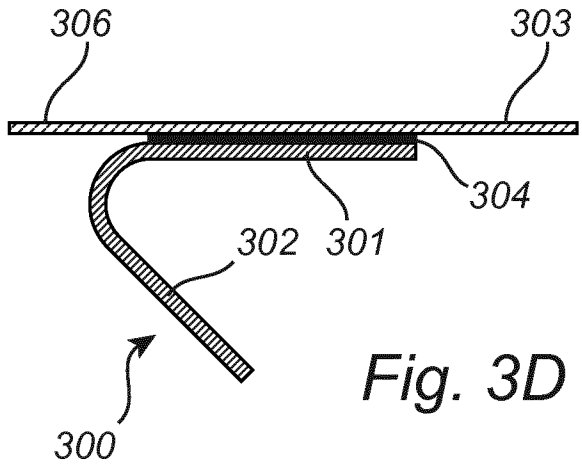


Fig. 3D

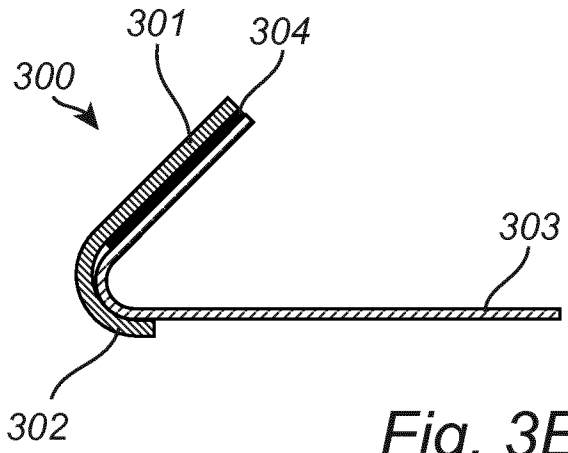


Fig. 3E

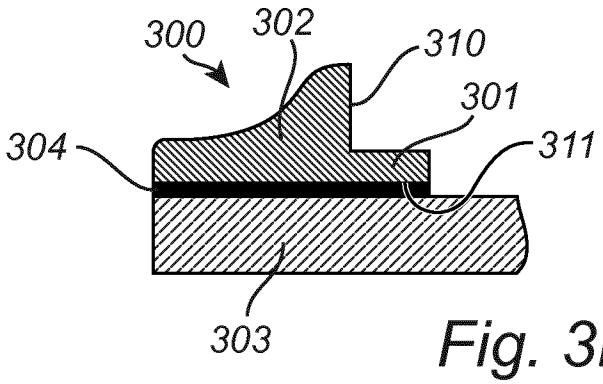


Fig. 3F

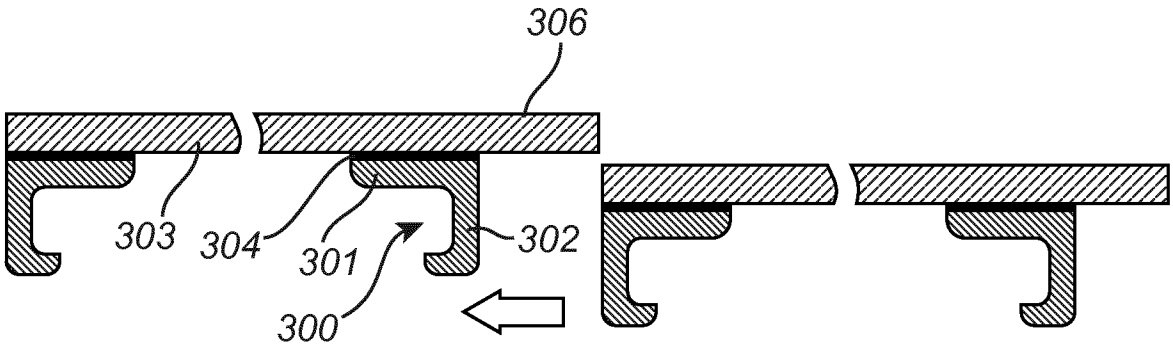


Fig. 3G

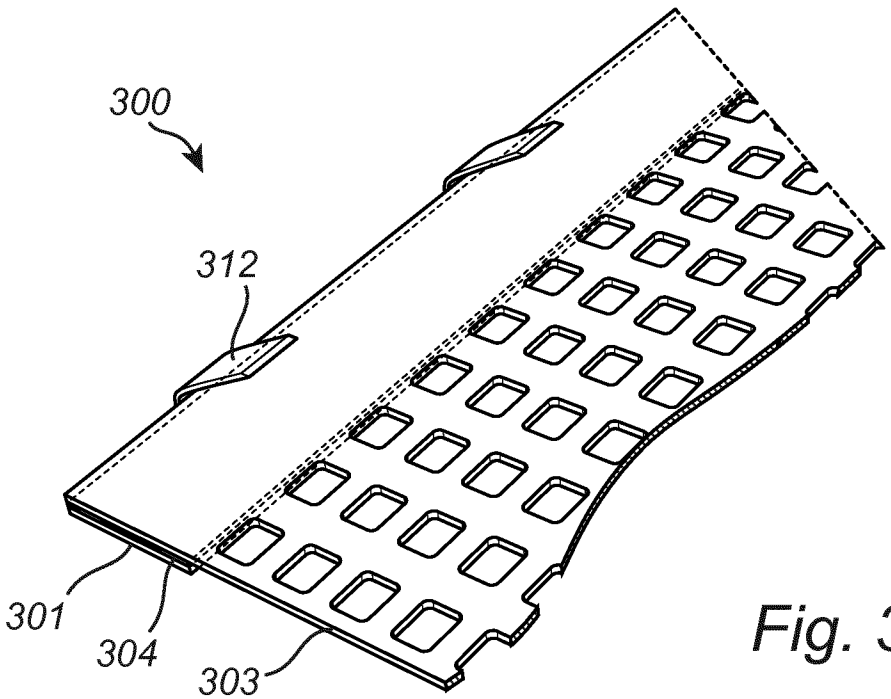


Fig. 3H

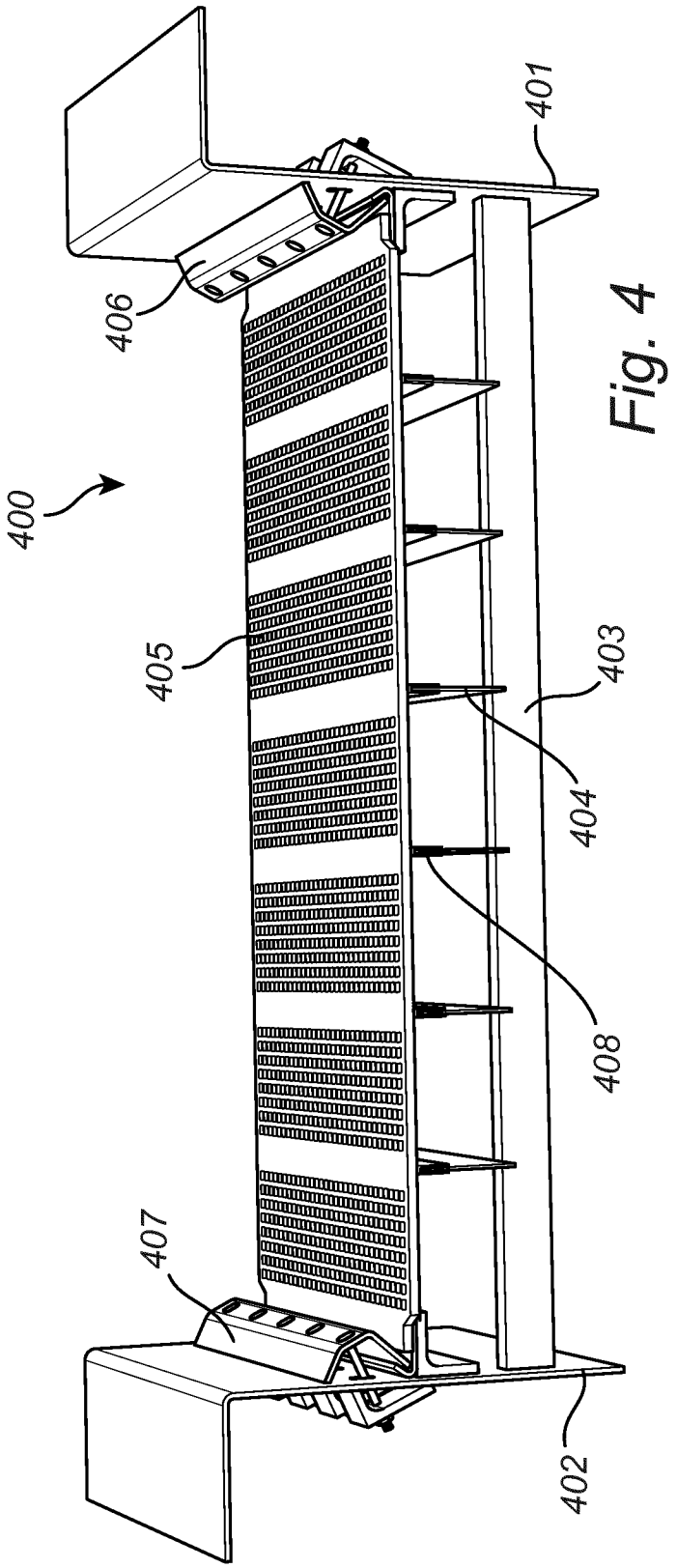


Fig. 4

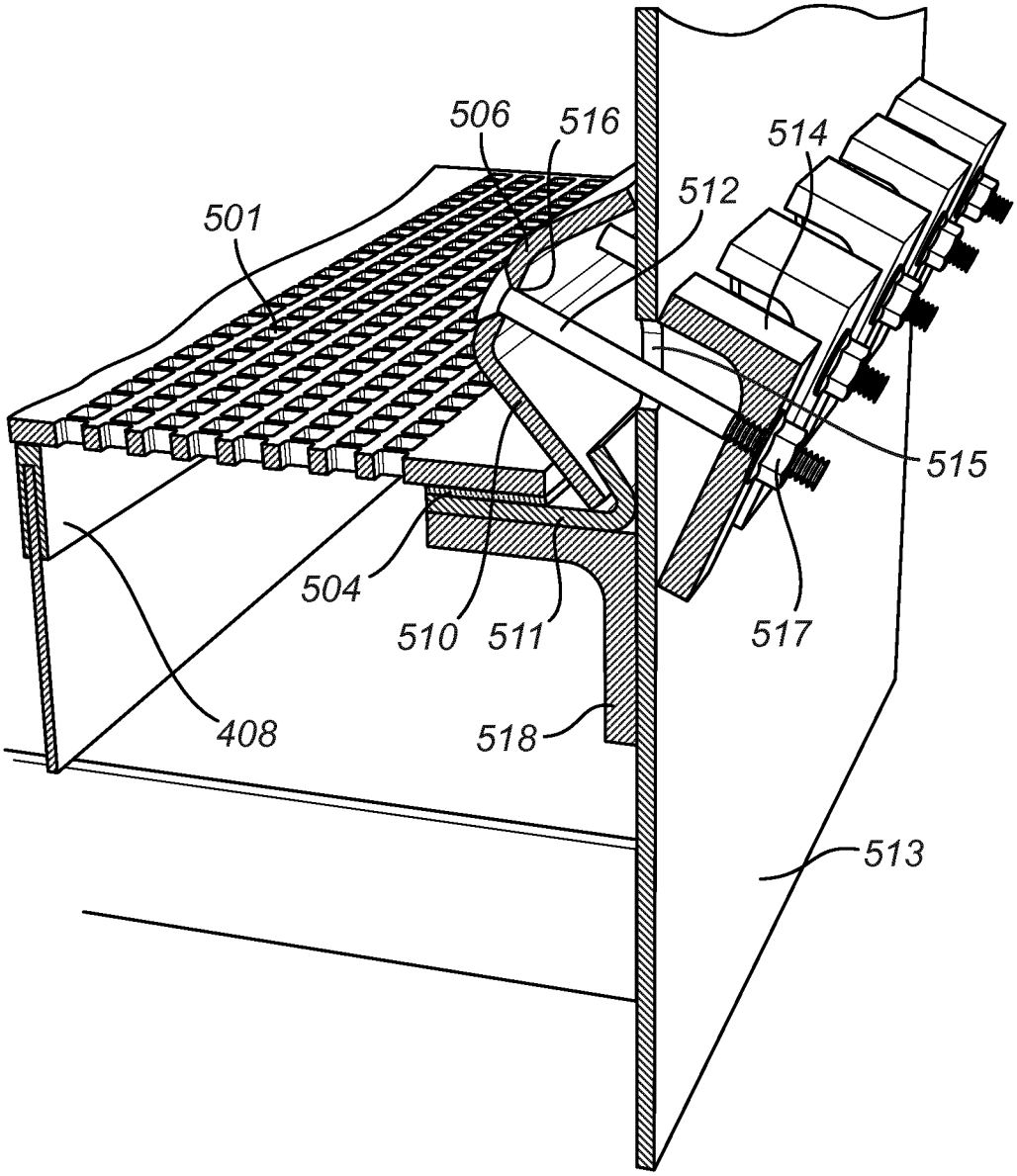


Fig. 5

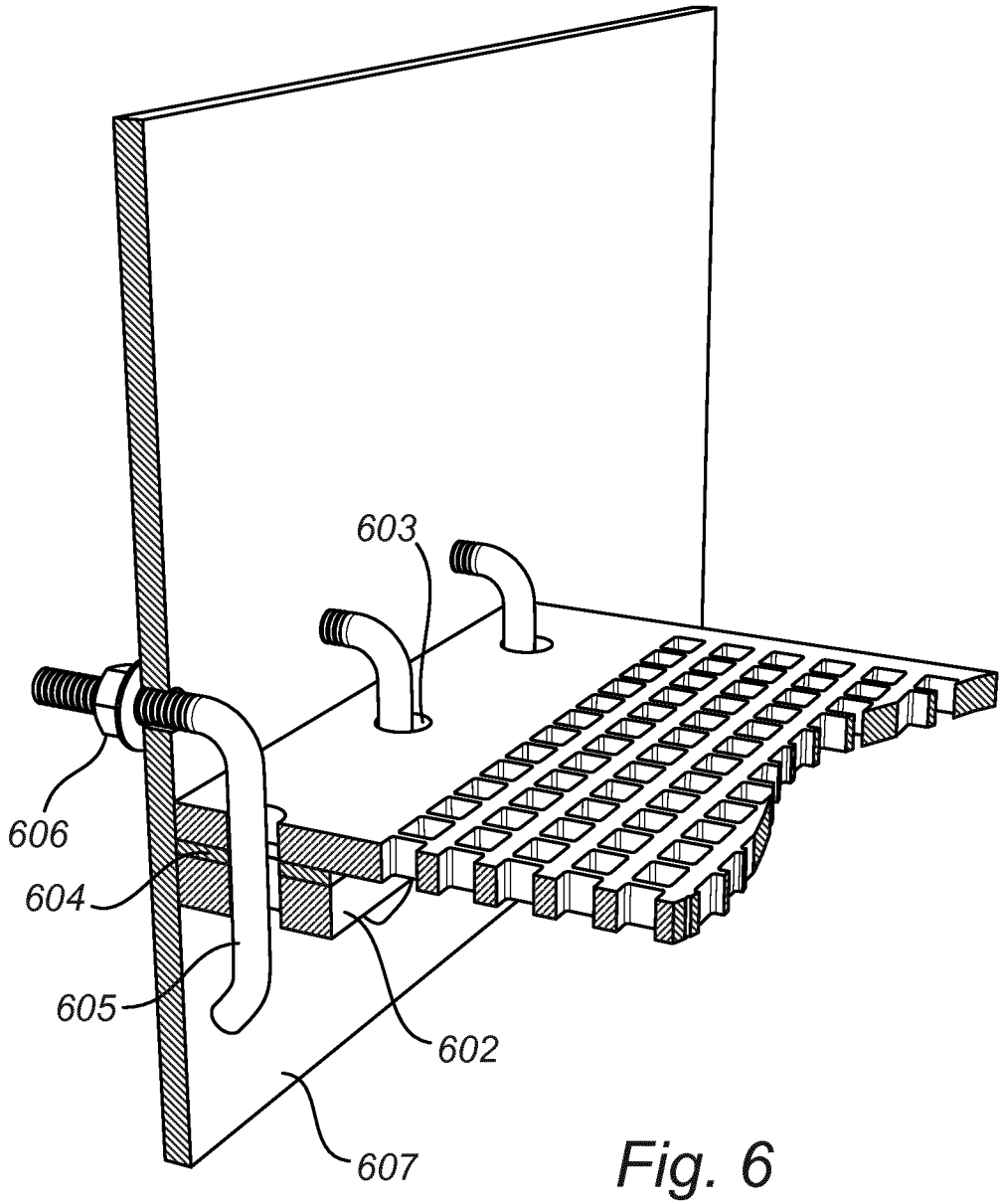


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/069040

A. CLASSIFICATION OF SUBJECT MATTER
INV. B07B1/46 B07B1/48
ADD.

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)
B07B

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01/17659 A1 (TUBOSCOPE I/P INC. [US]; LUCAS BRIAN RONALD [GB]) 15 March 2001 (2001-03-15) abstract page 14, line 15 - page 16, line 1 page 18, line 10 - page 19, line 14 page 21, line 19 - line 35 page 22, line 12 - line 23 claims figures -----	1-15
X	DE 295 19 156 U1 (HAVER & BOECKER [DE]) 18 January 1996 (1996-01-18) page 1, line 3 - line 6 page 2, line 6 - line 29 claims figure -----	1-9, 12-15

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 March 2019	02/04/2019

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	van der Zee, Willem

1

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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.
X	GB 2 175 222 A (THULE UNITED LIMITED) 26 November 1986 (1986-11-26) abstract page 1, line 27 - line 61 page 1, line 83 - line 85 page 1, line 101 - line 118 claims figures	1-9,12, 13,15

X	GB 1 322 013 A (TUFDURA LTD) 4 July 1973 (1973-07-04)	1-3,9, 13,15
A	page 1, line 9 - line 32 page 1, line 74 - page 2, line 121 claims figure	6,7

X	GB 1 322 014 A (TUFDURA LTD) 4 July 1973 (1973-07-04)	1-3,9, 13,15
A	page 1, line 9 - line 30 page 2, line 19 - line 32 page 2, line 125 - page 3, line 15 claims figures	6,7

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2018/069040

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