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

(11) **EP 2 915 595 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.09.2015 Bulletin 2015/37

(51) Int Cl.:
B07B 1/46 *(2006.01)*

(21) Application number: **14157807.0**

(22) Date of filing: **05.03.2014**

(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 MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **Sandvik Intellectual Property AB**
811 81 Sandviken (SE)

(72) Inventors:
- **Malmberg, Mats**
  SE-274 63 Rydsgård (SE)
- **Fransson, Thomas**
  23153 Trelleborg (SE)

(54) **Screen apparatus sidewall protection assembly**

(57) An assembly to protect a sidewall (107) of a screen apparatus releasably attachable to a screen frame (101). The assembly comprises a support body (102) that releasably and adjustably mounts a side liner (103) via at least one adjustably mounted attachment. Accordingly, the present assembly does not require bolting or welding to the sidewalls (107).

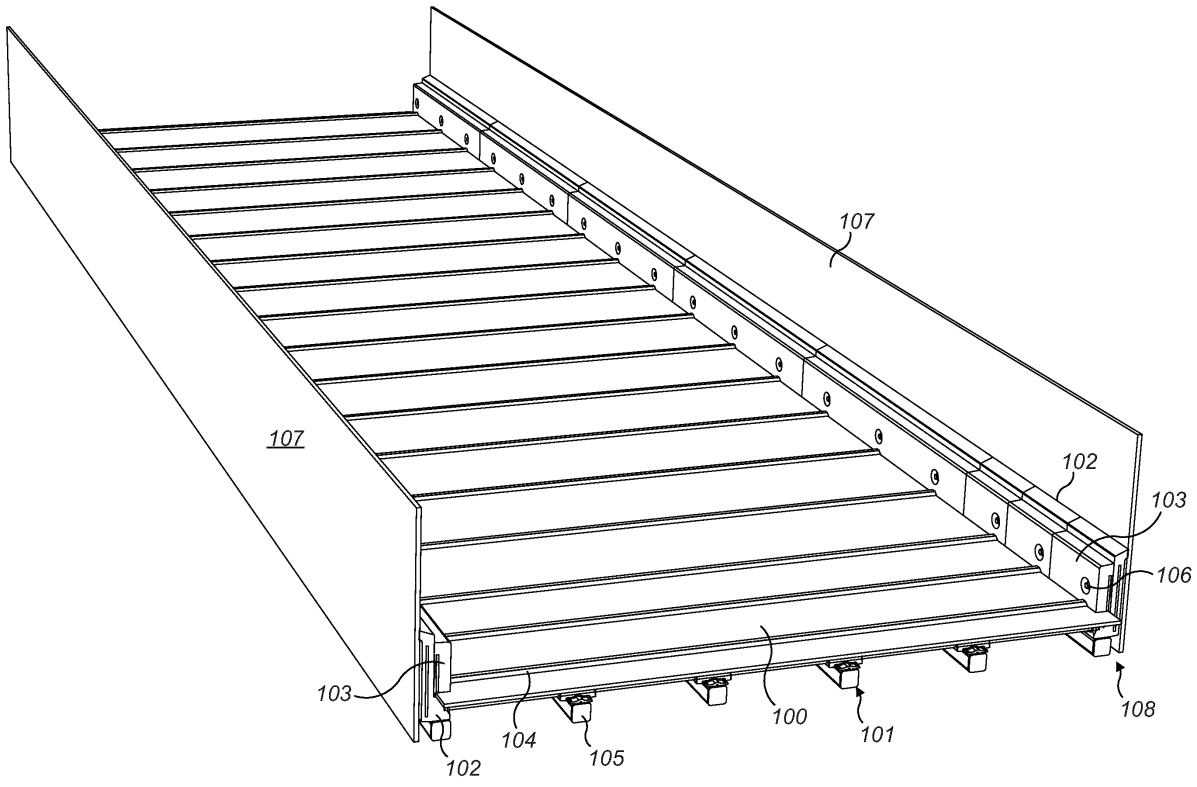

FIG. 1

EP 2 915 595 A1

Description

Field of invention

[0001] The present invention relates to an assembly to protect a sidewall of a screen apparatus and in particular, although not exclusively, to a side liner adjustably mounted at a support body to sit against the sidewall that does not require modification of the sidewall by way of welding or drilling to affix the side liner.

Background art

[0002] Screening apparatus are used for a variety of different applications and typically comprise interchangeable square or rectangular screen elements that provide a screening surface onto which bulk material may be deposited. The screen surface (commonly referred to as the screening media) is formed from a mesh or perforated grid like arrangement having sieve openings.

[0003] The main body of the screen is supported on a screen frame generally formed from longitudinal extending cross pieces or bars. Some of the bars may typically extend lengthwise whilst others may extend widthwise in perpendicular direction between the sidewalls of the apparatus. Example screening apparatus are disclosed in US 4,960,510 and AU 0559443.

[0004] Conventional screening systems are susceptible to damage due to the abrasive bulk material contacting the sidewalls during use. Attempts have been made to mitigate sidewall damage by the provision of side liners that sit against the sidewalls. The side liners are effectively wear parts and are required to be replaced over time. AU 199897218 describes a modular screening apparatus in which elongate side liners act to both protect the sidewalls and to drive downwardly the screen onto the underlying support frame to secure the screening media in position.

[0005] US 5,104,521 describes a modular material screen assembly in which a set of side liners protect sidewall clamps that are used to secure the screen in position between the sidewalls.

[0006] However, conventional screen attachment and sidewall protection assemblies are disadvantageous for a number of reasons. Primarily, the screen frame clamps and/or the side liners are secured to the sidewalls via attachment bolts that necessitate drilling the sidewalls at specific regions. On replacement of the worn screen sections, it is common for the replacement screen or attachment elements to have a different geometry and additional holes are required to be formed in the sidewalls. This is both time consuming and inconvenient for interchange of the worn screen and may also structurally weaken the sidewalls. Additionally, fixation may be problematic if the existing sidewall bores interfere with the required new positions of attachment. A similar problem exists when the side liners are required to be replaced and the geometries of the replacement liners are different to the original mountings. Accordingly, what is required is an assembly to protect the sidewall and/or mount a screen assembly that addresses these problems.

Summary of the Invention

[0007] It is an objective of the present invention to provide an assembly to protect a sidewall of a screen apparatus and/or mount a screen that does not require the sidewall of the apparatus adjacent the screen to be modified and in particular to be drilled or to receive welding. It is a further specific objective to provide a screen and support frame assembly that may be mounted in order to attach the screen in position against the sidewall via abutment with the widthwise ends of the screen frame and/or screen.

[0008] The objectives are achieved by providing an assembly in which a modular side liner is releasably mountable at a liner support body that is in turn configured for abutment against the inward facing surface of the sidewall. Advantageously, a support body of the present assembly is configured to be conveniently clipped onto the screen frame and then by adjustment of a position of a sideliner relative to the support body, to conveniently mate a screen (screening media) into secure engagement onto the screen frame extending between the apparatus sidewalls.

[0009] According to a first aspect of the present invention there is provided an assembly to protect a sidewall of a screen apparatus comprising: a support body to sit against the sidewall, the support body having: a foot to contact a part of a screen frame of the apparatus; a wall abutment part for placing in contact against the sidewall; a seat part to support an end region of a screen of the apparatus; a mount portion to mount a side liner to protect the sidewall; a side liner mountable at the mount portion such that a lower part of the liner is positionable over the screen and/or screen frame to trap the screen and/or screen frame between the liner and the seat part; at least one attachment to secure the liner to the support body; characterised by: at least one adjustment element to provide adjustment of a separation distance between the lower part of the liner and the seat part of the support body to accommodate screens and/or screen frames of different thicknesses; and the attachment is provided between the liner and the support body and is not capable of extending through the sidewall.

[0010] Reference within this specification to screens and/or screen frames encompasses alternative and equivalent terms such as screening media and the like.

[0011] Preferably, the side liner is releasably secured to the support body exclusively via the at least one attachment. Moreover, the attachment extends to couple exclusively the liner to the support body and does not additionally function to secure the support body to the sidewall.

[0012] Reference within the specification to a '*sider liner*' encompasses alternative terms such as shields,

guards, covers and the like intended to have a sufficient wear resistance to withstand abrasive contact with the bulk material to be screened. The present side liners may be configured to be wear parts and have a predetermined life-time.

[0013] The inclusion of an adjustment element is advantageous to allow convenient movement and adjustment of the side liner relative to the support body and in particular to provide a range of different mounting positions of the liner relative to the body. This is beneficial to accommodate and securely mount different screens having different geometries and configurations including in particular thickness and/or shape. That is, the adjustment element and the attachment are cooperative to provide a slide mounting of the side liner at the support body in the upward and downward direction to allow adjustment of a separation distance between a lower part of the liner and a seat part of the support body in between which the screen and/or the screen frame is intended for anchorage.

[0014] Preferably, the foot, the wall abutment part, the seat and the mount portion of the support body are formed integrally. Such an arrangement is advantageous to provide a robust assembly configuration and to allow the assembly to be installed conveniently and maintained in position reliably at the sidewall. This is to be contrasted with a multicomponent support body that is typically difficult to orientate into the correct position and may become loose during use due to the loading forces and contact with the abrasive bulk material. The present integrally formed support body may be conveniently clipped or attached in position at the screen support frame.

[0015] Optionally, the attachment comprises at least one bolt extending through the liner and the support body. In particular, the assembly may comprise a plurality of bolts extending through the liner and support body. Additionally, the adjustment element may comprise at least one elongate slot extending in the support body or the liner, the elongate slot orientated to allow the adjustment of the separation distance between the lower part of the liner and the seat part of the support body. Preferably, the assembly comprises a plurality of slots extending in the support body or the liner. In order to provide the adjustment in the upward and downward direction, the slots are preferably arranged to extend in a direction between the foot and the uppermost end of the support body. Preferably, the side liner or support body may comprise three slots and three corresponding bolts. A slot and bolt arrangement is a convenient mechanism for the adjustable and releasable mounting of the liner at the support body without the need for specific specialist tooling.

[0016] Optionally, the elongate slot comprises a length in the range 20 to 50% of a total length of the support body between a lowermost edge end and an uppermost end of the support body (optionally excluding the foot as part of the total length of the support body). This configuration is sufficient to provide the desired adjustment of the liner at the support body without compromising the structural integrity of the support body and the liner.

[0017] Optionally, the side liner comprises at least one recess to receive a part of the attachment such that the attachment is recessed away from an exposed contact surface of the liner orientated towards the screen. The recess is advantageous to seat a bolts head or nut in a recessed orientation away from the contact face of the liner to avoid damage to the bolt or nut. Preferably, the at least one bolt comprises a head secured at a region of the abutment part of the support body and the attachment further comprises a nut positioned within the recess of the liner.

[0018] According to the preferred implementation, the assembly comprises a plurality of elongate slots extending through the support body in a direction between the lowermost end and the uppermost end of the support body; and a plurality of bolts, each of the bolts provided respectively through each of the slots wherein the liner is adjustably mounted at the support body via a sliding movement of the bolts within the slots. Such an arrangement provides convenient mounting and adjustment of the side liners that are resistant to the abrasive contact with the bulk material and do not become loose following use. Preferably, the seat part comprises plurality of grooves to receive end regions of the screen frame. In one implementation, a lower region of the support body comprises a laterally extending flange divided into segments with the grooves formed between the flange segments.

[0019] Optionally, the support body comprises a polymer material. Furthermore, the liner may further comprise a polymer material. Optionally, the polymer comprises a polyurethane or a polyurethane based material. Where the support body and/or the liner comprises a polymer based material, the support body and/or liner may comprise a reinforcement formed from a material having a greater hardness and/or stiffness than the polymer material. Optionally, the reinforcement may comprise a steel. Such an arrangement is advantageous to ensure the slots and hole within the support body and liner, respectively, do not wear prematurely and are maintained in the correct orientation both during manufacture of the assembly and during use.

[0020] Optionally, regions of the liner and/or support body may be profiled or roughened to increase the frictional contact between the two components. In particular, the mount portion of the support body may comprise a profiled or roughened surface region against which the liner is mated in touching contact. Accordingly, the surface roughening or profiling increases the frictional contact and provides a more secure attachment of the liner at the support body.

[0021] According to a further aspect of the present invention there is provided a screening apparatus comprising an assembly as claimed herein to protect a sidewall of the screening apparatus wherein the attachment to secure the liner to the support body does not extend

through the sidewall.

Brief description of drawings

[0022] 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 1 is an external perspective view of a modular screen arrangement extending between two parallel and vertically orientated sidewalls according to a specific implementation of the present invention;

Figure 2 is a front perspective exploded view of the screen mount and liner support assembly of figure 1 according to the specific implementation of the present invention;

Figure 3 is a rear perspective exploded view of the assembly of figure 2;

Figure 4 is a front perspective view of the assembly of figure 2 with the liner attached to the support body;

Figure 5 is a rear perspective view of the assembly of figure 4;

Figure 6 is a front perspective view of the modular screen apparatus of figure 1 with selected sections of the screen and screen support frame removed for illustrative purposes.

Detailed description of preferred embodiment of the invention

[0023] Referring to figure 1, a screen apparatus comprises a plurality of screening elements 100 formed from a grid, mesh or bar lattice-work to provide an open sieve on which bulk material may be deposited and screened. The screen elements 100 are generally rectangular and elongate to extend laterally between a pair of opposed sidewalls 107 that are arranged generally vertically (in the upright direction) perpendicular to screen elements 100. Screen elements 100 are supported upon a screen support frame indicated generally by reference 101. Frame 101 comprises a plurality of support bars 105 aligned perpendicular to elements 100 and equally spaced to be aligned with and to extend between sidewalls 107. Bars 105 are in turn supported by a plurality of cross struts (not shown) that extend between and are welded to each of the sidewalls 107. With reference to figure 6, each screen element 100 is maintained in fixed position upon bars 105 by intermediate frame rails 104 extending perpendicular to bars 105 in a direction between sidewalls 107. Each of the screen elements 100 is trapped between its lengthwise sides by adjacent rails 104. Each rail 104 is secured on top of the support bars 105 by rail mountings 600.

[0024] Referring to figure 1, a respective side liner assembly is provided at each side wall 107 to contact the lengthwise end of the screen assembly indicated generally by reference 108 and including specifically screen elements 100, bars 105 and rails 104. The liner assembly comprises a support body 102 that releasably and adjustably mounts a side liner 103 that functions to protect each of the sidewalls 107 from abrasive contact with the bulk material deposited onto screen elements 100. As shown in figure 6, the liner assembly is configured to mate with the respective lengthwise ends 601, 602 of the frame rails 104 and support elements 100 respectively.

[0025] The present side liner assembly may be regarded as freely mounted with respect to the sidewalls 107 in that the liner assembly does not require specific mounting to the sidewalls 107 as is common to conventional liner arrangements. In particular, the present assembly is effectively sandwiched in position between the lengthwise ends 601, 602 of the screen and screen frame (reference 108) and the side walls 107. Advantageously, a protection wear resistant liner 103, in the form of a sheet or block component, is removably and releasably attached to the support body 102 via attachment elements indicated generally by reference 106 that extend between liner 103 and support body 102. Importantly, the attachment elements 106 do not extend into the sidewalls 107. As described in further detail below, a lower region of the present assembly is configured to conveniently clip into position at the screen support frame 101 which together with the '*trapping*' of the assembly between the screen 100 (and/or screen frame 101) and the sidewall 107 is suitable to mount the assembly at and protect the sidewalls 107 from abrasive contact with the bulk material.

[0026] Referring to figures 2 to 5, support body 102 is formed as a single unitary body having a generally plate-like configuration with a rearward face 200 and an opposed forward face 203. Face 200 is configured for positioning in contact with sidewall 107 whilst face 203 is orientated towards the screen 100 and frame 101. An elongate flange 224 projects rearwardly from face 200 to provide an abutment for contact with sidewall 107. Flange 224 is provided at an uppermost end 208 of body 102 and represents an uppermost part of the support body 102. A second flange 206 projects laterally from forward face 203 at a lowermost region 225 of support body 102. Flange 206 is also generally elongate to extend the full length of support body 102. Flange 206 is divided into a plurality of flange segment 226 to define a plurality of grooves 202 that are formed between pairs of opposed end faces 209, 210 of each segment 226. Respective upward facing surfaces 207 of each flange segment 226 are aligned perpendicular to face 203 and extend a short lateral distance from face 203 to provide a chair or seat configuration at the lower region 225 of support body 102. In use, when mounted at sidewall 107 as shown in figure 6, frame rail ends 601 are configured to be received within each groove 202 so as to sit against a trough 227 of each groove 202. Additionally, the lengthwise ends

602 of each screen element 100 are configured to sit on each upward facing flange surface 207.

[0027] Support body 102 is secured in position at screen frame 101 via a foot 201 formed as an elongate ridge that projects downwardly from support body lower end 225. Additionally, ridge 201 extends substantially the full length of support body 102 and is configured to mate with an endmost support bar 105 at region 108 referring to figure 1. The entire liner assembly 102, 103 is therefore conveniently and reliably coupled and decoupled from the screen frame 101 via engagement between foot 201 and the endmost support bar 105. As will be appreciated, each endmost support bar 105 is specifically configured with an opening to receive foot 201 and to be retained by resiliently biased frictional contact.

[0028] Three elongate slots 204 are provided through support body 102 between the opposed faces 200, 203. Each slot 204, is aligned in the upright direction between the upper and lowermost ends 208, 225 so as to be orientated substantially vertically when the assembly is mounted in position at sidewalls 107. Each slot 204 comprises a length in a vertical direction that is approximately 25% of a total height of the support body 102 between upper and lower ends 208, 225. Additionally each slot 204 is spaced apart along the length of support body 102 and is configured to receive an attachment bolt 211. In particular, each attachment bolt 211 comprises a shaft 212 and a head 219. As illustrated in figure 3 a recess 300 is provided at the rearward face 200 immediately surrounding an exit end of each slot 204. Each recess 300 is elongate to correspond to the elongate length for each slot 204 and is dimensioned with a width sufficient to receive and accommodate bolt head 219. Accordingly, head 219 may be recessed from the rearward face 200 so that it does not stand '*proud*' of face 200 when seated in position.

[0029] The block-shaped liner 103 comprises a length being substantially equal to the length of support body 102 and comprises an upper lengthwise end surface 218 and a corresponding lower lengthwise end surface 214. Liner 103 further comprises a rearward face 215 and a forward face 216 intended to be positioned towards screen 100 and screen frame 101. Three bores 217 extend through liner 103 between faces 215, 216. Each bore 217 is evenly spaced along the length of liner 103 to correspond in position to support body slots 204. Each bore 217 terminates at forward face 216 as a larger diameter recess 228. Each recess 228 is dimensioned appropriately to receive a nut 213 having internal threads to cooperate with external threads (not shown) formed on bolt shaft 212.

[0030] According to the specific implementation, both the liner 103 and support body 102 are formed from a polyurethane and comprise a hardness sufficient to withstand the abrasive contact with the bulk material to be screened. However, to provide enhanced structural integrity, both the liner 103 and support body 102 comprise a respective reinforcement 221, 223 formed from steel. Each reinforcement 221, 223 is formed as a plate that is accommodated within an elongate slot 220, 222 formed within each of the support body 102 and liner 103 respectively. Liner reinforcement 223 also comprises three bores which corresponds to the bores 217 extending between faces 215, 216. Similarly, support body reinforcement 221 comprises a plurality of slots that correspond in size and position to slots 204.

[0031] Liner 103 is adjustably mountable at support body 102 via the mating of faces 215 and 203 and by inserting bolts 211 through slots 204 and the bore 217 with each nut 213 secured in position at each bolt 211. Frictional contact between the opposed faces 203, 215 is enhanced by a surface profiled region 205 on the forward support body face 203. Profiling region 205 comprises a plurality of ridges that engage the rearward liner face 215 and prevent any slippage between the mated faces 215, 203. Additionally, the lowermost liner face 214 comprises similar ridged profiling to facilitate frictional contact with the end regions 602 of screen elements 100.

[0032] Advantageously, liner 103 is adjustably mounted at support body 102 by sliding bolts 211 within the slots 204 to achieve a desired separation distance between liner surface 214 and flange surface 207. The adjustable mounting of liner 103 at support body 102 is achieved by an operator loosening nuts 213 within recesses 228 (which are conveniently accessible from the forward facing side of the assembly) to allow liner 103 to be adjusted in a vertical direction upwardly and downwardly relative to the flange 206 and in particular trough 227 and flange surface 207. Accordingly, and in contrast to conventional arrangements, repositioning of the liner 103 does not require adjustment at any attachments at the sidewall 107. The present arrangement is advantageous as access to the rearward side of the sidewall 107 may be restricted such that the present arrangement is adjustable exclusively from the forward facing side at a position generally above screen 100.

[0033] As will be appreciated, the present assembly and assembly components 102, 103 may be constructed from a variety of different materials including polymers and metals. According to further embodiments, the support body 102 and liner 103 may each comprise a single material without a respective additional inner reinforcement 221, 223.

Claims

1. An assembly to protect a sidewall (107) of a screen apparatus comprising:

   a support body (102) to sit against the sidewall (107), the support body (102) having:

   a foot (201) to contact a part (105) of a screen frame (101) of the apparatus;
   a wall abutment part (200) for placing in con-

tact against the sidewall (107);
a seat part (206) to support an end region (108) of a screen (100, 104) of the apparatus;
a mount portion (203) to mount a side liner (103) to protect the sidewall (107);

a side liner (103) mountable at the mount portion (203) such that a lower part (214) of the liner (103) is positionable over the screen (100, 104) and/or screen frame (101) to trap the screen (100, 104) and/or screen frame (101) between the liner (103) and the seat part (206);
at least one attachment (211) to secure the liner (103) to the support body (102);
characterised by:

at least one adjustment element (204) to provide adjustment of a separation distance between the lower part (214) of the liner (103) and the seat part (206) of the support body (102) to accommodate screens (100, 104) and/or screen frames (101) of different thicknesses; and
the attachment (211) is provided between the liner (103) and the support body (102) and is not capable of extending through the sidewall (107).

2. The assembly as claimed in claim 1 wherein the foot (201), the wall abutment part (200), the seat (206) and the mount portion (203) of the support body (102) are formed integrally.

3. The assembly as claimed in claim 2 wherein the attachment (211) comprises at least one bolt (211) extending through the liner (103) and the support body (102).

4. The assembly as claimed in claim 3 wherein the adjustment element (204) comprises at least one elongate slot (204) extending in the support body (102) or the liner (103), the elongate slot (204) orientated to allow the adjustment of the separation distance between the lower part (214) of the liner (103) and the seat part (206) of the support body (102).

5. The assembly as claimed in claim 4 wherein the elongate slot (204) comprises a length in the range 20 to 50% of a total length of the support body (102) between a lowermost end (225) and an uppermost end (208) of the support body (102).

6. The assembly as claimed in claims 4 or 5 wherein the side liner (103) comprises at least one recess (228) to receive a part (213) of the attachment (211) such that the attachment (211) is recessed away from an exposed contact surface (216) of the liner (103) orientated towards the screen (100, 104).

7. The assembly as claimed in claim 6 wherein the at least one bolt (211) comprises a head (219) secured at a region of the abutment part (200) of the support body (102) and the attachment (211) further comprises a nut (213) positioned within the recess (228) of the liner (103).

8. The assembly as claimed in any one of claims 5 to 7 comprising a plurality of elongate slots (204) extending through the support body (102) in a direction between the lowermost end (225) and the uppermost end (208) of the support body (102); and
a plurality of bolts (211), each of the bolts (211) provided respectively through each of the slots (204) wherein the liner (103) is adjustably mounted at the support body (102) via a sliding movement of the bolts (211) within the slots (204).

9. The assembly as claimed in any preceding claim wherein the seat part (206) comprises plurality of grooves (202) to receive end regions (602) of the screen (100, 104).

10. The assembly as claimed in any preceding claim wherein the support body (102) comprises a polymer material.

11. The assembly as claimed in any preceding claim wherein the liner (103) comprises a polymer material.

12. The assembly as claimed in claims 10 and 11 wherein the support body (102) and/or the liner (103) comprises a reinforcement (221, 223) formed from a material having a greater hardness and/or stiffness than the polymer material.

13. The assembly as claimed in any one of claims 1 to 7 comprising a plurality of attachments (211) and a plurality of adjustment elements (204).

14. The assembly as claimed in any preceding claim wherein the mount portion (203) of the support body (102) comprises a profiled or roughened surface region (205) against which the liner (103) is mated in touching contact.

15. A screening apparatus comprising an assembly as claimed in any preceding claim to protect a sidewall (107) of the screening apparatus wherein the attachment (211) to secure the liner (103) to the support body (102) does not extend through the sidewall (107).

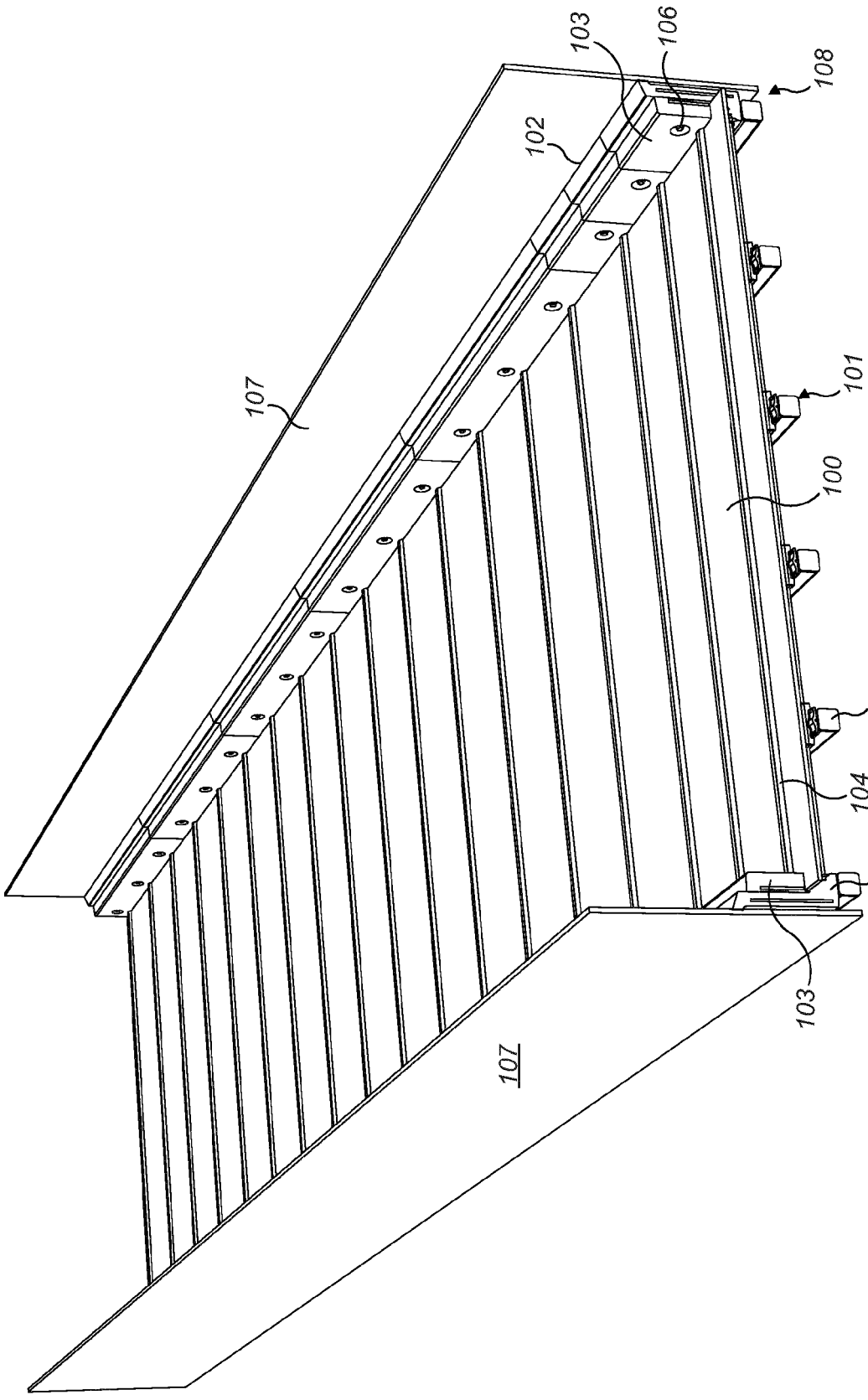

FIG. 1

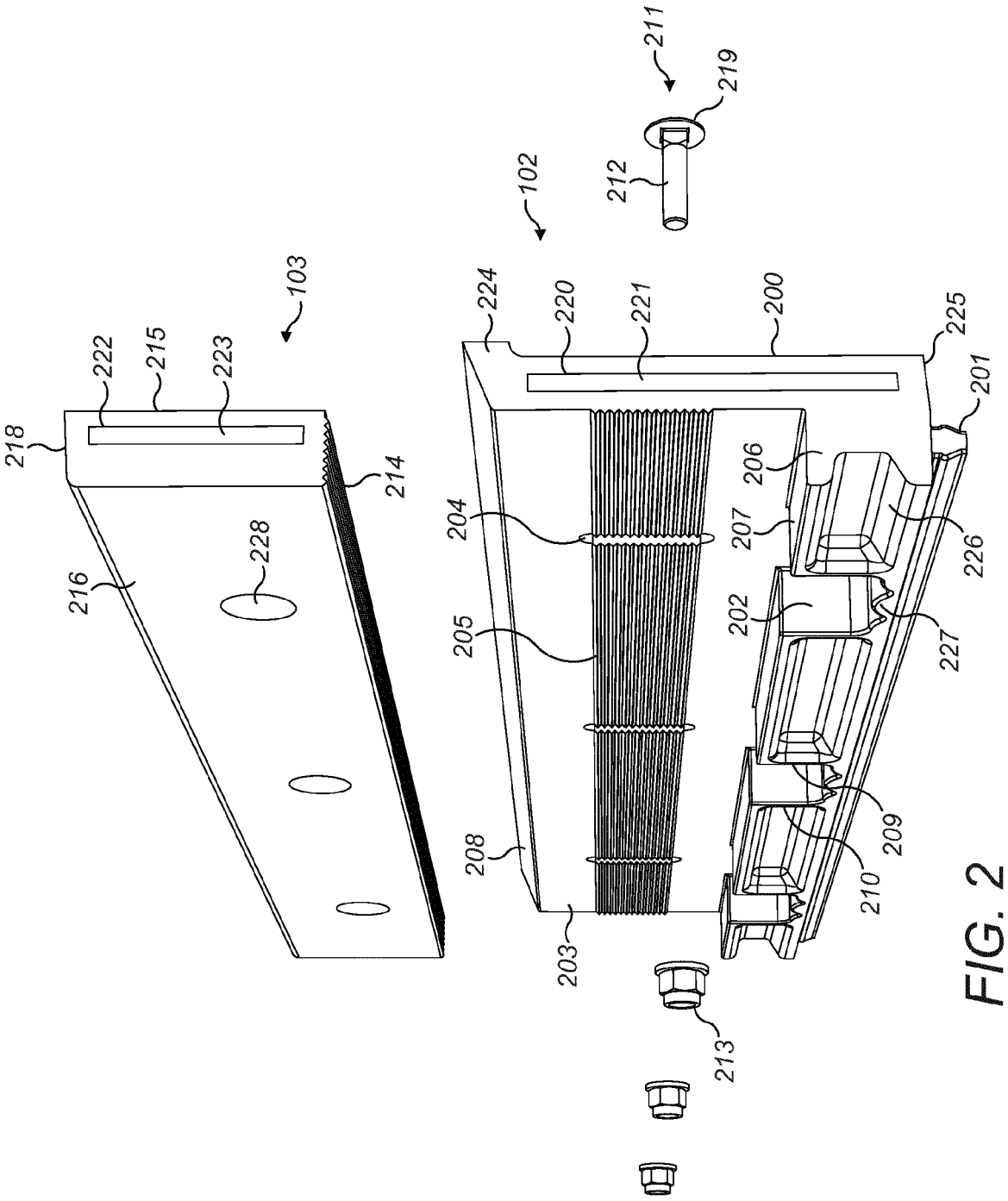
211
219
212
102
103
224
220
221
200
225
201
222
215
223
218
214
206
204
207
226
216
228
202
205
227
208
209
210
203
213

FIG. 2

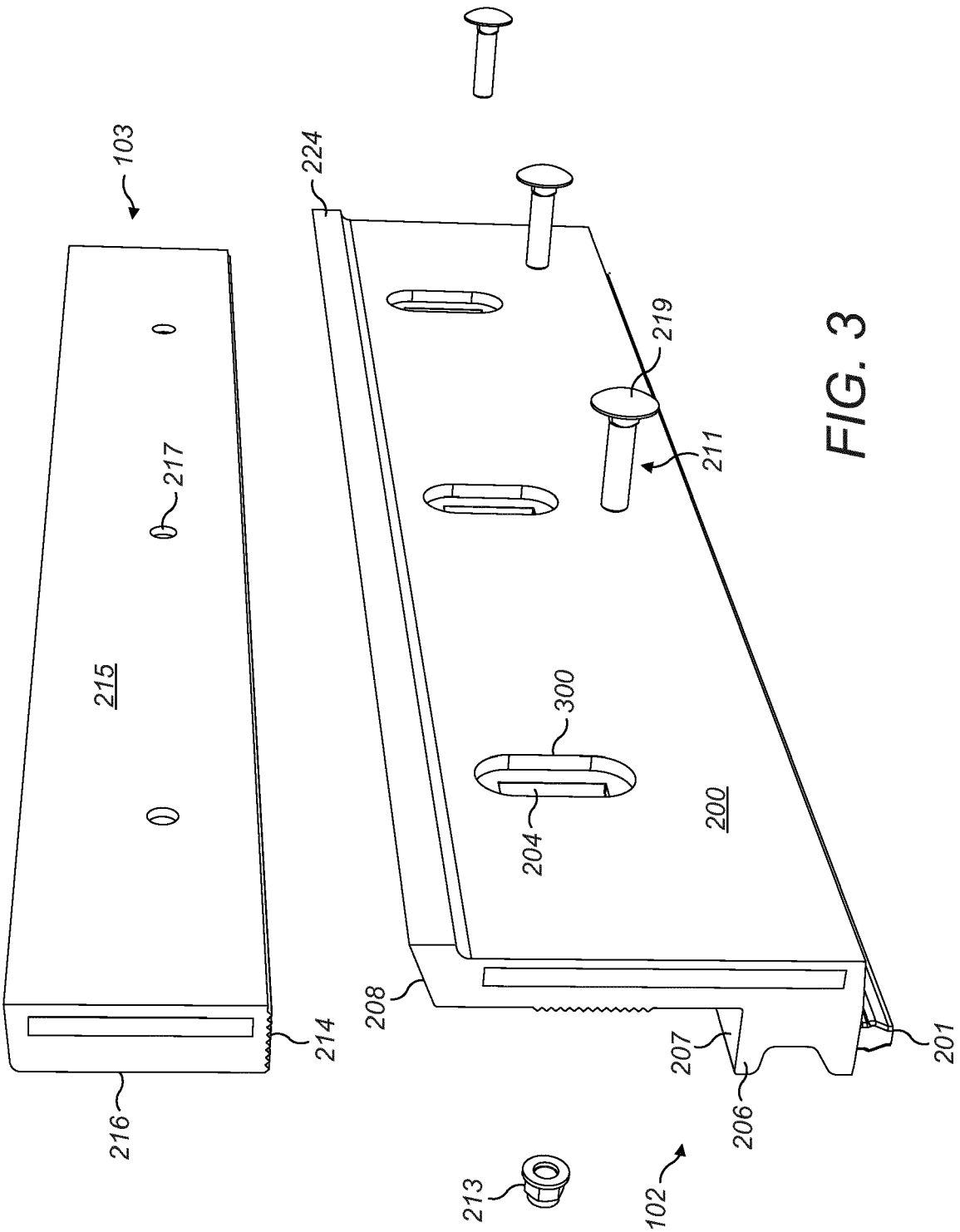
103
224
219
211
217
215
300
204
200
208
214
216
207
206
201
213
102

FIG. 3

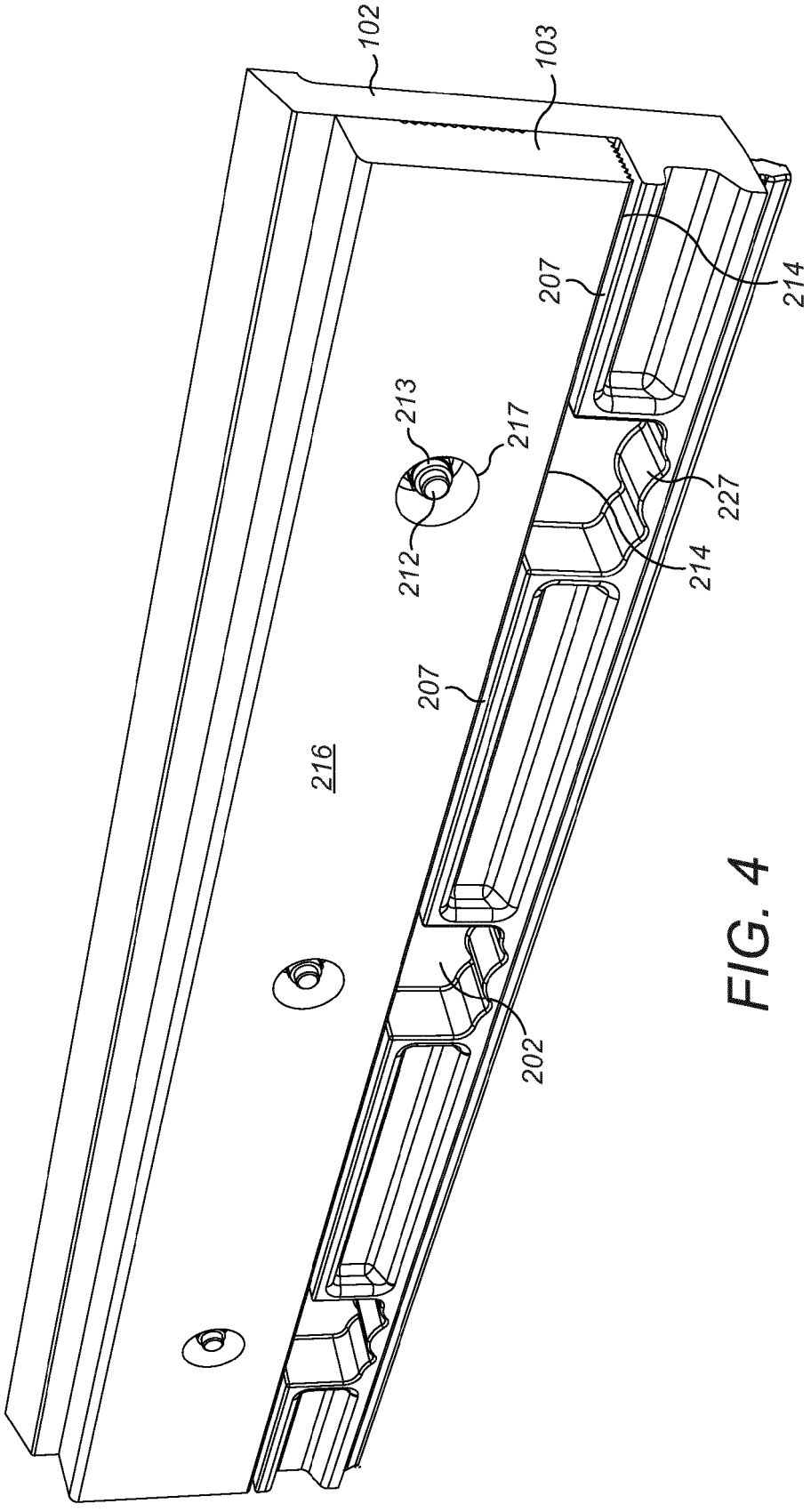

FIG. 4

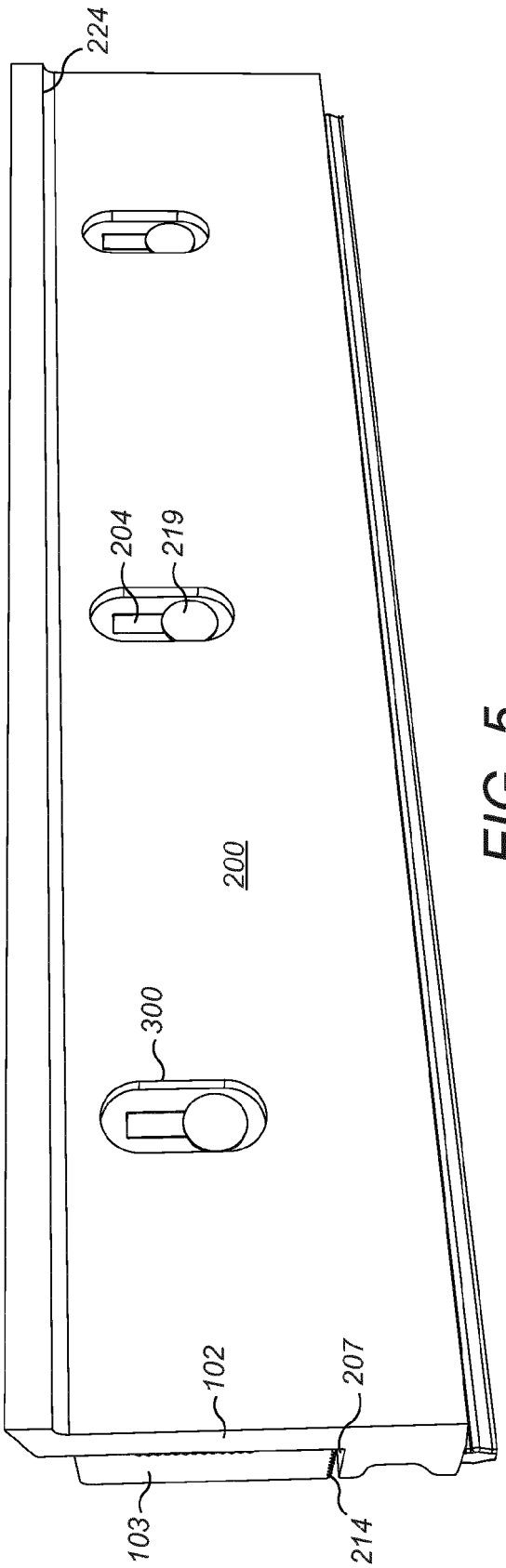

FIG. 5

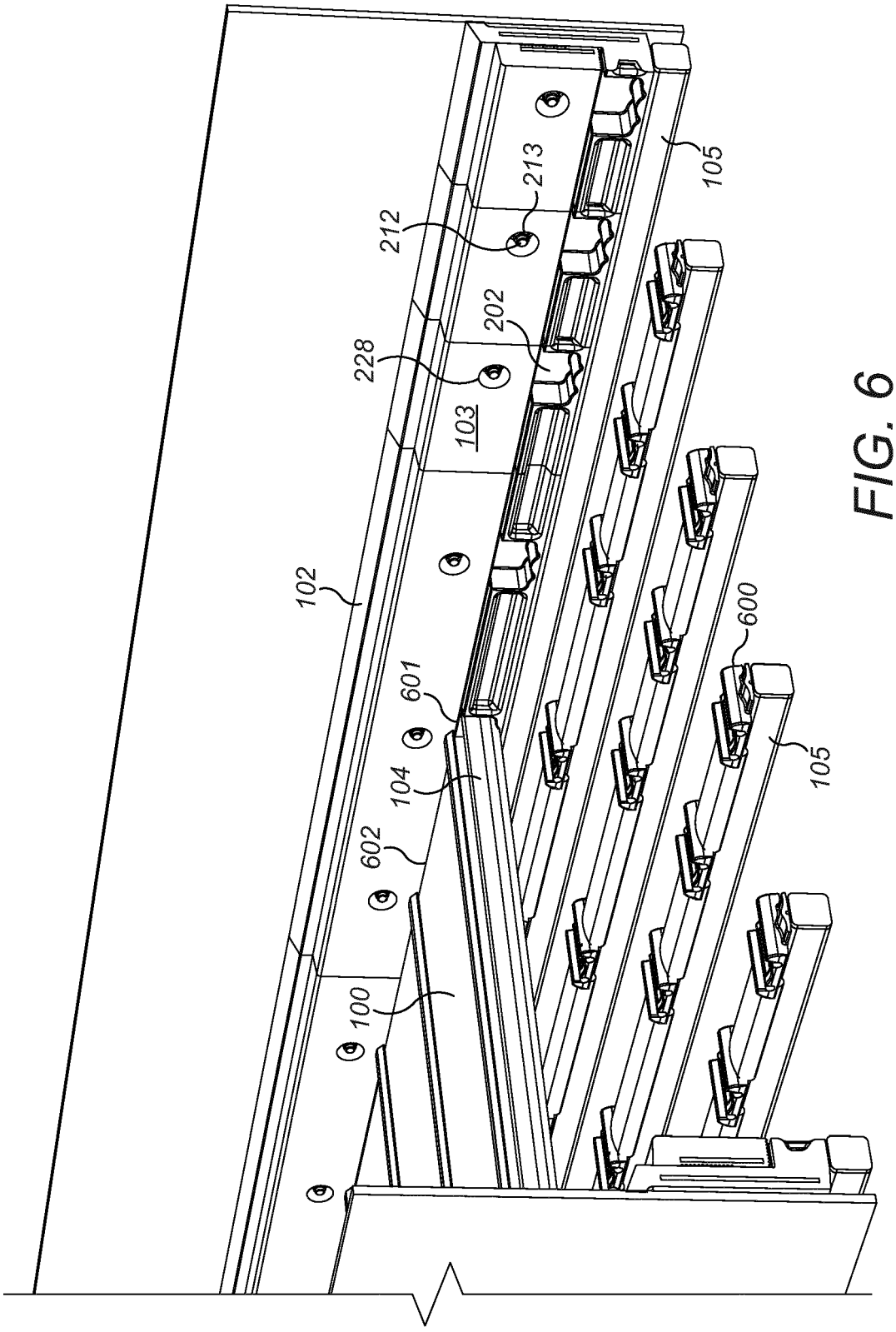

FIG. 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 15 7807

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	AU 704 990 B3 (USF JOHNSON SCREENS PTY LTD) 13 May 1999 (1999-05-13) * page 4, line 31 - line 33 * * page 5, line 1 - line 2; figure 1 *	1-15	INV. B07B1/46
A	WO 2006/031176 A1 (METSO MINERALS WEAR PROT AB [SE]; GROENVALL LARS [SE]; LARSSON KALLE [] 23 March 2006 (2006-03-23) * page 7, line 29 - line 37; claim 20; figure 1 *	1,15	
A	EP 0 032 436 A1 (GREENING N LTD [GB]) 22 July 1981 (1981-07-22) * page 7, line 7 - line 12; figures 1,12 *	1,15	
			TECHNICAL FIELDS SEARCHED (IPC) B07B B01D B65G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 July 2014	Lang, Xavier

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 15 7807

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-07-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
AU 704990 B3	13-05-1999	AU 704990 B3	13-05-1999
		AU 4679797 A	12-02-1998
WO 2006031176 A1	23-03-2006	AU 2005285583 A1	23-03-2006
		BR PI0515321 A	22-07-2008
		CA 2579136 A1	23-03-2006
		EP 1791656 A1	06-06-2007
		US 2009050539 A1	26-02-2009
		WO 2006031176 A1	23-03-2006
EP 0032436 A1	22-07-1981	AU 539949 B2	25-10-1984
		AU 6600781 A	23-07-1981
		DE 32436 T1	02-02-1984
		DE 3164016 D1	19-07-1984
		EP 0032436 A1	22-07-1981
		IN 155064 A1	29-12-1984

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 4960510 A **[0003]**
- AU 0559443 **[0003]**
- AU 199897218 **[0004]**
- US 5104521 A **[0005]**