EUROPEAN PATENT SPECIFICATION

SUPPORTING STRUCTURE AND A SUPPORT CARRIER

STÜTZSTRUKTUR UND STÜTZTRÄGER

STRUCTURE DE SUPPORT ET PORTEUR DE SUPPORT

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Description

Technical Field

[0001] The present invention concerns a supporting structure for different screening media on a vibrating screen and a support carrier used in the supporting structure.

Prior Art

[0002] In vibrating screens used for fractionation of for example crushed stones and gravel into fractions of stones with different sizes, screening media are used having screening holes for allowing stones smaller than the screening holes to pass through the holes.

[0003] Vibrating screens are known having an adapter system or a supporting structure to be able to use different types of screening media. The screening media normally have the form of a wire mesh, polymer mats, panels or modular screening elements. The supporting structure has the form of a number of elements placed in a grid supporting the screening media.

[0004] WO 2005/092523 shows an adapter for mounting cross-tensioned or pre-tensioned screening media in a vibrating screen having a screening deck provided with exchangeable modular screening elements for screening of material.

[0005] WO 84/02290 shows a modular screening system including a plurality of screening modules supported in an interlocking manner on clamping bars, which are secured to and positioned across a screening machine in parallel spaced relationship.

Summary of the Invention

[0006] A screen is relatively heavy and a general strive is always to lower the total weight whenever possible as well as to lower costs. In the different adapter systems or supporting structures for the screening media it is common to use different parts of metal, mainly steel. By replacing such parts with polymeric parts not only will the total weight of the screen be reduced one also avoids possible corrosion problems. Further, by having snap on locks instead of bolts, rivets or welding it will be easier and quicker to adapt the screen to the screening media used in a certain situation. By avoiding welding one also avoids problems caused by welding, such as cracking due to fatigue. Depending on the type of material received, the sizes of the fractions wanted etc. it may be necessary to change the type of screening media from time to time. Thus, it should be possible to amend the set-up of the screen without having to make any major rebuilding of the screen.

[0007] One object of the present invention is to reduce the total weight of the screen. According to the present invention one way to do this is to replace parts made of steel with corresponding parts made of a polymeric material. By using a polymeric material with reinforcement it is possible to combine relatively high strength with low weight. The use of a polymeric material instead of steel further means that one also avoids problems concerning corrosion. A further object is to form a system that easily could be adapted to different situations, both concerning the material to be screened and the screening media, such as modular screening elements or wire meshes to be used. A further object is to avoid the use of bolts, rivets, welding or similar means of fastening. Still a further object is to have a more simple system.

[0008] Further objects and advantages will be obvious for a person skilled in the art, reading the detailed description below of at present preferred embodiments.

Brief Description of the Drawings

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[0009] The invention will be described further below, by way of examples and with reference to the enclosed drawings. In the drawings,

Fig 1 is a perspective view of a screen in which the present invention may be implemented,

Fig 2 is a perspective view of the screen of Fig. 1 illustrating an alternative screening media,

Fig 3 is a perspective illustrative view of a supporting structure according to the present invention,

Fig 4 is a side view of a support carrier according to the present invention,

Fig 5 is an end view of the support carrier of Fig. 4, Fig. 6 is a cross section taken at the line B-B in Fig. 4, Fig. 7 is a longitudinal section taken at the line A-A in Fig. 5,

Fig. 8 is a perspective view of one example of a support carrier,

Fig 9 is a perspective view of an alternative support carrier,

Fig 10 is a perspective view of an alternative support carrier,

Fig. 11 is a perspective view of a further alternative support carrier,

Fig. 12 is an end view of one example of a transversal carrier according to the present invention,

Fig. 13 is an end view of a second example of a transversal carrier, Fig. 14 is an end view of a further example of a transversal carrier,

Fig. 15 is an end view of yet a further example of a transversal carrier, and

Fig. 16 is a perspective view of three different protective spacer elements according to the present invention.

Detailed Description of Preferred Embodiments

[0010] As used in this description expressions like "top", "upper", "lower" and similar expressions are in view of the positions as shown in the drawings and with the
A vibrating screen 1 has a screen deck receiving normal orientation of a vibrating screen. The screen deck is normally furnished with screening media formed of either a number of modular screening elements 2, a wire mesh, polymer mats 3 or panels. Wire meshes and polymer mats are often referred to as cross tension media. The screening media are received on some kind of supporting structure. If the screening media have the form of modular screening elements 2, they may be placed oriented either along or transversal to the direction of motion of the material to be screened. In the example of Fig. 1 the modular screening elements 2 are placed along the direction of motion of the material to be screened. In the example of Fig. 2 a cross tension media in the form of a polymer mat 3 is indicated. The polymer mat 3 is given a curved form.

In the shown embodiment the supporting structure is formed of a number of transversal carriers 4, support carriers 5 and protective spacer elements 6, 23, 25. The transversal carriers 4 are placed parallel to each other and transversal to the direction of motion for the material to be screened. The transversal carriers 4 are fastened by bolting, welding or other suitable fastening means to cross members (not shown) of the vibrating screen deck. The support carriers 5 are placed parallel to each other on top of the transversal carriers 4 and perpendicular to the transversal carriers 4. The protective spacer elements 6 are normally used together with cross tension media. The spacer elements 6, 23, 25 are placed on top of the transversal carriers 4 between the support carriers 5.

The transversal carriers 4 have the form of elongated rails. In cross section each transversal carrier 4 has a base with two stanchions 16, 17, 18, one at each side of the base. The transversal carriers 4 placed at the ends of the screen deck may have only one stanchion 19, 19a. In some embodiments the stanchions 18 are of similar height, while in other embodiments the stanchions 16, 17 of each transversal carrier 4 are of different heights. The stanchions 19, 19a of the transversal carriers 4 placed at the ends may also be of different heights. On top of each stanchion 16-19a a circular rib 20 is formed. The circular rib 20 is to be received in a matching groove of parts to be placed on top of the transversal carriers 4. A person skilled in the art realises that the exact form of the transversal carriers 4 may vary, as long as they fulfill the intended used.

The support carriers 5 are elongated, relatively thin elements having a generally rectangular cross section. The support carriers 5 are made of a polymeric material, for example polyurethane. At each end of each support carrier 5 a groove 8, 9 is formed for cooperation with the circular ribs 20 of the transversal carriers 4. The grooves 8, 9 have a generally vertical orientation and open towards the lower side of each support carrier 5. Thus, the grooves 8, 9 of the support carriers 5 will form a snap lock with the circular ribs 20 on top of the stanchions 16-19 of the transversal carriers 4. The positions and depths of the grooves 8, 9 of the support carriers 5 are adapted to the form of the transversal carriers 4 to receive said support carriers 5. As reinforcement and to increase the stiffness of the support carriers 5 a reinforcing rib 7 is placed inside each support carrier 5. The reinforcing ribs 7 are preferably made of a composite, e.g. fibreglass, or aramid. The reinforcing ribs 7 are placed in the support carriers 5 during moulding or are glued to the support carriers 5. The grooves 11 shown in the Figs. 3 and 6 at the bottom of the support carriers 5 are used in the manufacturing process. To save weight and material the support carriers 5 have a thinner part or indentation 10 placed at the lower part of each support carrier 5. One indentation 10 is formed on both opposing sides of each support carrier 5. The support carriers 5 have the full width, seen in cross section, at the top and at each end. Thus, the support carriers have full width in the area of the grooves 8, 9 for cooperation with the circular ribs 20 of the transversal carriers 4.

In some embodiments the upper part 5a of the support carriers 5 is made of a softer material. In other embodiments a capping in form of a polymeric strip is placed on top of each support carrier 5.

The top of the support carriers 5 has different shape depending on the type and make of the screen 1 and the screening media used. Some different shapes of the top of the support carriers 5 are indicated in Figs. 8-11. In the example of Fig. 8 the top is a rail profile 12, having side parts extending outside the support carriers 5, seen in cross section, and forming a longitudinal groove. In this example a central bulge 13 is indicated. The bulge 13 is intended for cooperation with an opening in a modular screening element 2, whereby the modular screening elements 2 will be correctly orientated and any tendency to movement of the screening media will be counteracted. Normally the bulge 13 is placed centrally on each support carrier 5, seen in longitudinal direction. In other embodiments each support carrier has two or more bulges placed along the upper surface of the support carrier. In another example the top of the support carriers 5 is a straight surface (Fig. 11), in other examples it is a groove profile 14 (Fig. 10) or a bar profile 15 (Fig. 9) in the form of a circular rib. Independent of the shape of the top of the support carrier 5, at least one bulge 13 is normally arranged. The bulge(s) 13 is placed on top of the support carrier 5, in the rail profile 12, in the groove profile 14 or on top of the bar profile 15. To give a wire mesh or other tensioned or pre-tensioned screening media of the screen deck an arched surface if wanted, support carriers 5 of different height are normally used.

The spacer elements 6, except the spacer elements 23, 25 placed at the ends of the screen deck, have two longitudinal grooves 21, 22 on the lower surface. The grooves 21, 22 are formed for cooperation with the circular ribs 20 of the stanchions 16-18 of the transversal carriers 4. Depending on the height of the stanchions
In use a number of transversal carriers 4 are normally placed abutting two adjacent support carriers 5. The spacer elements 23, 25 to be placed at the ends of the screen deck have only one groove 24, 26 for cooperation with a circular rib 20 on a single stanchion 19, 19a of a transversal carrier 4. The spacer elements 23, 25 to be placed at the ends of the screen deck are shown having different heights. In the shown examples the higher of the spacer elements has inclined surfaces on the side facing the screen deck. Thus, there will be a snap lock between the grooves 21, 22, 24, 26 of the faces on the side facing the screen deck. Thus, there will be a snap lock between the grooves 21, 22, 24, 26 of the faces on the side facing the screen deck. This allows the higher of the spacer elements to receive the modular screening elements 2. The support carriers 5 or the transversal carriers 4, respectively, depend on the orientation of the modular screening elements 2, wire mesh 3 or other screening media to be used. The support carriers 5 are placed on the transversal carriers 4 at the ends of adjacent support carriers abutting each other. Each support carrier 5 is placed with its ends on two adjacent transversal carriers 4. The grooves 8, 9 of the support carriers 5 cooperate with the circular ribs 20 of the stanchions 16-19a of the transversal carriers 4 to form snap locks. The support carriers 5 are placed parallel to each other and perpendicular to the transversal carriers 4. Concurrent with the placement of the support carriers 5 the protective spacer elements 6, 23, 25 are placed between the support carriers 5 and on top of the transversal carriers 4. The length of the spacer elements 6 are adapted to the distance between the support carriers 5 and normally the ends of the spacer elements will abut the support carriers 5. The grooves 21, 22, 24, 26 of the spacer elements 6 cooperate with the circular ribs 20 of the stanchions 16-19a of the transversal carriers 4, to form snap locks. Finally, a wire mesh 3, modular screening elements 2 or other screening media are placed on the supporting structure formed of the transversal carriers 4, the support carriers 5 and the spacer elements 6.

Depending on type and brand of the modular screening elements 2 and their orientation a number of support carriers 5 and spacer elements 6 may be taken away to receive the modular screening elements 2. The modular screening elements 2 are either snapped on to the support carriers 5 or the transversal carriers 4, depending on the orientation of the modular screening elements 2.

Claims

1. A supporting structure of a vibrating screen (1), having a number of support carriers 5 arranged parallel to each other and perpendicular to a number of carriers 4 transversal to the direction of motion for the material to be screened, whereby the support carriers 5 and the transversal carriers 4 form a grid, characterized in that the support carriers 5 have grooves (8, 9) at each end to be snapped on and locked on circular ribs (20) on top of the transversal carriers 4, that the support carriers 5 are made of a polymeric material, that the support carriers 5 have a rectangular cross section form, that the support carriers 5 have a cross section forming a rail (12), a groove (14) or a bar (15) at the top, that a reinforcing rib (7) is received inside each support carrier (5), and that screening media are received on the supporting structure having a grid shape, formed by the support carriers (5) and the transversal carriers (4).

2. The supporting structure of claim 1, wherein protective spacer elements (6, 23, 25) are placed between and abutting adjacent support carriers (5) and sides of the vibrating screen (1).

3. The supporting structure of claim 1, wherein the support carriers (5) are made of polyurethane.

4. The supporting structure of claim 1, wherein the reinforcing rib (7) is made of a composite, e.g. fibreglass, or aramid.

5. The supporting structure of claim 1, wherein the support carriers (5) have different heights.

6. The supporting structure of claim 1, wherein at least one bulge (13) is formed on each support carrier (5),
either at the top or inside the rail (12) or the groove (14) at the top.

7. The supporting structure of claim 1, wherein the transversal carriers (4) have a base part with one or two stanchions (16-19a), on top of which stanchions (16-19a) the circular ribs (20) to be received in the grooves (8, 9) of the support carriers (5) are placed.

8. The supporting structure of claim 7, wherein the stanchions (16-19a) of the transversal carriers (4) have different heights.

9. The supporting structure of claim 1, wherein each support carriers (5) has an indentation (10) on opposite sides of the lower part of the support carrier (5).

10. The supporting structure of claim 1, wherein the upper part (5a) of each support carrier (5) is made of a softer material than the rest of the support carrier (5).

Patentansprüche

1. Halteaufbau eines Vibrationssiebes (1), welcher eine Anzahl von Stützträgern (5) hat, die parallel zu einander und senkrecht zu einer Anzahl von Trägern (4) angeordnet sind, welche quer zu der Bewegungsrichtung des zu siebenden Materials verlaufen, wobei die Stützträger (5) und die Querträger (4) ein Gitter bilden, dadurch gekennzeichnet, dass die Stützträger (5) an jedem Ende Nuten (8, 9) haben, die an kreisförmigen Rippen (20) auf der Oberseite der Querträger (4) aufgerastet und gesichert sind, dass die Stützträger (5) aus einem Polymermaterial hergestellt sind, dass die Stützträger (5) eine rechteckige Querschnittsform haben, dass die Stützträger (5) einen Querschnitt, eine Linie (12), eine Nut (14) oder eine Stange (15) an der Oberseite bildet, dass eine Verstärkungsrippe (7) innerhalb jedes Stützträgers (5) aufgenommen ist, und dass Mittel zum Sieben auf dem Stützaufbau, der eine durch die Stützträger (5) und die Querträger (4) gebildete Gitterform hat, aufgenommen sind.

2. Stützaufbau nach Anspruch 1, wobei Abstandselemente (6, 23, 25) zum Schutz zwischen benachbarten Stützträgern (5) und Seiten des vibrierenden Siebes (1) angeordnet sind und daran anliegen.

3. Stützaufbau nach Anspruch 1, wobei die Stützträger (5) aus Polyurethan hergestellt sind.

4. Stützaufbau nach Anspruch 1, wobei die Verstärkungsrippe (7) aus einem Kompositmaterial, z.B. Fiberglas oder Aramid, hergestellt sind.

5. Stützaufbau nach Anspruch 1, wobei die Stützträger (5) unterschiedliche Höhen haben.

6. Stützaufbau nach Anspruch 1, wobei zumindest eine Ausbuchtung (13) an jedem Stützträger (5) ausgebildet ist, entweder auf der Oberseite oder innerhalb der Schiene (12) oder der Nut (14) an der Oberseite.

7. Stützaufbau nach Anspruch 1, wobei die Querträger (4) ein Basisteil mit ein oder zwei Pfosten (16-19a) haben, wobei auf der Oberseite dieser Pfosten (16-19a) die in den Nuten (8, 9) der Stützträger (5) aufzunehmenden kreisförmigen Rippen (20) angeordnet sind.

8. Stützaufbau nach Anspruch 7, wobei die Pfosten (16-19a) der Querträger (4) unterschiedliche Höhen haben.

9. Stützaufbau nach Anspruch 1, wobei jeder der Stützträger (5) auf entgegengesetzten Seiten des unteren Teiles des Stützträgers (5) eine Einsenkung (10) hat.

10. Stützaufbau nach Anspruch 1, wobei der obere Teil (5a) jedes Stützträgers (5) aus einem weicheren Material als der obere Teil des Stützträgers (5) hergestellt ist.

Revendications

1. Structure de soutien d’un tamis vibrant (1), ayant une pluralité de supports de soutien (5) agencés parallèlement les uns aux autres et perpendiculaires à une pluralité de supports (4) transversaux à la direction de déplacement pour le matériau à tamiser, de sorte que les supports de soutien (5) et les supports transversaux (4) forment une grille, caractérisée en ce que les supports de soutien (5) ont des rainures (8, 9) à chaque extrémité pour être enclenchées et verrouillées sur des nervures circulaires (20) au-dessus des supports transversaux (4), que les supports de soutien (5) sont constitués d’un matériau polymère, que les supports de soutien (5) ont une forme de section transversale rectangulaire, que les supports de soutien (5) ont une section transversale formant un rail (12), une rainure (14) ou une barre (15) au sommet, qu’une nervure de renforcement (7) est reçue à l’intérieur de chaque support de soutien (5), et que des milieux de tamisage sont résus sur la structure de soutien ayant une forme de grille, formée par les supports de soutien (5) et les supports transversaux (4).

2. Structure de soutien de la revendication 1, dans laquelle les éléments espaces protecteurs (6, 23, 25) sont placés entre et en butée contre des supports de soutien adjacents (5) et les côtés du tamis vibrant...
(1).

3. Structure de soutien de la revendication 1, dans laquelle les supports de soutien (5) sont constitués de polyuréthane.

4. Structure de soutien de la revendication 1, dans laquelle la nervure de renforcement (7) est constituée d’un composite, par exemple une fibre de verre ou un aramide.

5. Structure de soutien de la revendication 1, dans laquelle les supports de soutien (5) ont différentes hauteurs.

6. Structure de soutien de la revendication 1, dans laquelle au moins un renflement (13) est formé sur chaque support de soutien (5), au sommet ou à l’intérieur du rail (12) ou de la rainure (14) au sommet.

7. Structure de soutien de la revendication 1, dans laquelle les supports transversaux (4) ont une partie de base avec un ou deux montants (16-19a), où, au sommet desdits montants (16-19a), les nervures circulaires (20) destinées à être reçues dans les rainures (8, 9) des supports de soutien (5) sont placées.

8. Structure de soutien de la revendication 7, dans laquelle les montants (16-19a) des supports transversaux (4) ont différentes hauteurs.

9. Structure de soutien de la revendication 1, dans laquelle chaque support de soutien (5) a une découpe (10) sur des côtés opposés de la partie inférieure du support de soutien (5).

10. Structure de soutien de la revendication 1, dans laquelle la partie supérieure (5a) de chaque support de soutien (5) est constitué d’un matériau plus mou que le reste du support de soutien (5).
REFERENCES CITED IN THE DESCRIPTION

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