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DE-A-2 754 374
DE-A-2 932 696
FR-A-2 047 758
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(73) Proprietor: **TRELLEBORG AB**
Nygatan 102
S-231 00 Trelleborg (SE)

(72) Inventor: **Dehlen, Bengt Lars Arne**
Näckens väg 2
S-231 00 Trelleborg (SE)
Inventor: **Dyrup, Sven Erik**
Källstorpsvägen 11
S-230 30 Oxie (SE)

(74) Representative: **Wallin, Bo-Göran et al**
AWAPATENT AB Box 5117
S-200 71 Malmö (SE)

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Description

The present invention relates to a screen comprising a screen frame with supporting elements for a screen deck inserted in the screen frame, and fastening means for the screen deck.

Many different fastening methods have been used in the mounting of screens for dynamic screening machines. According to, for example, DE—OS 2,849,838 a snap-on system has been used in which the separate screen elements have been snapped onto enlarged supporting elements. Similar modes of fastening are utilized in DE—GM 78 38 335 and DE—OS 2,749,489. In some cases, fastening has been accomplished by projections on the underside of the screen cloths and expansion means adapted to urge said projections into engagement with recesses provided in the supporting elements of the screen frame. Such constructions are shown in, for example, U.S. patent specification 4,141,821 and the corresponding Swedish patent application 7700468-7, and also in U.S. patent specification 3,745,736.

However, the above-mentioned screening machines with small individually fastenable screen elements are not often used since they necessitate reconstruction of existing screening machines. The most commonly used variant of screening machines makes use instead of screen cloths of substantial size, very often 1—2 m^2 per unit.

This type of screen cloths are fastened in the screen frames by providing the screen cloth units with hooks by which the screen cloth units are clamped between opposed edges of the screen frame. An example of such a clamping method is disclosed in DE—OS 2,005,376. This fastening method is utilized for the majority of all screening machines which at present are manufactured all over the world, as a result of which the frame constructions of most screening machines are of a similar kind. As will appear from some of the above-mentioned publications, it has been tried to divide the screen deck into smaller units which are readily exchangeable to facilitate rapid exchange of a worn section and also to afford an opportunity for rapidly shifting from one hole size to another within a section of the screen deck.

The disadvantage of known smaller screen elements is that the frame construction of the screening machines used on the market must be redesigned or completed before the readily exchangeable screen element systems according to, for example, DE—OS 2,754,374 can be utilized.

US—A—2,910,180 relates to a screening device of the type defined in the preamble of claim 1 where use is made of resilient forces in the screening elements to hold them fixed against their supporting elements. However, the screening elements are not elongated and therefore require a special tool to bend them when locating them in position in the device.

FR—A—2,047,758 and US—A—3,833,120 are concerned with the conventional technique where the reinforcing structure is subjected to a pretensioning in the plane of the screen cloth at right angles to the screening direction in order to reduce the vertical vibration of the reinforcing members and, accordingly, to suppress the vertical vibration of the rubber screen.

CH—A—495,791 is based on the conventional technique where the screen cloth is subjected to a pretensioning in a plane transverse of the screening direction, and furthermore makes use of magnetic forces to hold the screen cloth down against its supporting structure.

US—A—4,120,784 teaches that the screen plates should be clamped in position by means of the T-section bars 3 which are threaded through the T-shaped slots 6 in the supporting bars 5. Hooks 4 serve to lock the cloths and also to prestress them in the transverse direction of the screen. The actual clamping of the screen cloth against the supporting bars 5 is effected by mechanical locking.

DE—A—2,461,237 teaches a construction in which the screen is clamped fast by means of conventional hook-shaped element 8 and, thus, is stretched in the longitudinal direction. Rods 6 with blocks 9 merely serve to stiffen the construction, but the actual tensile stress in the construction is obtained by means of the conventional clampings hooks 8. The tensioning elements 6, 6' have a relatively large ability to vibrate at right angles to the screen surface and a relatively large stiffness parallel to the screen surface.

It is one object of the present invention to provide a far-reaching simplification of prior art screen constructions with smaller screen elements and to allow of a simpler and cheaper mounting on location, without necessitating any essential alteration of the frame construction of the screening machine.

In a screening system comprising a screen frame with supporting elements for a screen deck inserted in the screen frame and fastening means for the screen deck which comprises several screen elements made from an elastomer and placed adjacent each other and having stiffening elements which are included in the screen elements and which by bending, are prestressed against the supporting elements by elastic deformation, upon mounting in the screen frame, it is required, according to the present invention, that the screen elements are mounted with their longitudinal direction extending transverse to the screen direction and that the length to width ratio of the screen elements is at least 3:1, so that the bending can be effected without the use of a special tool.

The invention thus is based on the idea that the separate screen elements forming said screen deck should be formed as elongated and rigid plank-like elements and, upon mounting, be subjected to an elastic deformation in order to provide the required holding-down force against the supporting elements of the screen frame.

Compared with the conventional systems where the separate screen cloths are provided at their edges with retention hooks by which the

cloths are prestressed, the present invention makes it much easier to apply the requisite holding-down force against the supporting elements of the screen frame. Thus, if the screen frame is designed in such a manner that the support elements force the screen elements to curve convexly, the screening elements can be formed with straight stiffening elements. One end of the screen elements is then secured to the frame, and the screen elements are bent over the supporting elements to be secured underneath a hold-down rib at the opposite side of the screen frame. The force required for bending the screen elements will be considerably less than a force directed in the plane of the screen elements and applied in order to stretch the screen elements to such an extent that the same holding-down force is obtained.

The screening system according to the invention can be utilized not only for screening machines in which the screen decks are curved convexly, but also in screening machines with planar decks. In such a case, it is possible, according to a development of the invention, to plastically deform the stiffening elements in a direction opposite to the elastic deformation to which the stiffening elements are subjected during mounting of the screen elements in the screening machine.

The screen elements in the screening system of the present invention preferably are formed for overlap jointing at their side edges extending along one another. As has already been mentioned, the screen elements are formed as elongated elements similar to planks. In order better to promote the elastic deformation which is required for bringing about the necessary holding-down force, it is best if the elements have a length to width ratio of preferably at least 4:1 or, which is even better, at least 5:1. By this arrangement, the stiffening elements will lie closer to one another, and thus the total holding-down force will be greater, without it being necessary, upon mounting of the individual elements, to exert an inconveniently great force on the free ends of the elements when they are bent down and mounted in the screen frame.

The invention will be described in more detail in the following, reference being had to the accompanying drawings in which

Fig. 1 is a perspective view of an example of a screen element in accordance with the present invention;

Fig. 2 is a perspective view of parts of the screen frame of a screening machine to illustrate the mounting of the screen elements;

Fig. 3 is a perspective view of another embodiment of a screen element according to the present invention;

Fig. 4 is a transversal section of a part of a screening machine with screen elements according to a further embodiment of the invention.

Fig. 1 shows a screen element consisting of an elastomer, for instance natural or synthetic rubber, such as polyurethane. The screen element has holes 2 made during the manufacture of the element. Reinforcing or stiffening elements 3 are inserted along the longitudinal sides of the screen element. These reinforcing elements are made of rigid material and may consist of metallic square tubes, as illustrated in the drawings. If necessary, the screen elements may also be reinforced with a suitable number of laid-in stiffening elements 4 extending at right angles to the stiffening or reinforcing elements 3. The screen element is then formed for overlap jointing by being provided with a recess 5 at one long side and an overlap flange 6 at the other long side.

Fig. 2 shows an example of a screen frame in a screening machine. The screen frame has side members 7, hold-down ribs 8 and longitudinal supporting elements 9. The side members 7 also are provided with supporting surfaces 10. In the embodiment illustrated, the supporting surfaces 10 and the supporting elements 9 are mounted at different levels, such that the screen elements 1 will curve upwardly over the supporting elements 9.

As will appear from Fig. 2, the screen elements are mounted by clamping their one ends against the supporting surface 10 by means of the hold-down rib 8, whereupon the elements are pressed down over the supporting elements 9 by being subjected to a force in the direction of the arrow 11. Finally, the elements 1 are retained in this elastically deformed position by securing the hold-down rib 8 to the left side in Fig. 2.

The present invention thus utilizes the elasticity or spring force provided by the stiffening elements 3 in order to obtain the requisite holding-down action against the supporting elements 9 during the subsequent use of the screening machine. The holding-down action can be very large if an appropriate material is selected for the stiffening elements 3. These elements may consist of, for example, metallic material which is rigid and can be subjected to heavy elastic deformation without surpassing the 0.2% yield strength during mounting. However, the stiffening elements 3 may also be formed of other materials, such as glass fiber rods or other rigid bars placed in the screen cloth elements either at the long side edges only, as is shown in Fig. 1, or at suitable intervals in the lateral direction of the screen elements (= the screening direction of the screening machine).

In the embodiment according to Figs. 1 and 2, the invention has been utilized in connection with a screening machine with a convexly curved screen deck. As has been mentioned above, the invention may also be utilized with screening machines in which the finished screen deck is planar, in which case the stiffening elements may have been subjected to a plastic predeformation (see Fig. 3) such that the screen elements are curved in a direction opposite to the elastic deformation imparted to them during mounting. In Fig. 3, this plastic predeformation is illustrated by the arrows 12 which indicate the amount by which the screen elements deviate from a straight line 13.

The invention has been described above with

reference to a screen frame in which the screening cloth elements extend from one side to the other. However, the invention may be used also with screening machines designed in a different manner, in which the screening deck is divided into two or more juxtaposed areas, as shown in Fig. 4.

Claims

1. A screening system comprising a screen frame (7) with supporting elements (9) for a screen deck inserted in the screen frame, and fastening means (8, 10) for the screen deck which comprises several screen elements (1) made from an elastomer and placed adjacent each other and having stiffening elements (3) which are included in the screen elements (1) and which, by bending, are prestressed against the supporting elements (9) by elastic deformation upon mounting in the screen frame (7), characterised in that the screen elements (1) are mounted with their longitudinal direction extending transverse to the screening direction and that the length to width ratio of the screen elements (1) is at least 3:1 so that the bending can be effected without the use of a special tool.

2. A screening system according to claim 1, characterised in that the length to width ratio of the screen elements (1) is at least 4:1.

3. A screening system according to claim 2, characterised in that the length to width ratio of the screen elements (1) is at least 5:1.

4. A screening system according to claim 1, 2 or 3, characterised in that the stiffening elements (3) are mounted in the screen frame (7) with an elastic deformation whose spring-back force resultant is at least as large as an inertia resultant acting on the screen deck (1) in the opposite direction when the screen deck is used in a dynamic screening machine.

5. A screening system according to any of claims 1—4, characterized in that the screen elements (1) have laid-in stiffening transverse elements (4) extending at right angles to the stiffening elements (3).

Patentansprüche

1. Siebsystem, umfassend einen Siebrahmen (7) mit Stützgliedern (9) für ein in den Siebrahmen eingesetztes Siebdeck, sowie Befestigungsglieder (8, 10) für das Siebdeck, welches mehrere aus einem Elastomer gefertigte Siebelemente (1) umfasst, die nebeneinander angebracht sind und Verstärkungsglieder (3) aufweisen, die in die Siebelemente (1) eingesetzt und durch Biegen und elastische Deformierung beim Einbau in den Siebrahmen (7) gegen die Stützglieder (9) vorgespannt worden sind, dadurch gekennzeichnet, dass die Siebelemente (1) derart eingebaut sind, dass sich ihre Längsrichtung quer zur Siebrichtung erstreckt, und dass das Längen: Breitenverhältnis des Siebelemente (1) zumindest 3:1 beträgt, so dass das Biegen ohne Zuhilfenahme eines besonderen Werkzeugs ausgeführt werden kann.

2. Siebsystem nach Anspruch 1, dadurch gekennzeichnet, dass das Längen: Breitenverhältnis der Siebelemente (1) zumindest 4:1 beträgt.

3. Siebsystem nach Anspruch 2, dadurch gekennzeichnet, dass das Längen: Breitenverhältnis der Siebelemente (1) zumindest 5:1 beträgt.

4. Siebsystem nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, dass die Versteifungsglieder (3) in den Siebrahmen (7) mit einer elastischen Deformierung eingebaut sind, deren Rückfederungsresultante zumindest ebenso gross ist wie eine auf das Siebdeck (1) in der entgegengesetzten Richtung einwirkende Trägheitsresultante, wenn das Siebdeck in einer dynamischen Siebmaschine benutzt wird.

5. Siebsystem nach einem der Ansprüche 1—4, dadurch gekennzeichnet, dass die Siebelemente (1) eingelegte Querversteifungsglieder (4) aufweisen, die sich rechtwinklig zu den Versteifungsgliedern (3) erstrecken.

Revendications

1. Système de criblage comprenant un cadre de crible (7) avec des éléments de support (9) pour une surface de criblage disposée dans le cadre, ainsi que des moyens de fixation (8, 10) pour la surface de criblage, laquelle est composée de plusieurs éléments de crible (1) faits d'un élastomère, placés les uns à côtés des autres et possédant des éléments de raidissement (3) qui sont inclus dans les éléments de crible (1) et sont appliqués contre les éléments de support (9), au montage dans le cadre (1), sous une précontrainte produite par une déformation élastique par courbure, caractérisé en ce que les éléments de crible (1) sont montés de manière que leur sens longitudinal soit transversal à la direction de criblage et que le rapport de la longueur à la largeur des éléments de crible (1) est d'au moins 3:1, si bien que la courbure peut être produite sans l'emploi d'un outil spécial.

2. Système selon la revendication 1, caractérisé en ce que le rapport de la longueur à la largeur des éléments de crible (1) est d'au moins 4:1.

3. Système selon la revendication 2, caractérisé en ce que le rapport de la longueur à la largeur des éléments de crible (1) est d'au moins 5:1.

4. Système selon la revendication 1, 2 ou 3, caractérisé en ce que les éléments de raidissement (3) sont montés dans le cadre de crible (7) avec une déformation élastique dont la force de rappel élastique résultante est au moins aussi grande que l'inertie résultante agissant sur la surface de criblage (1) en direction opposée lorsque la surface de criblage est utilisée dans un cribleur dynamique.

5. Système selon l'une quelconque des revendications 1—4, caractérisé en ce que les éléments de crible (1) possèdent des éléments raidisseurs transversaux (4), inclus dans ces éléments et s'étendant à angle droit par rapport aux éléments de raidissement (3).

Fig.1

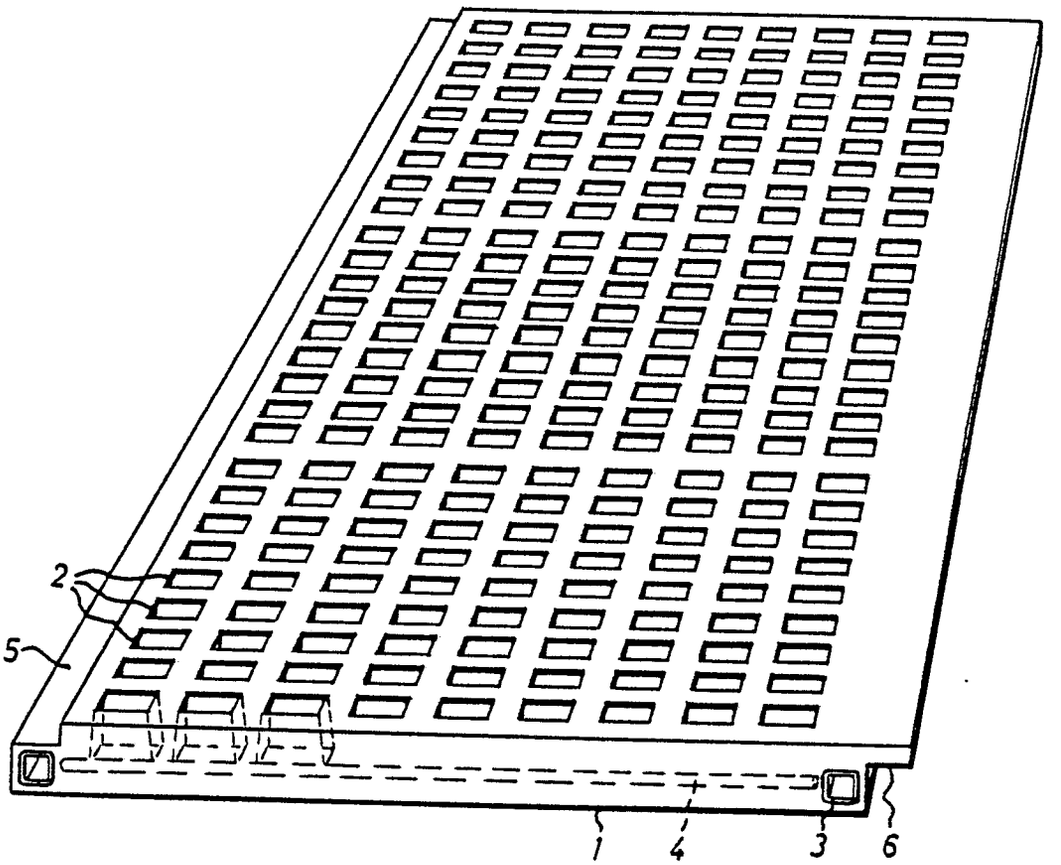


Fig.2

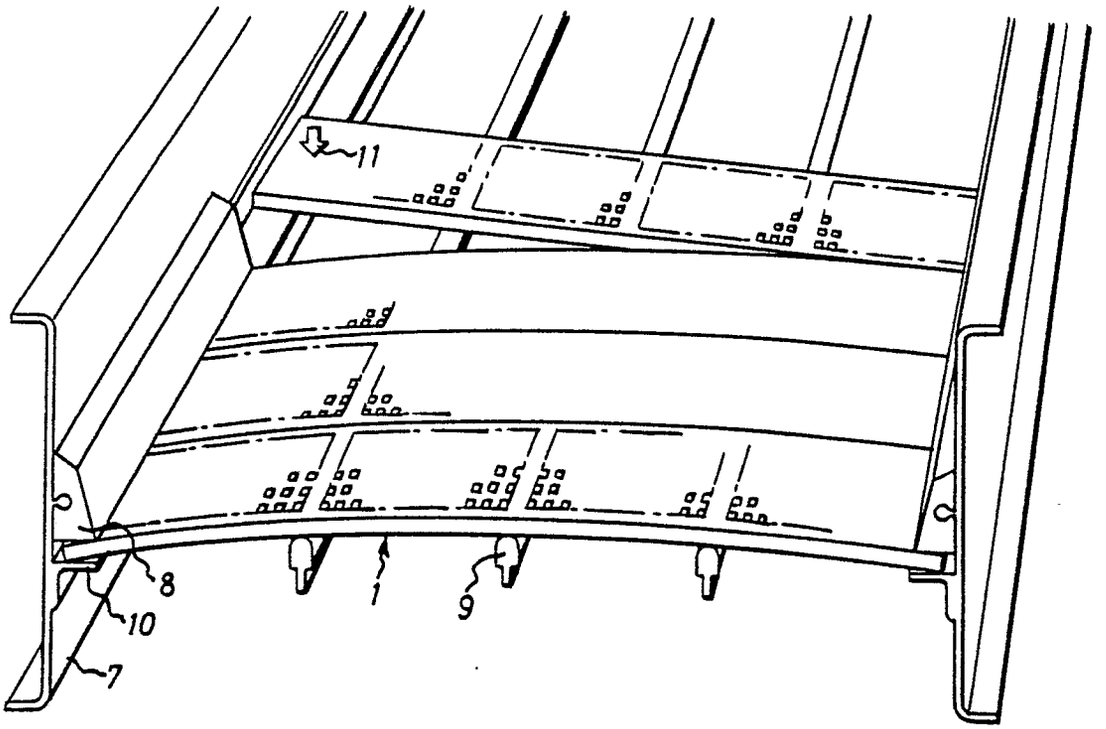
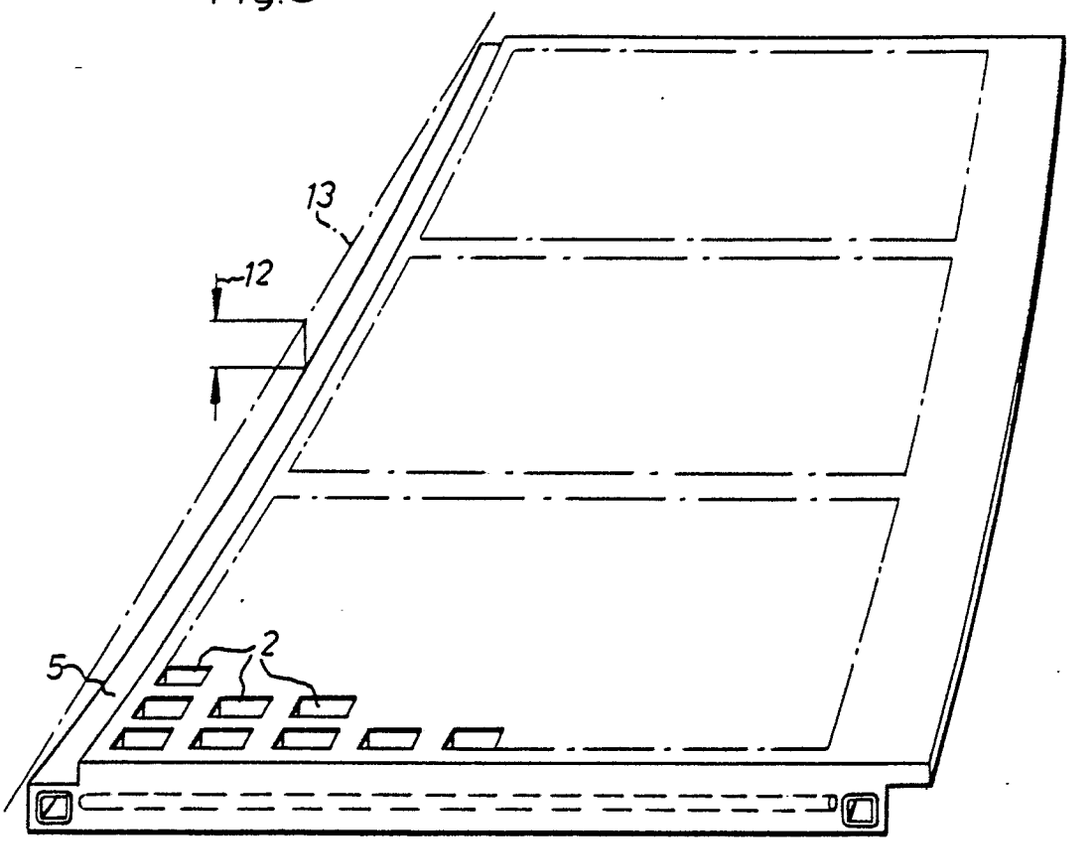


Fig.3



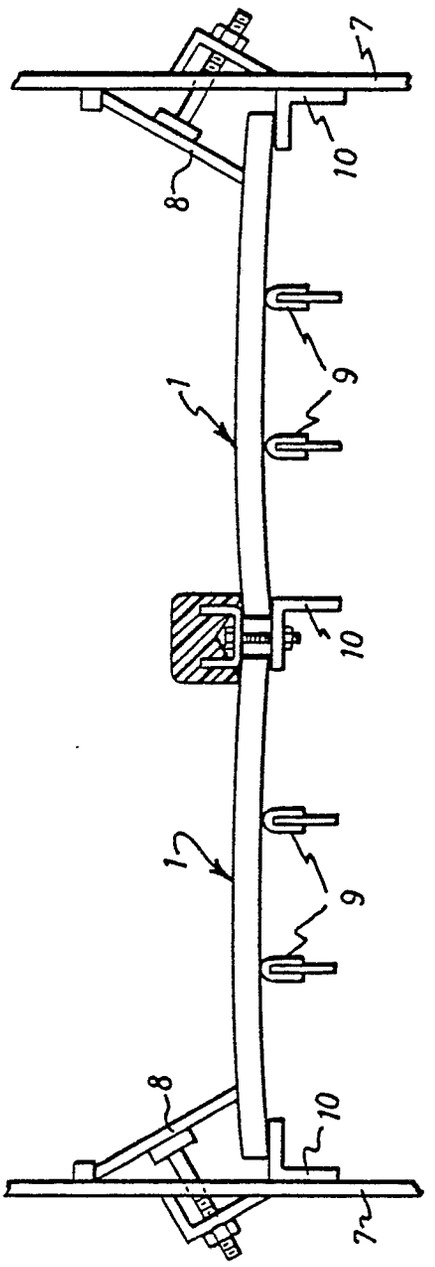


Fig.4