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(54) Mounting of cross beams in a weaving machine

Befestigung von Querträger in einer Webmaschine

Montage de traverses dans un métier à tisser

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Description

[0001] The present invention relates to a weaving machine comprising at least one cross beam which is carried and/or supported by at least two lateral frames of the weaving machine, in which the relative movement of the cross beam with respect to the lateral frames has at least one degree of freedom as a result of deformations of the lateral frames.

[0002] A weaving machine is usually composed of two lateral frames on either side of the weaving machine which are connected to one another via a number of intermediate or mounted cross beams. These measures are required in order to give the weaving machine the required strength in order to be able to absorb the forces generated during normal operation of the machine. A significant number of these cross beams also directly or indirectly have a function in the weaving process, such as, for example: yam guide roller, fabric guide roller, harness board support (also called cumber board support), selvedge system support and, with face-to-face weaving machines, in particular upper rod, lower rod and cutting bench.

[0003] During normal operation of the weaving machine, the structure composed of the lateral frames and the cross beams is subjected to a cyclic load of great forces due to the moving parts. In particular due to the beating-up movement of the beater, but possibly also due to the gripper drive or due to the variations in thread tension during shed formation, the tension on the warp thread supply and the tension on the fabric taken off.
In order to absorb these loads, the various cross beams, which do not perform a functional rotating or oscillating movement, are connected in a clamping manner by means of bolt connections to the (two or more) lateral frames which are each in turn connected to a support structure or to the ground.

[0004] In particular with high operating speeds and certainly in combination with high loads (high warp thread density, high weft thread density), the cyclic load leads to vibrations which continue on the lateral frames and in this way pass to the various cross beams which are connected to the lateral frames. In particular when the cross beam has a function or is a support for a functional unit, the resulting vibrations on the cross beams adversely affect the quality of the woven product, the stability of the weaving process by an increased number of standstills or the service life of the components of the weaving machine.

[0005] Thus, for example, on a face-to-face weaving machine in which two fabrics are simultaneously woven one above the other and which are connected to one another by pile warp threads which move from the bottom fabric to the top fabric and vice versa in a pattern-forming manner, the two fabrics are kept a distance apart which distance is determined by the opening between the lower cutting rod and upper cutting rod, provided the tension on the warp threads is sufficiently high. Subsequently, the sandwich fabric is presented to the cutting device. The cutting device consists of a knife carriage with a cutting knife which moves to and fro across the cutting bench across the width of the fabric. The cutting bench is fitted in the weaving machine as a cross beam and connected to the lateral frames. After the face-to-face fabric has been cut, both fabrics are each pulled out of the fabric zone by a pulling roller and taken off in an upper and a lower direction, respectively.

[0006] In flat weaving machines, analogously to the face-to-face weaving machines, a pulling roller pulls the fabric formed out of the fabric-forming zone in order to roll it up as a cloth. In this case, tensile forces are exerted which, for each pulling roller, may be as high as 15 kN/m.

[0007] Both with the face-to-face weaving machines and with the flat weaving machines, when the weaving reed strikes against the fabric edge, the tensile force of the pulling roller is partially or completely compensated for and immediately thereafter built up again when the beater with the weaving reed moves backwards again.
This continually alternating load results in continuous deformation of the pulling roller. Since the pulling roller is fitted in the lateral frames, this leads to a varying load on the lateral frames and causes a varying deformation of the lateral frames. This varying deformation of the lateral frames continues at the connection surface with the cross beams into these cross beams via the clamping connection between the lateral frame and cross beam. Certainly at relatively high weaving speeds and relatively high loads, this may cause vibrations which adversely affect the service life of the components, the quality of the fabrics or the weaving efficiency.
Thus, for example, the deformation of the lateral frames, which continues to the mounted cutting bench, may lead to deformations of the cutting bench, as a result of which the knife carriage with cutting knife moving to and fro across the cutting bench is subjected to vibrations and movements which cause the two fabrics to be cut through in an irregular manner. As a result thereof, more material has to be cut from the fabrics during finishing than is normally the case with a regular cut. This leads to a significant loss of material and a lower quality of the carpet.

[0008] In a similar manner, the accommodating beam for the harness boards for guiding the harness cords in a jacquard weaving machine can vibrate and deform, as a result of which the contact between the harness cords and the harness board becomes more intense, resulting in increased wear. Equally, in a flat weaving machine, the cross beam which supports one or more selvedge shed formation systems may be caused to vibrate and deform, as a result of which the selvedge results in reduced dimensional stability and the selvedge shed formation system having a reduced service life.

[0009] It is known, in order to prevent these problems, to make the lateral frames and/or the cross beams of a stronger design. This solution does, however, have a significant effect on the cost price of the device. In addition, this leads to large structures for which there is not always

sufficient space.

[0010] European patent EP 1 614 784 discloses a method for also supporting the cutting bench between the supporting surfaces on the lateral frames by connecting these to a guiding support at one or more intermediate locations. This method is effective at reducing the vibrations, but at relatively high speeds the resulting vibrations remain too high, thus adversely affecting the quality of the cut fabric.

[0011] It is an object of the present invention to provide a weaving machine in which the consequences of deformations of the lateral frames are limited, so that the adverse effects resulting from these deformations no longer occur.

[0012] The object of the invention is achieved by providing a weaving machine comprising at least one cross beam which is carried and/or supported by at least two lateral frames of the weaving machine, in which the relative movement of the cross beam with respect to the lateral frames has at least one degree of freedom as a result of deformations of the lateral frames, and in which at least one lateral frame of the weaving machine comprises at least one attachment element which is hingedly connected to the cross beam and is designed to carry and/or support the cross beam, as a result of which the deformations of the cross beam are smaller than the deformations of the lateral frame on the connection surface with the cross beam. This allows deformation of the lateral frame without the cross beam having to follow the entire deformation of the lateral frame at the connection to the cross beam. This means that the cross beam of the weaving machine according to the present invention will deform and vibrate to a lesser degree than in known weaving machines.

[0013] According to a more preferred embodiment of the weaving machine according to the present invention, the cross beam is hingedly connected to the attachment element by means of a hinge pin. More particularly, the hinge pin extends along a main axis of inertia of the cross beam, as a result of which the hinge pin lies along the neutral deformation line of the cross beam so that the deformations which are passed on are minimized.

[0014] In order to attenuate rotations of the hinge pin, the hinge pin, in a preferred embodiment, comprises a connecting element which is connected to a lateral frame of the weaving machine by means of an attenuating device. Said attenuating device comprises, in particular, a spring, a pneumatic cylinder or a hydraulic cylinder.

[0015] In order to absorb deformations along various axes of rotation and translation, the cross beam in the weaving machine, according to another preferred embodiment of the invention, is freely rotatable in the attachment element. In particular, the cross beam comprises a spherical element, the attachment element is of a socket-shaped design, as a result of which the spherical element is freely rotatable in the socket-shaped attachment element.

Obviously, for this purpose, the radius of the socket-shaped attachment element is greater than the radius of the spherical element.

In a preferred embodiment of the weaving machine according to the invention, the cross beam is a cutting bench in a face-to-face weaving machine. In another preferred embodiment, the cross beam is an upper or lower rod in a face-to-face weaving machine.

[0016] In yet another preferred embodiment of the weaving machine according to the invention, the cross beam is a support for selvedge systems in a weaving machine.

[0017] A more detailed description of the mounting in a weaving machine according to the invention is given below in order to explain the features of the present invention further and to indicate additional advantages and particulars thereof. It will be clear that nothing in the description given below may be interpreted as being a limitation of the scope of protection requested in the claims for the weaving machine according to the invention.

[0018] Reference numerals are used in this description to refer to the attached drawings, in which:

- Fig. 1: shows a representation of a device according to the state of the art;
- Fig. 2: shows a representation of the device from Fig. 1 in which additional attenuation has been provided;
- Fig. 3: shows a representation of a first device according to the invention in which a cross beam is hingedly suspended from the lateral frame;
- Fig. 4: shows a representation of the device from Fig. 3 in which additional damping has been provided;
- Fig. 5: shows a representation of a second device according to the invention in which the cross beam is mounted on the lateral frame of the weaving machine so as to be freely rotatable via a ball-and-socket joint.

[0019] A weaving machine is composed of two lateral frames (1) on either side of the weaving machine which are connected to one another by means of a number of intermediate or mounted cross beams (2). As has been discussed above, forces are generated during normal operation of the weaving machine which may cause deformations of the lateral frames (1) which may be passed onto the cross beams (2) with all the adverse consequences this entails.

[0020] In order to limit the consequences of deformations on the lateral frames (1), it is known according to the state of the art as presented in figure 1 that in a weaving machine the relative movement of the cross beam (2) with respect to the lateral frames (1) due to deformations of the lateral frames (1) has one degree of freedom, as a result of which the deformations of the cross beam are smaller than the deformations of the lateral frame (1) on the connection surface to the cross beam. This degree of freedom allows the lateral frames (1) to deform without

the cross beam (2) having to follow the entire deformation along this degree of freedom.

[0021] In the weaving machine, at least one lateral frame (1) comprises at least one attachment element (3, 10, 17) which is provided in order to carry and/or support the cross beam (2).

[0022] In order to achieve the one degree of freedom, the cross beam (2) of the weaving machine, as illustrated in Figs. 1 comprises a first projection (5), in which, between the attachment element (3) and the first projection (5), an attenuating material (4), such as for example rubber, felt or cork is provided. The attenuating material (4) absorbs part of the deformations of the lateral frames (1) without passing these deformations on to the cross beam (2).

[0023] In this device, the connection surface between the lateral frame (1) and the cross beam is at the attachment element (3). The attachment element is designed as a mounting surface (3) on which the cross beam (2) with its first projection (5) is mounted. The attenuating material (4) is provided in the space between the mounting surface (3) and the first projection (5). The mounting surface (3) preferably extends horizontally and is in particular at the neutral fibre of the cross beam (2), as a result of which, in this mounting surface (3), the deformation of the cross beam (2) as a result of the deformations on the lateral frame (1) only consists of a tilting of the first projection (5) of the cross beam (2) without a lengthening or shortening of the cross beam (2) occurring.

[0024] In this patent application, the expression neutral fibre is understood to mean the line in which no lengthening or shortening of the cross beam occurs upon bending of the cross beam.

[0025] The attenuating material (4) only has to attenuate the tilting of the first projection (5) of the cross beam (2), thus significantly limiting the resulting deformation of the cross beam (2) or almost reducing it to zero.

The attachment element (3) may, however, equally well be a vertical surface of a lateral frame which is subsequently connected to a vertical first projection of the cross beam by means of a bolt connection. The attenuating material (4) may be inserted between the vertical surface and the vertical first projection.

[0026] It is known that in order to further attenuate the movement between the machine frame (1) and the cross beam (2) with respect to one another, the cross beam (2) comprises a second projection (6) which is mounted in an attenuating manner at a lateral frame (1) of the weaving machine. This means, as is illustrated in Fig. 2, that the second projection (6) is accommodated in the lateral frame (1) and is surrounded by an attenuating material (7). The second projection (6) can be in the form of a surface and extend between two surfaces (8) which are connected to the lateral frames (1). These surfaces (8) between which the second projection (6) of the cross beam (2) extends are covered with an attenuating material (8) on their contact surface with the second projection (6). The attenuating material (8) may, for example, be rubber, felt or cork.

The second projection (6) can extend in any suitable direction (downwards, upwards, forwards, backwards, or in another direction). Said second projection (6) may also be in the form of an axle which extends through a sleeve which is connected to the lateral frame (1) (not illustrated in the figures). This sleeve is preferably covered with an attenuating material on the inside.

[0027] In order to achieve the effect of the invention, in a device (represented in Figs. 3 and 4), the cross beam (2) is hingedly connected to an attachment element (10). The cross beam (2) is hingedly connected to the attachment element (10) via a hinge pin (9). The hinge pin (9) is mounted in the attachment element (10).

This results in deformations of the cross beam (2) that are smaller than the deformations of the lateral frame (1) on the connection surface with the cross beam. This allows deformation of the lateral frame (1) without the cross beam (2) having to follow the entire deformation of the lateral frame at the connection to the cross beam. This means that the cross beam of the weaving machine according to the present invention will deform and vibrate to a lesser degree than in known weaving machines.

[0028] If, for example, the cross beam (2) is the cutting bench (2) of a face-to-face weaving machine and the hinge pin (9) is connected to a lateral flange (15) of the cutting bench (2) in the centre or at its two ends, while the lateral frame (1) is provided, on its attachment element (10), with two carrier elements (16) having a cover (not illustrated) and in which the axle (9) can be clamped in a mounted manner, the lateral frame (1) will be able to deform without the deformation being completely passed on to the cutting bench (2) after the carrier elements (16) having a cover have been fitted around the hinge pin (9). During its deformation, the lateral frame can hingedly rotate in the attachment element (10) with its carrier elements (16) around the hinge pin (9) which is connected to the cutting bench (2), as a result of which this rotating movement is not passed on to the cutting bench (2) so that the cutting bench (2) is subjected to fewer vibrations.

The same effect can be achieved with other cross beams (2) in face-to-face weaving machines or flat weaving machines.

[0029] Preferably, the hinge pin (9) is oriented along a main axis of inertia (11) of the cross beam (2). In this manner, the axle (9) lies along the neutral deformation line of the cross beam (2) and the deformations which are passed on are additionally minimized. During its deformation, the lateral frame (1) can rotate in the direction of rotation (12) in a clockwise or counterclockwise manner. As is illustrated in Fig. 4, in a further preferred device, a connecting element (13) in the form of a lever may be attached to the hinge pin (9), which connecting element (13) extends radially with respect to the axle (9) and the end of which is connected to an attenuating device (14), in order to attenuate the rotations (12) of the hinge pin

(9). The attenuating device (14) may, for example, be a spring or a pneumatic or hydraulic cylinder or an attenuating material.

[0030] As, upon precise inspection of the deformation of the lateral frames (1) of the weaving machine, it appears that the lateral frames (1) deform according to different axes of rotation and translation, in a third device (see Fig. 5) according to the invention, the cross beam (2) is provided so as to be freely rotatable in the attachment element (17). In this case, the cross beam (2) comprises a spherical element and the attachment element (17) is of a socket-shaped design, as a result of which the spherical element is freely rotatable in the socket-shaped attachment element (17). In this manner, a ball-and-socket joint (17) is formed, as it were.

Furthermore, the cross beam (2) is mounted in an attenuating manner in a least one point (18). If, relative to the ball-and-socket joint (17), this mounting point/mounting surface (18) is on that side on which the centre of gravity of the cross beam (2) is situated, one such mounting point/mounting surface (18) is sufficient.

[0031] In such embodiments having a ball-and-socket joint (17), all deformations of the lateral frame (1) along axes of rotation can be partially or completely neutralized.

Claims

1. Weaving machine comprising at least one cross beam (2) which is carried and/or supported by at least two lateral frames (1) of the weaving machine, in which the relative movement of the cross beam (2) with respect to the lateral frames (1) has at least one degree of freedom as a result of deformations of the lateral frames (1), **characterized in that** at least one lateral frame (1) of the weaving machine comprises at least one attachment element (3, 10, 17) which is hingedly connected to the cross beam (2) and which is designed to carry and/or support the cross beam (2), as a result of which the deformations of the cross beam are smaller than the deformations of the lateral frame (1) on the connection surface with the cross beam.

2. Weaving machine according to Claim 1, **characterized in that** the cross beam (2) is hingedly connected to the attachment element (10) by means of a hinge pin (9).

3. Weaving machine according to Claim 2, **characterized in that** the hinge pin (9) extends along a main axis of inertia (11) of the cross beam (2).

4. Weaving machine according to Claim 2 or 3, **characterized in that** the hinge pin (9) comprises a connecting element (13) which is connected to a lateral frame (1) of the weaving machine by means of an attenuating device (14).

5. Weaving machine according to Claim 4, **characterized in that** the attenuating device (14) comprises a spring, a pneumatic cylinder or a hydraulic cylinder.

6. Weaving machine according to Claim 1, **characterized in that** the cross beam (2) is freely rotatable in the attachment element (17).

7. Weaving machine according to Claim 6, **characterized in that** the cross beam (2) comprises a spherical element, the attachment element (17) is of a socket-shaped design, as a result of which the spherical element is freely rotatable in the socket-shaped attachment element (17).

8. Weaving machine according to one of the preceding claims, **characterized in that** the cross beam (2) is a cutting bench in a face-to-face weaving machine.

9. Weaving machine according to one of the preceding claims, **characterized in that** the cross beam (2) is an upper or lower rod in a face-to-face weaving machine.

10. Weaving machine according to one of the preceding claims, **characterized in that** the cross beam (2) is a support for selvedge systems in a weaving machine.

Patentansprüche

1. Webmaschine, umfassend wenigstens einen Querträger (2), welcher von wenigstens zwei Seitengestelle (1) der Webmaschine getragen und/oder gehalten ist, wobei die Relativbewegung des Querträgers (2) bezüglich der Seitengestelle (1) als Folge der Verformungen der Seitengestelle (1) wenigstens einen Freiheitsgrad aufweist, **dadurch gekennzeichnet, dass** wenigstens ein Seitengestel (1) der Webmaschine wenigstens ein Befestigungselement (3, 10, 17) umfasst, welches schwenkbar mit dem Querträger (2) verbunden ist und welches dazu ausgebildet ist, den Querträger (2) zu tragen und/oder zu halten, wodurch an der Verbindungsfläche mit dem Querträger die Verformungen des Querträgers geringer sind als die Verformungen des Seitengestelles (1).

2. Webmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** der Querträger (2) mittels eines Schwenkstifts (9) schwenkbar mit dem Befestigungselement (10) verbunden ist.

3. Webmaschine nach Anspruch 2, **dadurch gekennzeichnet, dass** sich der Schwenkstift (9) entlang einer Hauptträgheitsachse (11) des Querträgers (2) erstreckt.

4. Webmaschine nach Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** der Schwenkstift (9) ein Verbindungselement (13) aufweist, welches mit einem Seitengestell (1) der Webmaschine mittels einer Dämpfvorrichtung (14) verbunden ist.

5. Webmaschine nach Anspruch 4, **dadurch gekennzeichnet, dass** die Dämpfvorrichtung (14) eine Feder, einen Pneumatikzylinder oder einen Hydraulikzylinder aufweist.

6. Webmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** der Querträger (2) in dem Befestigungselement (17) frei drehbar ist.

7. Webmaschine nach Anspruch 6, **dadurch gekennzeichnet, dass** der Querträger (2) ein kugelförmiges Element umfasst und dass das Befestigungselement (17) glockenförmig ist, so dass das kugelförmige Element in dem glockenförmigen Befestigungselement (17) frei drehbar ist.

8. Webmaschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Querträger (2) ein Schneidetisch in einer Doppelstück-Webmaschine ist.

9. Webmaschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Querträger (2) ein Oberlineal oder ein Unterlineal in einer Doppelstück-Webmaschine ist.

10. Webmaschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Querträger (2) eine Halterung für Webkantensysteme in einer Webmaschine ist.

Revendications

1. Métier à tisser, comprenant au moins une traverse (2) qui est portée et/ou supportée par au moins deux bâtis latéraux (1) du métier à tisser, dans lequel le déplacement relatif de la traverse (2) par rapport aux bâtis latéraux (1) présente au moins un degré de liberté à la suite de déformations des bâtis latéraux (1), **caractérisé en ce qu'**au moins un bâti latéral (1) du métier à tisser comprend au moins un élément de fixation (3, 10, 17) qui est connecté de façon articulée à la traverse (2) et qui est conçu pour porter et/ou supporter la traverse (2), avec comme conséquence que les déformations de la traverse sont plus petites que les déformations du bâti latéral (1) sur la surface de connexion avec la traverse.

2. Métier à tisser selon la revendication 1, **caractérisé en ce que** la traverse (2) est connectée de façon articulée à l'élément de fixation (10) au moyen d'un axe de charnière (9).

3. Métier à tisser selon la revendication 2, **caractérisé en ce que** l'axe de charnière (9) s'étend le long d'un axe d'inertie principal (11) de la traverse (2).

4. Métier à tisser selon la revendication 2 ou 3, **caractérisé en ce que** l'axe de charnière (9) comprend un élément de connexion (13) qui est connecté à un bâti latéral (1) du métier à tisser au moyen d'un dispositif d'atténuation (14).

5. Métier à tisser selon la revendication 4, **caractérisé en ce que** le dispositif d'atténuation (14) comprend un ressort, un cylindre pneumatique ou un cylindre hydraulique.

6. Métier à tisser selon la revendication 1, **caractérisé en ce que** la traverse (2) peut tourner librement dans l'élément de fixation (17).

7. Métier à tisser selon la revendication 6, **caractérisé en ce que** la traverse (2) comprend un élément sphérique, l'élément de fixation (17) présente une conception en forme de douille, avec comme conséquence que l'élément sphérique peut tourner librement dans l'élément de fixation en forme de douille (17).

8. Métier à tisser selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la traverse (2) est une table de coupe dans un métier à tisser double face.

9. Métier à tisser selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la traverse (2) est une règle supérieure ou inférieure dans un métier à tisser double face.

10. Métier à tisser selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la traverse (2) est un support pour des systèmes de lisière dans un métier à tisser.

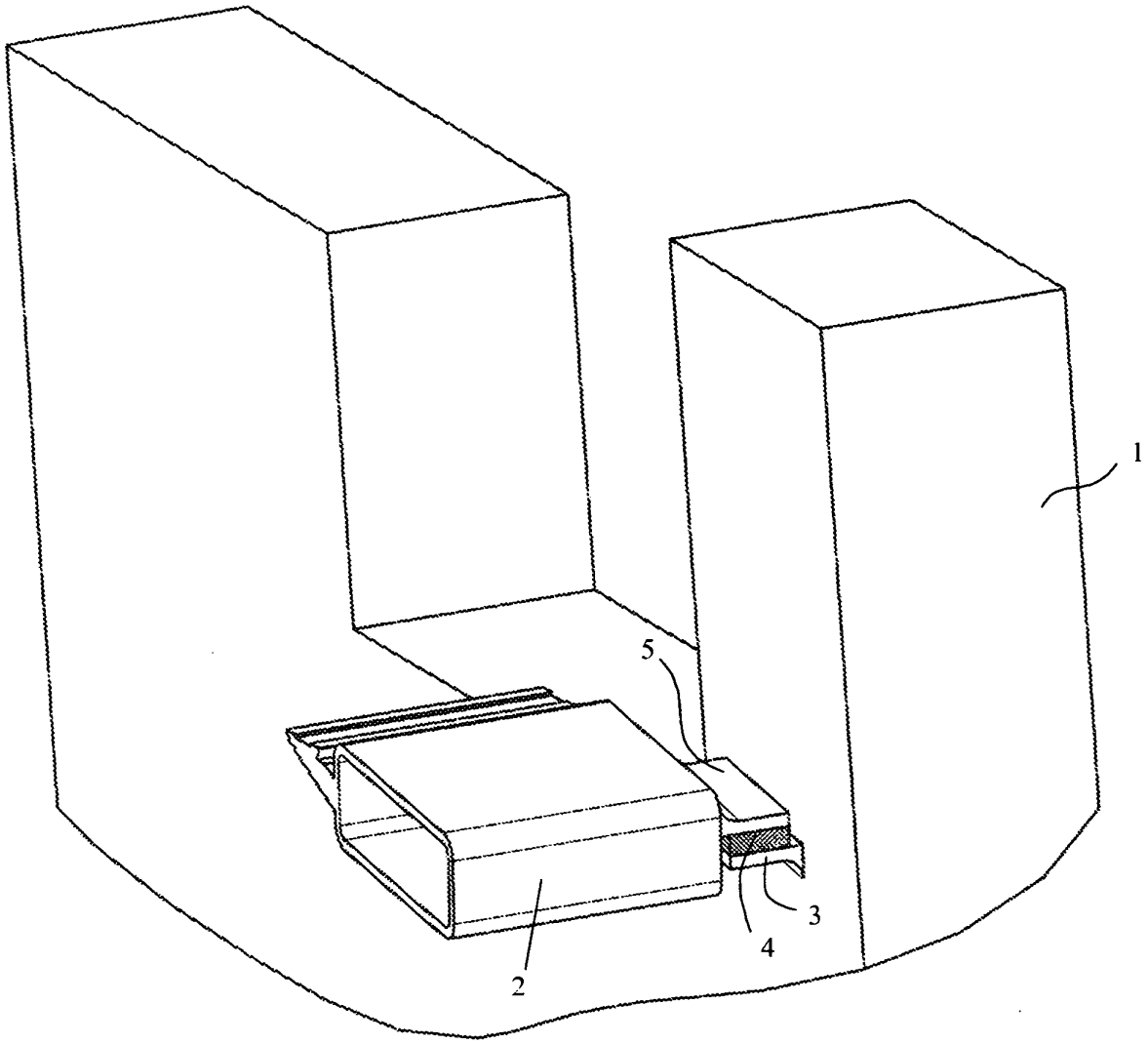


Fig. 1

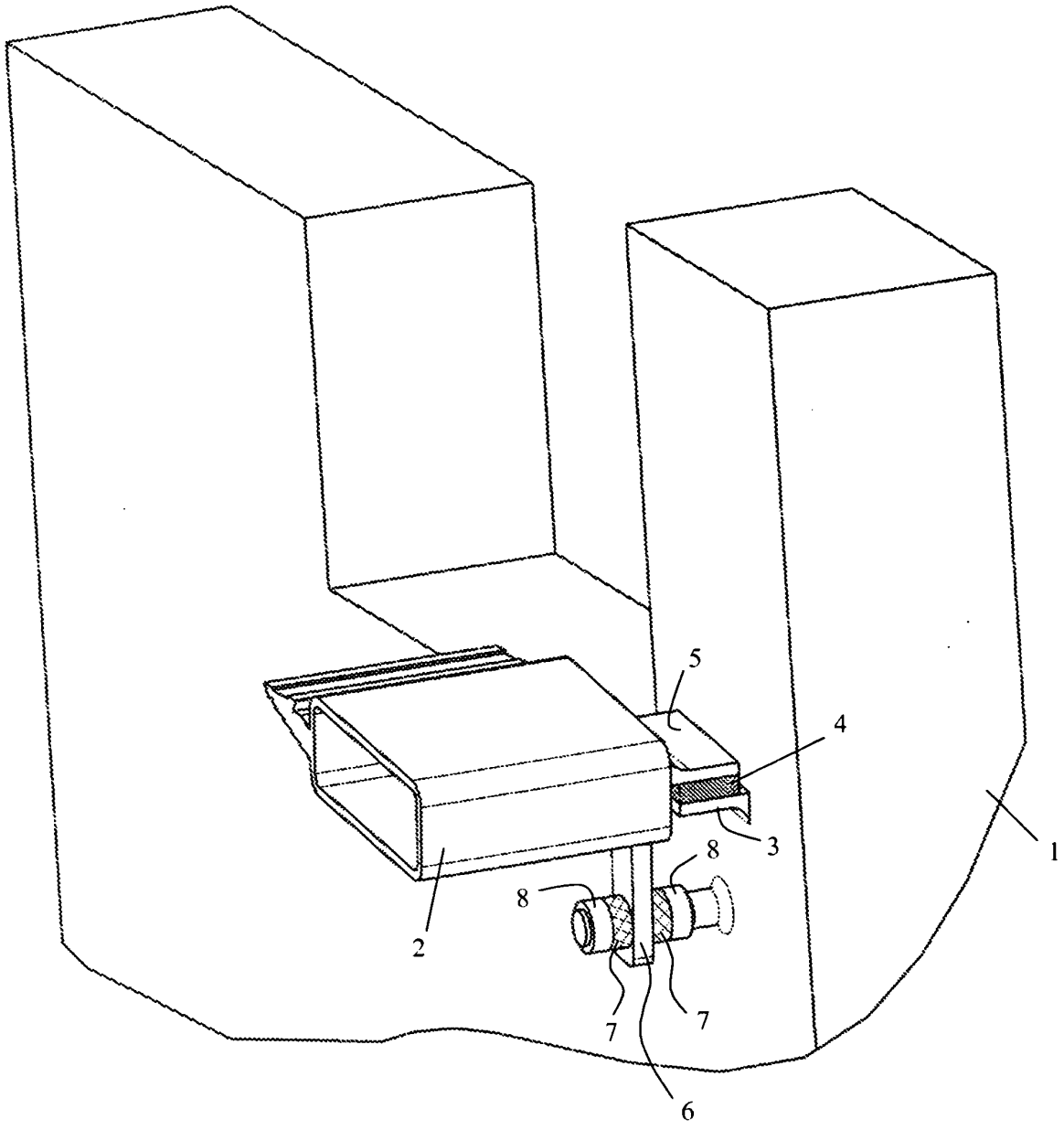


Fig. 2

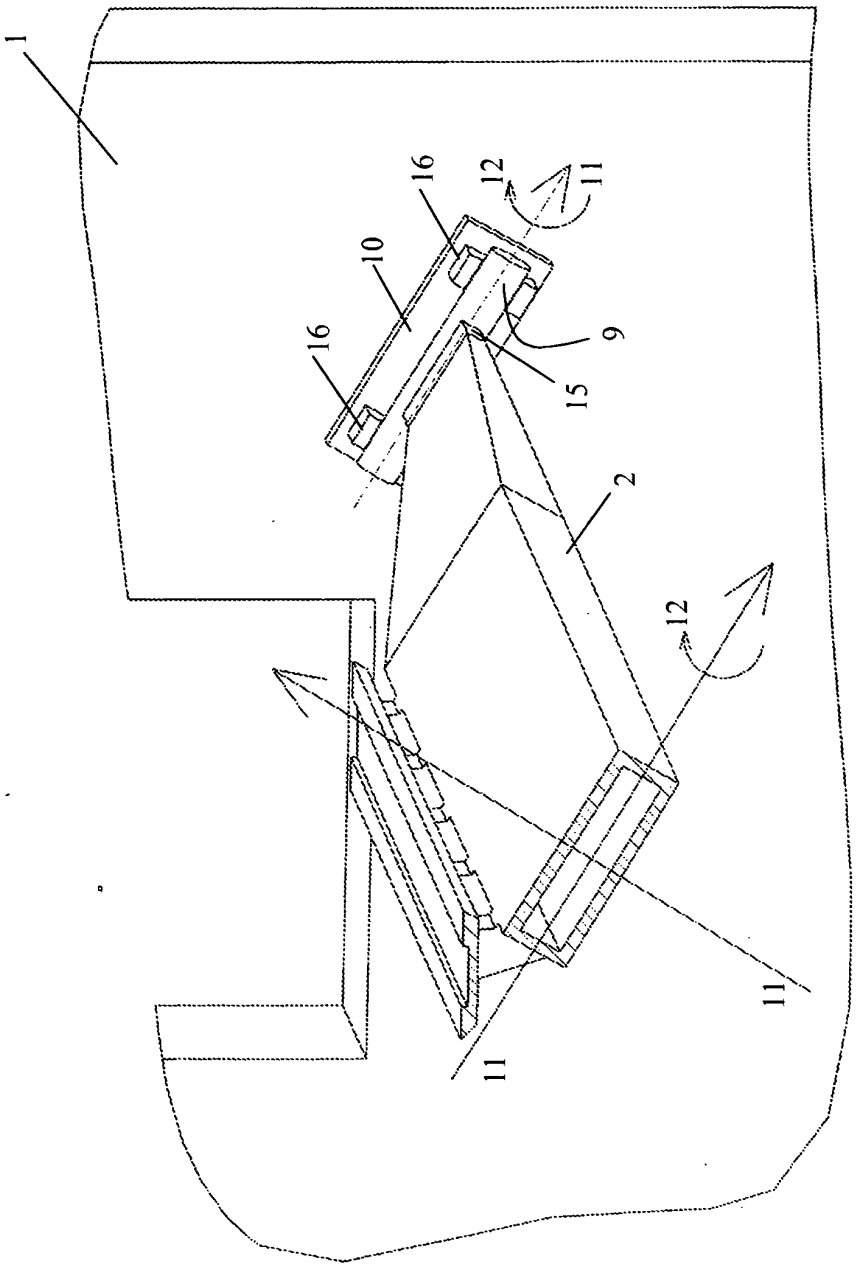


Fig. 3

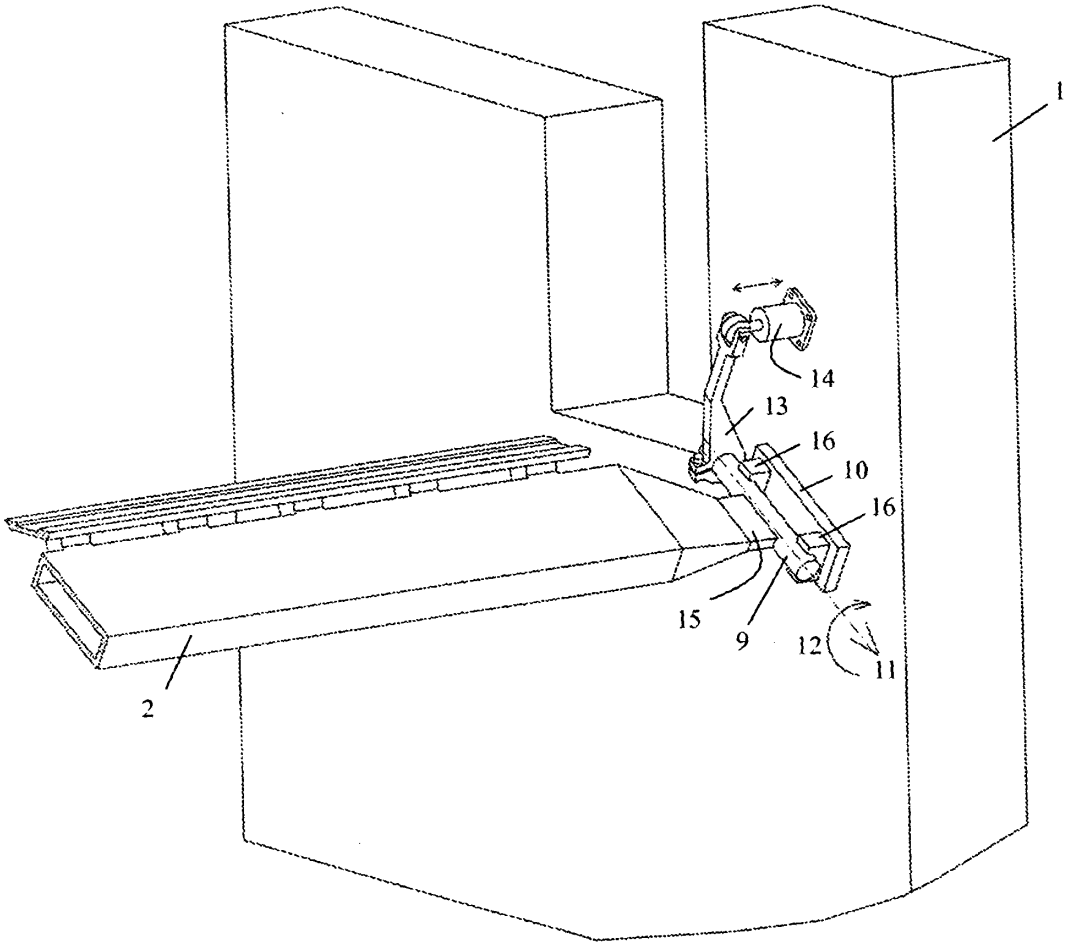


Fig. 4

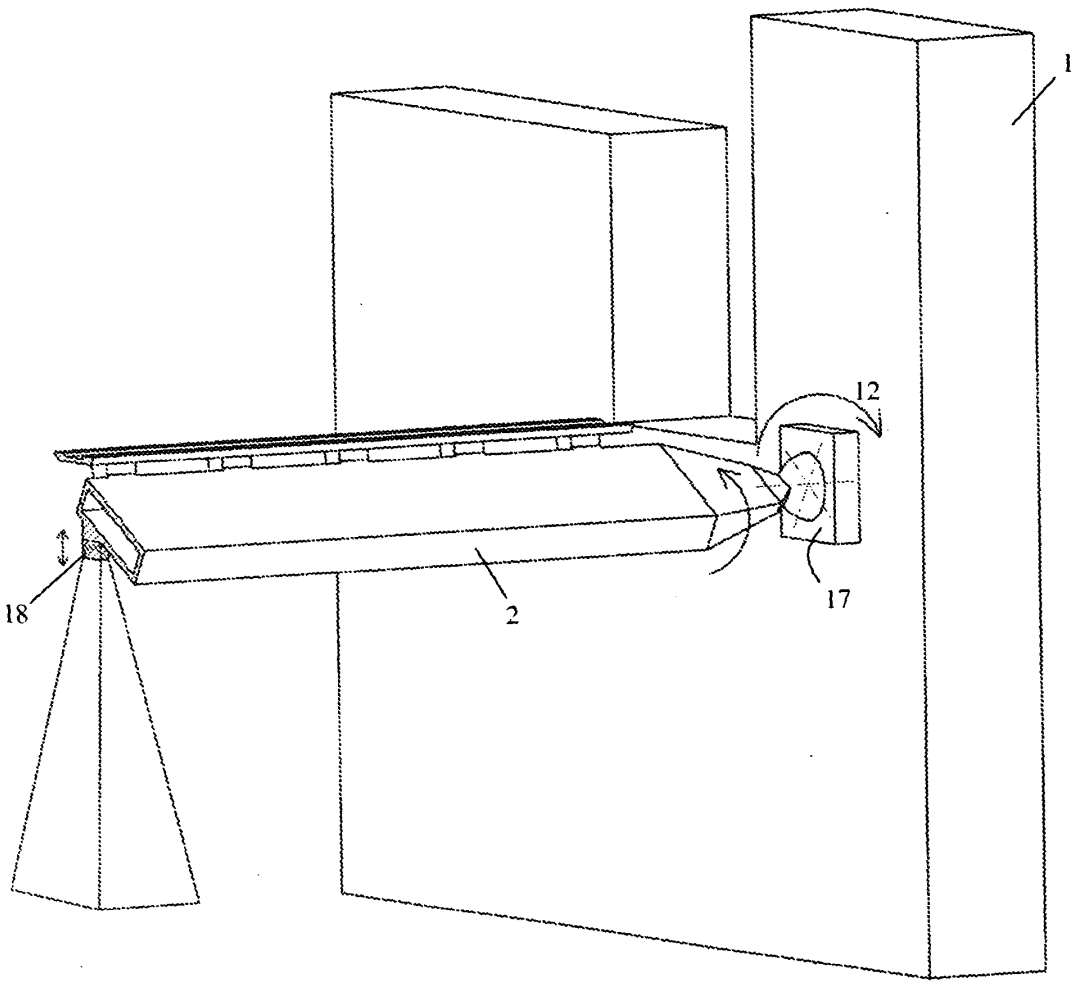


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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