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(54) **Fast guide device for the control rods of heald frames in a loom**

Feste Führungsvorrichtung für die Steuerstäbe der Schäfte in einer Webmaschine

Dispositif de guidage fixe pour les tiges de commande des cadres dans un métier à tisser

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Description

The present invention concerns a fast guide device for the control rods of heald frames in a loom, and particularly a device of this type apt to keep in a correct position the unused control rods, when the loom is working with a number of heald frames below the maximum number thereof foreseen on the loom by the constructor.

As known, the heald frames are rectangular frames formed by a pair of horizontal crosspieces and by two vertical sidepieces, into which is inserted a plurality of vertical healds - thin metal bars with a central slot - apt to guide the reciprocating motion of the warp yarns, each of which passes through the slot of a respective heald. The reciprocating motion, verticalwise, of the heald frame causes the corresponding motion of groups of warp yarns, hence determining the opening of the shed according to a pattern prearranged by the weaver, to allow picking the wefts. The heald frames vary in number - from a minimum of two to a maximum normally below twenty - according to the special design one wishes to weave. It is thus evident that the loom constructor sells its machines prearranged for working with a maximum number of heald frames; it is then up to the weaver to keep on the loom, each time, only the number of frames which will be required to weave a certain fabric.

The vertical shifting of the healds is obtained by special articulated systems which - in a particularly successful and widespread construction - impart a reciprocating motion, verticalwise, to a series of rods, commonly known as heald control rods, which in turn transmit said motion to the heald frames. The device of the present invention particularly applies to this type of driving mechanism of the heald frames which, for further clearness, will now be described in detail with reference to figs. 1, 2 and 3, of which:

Fig. 1 is a diagrammatic front view of a heald frame and of the respective driving mechanism;

Fig. 2 is a front sectional view, on an enlarged scale, of a control rod for heald frames, showing also two possible cross sections of the rod; and

Fig. 3 is a front sectional view, on an enlarged scale, showing the detail wherein the heald control rod is fixed to the heald frame.

Fig. 1 shows diagrammatically a single heald frame 1, which is caused to perform a reciprocating motion verticalwise by the weave machine (not shown), through square levers 2 controlling the motion of the heald control rods 3 (two rods for each heald frame). To obtain the mechanical connection between the heald frame 1 and the heald rods 3, said frame is provided, at its upper corners, with coupling tabs 4 apt to engage, with a hook mouth thereof, onto a bush 5 screwed on the upper end of the rod 3 which is suitably threaded for the purpose. By changing the position of the bush 5 on the heald rod 3, it is possible to adjust the height of the frame 1 to the

desired extent, according to weaving requirements.

The steady correct vertical positioning of the heald control rods 3 and consequently of the heald frames 1, and the correct spacing between them, is guaranteed by two pairs of racks 6 - one pair on each side of the group of frames - each rack being provided with a number of teeth equal to the maximum number of frames supplied on the loom. Each rack tooth contributes to keep in a stable position - with the slack required to allow its free axial movement - a heald control rod 3 against the bottom of a longitudinal guide slot 8 provided on the sidepieces 7 of the frames 1, as clearly shown in the section A-A of fig. 3. The racks 6 are in turn anchored onto lateral supports 9 of the loom, which are normally fixed.

The lateral supports 9 may however oscillate outwardly of the loom, about hingeing axes Z, so as to release the frames 1 from the racks 6 and from the heald control rods 3, and thereby allow the necessary replacements or changes on such frames, when breakages or modifications on the fabric being woven require these operations. To obtain this result, it is however necessary to previously block the heald control rods 3 to the supports 9, so that they may follow them in their oscillating movement, thus releasing both the sidepieces 7 and the coupling tabs 4 of the frames 1. Said result is normally obtained with a pair of templates 10, having a plurality of holes 11 equal in number to that of the rods 3, each template being temporarily fixed to a respective lateral support 9 (fig. 3) so as to block in position the heald control rods 3. This allows not only to block the rods 3 on the supports 9, but also to make sure that said rods remain in the exact working position, so as to avoid any problems or waste of time when the frames 1 have to be mounted again.

Nevertheless, the aforescribed operation of mounting and removing the frames 1 can be carried out with the necessary precision and at the required speed only when all the loom frames are working, which is indeed fairly rare. In fact, in the more frequent cases in which the loom works only with part of the frames available, the problem arises to block the heald control rods 3 which are not working, namely those onto which no frames are mounted. Said rods in fact, due to their actual construction and assembly, cannot be released, as they would end by dropping into the loom, thereby causing damages to the warp yarns or hampering the regular operation of the working frames. It is thus a common praxis to temporarily fix the rods 3 which are not working to the supports 9, using the most different methods.

However, this solution has two kinds of drawbacks, the common consequence of which is to slow down the operation of replacing the frames and thus prolong the non-working period of the loom; this proves to be day after day more harmful from the economical point of view, taking into account, on one hand, the high capital and running costs and, on the other hand, the considerable productivity levels reached by modern looms.

A first drawback hence lies in the fact that the fixing has to be done by way of tightening elements, blocked in position by clamps, pins, or other means, which anyhow involve the use of appropriate tools. Such tightening elements are normally quite numerous, as they must be changed according to the total number of inactive rods having to be blocked in position. Often, moreover, said tightening elements are not permanently set on the loom, or should anyhow be removed therefrom when wishing to use all the heald frames. In other words, these are rudimentary systems, which involve the use of a variety of elements, and of tools, as well as a considerable waste of time for their setting up.

A second drawback lies instead in the fact that such tightening elements, presently used in technique, are not apt to safely and positively keep the heald control rods 3 in their exact working position. Thus, when the weaver has to work on the frames 1 and should hence previously set on the templates 10, he meets with some difficulties in introducing exactly into the holes 11 the rods 3 which were not already guided by the frames 1, that is, the non-working rods 3. In fact, since their hinging onto the axis Z leaves a fair degree of freedom, not only in the plane shown in fig. 1 but also in a plane perpendicular thereto, it is almost inevitable that between one weave and the next - due to the considerable loom vibrations - said rods move away from their correct position and thus create problems when wishing to operate a quick insertion thereof into the templates 10.

The object of the present invention is therefore to overcome the aforementioned drawbacks, by supplying a fast guide device for the heald control rods, which is apt to operate with the greatest simplicity and speed on all the rods 3 which are not working, independently from their number, and to keep said rods perfectly in position during the whole weaving operation, so as to create no problems when the operator has to set the templates 10 onto said rods 3.

According to the present invention, said object is reached by means of a loom comprising a fast guide device for the control rods of heald frames, of the type in which one end of said rods is hinged onto the same axis on which there are hinged lateral supports to which said rods are fixed during certain weaving operations, characterized in that it comprises at least one screw and nut element, whose pitch is equal to the distance between the axes of said control rods, the nut being fixed to one of said lateral supports and the screw being positioned with its axis parallel to the plane of said rods and adjacent thereto, the thread of said screw consisting of a helical cavity apt to engage with said rods so as to keep them in a stable position between said screw and the respective lateral support.

The invention will now be described in further detail, with reference to a preferred embodiment thereof, illustrated in figs. 4 and 5 of the accompanying drawings, of which:

Fig. 4 is a side elevation view of the fast guide device according to the present invention mounted inside a loom; and

Fig. 5 is a partial section view along the line C-C of fig. 4.

To show more clearly its positioning inside the loom - where it is indicated by the letter D - the device of the present invention has also been diagrammatically illustrated in dashed lines in the front view of fig. 1.

With reference to fig. 4, it should be noted first of all that the right side thereof is that facing the loom reed, namely the weft picking side. The sheet on which said figure is drawn represents one of the lateral loom supports 9, to which the racks 6 are anchored and to which is also fixed the device of the present invention. Said device consists of a long screw 12 and of a respective nut 13, which is fixed to the support 9 - with the interposition of a plate 14, fixed in respect of the nut 13 - by means of locking nuts housed into slots 15. The thread of the screw 12 forms a helical cavity, the section of which is apt to engage - with the required slack - the section of the heald control rods 3. In the illustrated embodiment, said cavity has a rectangular section, while the heald control rods 3 have a circular section; other sections can however be provided - as shown for the heald control rods 3 in fig. 2 (Sec. B-B) - without thereby departing from the scope of the present invention.

The thread pitch P of the screw 12 corresponds exactly to the distance between the axes of adjacent heald control rods 3, so that, by positioning said screw next to the row of rods 3, these house themselves tangentially inside the threading of the screw 12 (see fig. 5). During initial setup of the device, the position of the screw 12 is axially modified by moving the plate 14 in respect of the support 9 thanks to the slots 15. Once having determined the position wherein the engagement between the screw 12 and the rods 3 takes place with the required precision, the plate 14 is locked in said position and no longer removed. At this stage, by rotating the screw 12 in respect of the nut 13, it is possible to engage with the screw 12 the selected number of rods 3 - starting from the one furthest from the reed - up to reaching the rod closest to the reed (right side of the drawing), hence providing to block in a steady position the rods which are not working and leaving instead perfectly free the rods which have to engage onto the corresponding heald frames.

It should in fact be remembered in this respect that, in the normal weaving technique, the heald frames are operated starting from the ones closest to the reed, up to gradually reaching the furthestmost ones. The device of the present invention hence allows to operate the frames just in this order, while simultaneously blocking in position the heald control rods which are not working and thereby reaching, with the greatest simplicity and efficiency, one of the objects of the present invention. The screw 12 is in fact constantly operating on the loom

and it requires no special tool for its forward or backward rotation since, by means of a suitable handle 16 provided on its head, it can be easily hand operated.

The aforescribed guide device for control rods of heald frames allows to simultaneously reach also the second object of the invention. In fact, as seen above, the axial displacements performed by the screw 12 through rotation thereof - in order to vary the number of heald control rods 3 blocked in position - take place without ever releasing the grip on such rods, which hence keep their position permanently unaltered. Furthermore, any heald control rods which must cease to work are, after removal of the respective heald frame, immediately set in a correct position by simple forward rotation of the screw 12. Thus, at any moment of the weaving operation, the heald control rods 3 are in a perfectly and constantly centred position, whereby their insertion into the template 10 (which is anyhow always useful, as it provides to position and block the working rods before removal of the heald frames, and thus before the screw 12 may block them in position) is extremely easy, and could even be obtained automatically, seen that a manual intervention - required up to date - is no longer needed to cause the exact insertion of each of the non-working rods 3 into the corresponding hole 11 of the template 10.

The working of the nut 13 has not been illustrated in detail, as it concerns a fully known mechanical construction. Said nut can be of the thread type or of the pin type, or even of other types, without altering the functionality of the fast guide device of the invention. According to the invention, the nut 13 is simply required to guarantee a total absence of axial slack of the screw 12 and, at the same time, to provide locking means to stop the rotation of said screw and block it in the wanted position during the loom working steps. It is not important for the screw 12 to be rigidly blocked in position - since, as already said, the rotations thereof do not change the position of the heald control rods - but it is sufficient for the locking means to prevent a rotation of said screw which could lead its front end to interfere with the last working frame.

Finally, to improve the engagement between the thread of the screw 12 and the heald control rods 3, it is preferable to mount said screw on the support 9 inclined by an angle α equal to the angle of the helical threading. In this way, in correspondence of the rod engagement zone, the threading is parallel to said rods and the engagement turns out to be smoother. Although preferred, said characteristic is however not binding. In fact, by suitably varying the shape of the cavity forming the screw thread, it is possible to obtain an efficient screw/rod engagement even with the screw 12 positioned in different ways, other than that shown in figures 4 and 5.

Claims

1. Loom comprising a fast guide device for the control rods (3) of heald frames (1), of the type in which one end of said rods (3) is hinged onto the same axis (Z) on which there are hinged lateral supports (9) to which said rods (3) are fixed during certain weaving operations, characterized in that it comprises at least one screw (12) and nut (13) element, whose pitch (P) is equal to the distance between the axes of said control rods (3), the nut (13) being fixed to one of said lateral supports (9) and the screw (12) being positioned with its axis parallel to the plane of said rods (3) and adjacent thereto, the thread of said screw consisting of a helical cavity apt to engage with said rods (3) so as to keep them in a stable position between said screw and the respective lateral support (9).
2. Loom comprising a guide device as in claim 1), wherein said nut (13) is fixed to the lateral support (9) by fixing means (15) allowing to adjust the axial position of said screw (12).
3. Loom comprising a guide device as in claim 1), wherein said nut (13) is of the type with internal thread cooperating with the helical cavity of said screw (12).
4. Loom comprising a guide device as in claim 1), wherein said nut (13) is of the pin type cooperating with the helical cavity of said screw (12).
5. Loom comprising a guide device as in claim 1), wherein said nut (13) comprises also locking means to stop the rotation of said screw (12) in a desired position.
6. Loom comprising a guide device as in claim 1), wherein said control rods (3) of the heald frames (1) have a circular or oval section, and the section of the helical cavity of said screw (12) is square or rectangular.
7. Loom comprising a guide device as in claim 1), wherein the axis of said screw (12) is inclined in respect of the horizontal plane of the loom by an angle (α) equal to the inclination of the screw thread.

Patentansprüche

1. Webmaschine mit einer festen Führungsvorrichtung für die Steuerstangen (3) der Schäfte (1) von der Art, bei der das eine Ende der Stangen (3) auf derselben Achse (Z) angelenkt ist, auf der die lateralen Träger (9) angelenkt sind, an denen die Stangen (3) während bestimmter Webvorgänge befe-

stigt sind, dadurch gekennzeichnet, daß sie wenigstens ein Element mit einer Schraube (12) und einer Mutter (13) aufweist, wobei die Steigung (P) gleich dem Abstand zwischen den Achsen der Steuerstangen (3) ist, die Mutter (13) an dem einen der lateralen Träger (9) befestigt ist und die Schraube (12) mit ihrer Achse parallel zu der Ebene der Stangen (3) und diesen benachbart positioniert ist, wobei das Gewinde der Schraube aus einer schraubenförmigen Ausnehmung besteht, die dazu eingerichtet ist, die Stangen (3) derart zu ergreifen, daß diese in einer stabilen Position zwischen der Schraube und dem jeweiligen lateralen Träger (9) verbleiben.

2. Webmaschine mit einer Führungsvorrichtung nach Anspruch 1, wobei die Mutter (13) einen dem lateralen Träger (9) mittels Befestigungsmittel (15) befestigt ist, die es erlauben, die axiale Position der Schrauben (12) einzustellen.
3. Webmaschine mit einer Führungsvorrichtung nach Anspruch 3, wobei die Mutter (13) von der Art mit einem Innengewinde, das mit der schraubenförmigen Ausnehmung der Schraube (12) zusammenwirkt, ist.
4. Webmaschine mit einer Führungsvorrichtung nach Anspruch 1, wobei die Mutter (13) vom Stifttyp ist, die mit der schraubenförmigen Ausnehmung der Schraube (12) zusammenwirkt.
5. Webmaschine mit einer Führungsvorrichtung nach Anspruch 1, wobei die Mutter (13) weiter Verriegelungsmittel zum Stoppen der Drehung der Schraube (12) in einer gewünschten Position aufweist.
6. Webmaschine mit einer Führungsvorrichtung nach Anspruch 1, wobei die Steuerstangen (3) die Schäfte (1) einem kreisförmigen oder ovalen Querschnitt haben und der Querschnitt der schraubenförmigen Ausnehmung der Schraube (12) quadratisch oder rechteckig ist.
7. Webmaschine mit einer Führungsvorrichtung nach Anspruch 1, wobei die Achse der Schraube (12) bezüglich der horizontalen Ebene der Webmaschine um einen Winkel α geneigt ist, der der Neigung des Gewindes der Schraube entspricht.

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tes tiges (3) sont fixées durant certaines opérations de tissage, caractérisé en ce qu'il comprend au moins un élément à vis (12) et écrou (13), dont le pas (P) est égal à la distance entre les axes desdites tiges de commande (3), l'écrou (13) étant fixé à l'un desdits supports latéraux (9) et la vis (12) étant positionnée avec son axe parallèle au plan desdites tiges (3) et adjacent à celui-ci, le filet de ladite vis consistant en une cavité hélicoïdale adaptée à s'engager avec lesdites tiges (3) de manière à les garder dans une position stable entre ladite vis et le support latéral (9) respectif.

2. Métier comprenant un dispositif de guidage selon la revendication 1, dans lequel ledit écrou (13) est fixé au support latéral (9) par un moyen de fixation (15) permettant de régler la position axiale de ladite vis (12).
3. Métier comprenant un dispositif de guidage selon la revendication 1, dans lequel ledit écrou (13) est du type avec un filet intérieur coopérant avec la cavité hélicoïdale de ladite vis (12).
4. Métier comprenant un dispositif de guidage selon la revendication 1, dans lequel ledit écrou (13) est du type tige coopérant avec la cavité hélicoïdale de ladite vis (12).
5. Métier comprenant un dispositif de guidage selon la revendication 1, dans lequel ledit écrou (13) comprend également un moyen de blocage pour arrêter la rotation de ladite vis (12) en une position souhaitée.
6. Métier comprenant un dispositif de guidage selon la revendication 1, dans lequel lesdites tiges de commande (3) des cadres à lisses (1) ont une section circulaire ou ovale, et la section de la cavité hélicoïdale de ladite vis (12) est carrée ou rectangulaire.
7. Métier comprenant un dispositif de guidage selon la revendication 1, dans lequel l'axe de ladite vis (12) est incliné par rapport au plan horizontal du métier d'un angle (α) égal à l'inclinaison du filet de vis.

Revendications

1. Métier comprenant un dispositif de guidage fixe pour les tiges de commande (3) de cadres à lisses (1) du type dans lequel une extrémité desdites tiges (3) est articulée sur le même axe (Z) sur lequel sont articulés des supports latéraux (9) auxquels lesdi-

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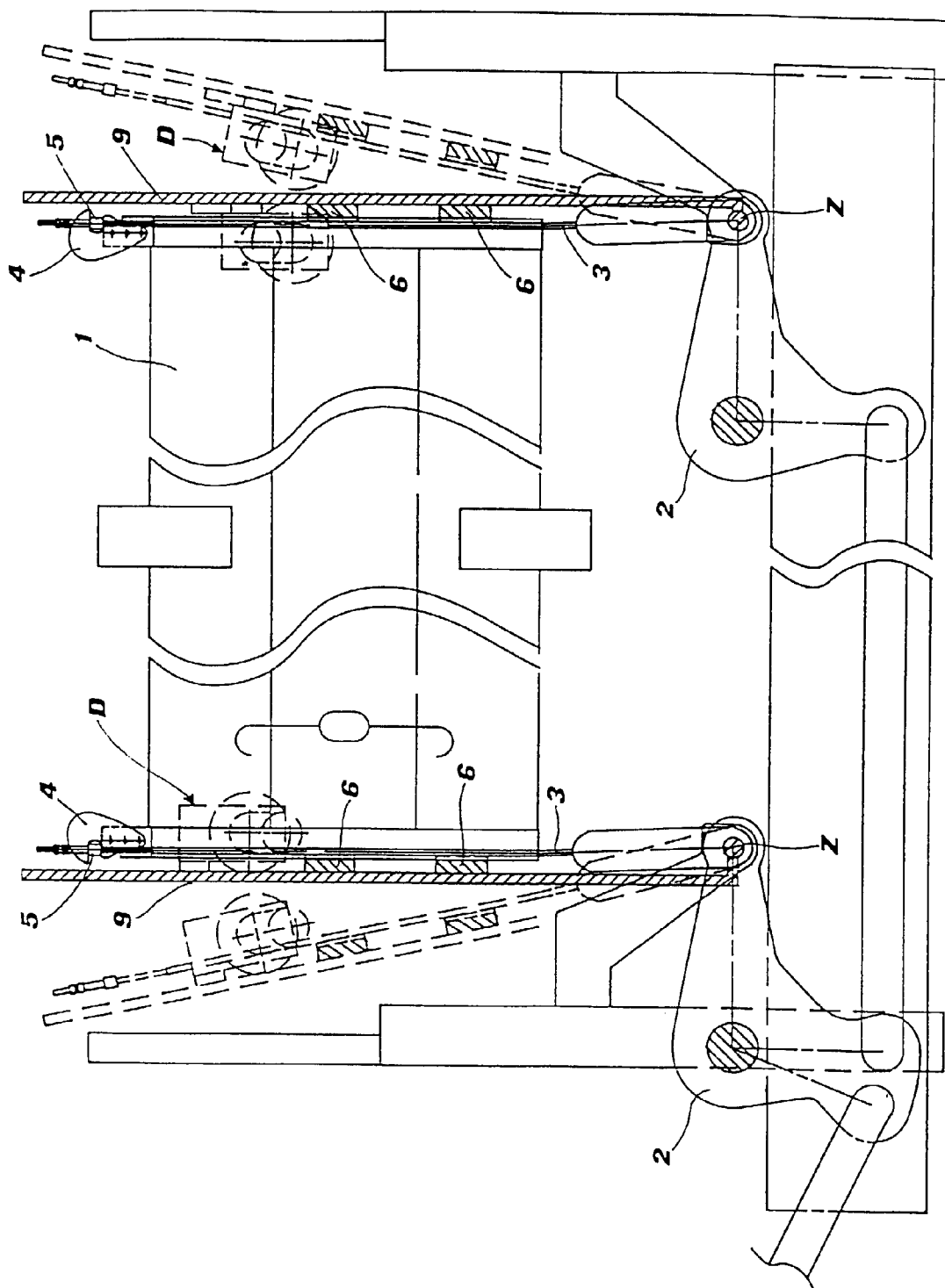
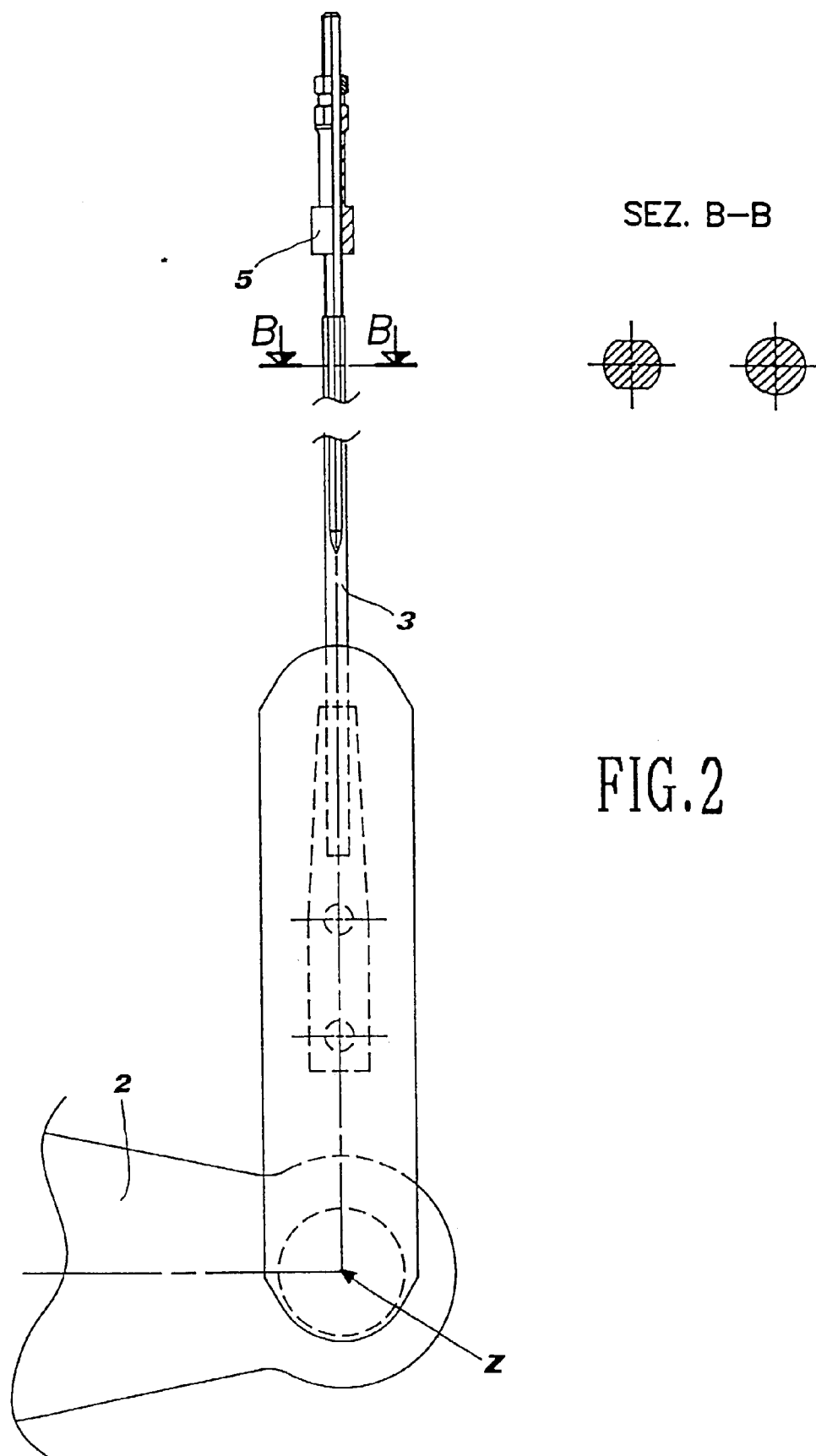


FIG.1



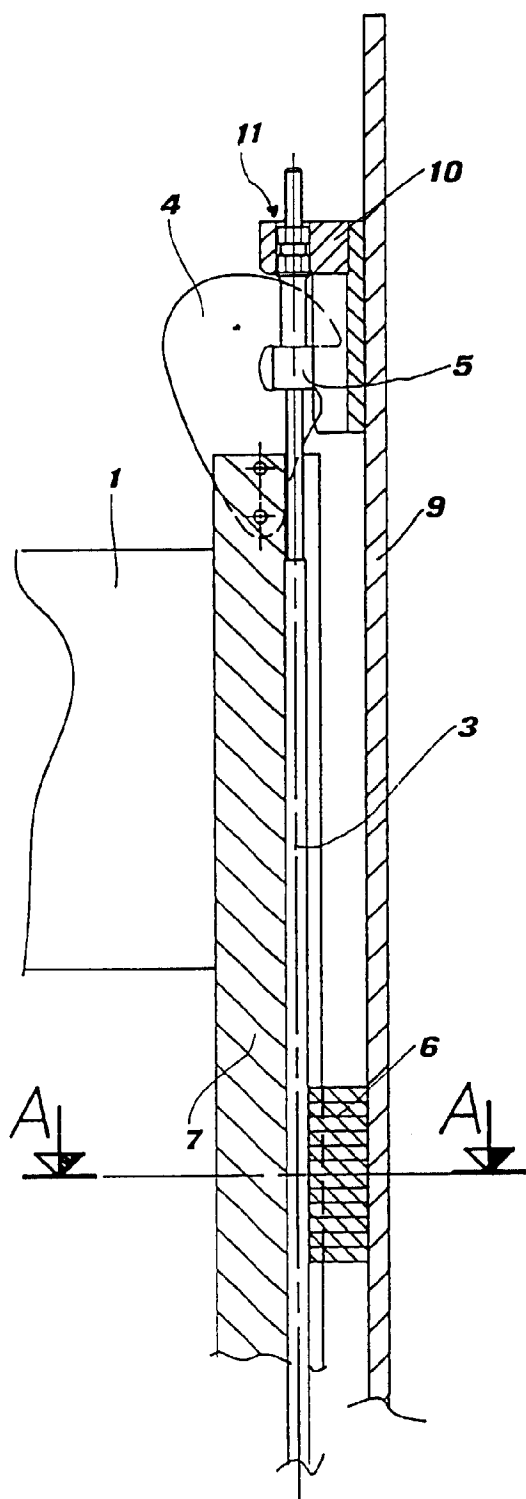


FIG.3

SEZ. A-A

