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(54) **Apparatus for releasing threads from a thread-guide rod for warpers**

(57) An apparatus for releasing threads from a thread-guide rod for warpers of a type comprising a thread-guide rod (4) contacting with reduced friction the threads guided by the same rod, and a group (5) of channels for the presentation and recovery of the threads, characterized in that it comprises a body (6) extending

above the operating area of said group (5) and moving from and to the same group (5), so as to take up a position (A) in correspondence of which it does not intercept the threads (F) each time guided from the rod (4), and a position (B) in correspondence of which it does intercept the said thread (F) by causing it to be released from the rod (4).

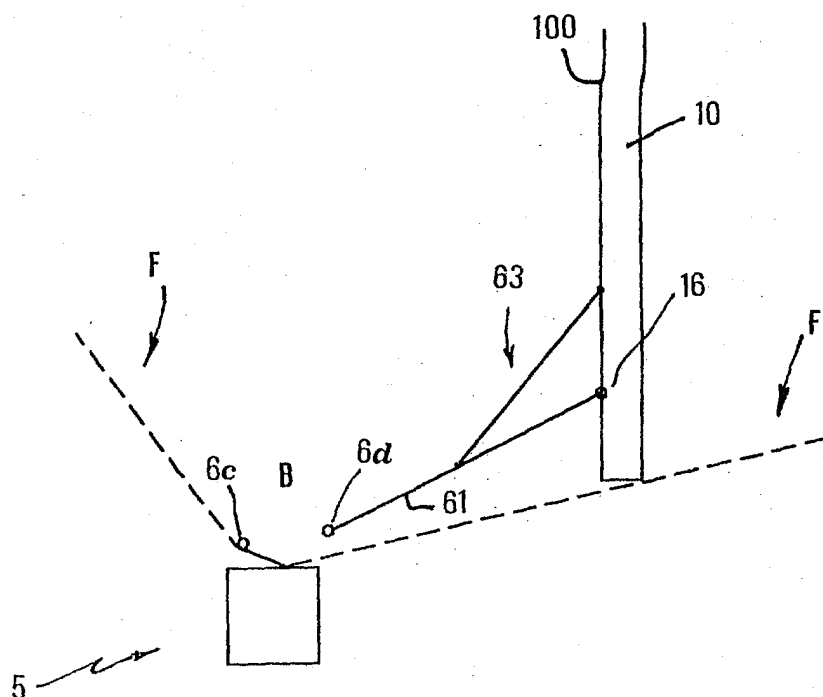


Fig. 5

Description

[0001] The present invention refers to an apparatus for releasing threads from a thread-guide rod for warpers.

[0002] Warpers are known to be machines for the preparation of warping beams for a loom and which comprise two main parts, that is, the proper warper and the creel holding the reels for the supply of warping threads.

[0003] In particular, in the warpers which operate the so-called "thread-by-thread" warping, the threads are recalled by the reels individually, that is, one at a time, in such a preset sequence as to achieve the desired effect, and are guided, that is, wound into concentric loops over the warper's drum. To drive the threads into rotation around the axis of the drum, thereby forming the warp, use is made of a rotating thread-guide member. The latter comprises a rod which is associated with a driving member allowing the rotation thereof around the drum's axis, the same rod being provided with an end portion onto which the thread under treatment is kept guided during said rotation.

Once the thread-guide rod has been rotated by a preset number of revolutions, that is, once a preset number of thread-loops wound up on the warper's drum has been reached, the thread is unloaded from the thread-guide rod and its place is taken by another thread with which the same number or a different number of loops is formed over the drum.

[0004] To this end, the warpers are usually provided with means intended to present the threads to the thread-guide rod and to recover the threads unloaded therefrom, the said means making up, in the whole, an operating group of "channels for the presentation and recovery of threads".

[0005] To unload the thread under work from the thread-guide rod, provision is made of single or multiple shedder devices well known in the art. A single shedder is disposed at a preset location along the path of the threads being wound over the drum, downstream of the channels for the presentation and recovery of threads, and is activated so as to intercept the thread to be unloaded at a programmed time of the work cycle. A multiple shedder consists of a plurality of individual shedders located in correspondence of the channels for the presentation and recovery of the threads.

[0006] A drawback related to the use of a single shedder is the time, usually considered excessive, elapsing between the moment the thread is unloaded from the thread-guide rod and the moment the same rod comes to be in correspondence of the channels for the presentation and recovery of the threads to load another thread.

[0007] A drawback related to the use of a multiple shedder is the structural and operational complexity and, thus, the cost thereof.

[0008] The main object of the present invention is to

overcome, or at least greatly reduce, the said drawbacks.

This result has been achieved, according to the invention, by providing by adopting the idea of making an apparatus having the features indicated in claim 1. Further characteristics being set forth in the dependent claims.

[0009] The present invention makes it possible to rapidly and accurately unload threads from a thread-guide rod, by means of an apparatus simple to make, cost-effective and reliable even after a prolonged service life.

[0010] These and other advantages and characteristics of the invention will be best understood by anyone skilled in the art from a reading of the following description in conjunction with the attached drawings given as a practical exemplification of the invention, but not to be considered in a limitative sense, wherein:

- Fig. 1 is a schematic side view of a warper for "thread-by-thread" warping;
- Fig. 2 shows the detail of a thread-guide rod in front view;
- Fig. 3 shows the detail of Fig. 2 rotated through 90°;
- Fig. 4 shows an enlarged detail of Fig. 1;
- Fig. 5 shows the detail of Fig. 4 with the body 6 in a position for the release of a thread from the thread-guide;
- Fig. 6 is a schematic plan view of the apparatus according to the invention;
- Fig. 7 is a schematic side view of the apparatus according to the invention; and
- Fig. 8 is a schematic front view of the said apparatus as viewed from the drum's side.

[0011] Reduced to its basic structure, and reference being made to the figures of the attached drawings, an apparatus according to the invention is applied in a warper (1) comprising a drum (2) on which more belts (3) are mounted in parallel relationship to the drum's longitudinal axis and on which the threads (F), intended to make the warp, wind up in concentric loops. The warper is provided with a thread-guide rod (4) and is supplied with threads which unwind from a plurality of reels (R) mounted on a creel (C) in a predetermined order. The rod (4) is made to rotate, about the longitudinal axis of the drum (2), in a plane lying between the drum and the creel. The warper is also provided with a plurality of channels (5) for the presentation and recovery of threads (F), and with means of known type acting in correspondence of said channels to present one thread (F) at a time to the rod (4) and, respectively, to recover the thread (F) upon the release of the latter from the rod (4). Provision is made for one channel for each thread.

[0012] The said means associated with said channels (5) are known to those skilled in the art and will not, therefore, be described in greater detail. An exemplary embodiment of such means is disclosed in EP 832.998, EP 882.820 and WO 91/19030.

[0013] The thread-guide rod (4) is of a type having re-

duced contact friction with the threads (F). For example, it is of a type illustrated in Figs. 2 and 3 of the attached drawings: the rod (4) is provided with an arm (40) being oriented towards the warper's drum and having a wheel (41) idly mounted on its end, the said rod being also provided with a slot (42) in which the thread (F) under treatment is guided. In practice, the thread is driven along over the warper's drum by the rod (4) which rotates about the longitudinal axis (a-a) of the latter, and is kept guided by the wheel (41) freely rotating about its axis (r-r), so that the friction, which develops between the thread (F) and the surface that keeps it within the guide, is much reduced.

[0014] Mounted above the channels (5) for the presentation and recovery of the threads (F) is a body (6) engaged with the fixed front shield (10) of the warper in such a way as to result movable from and to said channels (5) under control of a relevant actuator.

[0015] The position of said body (6) is suitably chosen so that it does not intercept the trajectory that the thread-guide rod imposes on the thread when the latter is to be wound over the belts (3) of the drum (2), as illustrated in Fig. 4 (position A), and it does intercept the said trajectory (position B in Fig. 5) when the thread is to be removed from the thread-guide rod.

[0016] In the position (A) of Fig. 4, the body (6) is sufficiently distant from the group of channels (5) to allow the thread (F) under work to remain within the guide (42) formed in the wheel (41) and, thereby, to allow the normal winding of the thread over the drum (2).

[0017] In the position (B) of Fig. 5, the body (6) is closer to the group of channels (5), so that it intercepts the trajectory of the thread (F) by changing the orientation thereof in the length between the group of channels (5) and the thread-guiding portion (42) presented by the rod (4): this is sufficient for the thread (f) to escape from the guide (42) thus leaving the rod (4) and be recovered in the respective channel of group the (5). As mentioned above, the procedures for the recovery of the threads after these have been unloaded from the thread-guide rod, are known to those skilled in the art and will not, therefore, be described in further details.

[0018] By way of example, the said body (6) may consist of two parallel metal rods (6c, 6d) lying above the group of channels (5), welded to each other at their ends and connected with the inner surface (100) of the shield (10) by means of two arms (61): each of said arms (61) being, on one end, fixed to the rod (6d) and, on the other, connected with the inner surface (100) of shield (10) via a hinge (16) having its axis orthogonal to the longitudinal axis of the drum (2). The two arms (61) support the two rods (6c and 6d) of the body (6) thereby allowing it to move from and to the group of channels (5) via the hinges (16) and a pair of electromagnets (7) which act, as best described later on, on two corresponding surfaces (60) of ferromagnetic material which the body (6) exhibit outside the group of channels (5): each of said arms (61) being also elastically engaged with the shield (10). For

example, each arm (61) can be engaged with the shield (10) via a corresponding elastic tension bar (63) which causes the body - when the electromagnets are activated (that is, during the winding of a thread over the warper's drum) - to reach the said position (A) and - when the electromagnets are deactivated (that is, after the body has reached the position (B) - to resume the position (A).

[0019] For example, the electromagnets (7) can be fixed to the inner surface (100) of the shield (10) in correspondence of the surfaces (60) exhibited by the body (6).

[0020] When it is desired to unload a thread (F) from the thread-guide rod, the electromagnets (7) are activated, and the magnetic force thus generated attracts the surfaces (60) towards the electromagnets. This makes the body (6) to rotate about the common axis of hinges (16), and to take up the position (B) of Fig. 5 in which, as above mentioned, the thread is released from the guide formed on the wheel (41). To bring the body (6) back to position (A) of Fig. 6, thereby allowing the winding of another thread over the warper's drum, it is sufficient to deactivate the electromagnets (7) so that the tension bars (63) recall the body (6) to the starting position (A).

[0021] The electromagnets (7) are connectable to the same programmable electronic unit which controls the operation of the means for the presentation and recovery of the threads (F). Such unit is known to those skilled in the art and will not, therefore, be described in greater detail.

The activation of the actuators (7), that is, the moving of body (6) to the position (B) for the release of a thread (F) from the thread-guide rod (4), can be operated at any instant of the work cycle. The extension of body (6) above the group of channels (5) for the presentation and recovery of the threads (F), allows the release of the thread (F) to be unloaded at any instant between its input (I) into, and respectively exit (U) from the area of the group (5), which makes it possible to reduce the time elapsing between the unloading of a thread and the loading of another one.

[0022] It is understood that the means for moving the body (6) to allow the positioning thereof to the said positions for releasing (position B) and winding (position A) the thread, may be of any suitable type.

The two rods (6c, 6d) of body (6) delimit an opening or window (600) above the group of channels (5) so that the actuation of the means for the presentation and recovery of the threads is by no means prevented or hindered.

Claims

1. Apparatus for releasing threads from a thread-guide rod for warpers of a type comprising a thread-guide rod (4) contacting with reduced friction the

threads guided by the same rod, and a group (5) of channels for the presentation and recovery of the threads, **characterized in that** it comprises a body (6) extending above the operating area of said group (5) and moving from and to the same group (5), so as to take up a position (A) in correspondence of which it does not intercept the threads (F) each time guided from the rod (4), and a position (B) in correspondence of which it does intercept the said thread (F) by causing it to be released from the rod (4). 5 10

2. Apparatus according to claims 1 and 3, **characterized in that** the said body (6) is elastically engaged with a stationary part (13) of the warper. 15
3. Apparatus according to claim 1, **characterized in that** it is associated with actuators (7) which operate the moving thereof to said position (B) for the release of threads (F) from the thread-guide rod (4). 20
4. Apparatus according to claims 1 and 3, **characterized in that** the said actuators (7) are of electromagnetic type and intended to act on surfaces (60) of body (6) outside the operating area of said group of channels (5). 25
5. Apparatus according to claim 1, **characterized in that** the said body (6) is made up of two metal rods (6c, 6d) welded to each other. 30

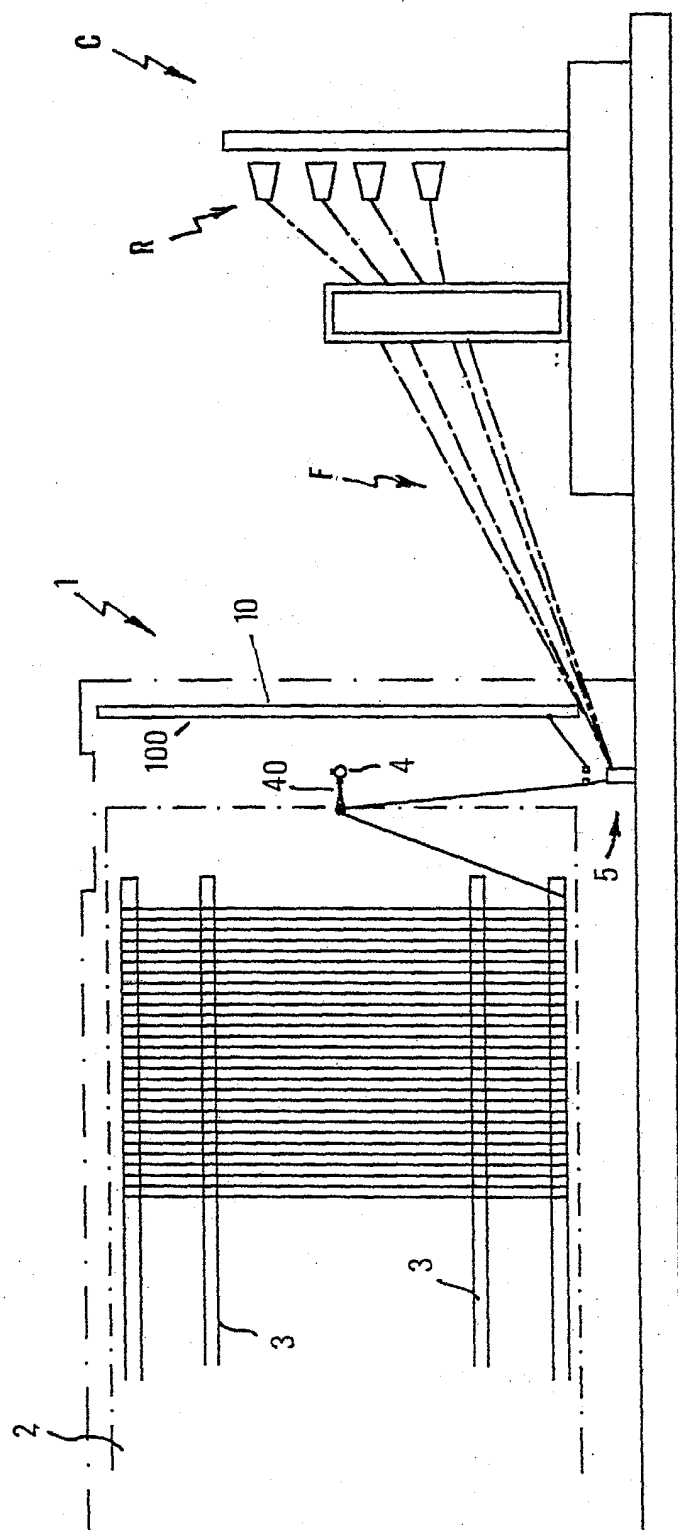
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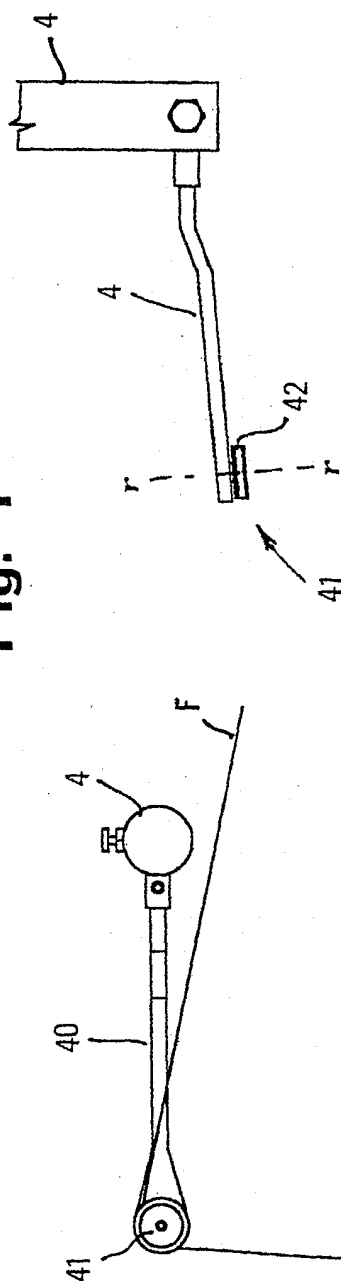


Fig. 2

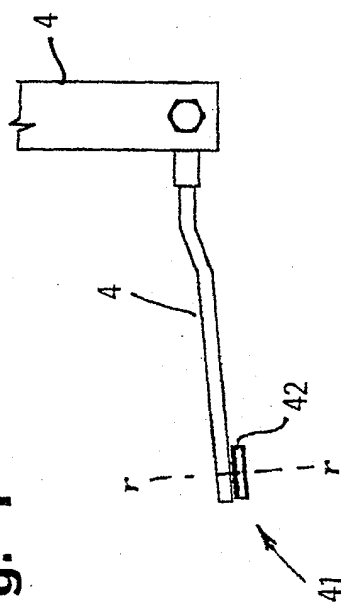


Fig. 3

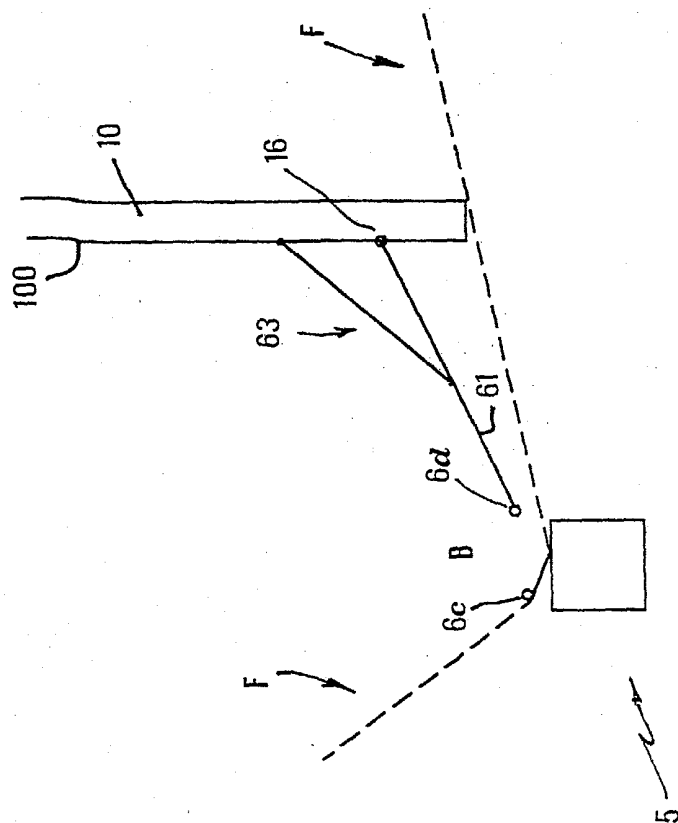


Fig. 5

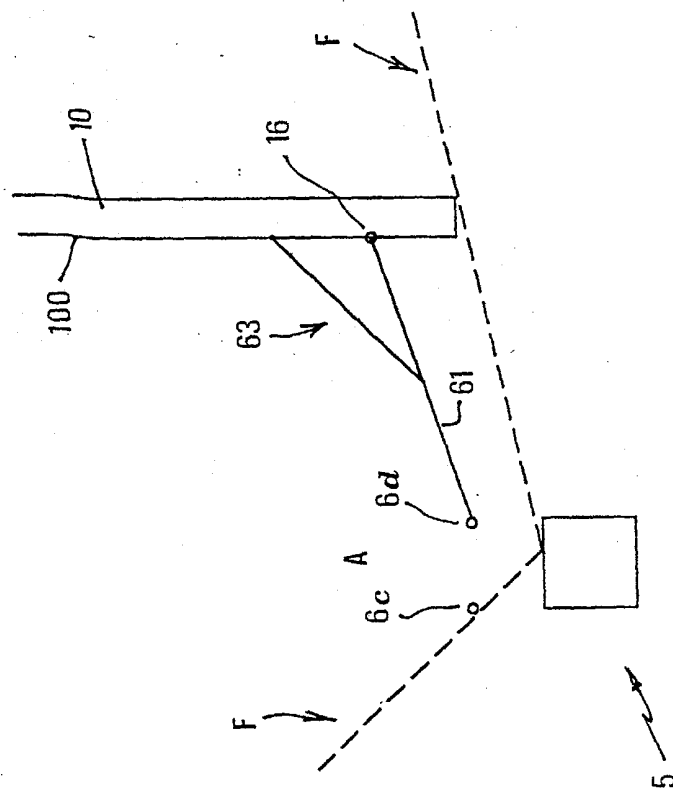


Fig. 4

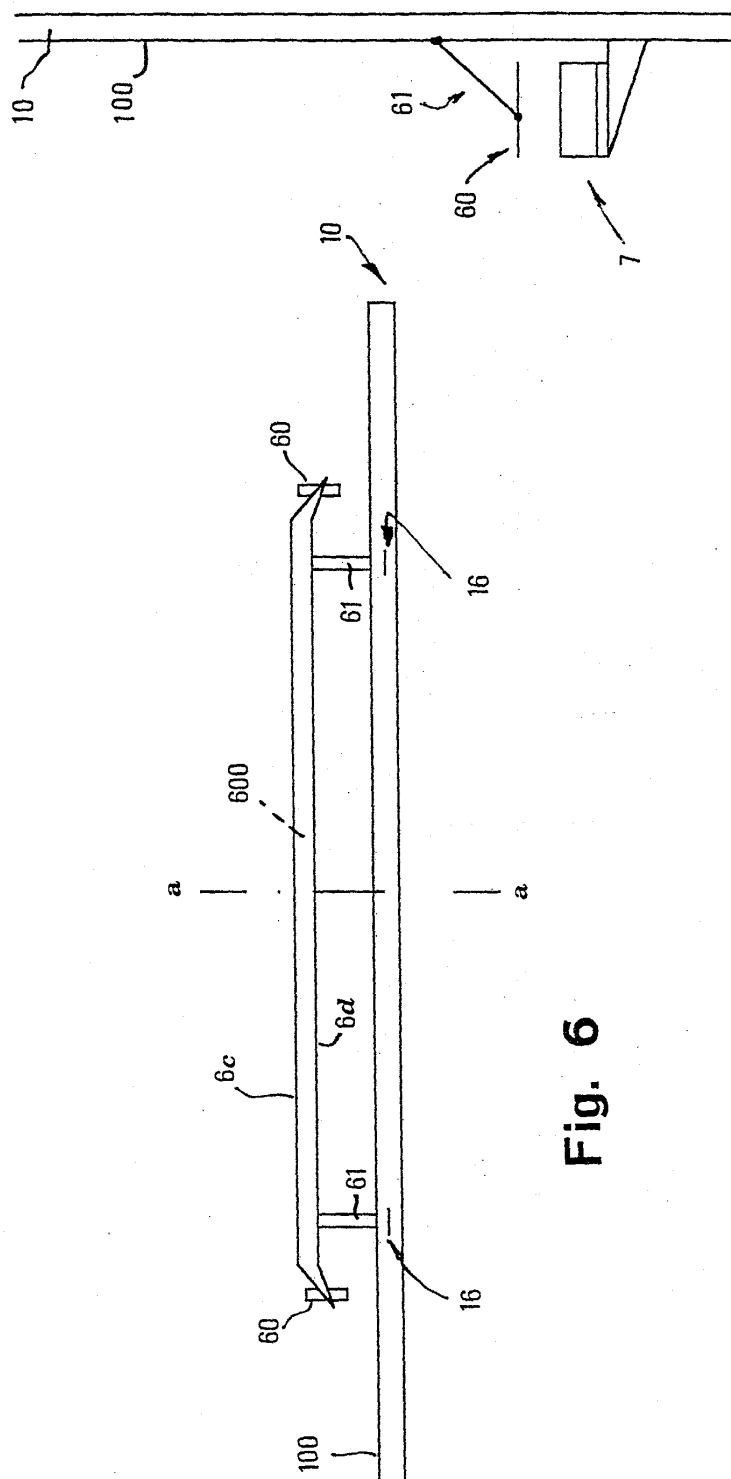


Fig. 6

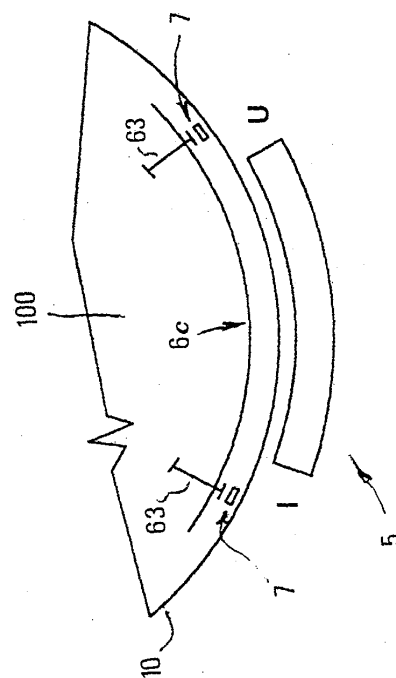


Fig. 8

Fig. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5587

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 January 2004	Examiner Rebiere, J-L
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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