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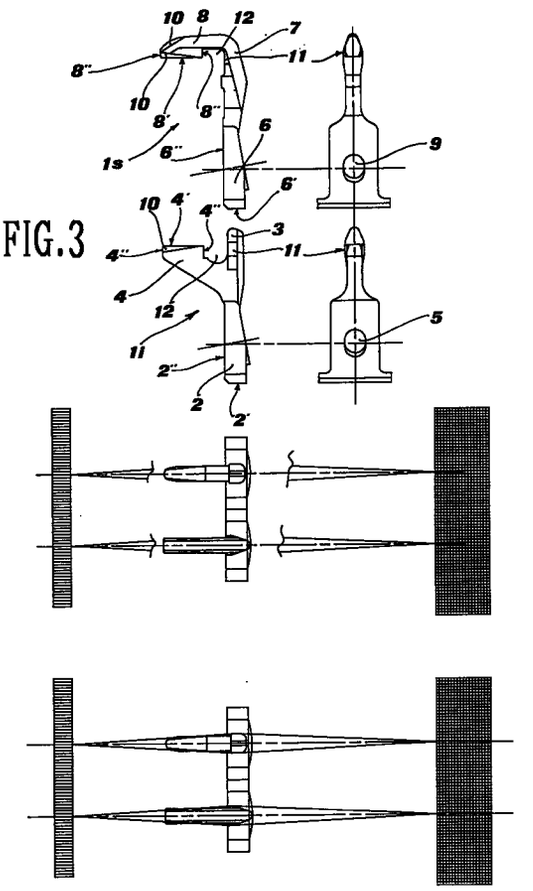
(54) Guide track for gripper straps in looms

(57) A guide track for gripper straps in looms consists of a plurality of mutually spaced support and guide elements fixed to the loom sley (A) and comprises lower support and guide elements (1i) and upper support and guide elements (1s), shaped as upturned brackets (4) and, respectively, downturned brackets (8) and alternately positioned along the track, said elements being apt to slidably cooperate with longitudinal notches provided on the opposed surfaces of the gripper straps (N).

FIG.3



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Description

The present invention concerns a guide track for straps in gripper looms, namely a track allowing to guide the two flexible straps carrying the grippers and controlling their movement during their fast back and forth motion inside the shed.

As known, in prior art there has been a constant evolution in the structure and operating mode of such "tracks", to allow a regular working of the loom and, in particular, of the weft yarn exchange between the grippers, even at increasingly fast weaving rates of said looms. A special care has also been taken in dealing with the phenomenon of wear of the straps - for what concerns both the useful life of the strap and the increasing roughness of its surface, actually due to wear - which is apt to compromise the integrity of the warp yarns rubbing against the edges of the strap, especially in the shed closing step.

According to a first constructive solution, the lower surface of the straps was bearing onto a sliding plane specially formed on the sley, sliding over the lower warp yarns, and the straps were laterally guided by hooks which clamped part of their upper and sometimes lower surface and all their lateral surface. In some constructions, the strap was guided by the actual reed, obviously only on one of its two sides. Examples of tracks of this type are described in US-A-4,076,053. This type of "bearing" tracks was subsequently abandoned, as the stresses which were imparted on the warp yarns - especially when these are positioned irregularly or not perfectly tensioned - and the consequent breakages thereof, had become quite unacceptable, taking also into account the subsequent weaving speed increases.

The so-called "floating" tracks were thus subsequently adopted, which keep the strap in an intermediate position inside the shed, preventing it from rubbing against the lower warp yarns. Also for this type of track a great number of solutions have been proposed, differing for what concerns both the positioning of the strap - which can either be parallel or perpendicular to the reed - and the shape of the hooks clamping said strap. These last ones were initially positioned on both sides of the strap.

Later on, to reduce the space occupied by the tracks inside the shed, it was proposed to adopt tracks with hooks only on one side thereof, each of which is apt to clamp the strap almost entirely, so as to prevent any degree of freedom thereof - other than the axial sliding movement - and, at the same time, to leave one side of the strap in sight and free from hooks, for the gripper to be fixed thereon. An example of this type of track, with the straps positioned vertically (parallel to the reed), is that proposed by SAURER. Another example of this type of track, with the straps positioned horizontally (perpendicular to the reed), is that proposed by VAMATEX in EP-B-275.479.

The guide track for gripper straps described in this last patent - which can be considered as the one of prior art closest to the present invention - has allowed to obtain considerable advantages for what concerns the increases in strap motion speed and the reliability of their guiding, but is not however free from drawbacks. Among them, we should remember in the first place the breakage of the warp yarns. Due to the particular shape of the hooks described in this patent, these form a very deep loop which extends in the same direction as the warp yarns; it can thus often happen that, during the shed closing step, some warp yarns may get caught into said loop. As the next beating up takes place, when one of the straps is inserted at full speed into the loop, the warp yarns will thus have no way of escape and will inevitably get cut off.

Another drawback of this type of guide track lies in the fact that the hook surfaces, along which slide the gripper straps, are not perfectly flat; this determines, at the high loom working speeds, vibrations in the straps and an excessive wear thereof. In fact, said sliding surfaces, due to their loop configuration with small opening (few mm), can be mechanically obtained only with a bush-hammering operation, which does not allow to reach those particularly high levels of flatness and smoothness which would actually be required at the high and very high loom working speeds, more and more adopted now-a-days.

A third drawback finally lies in the fact that the strap is guided also in correspondence of one of its edges, with consequent wear and roughening thereof, which should instead be avoided in order to prevent any warp yarns from getting eventually entangled in the strap during the shed closing step; this practically never leads to their breakage, but is apt to determine a misalignment of the warp yarns and thus favour the subsequent catching thereof into the loop of the hooks.

The object of the present invention is therefore to supply a guide track for gripper straps of the "floating" type, apt to overcome all the aforementioned drawbacks, which allows to work on looms at a very high speed and with an extremely reduced number of warp yarn breakages.

According to the present invention, said object is reached by means of a guide track for gripper straps in looms, of the type consisting of a plurality of mutually spaced support and guide elements fixed to the loom sley, characterized in that it comprises lower and upper support and guide elements, shaped as upturned brackets and, respectively, downturned brackets and alternately positioned along the track, said elements being apt to slidably cooperate with longitudinal notches provided on the opposed surfaces of the gripper straps.

The invention will anyhow be more clear from the following detailed description of a preferred embodiment thereof, illustrated on the accompanying drawings, in which:

Fig. 1 is a diagrammatic longitudinal section view of a loom incorporating a guide track for gripper straps according to the invention, shown in correspond-

ence of a lower support and guide element in the form of an upturned bracket;

Fig. 2 is a section view similar to that of fig. 1, in correspondence of an upper support and guide element in the form of a downturned bracket;

Fig. 3 shows in detail a side view, a front elevation, and a plan view (without and with warp yarns), of the upper and lower support and guide elements in the form of a downturned bracket and of an upturned bracket; and

Fig. 4 is a perspective view showing, in assembly and in detail on an enlarged scale, the guide track for gripper straps according to the invention.

Figures 1, 2 and 4 clearly show the basic elements of the loom, in the shed zone, inside which there is actually mounted the guide track for gripper straps of the present invention.

Said elements consist of the sley A, the reed P fixed thereto, the warp yarns O which, while parting, form the shed F, the strap N, the gripper S, and finally the fabric T.

The guide track for gripper straps of the present invention is, as seen, of the "floating" type, namely formed of a plurality of support and guide elements apt to guide the straps without these last ones bearing onto the surface of the sley A.

Contrary to what happens in the known-type guide tracks for gripper straps - wherein all the support and guide elements are exactly alike and are apt to prevent the movement of the strap in all the four possible directions (upward, downward, to the right, to the left) - in the guide track of the present invention said elements are of two different types, each of which is apt to limit the movement of the strap only in three directions (right and left, and respectively, upward or downward).

More particularly, the invention provides for lower support and guide elements 1i and upper support and guide elements 1s, the shape of which is illustrated in detail in figs. 1, 2 and 3. These figures clearly show the characteristic bracket shape - upturned and, respectively, down-turned - which characterizes said support and guide elements of the guide track for gripper straps according to the invention.

Each lower support and guide element 1i comprises a foot 2 for anchorage to the sley A, which vertically extends into a tip 3 from whose base an upturned bracket 4 projects cantilevered. The upper part of the bracket 4 has dimensions such as to fit - with the required slack - into a lower notch of the straps N having a rectangular section and extending longitudinally throughout their length. The bracket 4 slidably cooperates with the notch of the strap N through its top surface 4' and its lateral surfaces 4", so as to support and guide the strap in the three corresponding directions perpendicular to said surfaces. The element 1i is finally fixed to the sley A - and precisely onto an appropriate rail R provided therein - by means of a screw clamp M housed into a hole 5 of the foot 2; said hole 5 has a certain downward inclination in the direction of the rail R, for the purposes explained more clearly hereinafter.

Likewise, the upper support and guide element 1s comprises a foot 6 for anchorage to the sley A, which vertically extends into a tip 7 - slightly longer than the tip 3 - from whose top a downturned bracket 8 projects cantilevered. The lower part of the bracket 8 has dimensions such as to fit - with the required slack - into an upper notch of the straps N having a rectangular section and extending, like the previous lower notch, throughout the length of the straps. The bracket 8 slidably cooperates with the corresponding notch of the strap N by way of its lower surface 8' and its lateral surfaces 8", so as to support and guide the straps N in the three corresponding directions perpendicular to said surfaces. The element 1s is also fixed to the aforecited rail R of the sley A by means of a screw clamp M housed into a hole 9 of the foot 6, which hole is also downwardly inclined like the hole 5 of the element 1i.

The lower and upper support and guide elements 1i and 1s are alternately positioned along the rail R - as clearly shown in fig. 4 - so as to form a steady and reliable guide for the straps N, with the considerable advantages described hereinafter.

In fact, the particular "open" configuration of the support and guide elements 1i and 1s, of the guide track for gripper straps according to the invention, allows to carry out on said elements machining operations which could by no means be done on the support and guide elements of the known-type guide tracks; it is consequently possible to obtain an extremely more precise alignment and flatness of the strap guiding surfaces, so as to eliminate any vibrations of said straps and strongly reduce their wear. These advantageous conditions hence allow to increase even further the speed of the loom, with no fear of harmful consequences on the straps.

Said machining operations consist in grinding both the guiding surfaces and the positioning surfaces of the support and guide elements 1i and 1s. The guiding surfaces are the surfaces 4' and 4" of the upturned bracket 4 and the surfaces 8' and 8" of the downturned bracket 8; after grinding, said surfaces may eventually be lapped in order to obtain a perfect smoothing. The positioning surfaces are the abutment surfaces of the feet 2 and 6, and precisely the surfaces 2', 2" and 6', 6", which are used to obtain a reproducible and constant positioning of said feet both in the machine tool, which provides to grind the aforecited guiding surfaces, and in the final positioning on the sley A. For this purpose the rail R, formed from an extruded section, provides a specific bearing seat for the feet 2 and 6, consisting of the two surfaces R' and R" onto which abut the surfaces 2', 6' and, respectively, 2" and 6" of the feet 2 and 6.

When the elements 1i and 1s are fixed to the rail R by tightening the clamps M, such clamps - thanks to the inclination of the holes 5 and 9 housing the same - are apt to impart both a downward clamping force, in the direction of the surface R', and of course the normal clamping force in the direction of the surface R". This

expedient hence allows to easily obtain - without having to perform any special operations of adjustment - a perfect mating of the aforecited abutment surfaces of the feet 2 and 6 with the corresponding surfaces R' and R" of the rail R, and consequently a perfect alignment of the guiding surfaces of the brackets 4 and 8, thus reaching one of the objects of the present invention.

Furthermore, the special "open" configuration of the support and guide elements 1i and 1s, of the guide track for gripper straps according to the invention, is apt to notably reduce the possibilities for a warp yarn O - not perfectly positioned or not properly tensioned - to be cut off by the straps during their movement through the support and guide elements. To improve even further this already excellent result, all the surfaces of said elements apt to come in contact with the warp yarns have no sharp edges and are smoothly radiused. Moreover, the area of the flat surfaces 4' and 8' of the brackets 4 and 8 slidably cooperating with the straps N - which is already modest in itself - is reduced even further by lateral bevelings 10, apt to favour the outlet of any warp yarns which may accidentally bear onto said surfaces 4' and 8'. Finally, both the tip 3 of the support and guide element 1i and the corresponding tip 7 of the support and guide element 1s comprise, on their top surface, an overturned V beveling, and are provided with parting projections 11 in the form of lateral protuberances which are perfectly radiused to the body of said elements. The function of said bevelings and projections is to smoothly part the warp yarns O, during opening of the shed, so as to allow an easy insertion of said yarns between the single support and guide elements. The beveled top surface of the tip 3 is particularly meant to separate the warp yarns O during closing of the shed and, with the help of the parting projections 11, to prevent said yarns from bearing onto the surface 4' and being consequently subject to breakage during sliding of the straps N.

Thanks to these special characteristics of the shape of the support and guide elements, the warp yarn breakages - determined by the movement of the straps through said elements - are reduced to an extremely low number, thereby fully reaching another object of the invention.

Finally - as can be noted on examining figs. 1, 2 and 3 - the cavities 12, which separate the brackets 4 and 8 from the respective tips 3 and 7, have transversal dimensions wider than the edge of the straps N housed therein. Said strap edges do not hence come in contact with any point of the support and guide elements and cannot thus get worn thereby; this allows to reach the third and last object of the present invention.

Claims

1. Guide track for gripper straps in looms, of the type consisting of a plurality of mutually spaced support and guide elements fixed to the loom sley (A), characterized in that it comprises lower and upper support and guide elements (1i, 1s), shaped as upturned brackets (4) and, respectively, downturned brackets (8) and alternately positioned along the track, said elements being apt to slidably cooperate with longitudinal notches provided on the opposed surfaces of the gripper straps (N).

2. Guide track for gripper straps as in claim 1), wherein each lower support and guide element (1i) comprises a foot (2) for anchorage to the sley (A), which vertically extends into a tip (3) from whose base said upturned bracket (4) projects cantilevered.

3. Guide track for gripper straps as in claim 1), wherein each upper support and guide element (1s) comprises a foot (6) for anchorage to the sley (A), which vertically extends into a tip (7) from whose top said downturned bracket (8) projects cantilevered.

4. Guide track for gripper straps as in claim 1), wherein all the surfaces of said support and guide elements (1i, 1s), apt to come in contact with the warp yarns (O), have no sharp edges and are smoothly radiused.

5. Guide track for gripper straps as in claims 2) and 3), wherein the surfaces (2'-2", 6'-6") of said feet (2, 6) abutting onto corresponding surfaces (R', R") of the sley (A) are ground.

6. Guide track for gripper straps as in claims 2) and 3), wherein said anchor feet (2, 6) comprise a through hole (5, 9) to house a screw clamp (M) for tightening said feet onto the sley (A), the axis of said hole being inclined in a direction such as to determine useful components of the clamping force in two directions perpendicular to the abutment surfaces (R', R") of the sley (A).

7. Guide track for gripper straps as in claims 2) and 3), wherein the surfaces (4'-4", 8'-8") of said brackets (4, 8), which slidably fit into the corresponding notches of the gripper straps (N), are ground or lapped.

8. Guide track for gripper straps as in claims 2) and 3), wherein the horizontal flat surface (4', 8') of said brackets (4, 8) is reduced by lateral bevelings (10).

9. Guide track for gripper straps as in claims 2) and 3), wherein the lateral surfaces of said tips (3, 7) of the lower and upper support and guide elements (1i, 1s) comprise, close to their top, opposed pairs of parting projections (11).

10. Guide track for gripper straps as in claims 2) and 3), wherein the top surface of said tips (3, 7) of the lower and upper support and guide elements (1i, 1s) comprises an overturned V beveling to part the warp yarns (O).

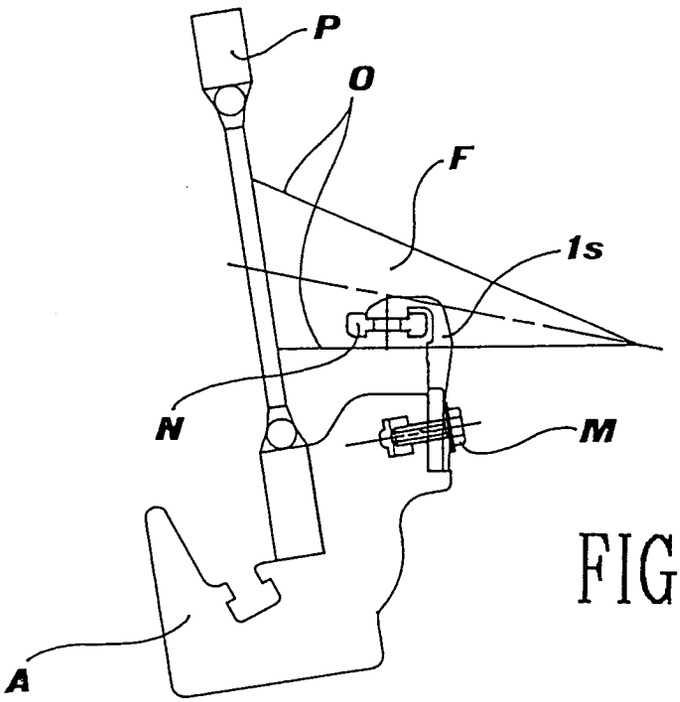


FIG.2

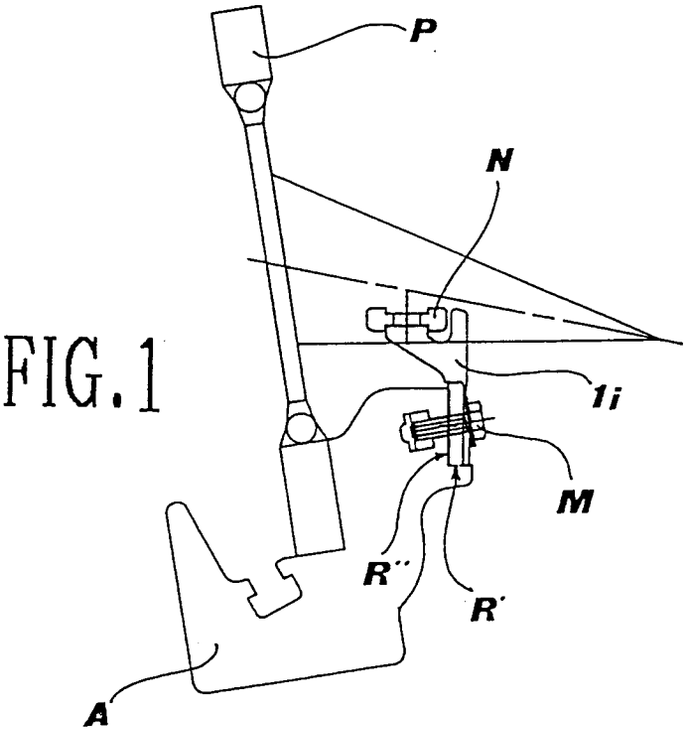
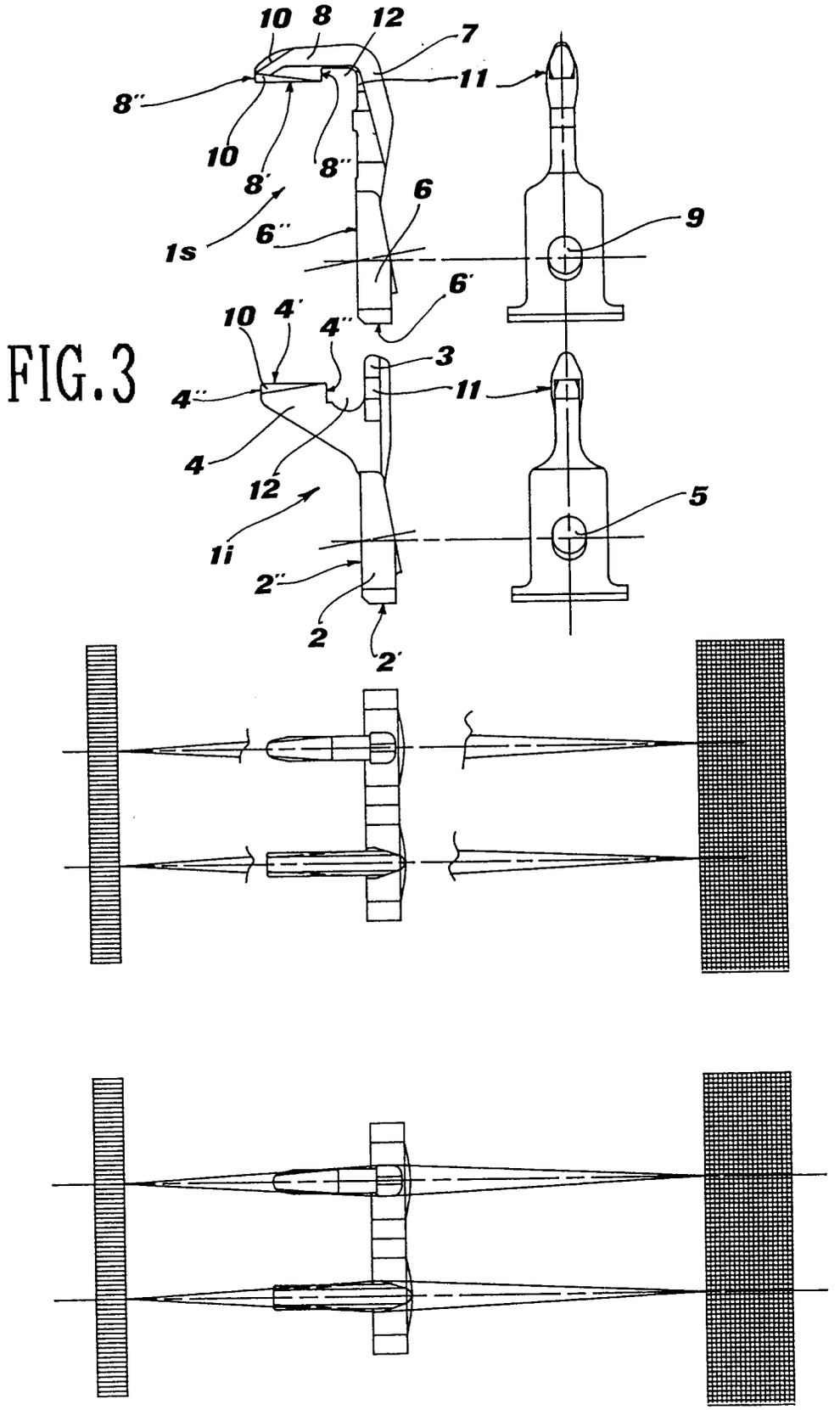


FIG.1

FIG.3



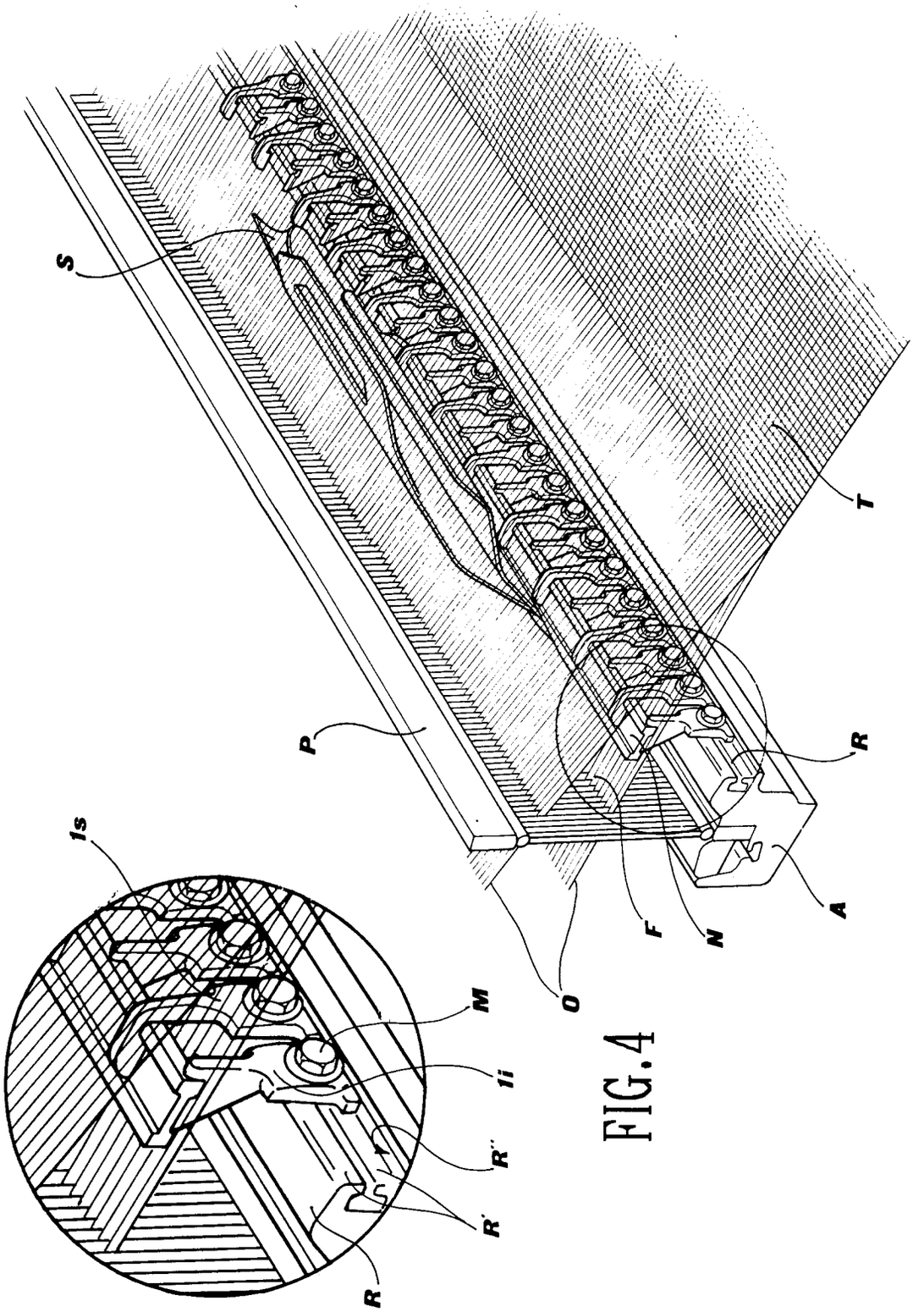


FIG.4

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EUROPEAN SEARCH REPORT

Application Number
EP 95 11 6891

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X A	EP-A-0 199 880 (SULZER) * figures 1-4 *	1-3 4,6,10	D03D47/27
X	MELLIAND TEXTILBERICHTE, vol. 49, no. 4, April 1968 HEIDELBERG, pages 417-419, K. HABERHAUER 'Theorie und Entwicklung einer Hochleistungswebmaschine II' * figures 6-8 *	1-3	
A	FR-A-1 227 684 (SULZER) * figures 1,3,5 *	6,8,10	
X	EP-A-0 199 881 (SULZER) * figures 6,7,10,11 *	1-3	
A	US-A-3 556 163 (PFARWALLER) * figure 5 *	1-3	
A	EP-A-0 357 974 (VAMATEX)		
A,D	EP-A-0 275 479 (VAMATEX)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 January 1996	Boutelegier, C

CATEGORY OF CITED DOCUMENTS

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