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## (54) Device to modify the geometry of the shed in correspondence of the fabric selvedge in a weaving loom

(57) Device to modify the geometry of the shed in correspondence of the fabric selvedge, in a weaving loom comprising a yarn carrier bar (T), eventually oscillating, to deviate the warp yarns (O) between a warp beam (S) and a set of heald frames (Q). In correspondence of the ends of said yarn carrier bar (T) there are provided deviation rollers - in the form of idle bushes (1) or of idle pins (2) - apt to cooperate with the sole warp yarns forming the fabric selvedge, the axis of said rollers coinciding with or being parallel to the axis of the yarn carrier bar (T), and their lateral surface being tangent to the plane formed by the warp yarns in the weaving zone when the geometry of the shed is symmetrical and the shed is closed.

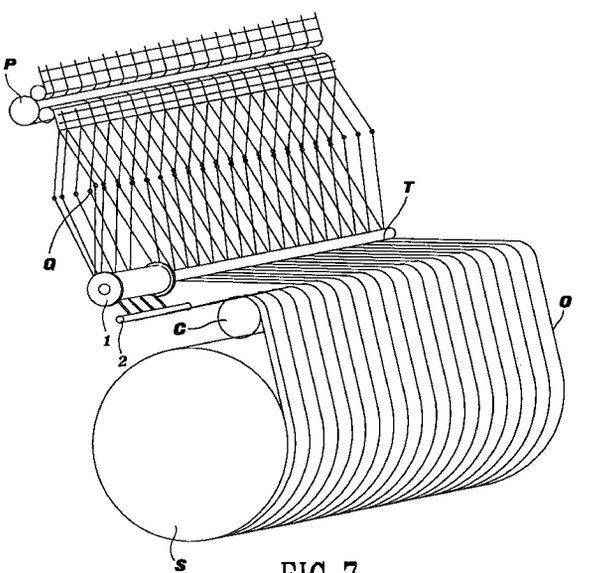


FIG.7

EP 0 877 110 A1

## Description

The present invention concerns a device to be applied on looms - particularly air looms - to set a geometry of the shed in correspondence of the fabric selvedge, differing from the geometry of the shed set on the fabric and in particular, to set on the selvedge a symmetrical geometry of the shed.

As known, during loom operation, the warp yarns are cyclically parted by the heald frames in order to form the shed into which a weft yarn is inserted at each loom cycle. The parting of the warp yarns is delimited, on one side, by the fabric just being woven and, on the other side, by a deviation bar - named in the sector "yarn carrier bar" - so that, in a parted position and seen from the side, the warp yarns take up a typical rhomboidal configuration. The particular shape of this rhombus is actually referred to as "geometry of the shed" and is apt to determine some characteristics of the fabric obtained.

According to a particular - so-called asymmetrical - configuration of the shed geometry, the two parted branches of the warp yarns are of different lengths on the side of the yarn carrier bar, thereby obtaining a different tensioning of the two groups of warp yarns. This type of shed geometry is adopted when wishing to obtain a "thicker" fabric, namely a fabric comprising a higher number of weft yarns per fabric length unit. The different tensioning of the warp yarns, above and below the weft, allows in fact such warp yarns, during beating up of the reed, to be positioned offset also in respect of a vertical plane, thereby enabling the beaten up weft to get closer to the previous weft.

This weaving system, widely known per se, however involves a tiresome drawback, in that the presence of alternately loose and tensioned warp yarns in correspondence of the selvedge zone leads to the fact that, in this zone, the shed inlet may not be perfectly open. This circumstance - combined with the fact that, as far as seen above, the configuration of the shed inlet is also asymmetrical - may be prejudicial to a safe and correct weft insertion, especially in the case of air looms. In fact, the configuration taken up by the shed in correspondence of the selvedge zone is particularly critical - for what concerns both the launching and the arrival of the weft yarn - and it is hence preferable for the warp yarns, in this zone, to form a symmetrical shed with uniform tensions.

The object of the present invention is to therefore supply a device allowing to keep a symmetrical geometry of the shed, merely in correspondence of the fabric selvedge, even when the fabric - for the reasons mentioned heretofore - is woven with an asymmetrical geometry of the shed.

Another object of the present invention is to supply a device allowing to regulate the tension of the warp yarns in correspondence of the selvedge zone and, in particular, to increase the tension of the warp yarns only in this zone, so as to obtain a perfectly tensioned and stable shed inlet, even in the presence of the strong air jet used to insert the weft yarn.

According to the present invention, said objects are reached by means of a device to modify the geometry of the shed in correspondence of the fabric selvedge, in a loom comprising a yarn carrier bar, eventually oscillating, to deviate the warp yarns between a warp beam and a set of heald frames, said device being characterized in that, in correspondence of the ends of said yarn carrier bar there are provided deviation rollers apt to cooperate with the sole warp yarns forming the fabric selvedge, the axis of said rollers coinciding with or being parallel to the axis of the yarn carrier bar, and their lateral surface being tangent to the plane formed by the warp yarns in the weaving zone when the geometry of the shed is symmetrical and the shed is closed.

According to a first embodiment of the present invention, said deviation rollers have their axis coinciding with the axis of the yarn carrier bar, and are preferably in the form of idle bushes inserted onto the ends of said yarn carrier bar.

According to a second embodiment of the present invention, said deviation rollers have their axis parallel to the axis of the yarn carrier bar, and are in the form of idle pins mounted upstream of the yarn carrier bar.

The device of the present invention will anyhow be described more in detail, with reference to some preferred embodiments thereof, given by way of example and illustrated on the accompanying drawings, in which:

Fig. 1 is a diagrammatic lateral view of a loom incorporating a first embodiment of the device according to the present invention;
Fig. 2 is a diagrammatic axonometric view of the same loom shown in fig. 1;
Fig. 3 is a diagrammatic lateral view of a loom incorporating a second embodiment of the device according to the present invention;
Fig. 4 is a diagrammatic axonometric view of the same loom shown in fig. 3;
Fig. 5 is a time-tension diagram (N/t) illustrating the warp yarn tension changes during the weaving cycle;
Fig. 6 is a diagrammatic lateral view of a loom incorporating both embodiments of the device according to the present invention; and
Fig. 7 is a diagrammatic axonometric view of the same loom shown in fig. 6.

Fig. 1 and 2 show the different parts of a loom, and precisely: the warp beam S; the warp yarns O; the yarn carrier bar T; the heald frames Q; and the take-up rollers P.

As illustrated in fig. 1, the yarn carrier bar T can be set between a position T1, in which the shed geometry is perfectly symmetrical (warp yarns in dashes), and a laterally shifted position T2 (warp yarns in full lines). In the position T1, the warp yarns O are obviously ten-

sioned to an exactly equal extent, during opening of the shed, thanks to the heald frames Q; whereas in the position T2, the upper warp yarns Os are looser than the lower warp yarns Oi. This arrangement - as already said - allows to weave fabrics with a higher number of weft yarns per fabric length unit.

In the first embodiment of the device according to the invention, two idle bushes 1 are respectively inserted on the two ends of the yarn carrier bar T, the height of said bushes 1 being equal to the height of the group of warp yarns meant to form the fabric selvedge, and the radial thickness of said bushes corresponding to the distance between the two positions T1 and T2 of the yarn carrier bar T. The bushes 1 preferably comprise annular projections at the two opposite ends, such as to form two edges apt to laterally contain the warp yarns carried thereby.

With this arrangement the warp yarns O, meant to form the fabric selvedge, are forced to follow the outer profile of the bush 1, thereby reaching the heald frames Q with a perfectly symmetrical shed geometry; the first object of the present invention is hence obtained in a very simple and economic manner.

In the second embodiment of the device according to the invention, the same result is obtained by means of two pins 2, mounted idle on the loom with their axis parallel to the axis of the yarn carrier bar T. The pins 2 are positioned upstream of the yarn carrier bar T - in respect of the warp yarns moving direction - and their length is such that they interfere with the sole warp yarns meant to form the fabric selvedge. As shown in fig. 3, the lateral position of the pins 2 is that in which their peripheral surface is substantially tangent to the plane r formed by the warp yarns in the weaving zone when the geometry of the shed is symmetrical and the shed is closed; in fact, in this position, the warp yarns deviated by the pins 2 are no longer influenced by the oscillating movement of the yarn carrier bar T, foreseen to compensate the warp yarn tension changes, nor by the possible shifting of said bar T into its lateral position T2. The tension of said warp yarns thus no longer follows the profile (dashed line a in fig. 5) typical of the other warp yarns - whose tension increase, during the opening step Z of the heald frames, is partly compensated by the movement of the yarn carrier bar T in the direction of the arrow F - but it follows a profile characterized by far higher values of the tension N (continuous line b in fig. 5).

By shifting the position of the pins 2 laterally in respect of the position indicated heretofore (namely away from the plane r, towards T2), it is possible to obtain a partial compensation also of the tension of the warp yarns deviated by said pins; the weaver is thus able to choose the optimal tension value to satisfy the opposite requirements of having, on one hand, a properly open and perfectly tensioned shed inlet, and of ensuring, on the other hand, a maximum tension of the warp yarns meant to form the fabric selvedge, such as to cause no undesired warp yarn breakages. Evidently, the partial tension compensation also of the warp yarns meant to form the fabric selvedge is apt to reduce the perfect symmetry of the shed geometry; thus, to form said selvedge, it is normally preferable to use stronger warp yarns and to keep the position of the pins 2 tangent with the plane formed by the warp yarns in the weaving zone.

Alternatively, as shown in figs. 6 and 7, both the bushes 1 and the pins 2 can simultaneously be mounted on the loom, thereby obtaining the double advantage to constantly maintain a perfectly symmetrical geometry of the shed and to be able to regulate, at will, the tension of the warp yarns meant to form the fabric selvedge.

As it appears evident from the previous description, the device according to the present invention has allowed to reach the desired objects with utmost simplicity and efficiency. In particular, both embodiments of the device allow to obtain a perfectly symmetrical shed geometry on the warp yarns meant to form the fabric selvedge, while the second embodiment even provides for the further possibility to regulate at will the tension of said warp yarns while the shed is being formed. hence allowing to form a perfectly tensioned and symmetrical shed inlet and thereby making the weft yarn insertion step far more reliable. Viceversa, the combination of both embodiments of the device allows to simultaneously obtain all these advantages.

## Claims

1. Device to modify the geometry of the shed in correspondence of the fabric selvedge in a weaving loom - of the type comprising a yarn carrier bar, eventually oscillating, to deviate the warp yarns between a warp beam and a set of heald frames - characterized in that, in correspondence of the ends of said yarn carrier bar there are provided deviation rollers apt to cooperate with the sole warp yarns forming the fabric selvedge, the axis of said rollers coinciding with or being parallel to the axis of the yarn carrier bar, and their lateral surface being tangent to the plane formed by the warp yarns in the weaving zone when the geometry of the shed is symmetrical and the shed is closed.

2. Device as in claim 1), wherein said deviation rollers have their axis coinciding with the axis of the yarn carrier bar and are in the form of idle bushes inserted onto the ends of said yarn carrier bar.

3. Device as in claim 2), wherein said bushes comprise annular end projections.

4. Device as in claim 1), wherein said deviation rollers have their axis parallel to the axis of the yarn carrier bar, and are in the form of pins mounted idle on the

loom, upstream of the yarn carrier bar.

**5.** Device as in claim 1), wherein said deviation rollers jointly comprise both said idle bushes and said idle pins.

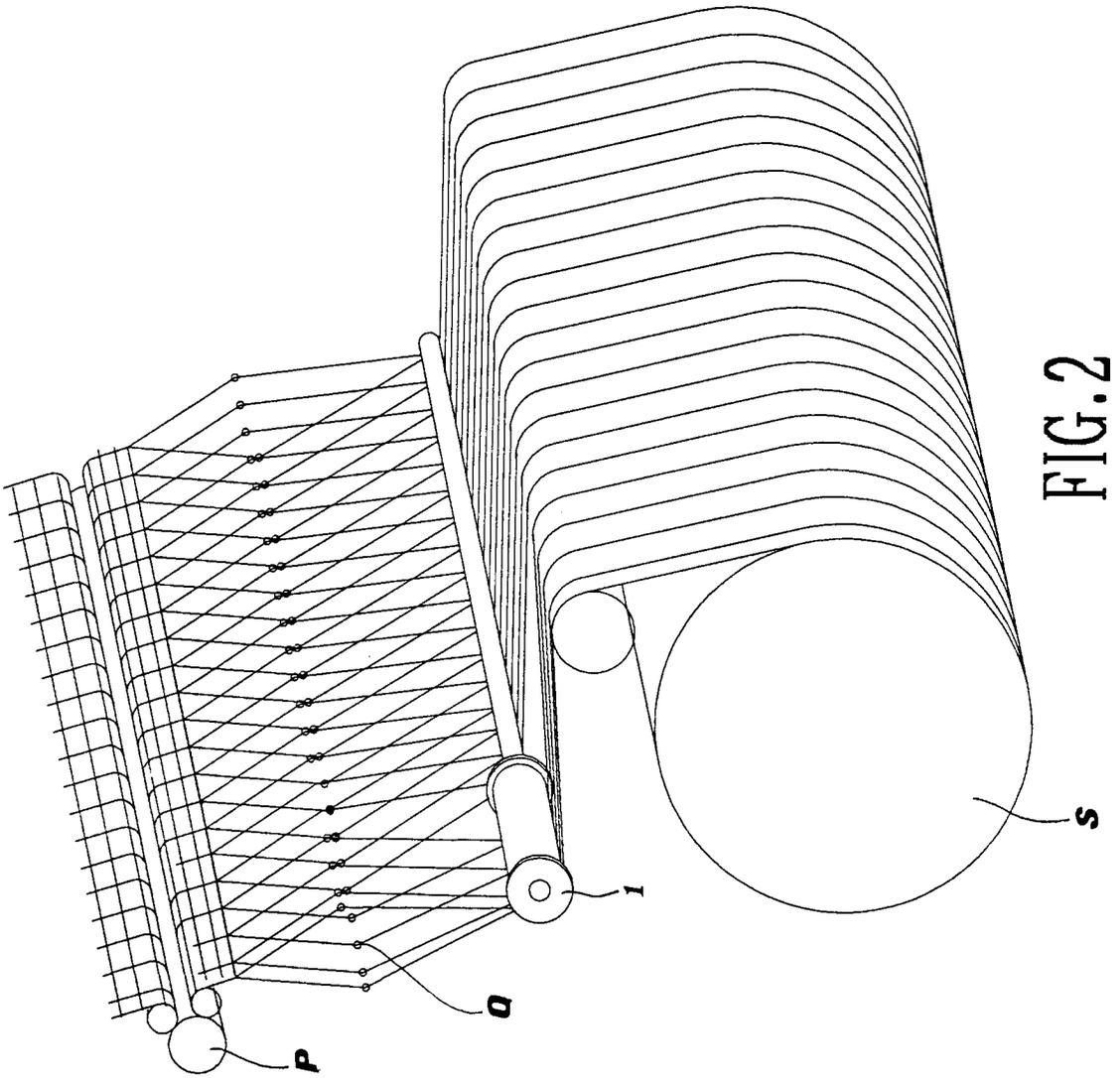


FIG.2

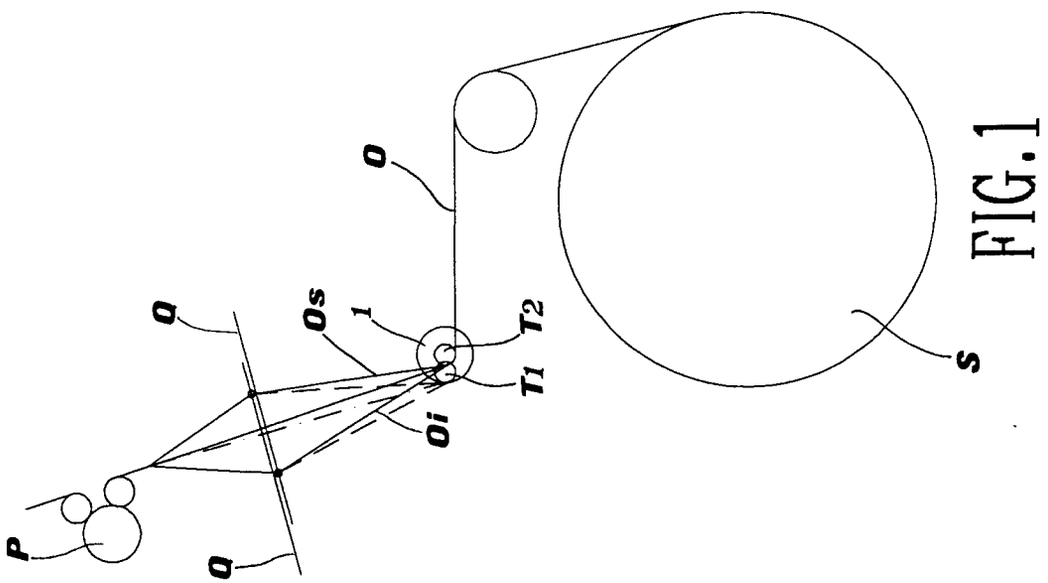


FIG.1

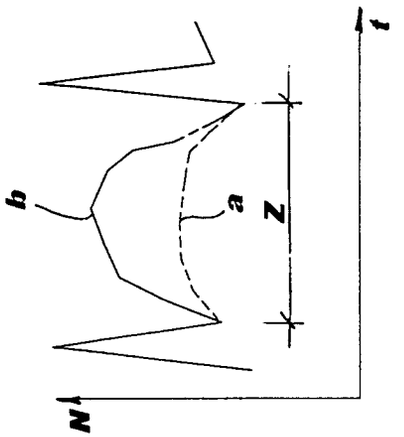


FIG.5

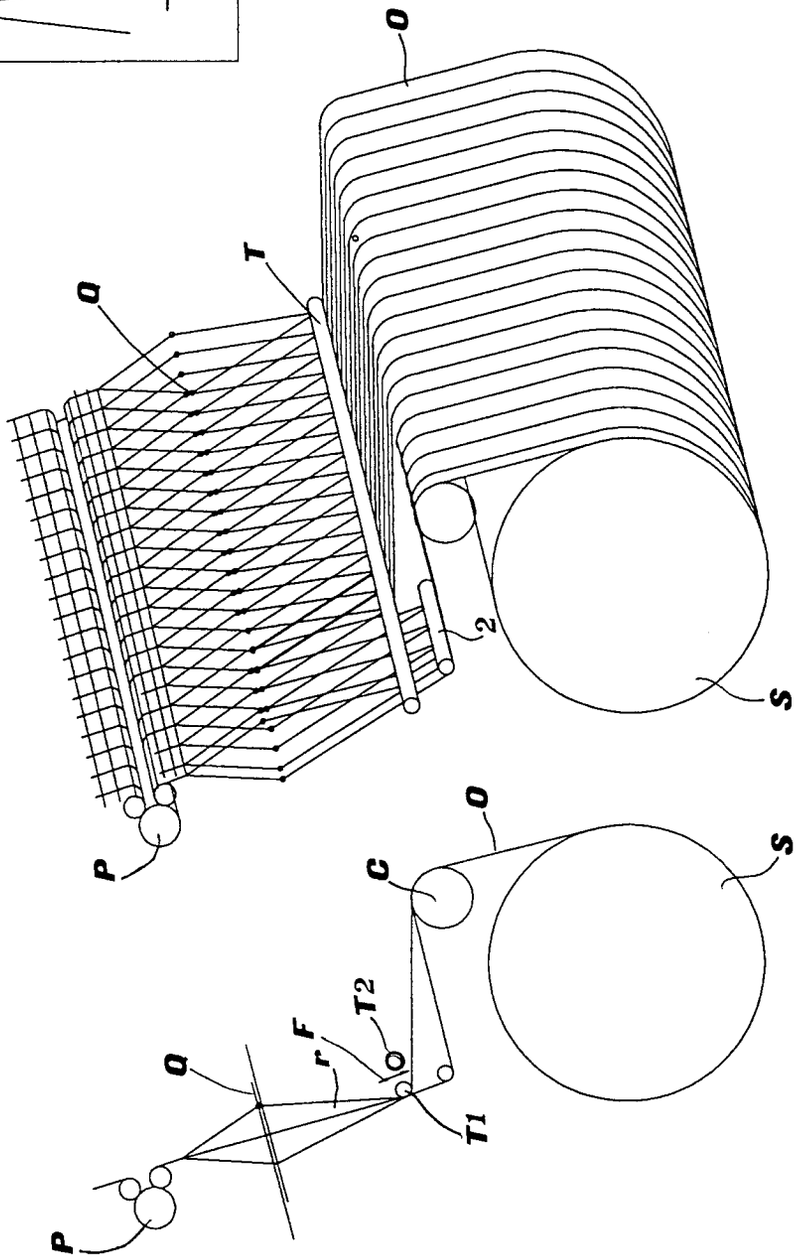


FIG.4




FIG.3

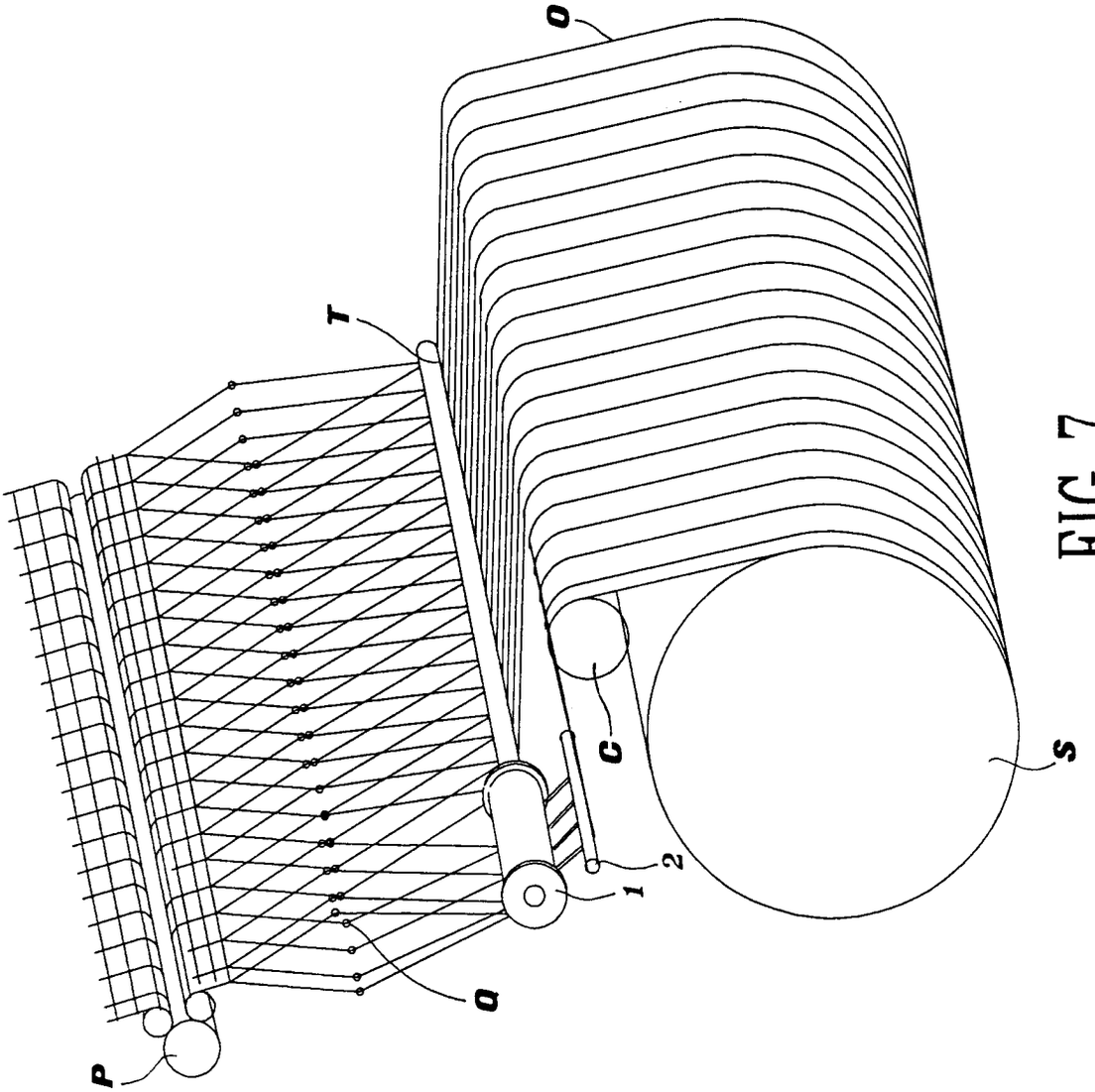


FIG.7

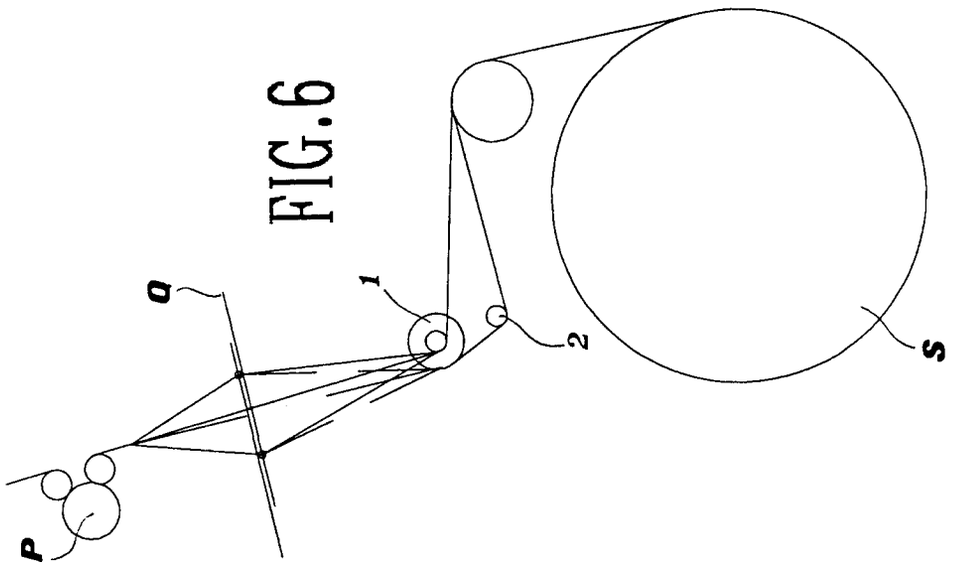


FIG.6

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# EUROPEAN SEARCH REPORT

Application Number
EP 98 10 8446

## 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) |
|---|---|---|---|
| A | FR 2 339 014 A (RUTI) 19 August 1977<br>* page 2, line 5 - line 23; figure 1 * | 1,3,4 | D03D49/22<br>D03D47/40 |
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| A | CH 181 225 A (GRIMM) | | |

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 | 15 July 1998 | Boutelegier, C |

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