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(54) Simplified automatic machine for simultaneously tensioning belts for furniture upholstery

(57) This invention proposes a simplified belt tensioning machine which, after the forward movement and the manual positioning of the belts (2) on the frame (1) of the piece of furniture by the operator, by tensioning means (12), drives a segment of upper belt placed upstream the frame until it overlaps on a lower segment

passing, in alternate direction, through a couple of rolls (4,5) placed side by side in order to lock it and afterwards, when the dragging is in progress, to tension it. Each of the said tensioning means (12), being activated by a common hydraulic circuit, tensions the respective belt (2) with the force of traction.

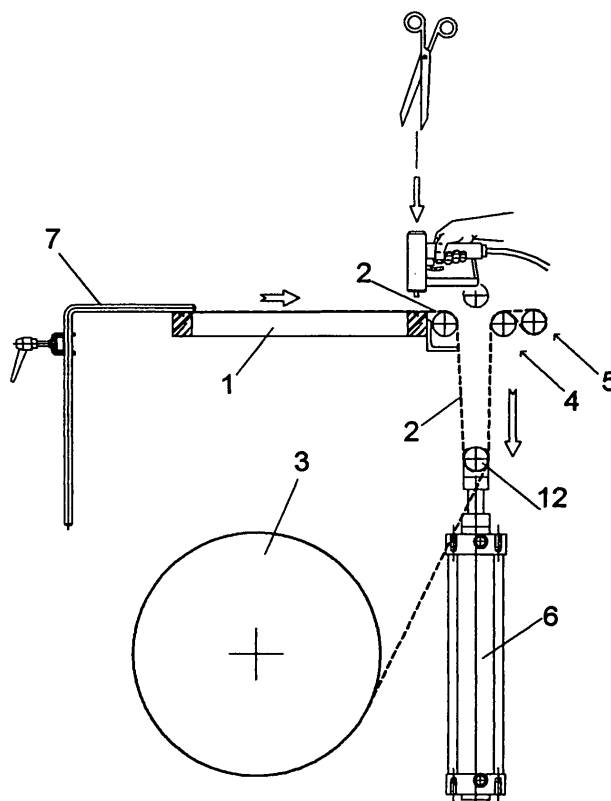


FIG. 4

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Description

[0001] This invention relates to a simplified automatic machine for simultaneously tensioning belts for furniture upholstery, wherein all the said belts are tensioned at the same time and with the same force.

[0002] This machine, compared with the previous machines known to the art, proposes a simplified model providing for means which, after the operator has secured the ends of the belts to the piece of furniture frame by staples or other system known to the art, tension the belts which are then fixed also to the opposite side of the frame, before being cut.

[0003] The said tensioning means are operated by a pneumatic system which guarantees a good continuity of results.

[0004] As known, some pieces of furniture, such as armchairs, sofas and the like, generally have upholstered seats and backrests and such upholstery often requires a supporting flexible structure which usually comprises a series of elastic belts which are fixed and tensioned between to points located on opposite sides of a rigid frame.

[0005] The fastening operation of the said belts provides for an end of the belt to be fixed to a first point of the frame, which belt is then tensioned with a preset force, and fixed to a second point of the frame on an opposite edge and finally cut.

[0006] In the large-scale production furniture industry, where the production times have a significant economic importance, the automation of the said belt tensioning operations is a prerequisite; on the contrary, if the said tensioning operations are made manually, they would imply an excessive lengthening of times.

[0007] Different machines capable of speeding up the said operations by providing for the automatic simultaneous tensioning of all the belts, thus making the operator's tasks easier, are known to the art.

[0008] These known machines comprise a series of reels which feed to a common tensioning roll all the belts, which are engaged to the surface by means of several types of locking devices.

[0009] Once the roll has been rotated, the belts are simultaneously tensioned with a force which varies with the variation of the roll rotation range.

[0010] One of the said machines is described in the European Patent No 0,511,458 filed by the same applicant.

[0011] This is a machine requiring a reeling/tensioning roll with a particular shape suitable to create, on the surface, a cavity parallel to the axis of rotation, wherein a bar, around which the belts pass through, is lodged.

[0012] The said feature considerably increases the cost of the machine.

[0013] Other machines known to the art provide also for means capable of driving, one by one and automatically, the ends of the belts up to a first locking point of the frame and other automatisms, which are not shown

herein, which allow to tension the belts one by one with a constant force. A machine of the kind is described in the European Patent application No 1,258,214 filed by the same applicant.

[0014] The purpose of this invention is for a simplified tensioning machine, which is easier to use and, mainly, more affordable than those known to the art, and which at the same time is capable of simultaneously tensioning all the belts of the piece of furniture, guaranteeing also a good continuity of results.

[0015] According to this invention, the machines provides for an automatically-drive tensioning device which is common for all the belts.

[0016] Each of the said belts passes around a setting roll and is bent backward, overlapping on a segment of the belt upstream, so that when the said belt is tensioned, it presses this segment of belt upstream against a fixed support, blocking it by friction.

[0017] The machine according to this invention comprises a height-adjustable bearing plane, equipped with fast locking means preventing the frame from overturning once the belts have been tensioned.

[0018] These and additional characteristics will be made clearer by the following description, which is given by way of example but without any limitation thereto, with reference to the figures annexed hereto, wherein:

- figure 1 is a side view of the tensioning machine according to this invention;
- figure 2 is a front view of the tensioning machine according to this invention;
- figures 3 and 4 show two schematic working phases of the tensioning machine according to this invention, wherein the belt is, respectively, ready to be fixed in the first locking point of the frame, and already locked and tensioned, ready to be fixed to the second point;
- figure 5 is a detail of the belt of figure 4 shown in the segment wound around two rolls placed side by side, wherein it is possible to see the overlapping of the folded up belt.

[0019] With reference to figure 1, 1 indicates the frame of the piece of furniture, which the belts 2 (figure 3) are to be fitted on, which belts will form, together with the frame 1, an elastic supporting structure of the piece of furniture upholstery.

[0020] A series of reels 3 feed the belts to a couple of supporting fixed and setting rolls 4, 5 among which the belts 2 pass through, before being manually fixed, with the free end coming out of from the reel, to the frame 1 distal edge.

[0021] The rolls 4 and 5 are aligned and each belt 1 is wound up for a segment around the first supporting roll 4 (approx. half turn), then is let pass around the second roll (setting roll 5) fitted near to the first one, making a complete turn, and is finally let come back passing above the segment of belt upstream, wound around the roll 4.

[0022] According to this method, by applying a tension

to the belt as indicated by the arrow "F" in figure 5, the said belt rests on the segment 9 of belt wound around the roll 4 and presses it, locking it by friction with a force which is directly proportional to the tension which is applied.

[0023] A tensioning roll 12, activated by tensioning means 6, which in the specific case consists of a couple of pneumatic cylinders, engages the belt 2 in the position between the said rolls 4, 5 and an idle roll 10, fitted just upstream the frame, pulling it downwards (figure 4), so that this portion pushes against the segment of belt wound around the roll 4.

[0024] The details are better visible in figure 5 which shows the two overlapped segments of belt upstream and downstream the locking rolls 4, 5 just close one to the other and pressed against the roll 4.

[0025] In this position the belt, which is pulled by the tensioning roll 12 in the direction of the arrow "F", is locked by the friction and the pressure made on the surfaces which are pressed one down the others and against the fixed roll 4, thus blocking the forward movement of the belt coming out of the reel and allowing only the other portion of the belt located between the said roll and the end fixed on the frame to be tensioned when the tensioning means 6 are activated.

[0026] The segment of belt between the end previously fixed by the operator to the frame and the point on which it blocks just near the locking rolls 4 and 5, is then tensioned by the tensioning roll 12 which, under the action of the tensioning devices 6, keeps on getting down, thus simultaneously tensioning the belts with preset force and depending on the pressure applied to the pneumatic circuit.

[0027] The use of tensioning pneumatic means offers a considerable continuity of results.

[0028] The locking system 7, which is used in the initial phase of positioning of the frame to the bearing plane is, according to a preferred embodiment of the invention, "upside down L" shaped and is sliding along the vertical side from a lifted position, which allows the insertion of a maximum-size frame corresponding to the maximum travel of the said element 7, to a lowered position, in which it engages the frame of the piece of furniture to prevent it from overturning when the belts are tensioned.

[0029] The functioning is as follows.

[0030] An operator simply leans the frame of the piece of furniture 1 on the bearing plane 8 of the machine, making an edge thereof lean against an edge 11 of the said plane 8.

[0031] The operator then secures the frame from overturning putting it against, along the opposite edge, the end portion of the locking element 7, adjusts the height of the frame 1, putting the plane in a working position 8' to adjust it to the dimensions of the piece of furniture and also to the operator's ergonomic requirements.

[0032] The operator then takes the ends of each belt coming out of the reels 3, and makes them pass around the respective locking rolls 4, 5, at first around one roll,

and later around the second roll, but contrariwise, until the ends come near to the most remote edge of the frame 1, wherein he fixes them, for example, by using a staple gun.

5 [0033] Each belt is therefore arranged as shown in figure 3, with its upper segment between the first locking point to the frame 1 and the roll 5, which has an almost horizontal course, and the bottom end, which goes from the feeding reel 3 to the locking roll 4, which has an almost
10 vertical or slightly oblique course according to the reel position with respect to the machine.

[0034] Just near the roll 4, the two overlapped segments of belt are in contact one with the other, so that when the machine is activated, the tensioning means 6
15 lower the roll 12, which in turn makes a segment of upper belt 13 press against the segment of the underlying belt 14, thus locking by compressing against the roll 4.

[0035] Continuing the travel of the tensioning means 6, the roll 12 further pulls the segment of upper belt 13
20 between the frame and the locking rolls 4, 5, thus tensioning it for a preset value.

[0036] At the point of higher travel of the roll 12, i.e. when the desired tensioning value is reached, the operator fixes each belt to a second point of the frame, on the
25 opposite side.

[0037] Each belt can now be cut, after having duly checked that the belts have been tensioned with the preset force, according to the fluid pressure in the cylinder 6.

[0038] A machine made having such features as explained above is extremely easy to manufacture with a significant cut in the costs of production compared to the tensioning machines known to the art, resulting to be also light and very small-sized.

[0039] Also the functioning is simplified for the benefit
35 of the personnel in charge of its use, who will not require any more training periods and without the need to be flanked by skilled workers.

40 Claims

1. Belt tensioning machine for furniture upholstery, of the kind comprising a plane (8) for fastening the piece of furniture, one or more reels (3) feeding the belts and tensioning means (2) made in such a way as to simultaneously tension all the belts (2), **characterised in that** it provides for a couple of locking rolls (4, 5) placed side by side upstream the piece of furniture and around which the belts (2) are partly wound in such a way that a segment of belt downstream overlaps to a segment of belt coming from the reel, and wherein the said tensioning means (12) operate on the said belts downstream the said rolls, by exerting a traction according to a direction making the segments of overlapped belt tighten one on the other and lock the belts on the said rolls (4).

2. Belt tensioning machine according to the claim 1

characterised in that the said movable tensioning means consist of at least one roll (12) made in such a way as to simultaneously engage all the belts (2), which roll (12) being subject to the action of a couple of pistons (6) which control their movements.

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3. Belt tensioning machine for furniture upholstery according to any of the previous claims **characterised in that** it provides, upstream the structure (1) of the piece of furniture and downstream the tensioning device (12), for an idle roll (10) made in such a way as to aid the sliding of the segment of belt already fixed to the piece of furniture during the tensioning phase.
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4. Belt tensioning machine for furniture upholstery according to any of the previous claims **characterised in that** the said locking rolls (4, 5) and the said idle roll (10) are substantially aligned with the piece of furniture plane which the belts must be fitted to.
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5. Belt tensioning machine for furniture upholstery according to any of the previous claims **characterised in that** it provides for locking means (7) of the piece of furniture, comprising at least one element sliding from a lifted position for inserting the piece of furniture, to a lowered position in which it engages the said frame of the piece of furniture, thus preventing it from overturning during the tensioning of the belts, the said sliding element being locked in the said lowered position by locking mechanic means.
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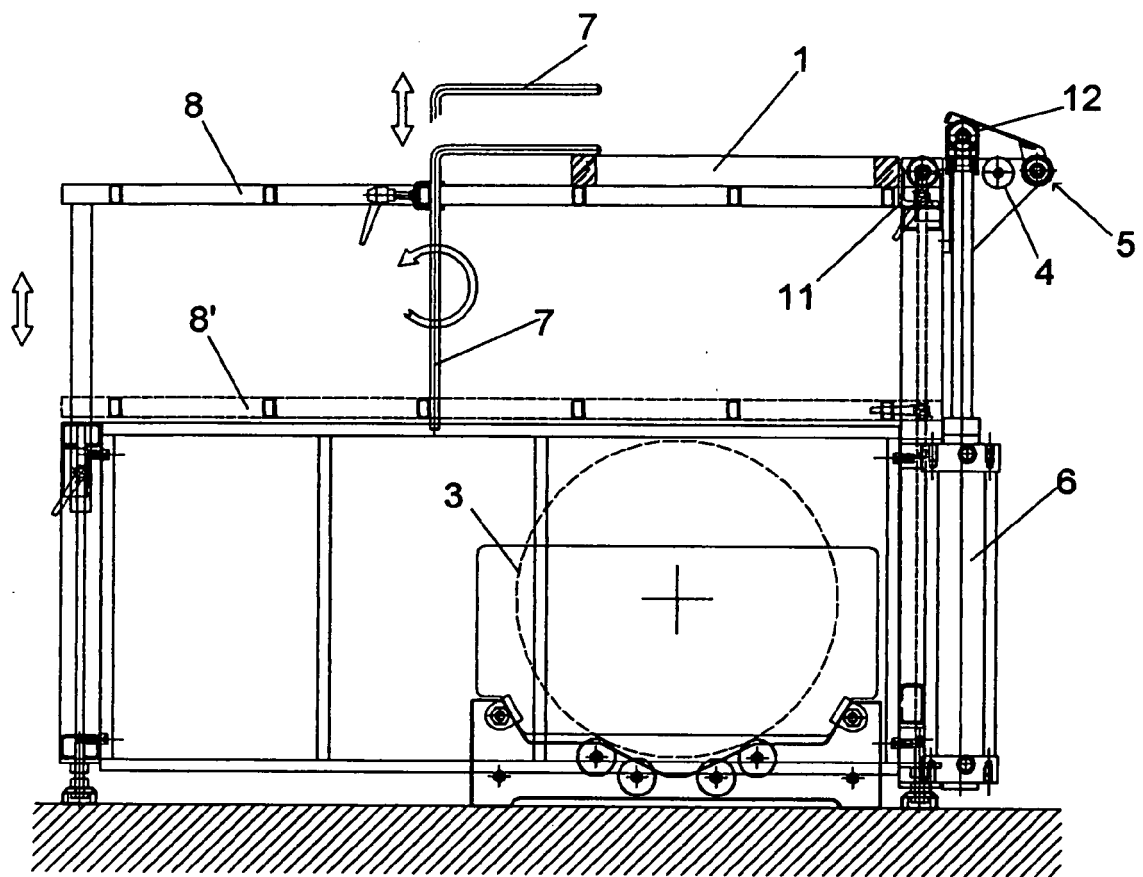


FIG. 1

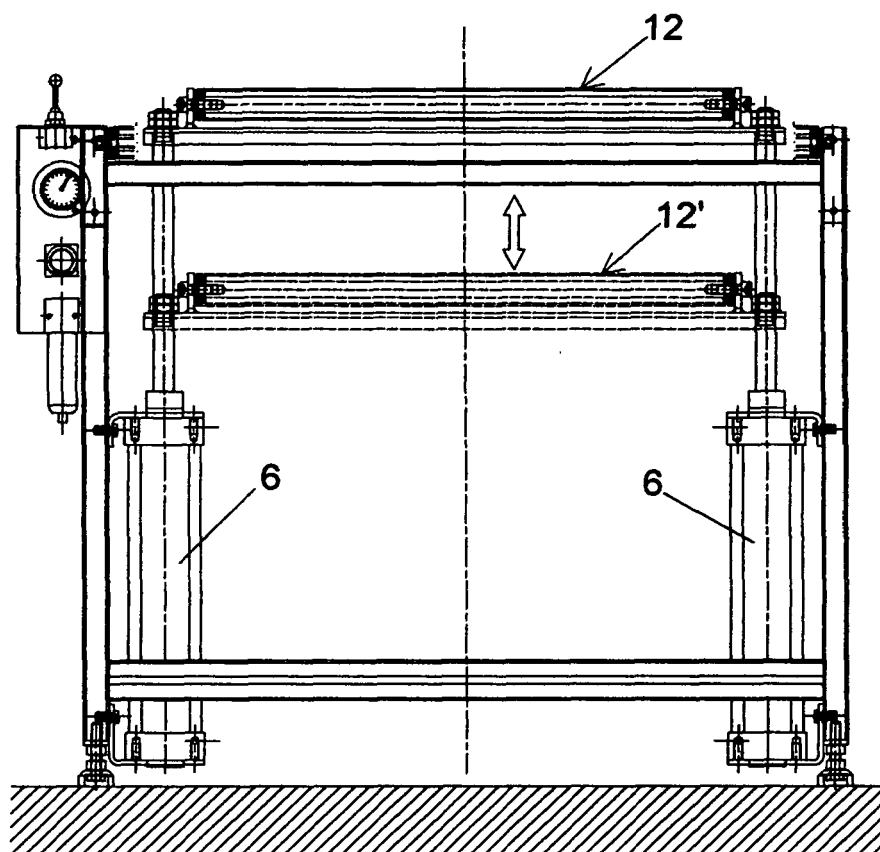


FIG. 2

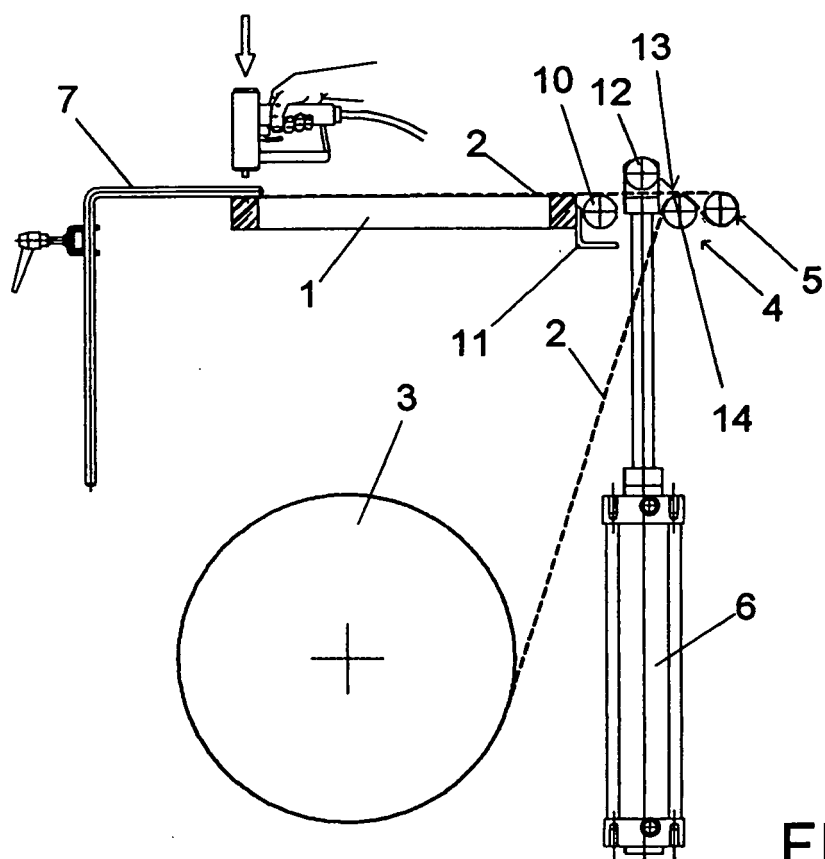


FIG. 3

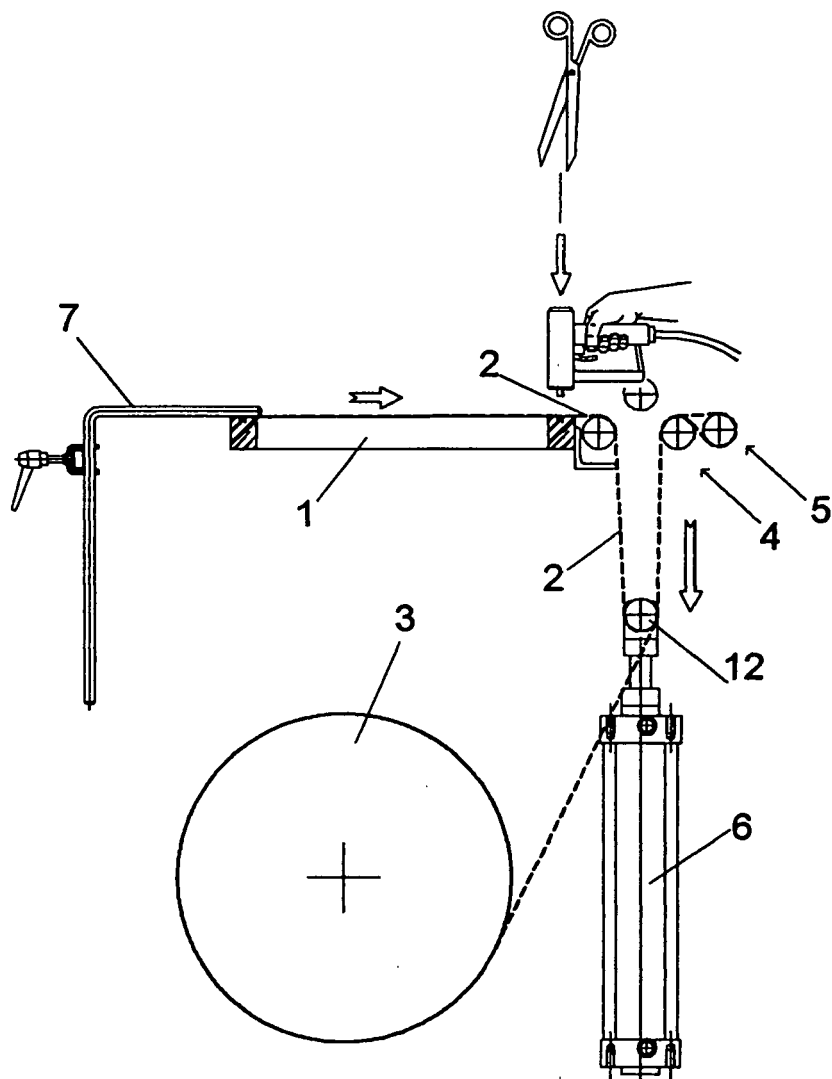


FIG. 4

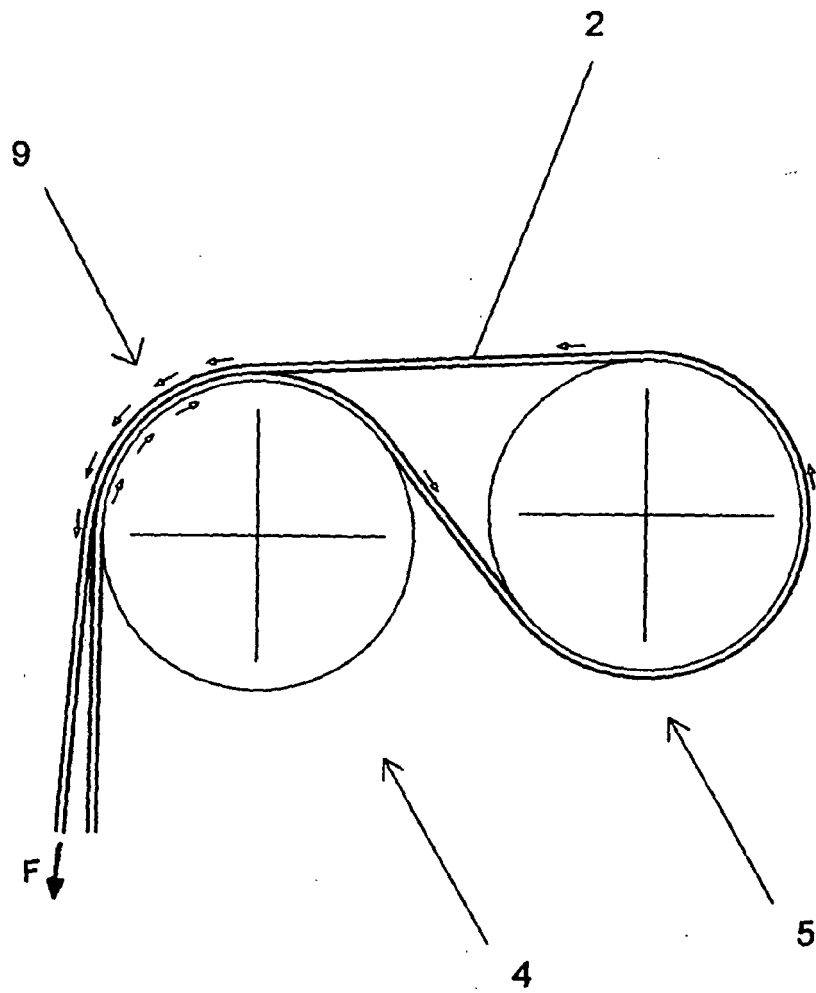


FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 06 00 1572

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 June 2006	Examiner Alff, R
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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