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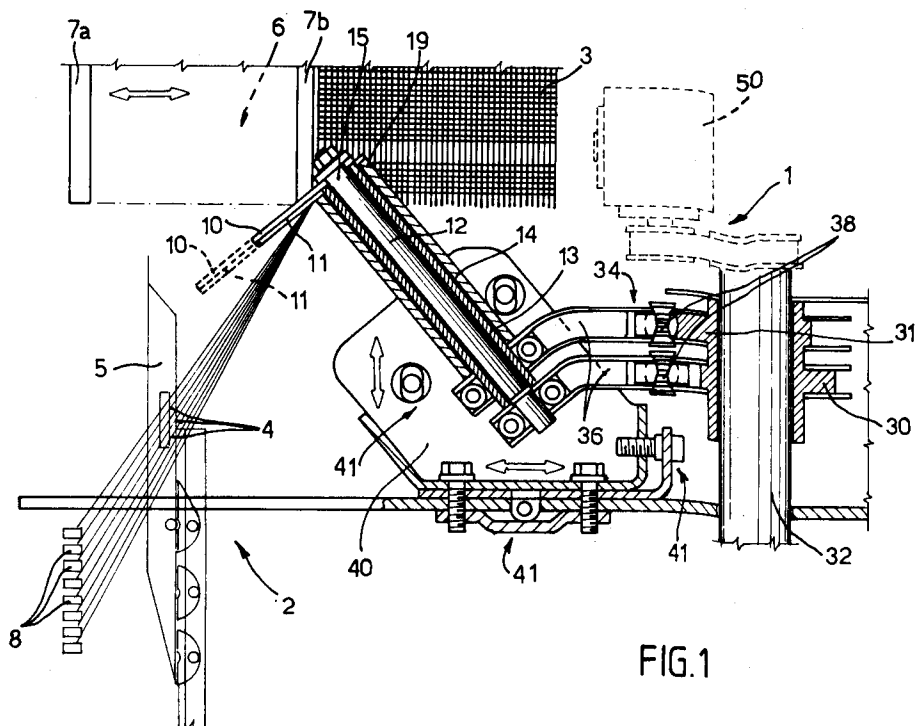
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I-10121 Torino (IT)(54) **Weft yarn cutting device for looms.**

(57) A weft yarn cutting device presenting a first (10) and second blade (11) moving in relation to each other in a cutting plane perpendicular to the fabric (3) and inclined in relation to the feed direction of the fabric; first positive control means (30) for the

first blade; and second positive control means (31) for the second blade; the second control means generating a movement independent of that generated by the first control means; and the second blade being connected mechanically to the first.

**FIG.1****EP 0 679 744 A1**

The present invention relates to a weft yarn cutting device for looms wherein the fabric being formed is fed in one plane, and the weft yarn is inserted by at least one weft carrying gripper traveling back and forth in a predetermined direction crosswise to the fabric.

The cutting device of looms of the above type normally consists of two blades oscillating in a plane perpendicular to the traveling direction of the weft carrying grippers and parallel to the feed direction of the fabric. Part of the oscillating movement of the blades provides for positioning them so as to intercept the weft yarn upon passage of the carrying gripper, and the rest of the movement for producing a relative motion for actually cutting the yarn.

The weft yarn in the carrying gripper must be cut as soon as it is fed by the gripper into the shed, so as to cut it off the edge of the newly formed fabric before it is snapped by the gripper. As the traveling speed of the gripper may exceed 20 m/sec, the yarn must be cut rapidly; and, as the leftover portion of the yarn between the cut-off point and the fabric is considered waste, the yarn must be cut as close as possible to the edge of the fabric so that the waste portion of the yarn is as short as possible.

Known cutting devices of the above type fail to meet such requirements. In particular, when the yarn is actually cut, the blades are kept from getting too close to the fabric, to prevent interference with the gripper and the reed, so that a relatively long waste portion is generally inevitable to ensure troublefree operation of the loom. Moreover, the cutting motion is slow and difficult to adjust.

It is an object of the present invention to provide a cutting device designed to overcome the aforementioned drawbacks, and which in particular provides for rapidly and safely cutting the weft yarn as short and as close as possible to the fabric.

According to the present invention, there is provided a weft yarn cutting device for a loom wherein the fabric being formed travels in a feed plane, and the weft yarn is inserted by at least one weft carrying gripper traveling back and forth in a predetermined direction crosswise to the fabric; the device comprising a first and second blade moving in relation to each other in a cutting plane and between a first limit position away from the fabric, and a second limit position over the fabric; characterized in that it comprises first positive control means for the first blade, and second positive control means for the second blade; the second control means generating a movement independent of that generated by the first control means; and the second blade being mechanically connected to the first.

More specifically, the cutting plane is perpendicular to the feed plane of the fabric, and oblique in relation to the traveling direction of the gripper.

As such, the yarn may be cut rapidly and extremely close to the fabric for eliminating waste, and the position of the cutting device may be adjusted easily and within a wide range by acting separately on the first and second positive control means. Here and hereinafter, the term "positive control means" is intended to mean members/devices for generating in a driven member - in this case the blades - a motion controlled according to a predetermined law, both in acceleration and deceleration, and which depends exclusively on the design of the control member/device.

According to a first embodiment of the invention, said first and second positive control means consist of two cams, each with a predetermined profile, fitted coaxially and side by side to a common drive shaft; each cam controlling the movement of a respective blade via a lever transmission and a cam follower cooperating in contact with the respective cam and connected to the transmission. The shaft may be controlled directly by the loom, or by an independent motor servocontrolled in time with the operating cycle of the loom.

In a second embodiment, said first and second positive control means consist of two independent motors, each servocontrolled in time with the operating cycle of the loom.

In both cases, said first and second blades are fitted to a pair of coaxial shafts fitted concentrically and idly in relation to each other inside a supporting sleeve; a first of the shafts being connected to the first positive control means, and a second to the second positive control means, so as to rotate back and forth by a predetermined angle about an axis perpendicular to the cutting plane; the first blade projecting radially from and being secured angularly integral with the end of the first shaft facing the fabric; and the second blade being hinged, parallel to the rotation axis of the shafts, to a crank arm projecting radially from and secured angularly integral with the end of the second shaft facing the fabric.

As such, the blades reach the cutting position wide open and ready to intercept and cut the weft yarn; the weft yarn is cut by rotation of the crank arm moving the second blade along the first; and the cutting position may be adjusted easily by clamping the sleeve to a support by means of a system of slides, with no noticeable variation in the cutting phase in relation to the operating cycle of the loom, and with no variation in the pressure setting of the blades.

A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic top plan view of a continuous weft feed loom featuring a weft yarn cutting device in accordance with the present invention;

Figure 2 shows a detail of the Figure 1 machine featuring a different embodiment of the cutting device according to the invention;

Figure 3 shows a schematic view of the Figure 1 cutting device;

Figures 4, 5 and 6 show schematic views of various operating phases of the cutting device according to the invention.

With reference to Figures 1 and 3, number 1 indicates a weft yarn cutting device for a known loom 2 wherein the fabric 3 being formed is fed in a substantially horizontal plane, and a number of weft yarns 4 are selectively inserted one at a time, by a respective weft carrying gripper 5 moving back and forth in a predetermined direction crosswise to fabric 3, inside shed 6 in which reed 7 moves back and forth between positions 7a and 7b to form fabric 3. In the example shown, weft yarns 4 are unwound off reels 8, and are moved in known manner, one at a time, from the standby position shown in Figure 1, to an insertion position (shown schematically by the dotted line in Figure 3) by a known presentation device of which only a movable member or "arrow" 9 is shown (Figure 3).

Cutting device 1 comprises a first blade 10 and a second blade 11, both movable in relation to each other in a cutting plane coincident with their own plane, and between a first limit position (shown by the dotted line in Figures 1, 3) away from fabric 3, and a second limit position (shown by the continuous line) over fabric 3. Blades 10, 11 are fitted to a pair of tubular, coaxial shafts 12, 13 fitted concentrically and idly in relation to each other inside a supporting sleeve 14. Shafts 12 and 13 are driven shafts rotated back and forth by a predetermined angle about their axis, which is perpendicular to the cutting plane and, more specifically, lies in a substantially horizontal plane and is inclined 30-60° in relation to the traveling direction of gripper 5. The cutting plane (which coincides with the plane of Figures 4-6) is therefore perpendicular to the feed plane of fabric 3 and inclined in relation to the traveling direction of gripper 5.

With reference also to Figures 4, 5 and 6, blade 10 projects radially from and is secured angularly integral with the end 15 of shaft 12 facing fabric 3; blade 11 is hinged at 16, parallel to the rotation axis of shafts, 12, 13, to a crank arm 18 projecting radially from the end 19 of shaft 13 facing fabric 3; and arm 18 is secured angularly integral with end 19. According to the invention, blade 11 is connected mechanically to blade 10 - in the example shown, by means of a hinge with its axis parallel to the rotation axis of shafts 12, 13 and

defined by a pin 20, and via sliding means defined by a straight slot 21 formed through blade 11 and engaged in sliding manner by pin 20. As such, blade 10 is connected so as to rotate together with shaft 12; crank arm 18 rotates together with shaft 13; and blade 11 acts substantially as a connecting rod connected at 16 and 20, and, as a consequence of the rotation of shafts 12, 13, effects a predominantly translatory movement in relation to blade 10, which movement, as will be seen, is exploited for cutting the yarn.

In the embodiment shown, blades 10, 11 are defined by levers connected one on top of the other, and presenting respective cutting edges 22, 23 on the C-shaped end 24 of lever or blade 10 and on the prismatic head 25 of lever or blade 11. Blades 10 and 11 are free to rotate in relation to each other at pin 20, and mutual sliding of the blades is guided by respective lateral skids 26 at pin 20, and by an additional skid 27 formed where head 25 is superimposed on C-shaped end 24.

In the Figure 1 and 3 embodiment, back and forth rotation of shafts 12, 13 is controlled by separate positive control means operating independently for blades 10, 11 and consisting of respective cams 30, 31 fitted coaxially and side by side to a common drive shaft 32, and each presenting a predetermined profile for generating a movement independent of (but obviously timed with) that of the other cam. Each cam 30, 31 transmits motion to respective shaft 12, 13 via a lever transmission 34, and via a known cam follower 35 cooperating in contact with and simply resting on the respective cam, but which is connected to relative transmission 34.

In the example shown, transmissions 34 comprise, for each cam, an L-shaped first lever 36 fitted angularly integral at a first end to respective shaft 12, 13 so as to oscillate about the axis of the shaft; and a second lever or connecting rod 37 connected at opposite ends, by means of respective known ball joints 38, to a second end, opposite the first, of respective lever 36, and to the cam follower 35 of respective cam 30, 31. Transmissions 34 are preferably so designed that levers 37 lie in a substantially vertical plane, and ball joints 38 permit movements of a few millimeters in planes substantially perpendicular to levers 37. As such, the whole comprising sleeve 14, blades 10, 11, arm 18 and shafts 12, 13 may be moved in said planes within a radius of roughly 15 mm using commercial type joints 38. This advantage is exploited by forming sleeve 14 integral with a plate 40 mounted in sliding manner on a known system of slides 41 defined by lock screws and respective slots, and which provide for moving plate 40 along three axes, and for adjusting the position of the cutting plane and hence accurately adjusting the

cut-off point close to the lateral edge of fabric 3.

In the Figure 1 and 3 embodiment, drive shaft 32 is driven in known manner (not shown) directly by loom 2, or, according to the variation shown by the dotted line, by an independent motor 50 ser-

vocontrolled in time with the operating cycle of the loom.

Figure 2, wherein any parts similar to those already described are indicated using the same numbering system, shows a further embodiment 52 of the cutting device according to the invention, wherein the cam control system is replaced by a more direct system, though still independent for each shaft 12, 13. In the example shown, shafts 12, 13 are driven directly by two independent step or brushless motors 53, 54, each servocontrolled in time with the operating cycle of loom 2; which variation obviously provides for easier automatic startup of loom 2, in the event of stoppages, by facilitating timing of the various devices.

With reference to Figures 4, 5 and 6 - which apply indifferently to both the Figure 1 and 2 embodiments (the only difference being the control system of shafts 12, 13) - operation of the cutting device according to the invention will be clear from the foregoing description: the oscillating movement imparted to blades 10, 11 by shafts 12, 13 provides for moving the blades away from fabric 3 and up from the feed plane of the fabric, thus enabling the weft yarn 4 being inserted to be positioned between device 1 (or 52) and fabric 3 without interfering with reed 7.

Conversely, when shafts 12, 13 are rotated in the opposite direction, blades 10, 11 are restored from the Figure 4 to the Figure 5 position close to the fabric, and to a point over fabric 3 and from which the blades extend rearwards perpendicular to the axis of shafts 12, 13 (Figures 1 and 2). In the course of the above movement, blades 10, 11 slide in relation to each other and are rotated slightly at 20; head 25 moves along end 24 so that the blades reach the cutting position (Figure 5) wide open and ready to intercept and cut weft yarn 4; and the yarn is cut by shaft 13 rotating further in relation to shaft 12, thus moving arm 18 which moves blade 11 downwards to bring cutting edges 22 and 23 together and so cut the yarn upon edge 23 reaching the limit position shown by the dotted line in Figure 6. The above cycle is then repeated to cut the next weft yarn 4.

Claims

1. A weft yarn cutting device for a loom wherein the fabric being formed travels in a feed plane, and the weft yarn is inserted by at least one weft carrying gripper traveling back and forth in a predetermined direction crosswise to the

fabric; the device comprising a first and second blade moving in relation to each other in a cutting plane and between a first limit position away from the fabric, and a second limit position over the fabric; characterized in that it comprises first positive control means for the first blade, and second positive control means for the second blade; the second control means generating a movement independent of that generated by the first control means; and the second blade being mechanically connected to the first.

2. A cutting device as claimed in Claim 1, characterized in that said cutting plane is perpendicular to said fabric feed plane, and is inclined in relation to said traveling direction of the gripper.

3. A cutting device as claimed in Claim 1 or 2, characterized in that said first and second positive control means comprise respective cams fitted coaxially and side by side to a common drive shaft, and each presenting a predetermined profile; each cam controlling the movement of a respective blade via a lever transmission, and via a cam follower cooperating in contact with the respective cam and connected to said transmission.

4. A cutting device as claimed in Claim 3, characterized in that said common drive shaft is driven directly by the loom.

5. A cutting device as claimed in Claim 3, characterized in that said common drive shaft is driven by its own independent motor servocontrolled in time with the operating cycle of the loom.

6. A cutting device as claimed in one of the foregoing Claims from 3 to 5, characterized in that said lever transmissions comprise, for each said cam, a first lever connected so as to oscillate at a first end about an axis perpendicular to the cutting plane; and a second lever connected at opposite ends, via respective ball joints, to a second end, opposite the first, of said first lever, and to the cam follower of the respective cam; said second levers lying in a substantially vertical plane; and said ball joints permitting movements in planes substantially perpendicular to said second levers.

7. A cutting device as claimed in Claim 1 or 2, characterized in that said first and second positive control means comprise two independent motors, each servocontrolled in time with

the operating cycle of the loom.

8. A cutting device as claimed in any one of the foregoing Claims, characterized in that said first and second blades are fitted to a pair of coaxial shafts fitted concentrically and idly in relation to each other inside a supporting sleeve; a first and second of said shafts being connected respectively to said first and second positive control means, so as to rotate back and forth by a predetermined angle about an axis perpendicular to the cutting plane; said first blade projecting radially from and being connected angularly integral with the end of the first shaft facing the fabric; and said second blade being hinged, parallel to the rotation axis of said shafts, to a crank arm projecting radially from and connected angularly integral with the end of the second shaft facing the fabric.
9. A cutting device as claimed in Claim 8, characterized in that the second blade is connected to the first by a hinge presenting an axis parallel to the rotation axis of said shafts, and via sliding means which, as a consequence of the rotation of said shafts, produce a predominantly translatory movement of the second blade in relation to the first for cutting the yarn.

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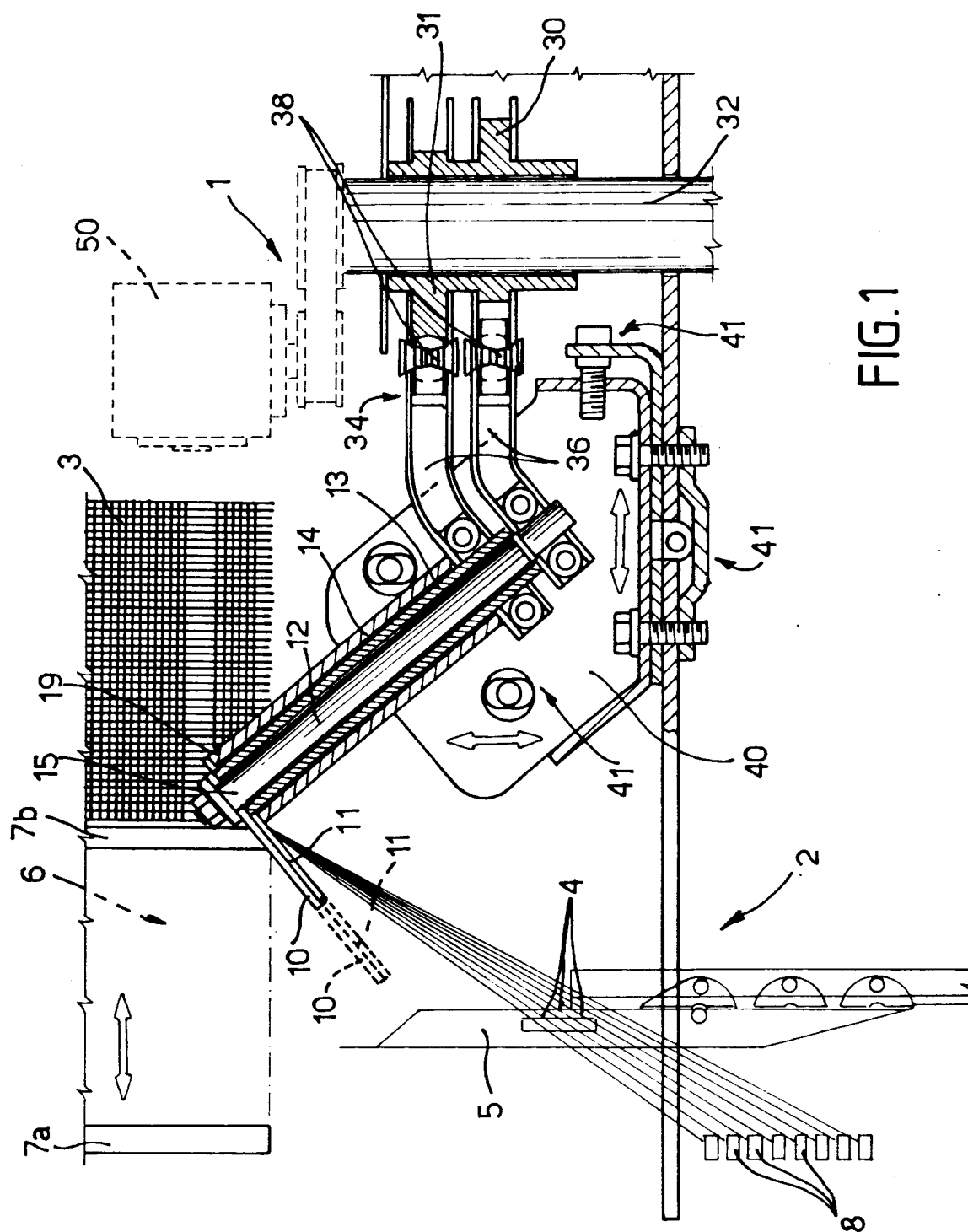


FIG.1

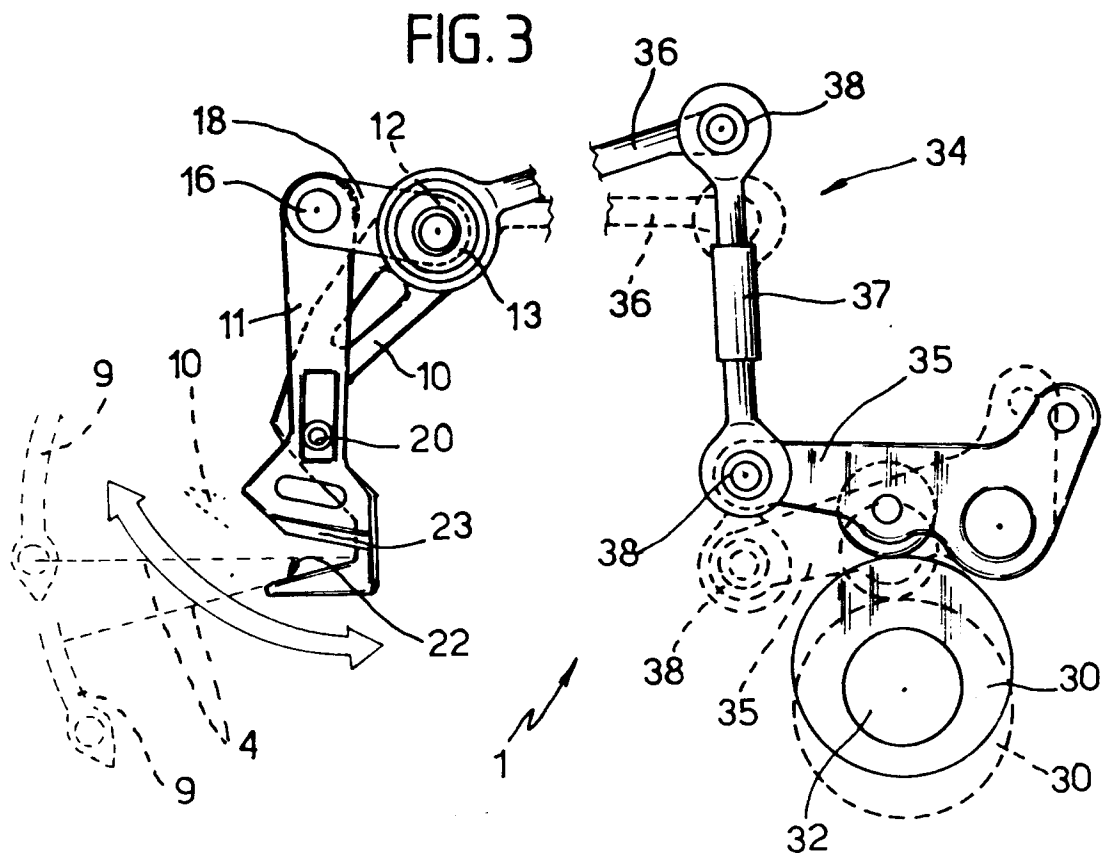
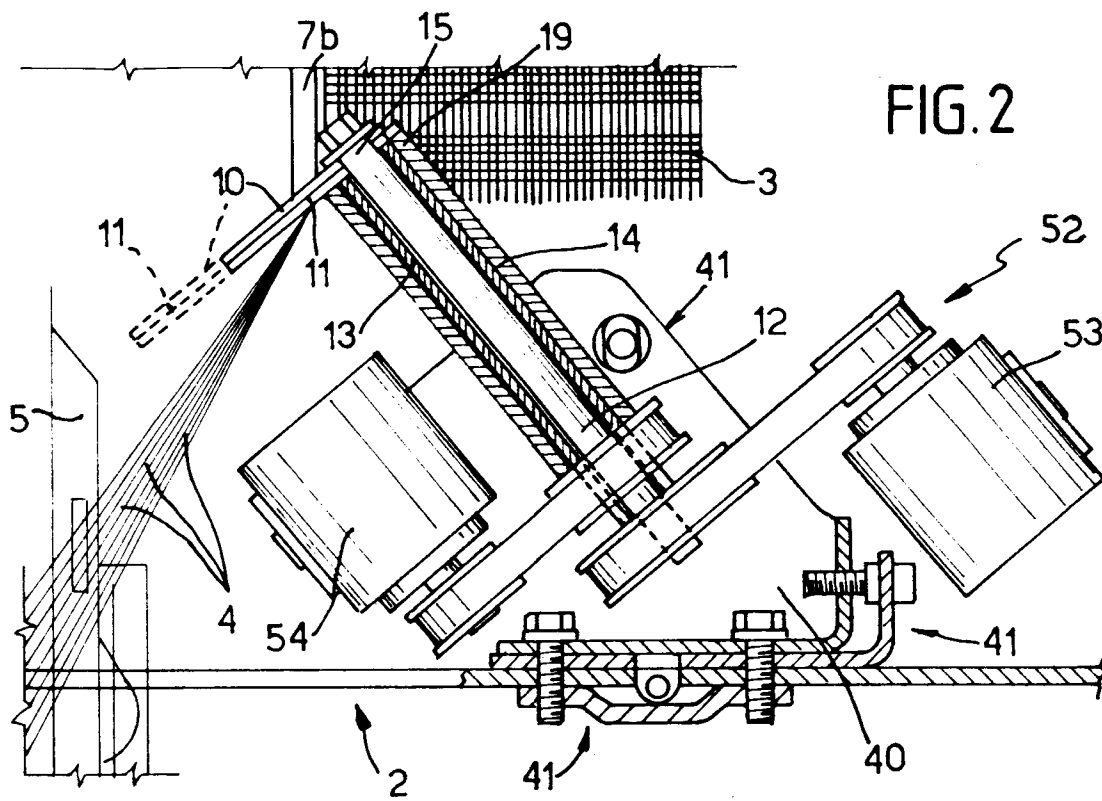


FIG. 4

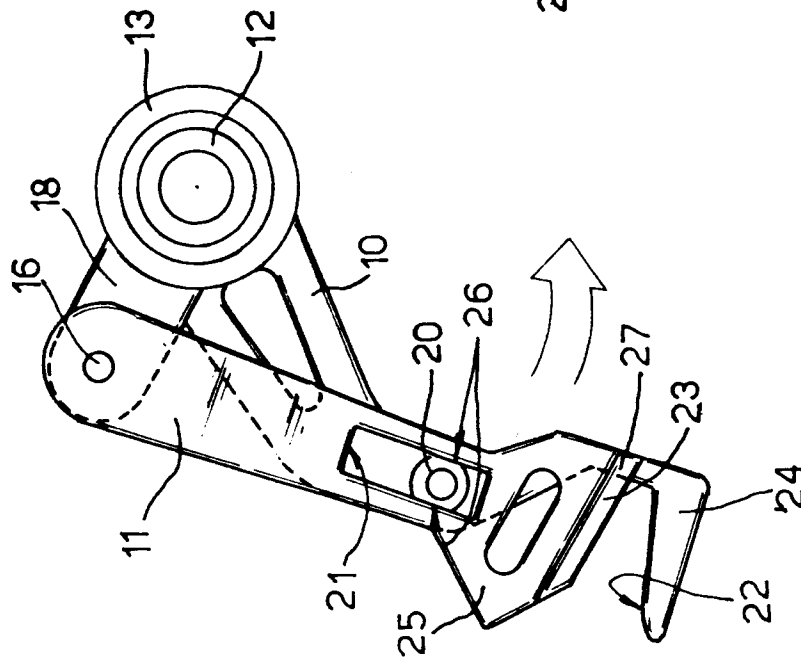


FIG. 5

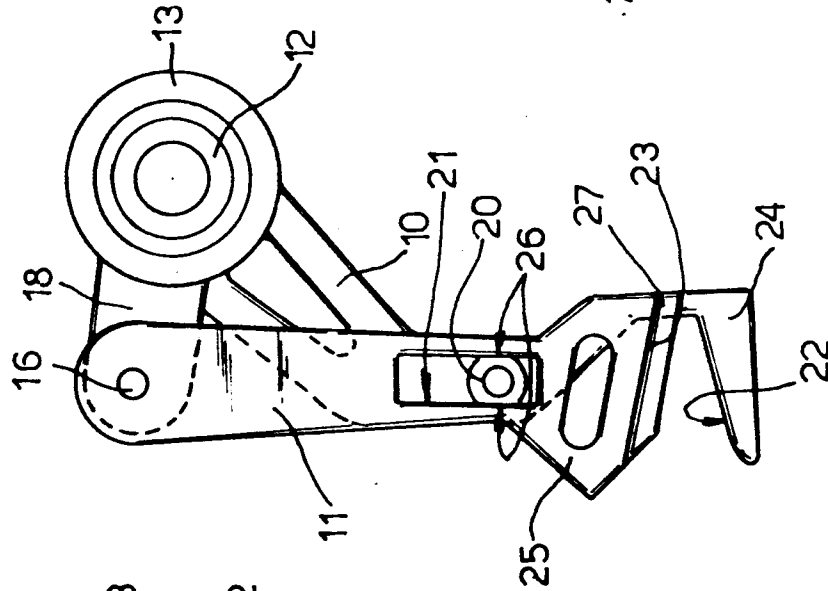
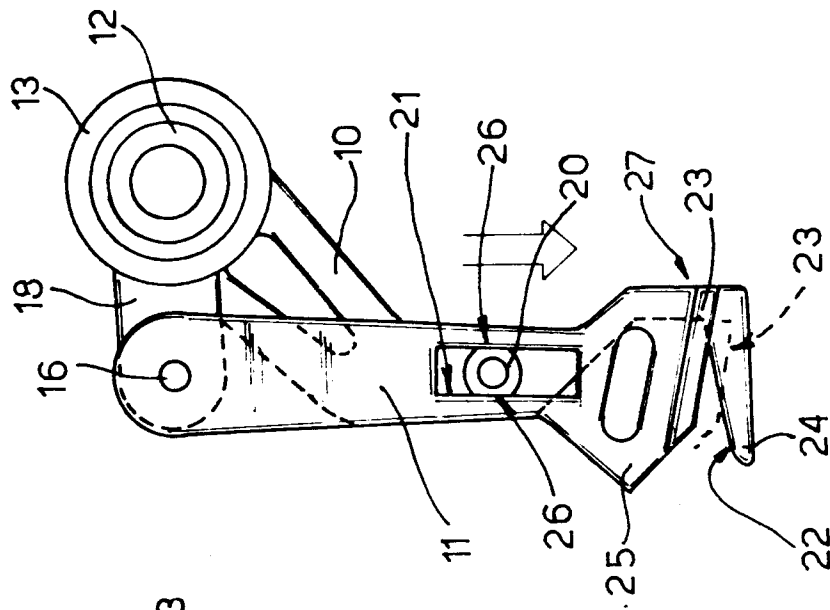


FIG. 6





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EUROPEAN SEARCH REPORT

Application Number
EP 95 10 6372

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	FR-A-2 269 594 (NUOVO PIGNONE)	1-4	D03D47/36
Y	* page 4, line 23 - page 6, line 14; figures 1-3 *	5,7	D03D49/70

Y	EP-A-0 284 766 (PICANOL)	5,7	
	* column 2, line 1 - line 21 *		

X	FR-A-2 143 168 (SOMET)	1,3,4	
	* page 2, line 13 - page 3, line 20; figures *		

X	US-A-3 380 482 (SCHERILLO)	1,3,4	
	* the whole document *		

X	BE-A-673 496 (LINDAUER DORNIER)	1	
	* page 5, line 14 - page 6, line 30; figures 1,2 *		

			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		24 July 1995	Rebiere, J-L
CATEGORY OF CITED DOCUMENTS			
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