

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 863 237 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication: 09.09.1998 Bulletin 1998/37

(51) Int. Cl.⁶: D03D 47/38

(21) Application number: 97830090.3

(22) Date of filing: 03.03.1997

(84) Designated Contracting States: AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

(72) Inventor: Moia, Ivo I-22073 Fino Mornasco, (Como) (IT)

(71) Applicant: Moia, Ivo I-22073 Fino Mornasco, (Como) (IT)

(74) Representative: Lecce, Giovanni Ufficio Internazionale Calciati S.r.l. Via G. Negri 10 20123 Milano (IT)

(54) Sorting device for weft yarns

(57) A sorting device for weft yarns suitable to be applied to looms to feed, cut and thread the sorted weft yarn into a bearing gripper (5), comprising:

a package (2) of heddles (3) placed side by side and parallel to one another, each heddle carrying a weft yarn;

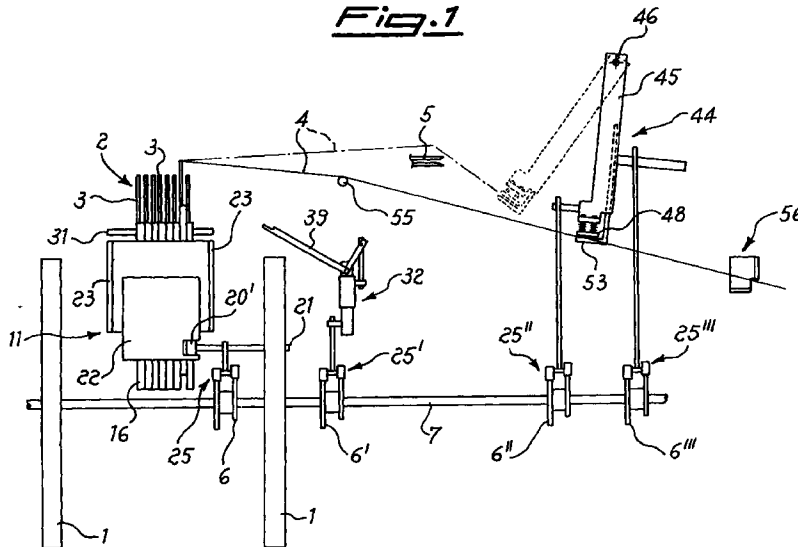
a means for sorting and extracting (11) each heddle (3), comprising an electromagnet (12), which sorts and unlocks a heddle (3), and a lever (20) activated by a first parallel axis oscillator (25), provided with conjugated cam shifting means (6) and roller feeler (26), which extracts the sorted heddle (3) from package (2);

a means for sorting and cutting (44) the sorted yarn (4) and its shifting to the bearing gripper (5), activated by a third and a fourth conjugated cam (6'', 6''') oscillator (25'', 25'''), and

a means (32) for feeding the sorted yarn (4) from the sorting means (11) to the locking and cutting means (44), activated by a second conjugated cam (6'') oscillator (25').

All the conjugated cams (6, 6', 6'', 6''') are located on a rotary shaft (7) and activated at the same time and in a synchronous manner by a motor of the loom.

Fig.1



EP 0 863 237 A1

Description

The present invention relates to a sorting device for weft yarns.

More particularly, the present invention relates to a sorting device for weft yarns having a very simple and compact structure and suitable to be easily applied to looms to feed, cut and thread a weft yarn into the bearing grippers of looms in a easy, smooth and precise manner.

As is known, looms are provided with devices for sorting weft yarns which have the task of separating weft yarns of various type from one another, selecting the one which is each time more suitable for the type of working and fabric, and to feed the chosen yarn to the bearing gripper of the loom.

These sorting devices, which are called in the art "weft feeding machines", comprise a mechanism, driven by an electromagnet and activated in some cases by cables running within special sheaths, which shifts the yarn constituting the weft to such a position as to be firstly collected by the bearing gripper of the loom and thereafter cut by scissors before entering the fabric. Afterwards, the gripper runs across the length of the loom keeping in its inside an end of the yarn and locates the latter between the warp yarns opened by meshes. On the following run, the sorting device feeds again a yarn to the gripper, to be collected by the latter and transported throughout the whole length of the loom.

The known sorting devices have several drawbacks which limit their use and application in looms.

A first drawback is due to the fact that, as the various heddles that constitute the device are placed side by side, each heddle shifts the yarn it carried to a different direction. The gripper which collects the weft yarn chosen will find therefore the yarn in a different position according to the heddle activated; this causes the synchronisation of the whole mechanism relatively to the movement of grippers to be difficult.

The activation of the sorting device by means of cables inserted in sheaths involves a remarkable complexity of the structure, due to the fact that the drive must take place in a quick and very precise way, given the high feed speed of the bearing gripper.

Another drawback arises from the complexity of the lever system used to activate the heddles and to cut the yarn. Such lever system is very complex and bulky, and its assembly on the loom gives rise to technical problems, and its maintenance markedly affects running costs.

Lastly, the yarn cut by scissors involves a high waste of yarn which affects the cost of the fabric especially when expensive yarns are used, such as, for instance silk yarns.

Object of this invention is to obviate all these drawbacks of the devices for sorting weft yarns of the known art.

More particularly, object of this invention is to pro-

vide a sorting device for weft yarns having a very simple and not encumbering structure, of easy maintenance and assembly on textile looms and such as to allow to reduce yarn waste during the cutting, and to feed and insert in a quick and precise manner the yarn into the bearing gripper of the loom.

According to this invention, these and other objects, which will be clearly stressed by the following description, are achieved by a sorting device comprising: a package of heddles, each heddle carrying a weft yarn; a means for locking and extracting each heddle; a means for locking and cutting the sorted yarn and its feeding to a bearing gripper of the loom; a means for transferring the yarn sorted by the sorting means to the locking and cutting means, wherein said means for sorting and extracting each heddle comprises an electromagnet which selects and unlocks a heddle, and a lever activated by a parallel axis oscillator provided with gearing means with conjugated cams and roller feeler, which extracts the chosen heddle from the package, and wherein said positioning means and said locking and cutting means are activated by parallel axis oscillators provided with gearing means with conjugated cams and roller feeler; all the conjugated cams being placed on a rotary axis driven by the loom motor.

Parallel axis oscillators are known mechanisms which transform the uniform rotary motion of the rotary axis into an intermittent oscillating motion. Tests carried out by the Applicant have stressed that such oscillators are particularly suitable to be used in a sorting device for weft yarn, as they allow to obtain high precision, high speed, low vibration, noiselessness, absolute repetitiveness of movements and application versatility.

The profile or shape of conjugated cams is determined based on the movements and oscillations which the operation to be carried out requires and on the synchronism of the various operations.

The construction and working characteristics of the device for sorting the weft yarn of this invention will be better understood by the following detailed description, wherein reference is made to the attached drawings which represent an embodiment shown by way of non limitative example of such device, and wherein:

Figure 1 is a schematic plan view from the top of the device for sorting weft yarns of this invention;

Figure 2 is a schematic side view of the means for sorting and extracting heddles;

Figure 3 is a schematic front view of the means for feeding the yarn to a locking, cutting and positioning system;

Figure 4 is a plan view from the top of the means for locking, cutting and feeding the yarn to a bearing gripper of the loom;

Figure 5 is a schematic side view of the means for locking, cutting and feeding the yarn of Figure 4;

Figure 6 is a schematic side view of the weft-guide, and

Figure 7 is a perspective schematic view of the weft-guide of Figure 6.

With special reference to the figures, the sorting device for weft yarns of the present invention comprises a package (2) of heddles (3), placed parallelly to one another; a means (11) for sorting and extracting each heddle; a means for locking and cutting (44) the sorted yarn (4) and its positioning near a bearing gripper (5) of a loom, and a means (32) for feeding the sorted yarn from the sorting and extraction means (11) to the locking and cutting means (44). Said sorting and extracting (11), feeding (32) and locking and cutting (44) means are activated at the same time and in a synchronous manner by corresponding parallel axis oscillators (25, 25', 25'', 25'''), whose conjugated cams (6, 6', 6'', 6''') are mounted on a single rotary shaft (7) driven by a loom motor by means of conventional gearing means.

The rotary shaft (7) is supported by a bearing structure (1) in which the heddle package (2) is inserted.

The heddle package (2) may be constituted of any number of heddles (3); in the figures, heddles are 8, but they may vary between 2 and 20. Each heddle (3) comprises a body (8) having a rectangular section, to allow the side by side sliding, preferably made from wear-resistant, high slide plastic material, and a ferrule (9), possible from metal, provided with a through hole (10) at its free end and adjustably fixed to body (8) by means of conventional fastening means, such as, for instance, screws.

A weft yarn (4) is inserted in the through-hole (10). The fastening of ferrule (9) to body (8) may be varied and adjusted to allow the transferring means (32) to hook without mistake possibility the sorted yarn (4) which passes into the through-hole (10).

With special reference to Figure 2, the means for sorting and extracting (11) a heddle (3) comprises an electromagnet (12) activated by a conventional electronic work control system (not represented in the figure). Said electromagnet (12) is provided with a spindle or piston (13) which meets an end of a first lever (14) connected to a second lever (16), parallel to the first one, by a tie rod (15). An end (16'') of said second lever (16) meets end (8') of body (8) of a heddle (3) opposite to the one provided with the ferrule (9). Preferably, said second lever (16) is hammer-shaped, with the protruding part smoothed on each side to avoid any touch with the adjoining heddles during the movement.

The first and second lever (14, 16) are pivoted at the opposite free end (14', 16') to a fixed structure.

Body (8) of each heddle (3) is provided with a first cavity (17) wherein a stop (18) is inserted fixed to a

bearing structure. A spring (19) provides to keeping body (8) of each heddle (3) in touch with end (16'') of the second lever (16) and stop (18) inserted in the first cavity (17).

The sorting and extraction means (11) comprises also a lever (20) having an end (20) inserted in a hollow (24) of a sliding carriage (22) and the opposite end (20'') pivoted at (21) to the bearing structure (1) and fixed to a roller feeler (26) of a parallel axis oscillator (25). The rollers of said feeler (26) slide along the external surfaces of the first conjugated cam (6).

Carriage (22) slides along a guide (23) fastened to a fixed structure. Said carriage (22) is also provided on the surface looking towards body (8) of the heddle with a protrusion (27) opposed by a spring (28) located between said protrusion (27) and carriage (22). In correspondence of said protrusion (27), body (8) of each heddle (3) is provided with a second cavity (29).

In correspondence of the end provided with ferrule (9), body (8) has a groove (30) wherein a pin (31) is inserted, fastened to a fixed structure.

Body (8) of each heddle may slide and rotate about said pin (31).

When an electromagnet (12) is activated, the corresponding second lever (16) acts on end (8') of the selected heddle, causing the same to rotate around pin (31). Such rotation causes the release of stop (18) from the first cavity (17) and the insertion of protrusion (27) of carriage (22) into the second cavity (29) of the heddle. In this way, the selected heddle is connected to the sliding carriage (22) and may be extracted from package (2) and oscillate based on carriage (22) being set in motion through lever (20) by oscillator (25). The heddle sorted and extracted from package (2) draws yarn (4) which reaches an advanced position with respect to the remaining yarns and may be taken up by the transferring means (32).

When electromagnet (12) is de-activated, the second lever (16) does not act on end (8') of the heddle and the latter, pulled by spring (19), rotates on pin (31) in a direction opposite to the preceding one, and stop (18) inserts into the first cavity (17), locking the heddle when the carriage (22) is put into the original position. Each heddle (3) is provided with an electromagnet (12) with the respective levers (14, 16) and tie rod (15) and a return spring (19).

The transferring means (32), shown in Figure 3, comprises a cursor (33) which slides between two guides (34, 34'), activated by the second parallel axis oscillator (25') through a lever (35) and an orthogonal arm (36).

Preferably, cursor (33) is constituted of a plate from metal or plastic material having a substantially parallelepipedal shape, provided at one end with a transversal through-hole wherein the shaft of an articulated joint (37) is inserted. Guides (34, 34') are fastened to the bearing structure (1) and are formed by sections or rods from metal or plastic material. Lever (35) is parallel to

cursor (33) and is provided at the free end with a fork (38) wherein arm (36) orthogonal to said lever (35) and fixed to cursor (33) is inserted.

A spike (39) and a rod (40), adjustably tied at an angle to one another, are connected to the articulated joint (37). The free end of rod (40) is slidingly fitted in a rotary bush (41) pivoted to a support (42) fixed to guide (34).

Spike (39) is provided at the free end with a cavity (43) for hooking the weft yarn (4) sorted and brought by the selection and shifting means (11).

The means for locking and cutting yarn (44), shown in Figure 4, has the function of locking yarn (4) fed by positioner (32), cutting and then positioning it for the insertion in loom gripper (5).

Said means for locking and cutting (44) comprises an L-shaped structure (45), pivoted on a pin (46) of the bearing structure (1) in correspondence of the free end of the longer vertical side. Said L-shaped structure (45) can oscillate around pin (46) under the action of the third oscillator (25"), whose roller feeler (not shown in the figure) rotates around the surface of the conjugated cam (6") and is integral with a lever (47) connected to the horizontal shorter side of said structure (45).

The L-shaped structure (45) can oscillate from its position nearer to the fabric to the one nearer to the trajectory of the bearing loom gripper (5) and vice-versa.

The surface of said horizontal shorter side, looking towards yarn (4), is provided with a mobile plate (48) slidingly connected to said surface by two pistons (49) and kept at a distance from the latter by compression springs (50).

Along the longer vertical side of said L-shaped structure (45) a cursor slides (51), activated by the fourth parallel axis oscillator (25"), whose roller feeler slides along the surfaces of the conjugated cam (6") and is integral with a lever (52) fixed to the opposite end to said cursor (51). The protruding free end of cursor (51) is bent at a right angle, so as to form a base (53) parallel and opposite to the mobile plate (48).

A cutting blade (54) is fixed to said L-shaped structure (45), in such a way as to protrude from its horizontal side to an extent a little shorter than the distance from the surface of said side and plate (48).

When the sorted yarn (4) is inserted by positioner (32) between plate (48) and base (53), the rotation of cam (6") causes base (53) to get near plate (48), overcoming the antagonistic strength of springs (50). In this way, yarn (4) is locked between plate (48) and base (53) close to one another.

A further approaching of base (53) to plate (48) involves a further compression of springs (50) until yarn (4) gets in touch with the protruding blade (54) and is cut by the latter.

At the same time, the L-shaped structure (45), with the cut and locked yarn, is caused to oscillate by oscillator (24") until the yarn is positioned in correspondence of the trajectory of the bearing loom gripper (5).

When gripper (5) approaches the loom, yarn (4) inserts into the same and is unthread from the plate (48)-base (53) grip.

In order to ensure a precise and secure working and of further compacting heddles reducing the encumbrance of the package, the sorting device of the present invention may also comprise a weft-guiding rod (55), preferably in correspondence of positioner (32). It allows to adjust and keep the trajectory of the weft yarn (4) in the fittest position for its hooking by positioner (32).

Besides, between the means for locking and cutting (44) and the fabric, a weft-guiding support (56) is located having the function of keeping weft yarns in a fixed position relatively to the locking and cutting means (44).

Such support comprises a base (60), two protruding walls (58, 59) in correspondence of two adjoining sides of said surface and a groove (57) defined between said protruding walls. One (59) of said walls is inclined and forms an edge (61) in correspondence of groove (57). When the weft yarn is beaten by the comb against the fabric being formed, the yarn slides along the inclined wall (59) and enters groove (57). Edge (61) prevents weft yarn from going back. Groove (57) keeps yarn in the right position to be hooked by the locking and cutting means (44).

The working of the sorting device of this invention is easily understandable by those skilled in the art on the basis of the above description. By way of illustration we explains hereunder its working.

When an electromagnet (12) is activated, the corresponding heddle (3) rotates on pin (31) because of the action of levers (14, 15, 16) on one of its ends (8'). In this way, heddle (3) is released from stop (18) and fixed to the sliding carriage (22). Heddle (3) performs the oscillation movement caused by lever (20) having an end (20") fastened to a first conjugated cam oscillator (25) and the other end (20') inserted into the sliding carriage (22). The selected heddle is therefore extracted from package (2) and feeds yarn (4) to an advanced position.

At the same time as the shifting of the heddle, a second conjugated cam oscillator (245') acts on the positioning means (32), shifting cursor (33) and causing rod (40) to rotate in bush (41). Then, spike (39) rotates and, together with hollow (43), hooks yarn from the selected heddle and positions it between plate (48) and base (53) of the locking and cutting means (44). Base (53) is moved at the same time by the third conjugated cam oscillator (25") until it locks and cuts the yarn. The locking and cutting means (44) is thereafter caused to rotate by a fourth conjugated cam oscillator (25") and feeds the cut yarn along the trajectory of the bearing loom gripper (5).

Even though the present invention has been described hereabove with reference to a possible embodiment of the same, expounded only by way of

non limitative illustration, various changes and modifications may be made by those skilled in the art, in the light of the above description.

Hence, the present invention intends to cover all changes and modifications falling within the protection scope of the following claims.

Claims

1. A device for sorting weft yarns, suitable to be applied to looms to feed, cut and thread the sorted weft yarn into a bearing gripper (5), comprising:
 - a package (2) of heddles (3) placed side by side and parallel to one another, each heddle carrying a weft yarn; a means (11) for sorting and extracting each heddle (3); a means (44) for locking and cutting the sorted yarn (4) and for feeding it to the bearing gripper (5), a means (32) for feeding (32) the sorted yarn (4) from the sorting means (11) to the locking and cutting means (44); wherein said sorting and extraction means (11) of each heddle (3) comprises an electromagnet (12), which sorts and releases a heddle (3), and a lever (20) activated by a parallel axis oscillator (25) provided with conjugated cam shifting means (6) and roller feeler (26), which extracts the sorted heddle (3) from package (2), and wherein said positioning (32) and locking and cutting (44) means are activated by parallel axis oscillators (25', 25'', 25''') provided with conjugated cam gearings (6', 6'', 6''') and roller feeler, all the conjugated cams (6', 6'', 6''') being located on a shaft (7) and activated at the same time and in a synchronous manner by a loom motor.
2. The device for sorting weft yarns according to claim 1, characterised in that each heddle comprises a body (8), having a rectangular section, and a ferrule (9) adjustably fixed to body (8) and provided with a through hole at its free end; said body (8) being pivoted, in correspondence of the ferrule-provided end (9), on a pin (31) fastened to a fixed structure, and being provided on the opposite surfaces of a first cavity (17) wherein a stop (18) is inserted through the action of a spring (19), and a second cavity (29).
3. The device for sorting weft yarns according to claim 2, wherein body (8) is made from low wear, high slide plastic material, and ferrule (9) is from metal.
4. The device for sorting weft yarns according to any of the preceding claims, wherein electromagnet (12) acts on end (8') of body (8) opposite to the ferrule-provided (9) one by means of two parallel levers (14, 16), connected by a tie rod (15); said levers (14, 16) being pivoted at the opposite free end (13', 14') to a fixed structure.
5. The device for sorting weft yarns according to any of the preceding claims, wherein lever (20) has an end (20') inserted in a cavity (24) of a sliding carriage (22) and the opposite end (20'') pivoted in (21) to the bearing structure (1) and fixed to a roller feeler (26) of a first parallel axis oscillator (25); said carriage (22) being also provided, on the surface looking towards body (8) of heddle and in correspondence of the second cavity (29) of a protrusion (27) opposed by a spring (28) located between said protrusion (27) and the surface of carriage (22).
6. The device for sorting weft yarns according to any of the preceding claims, wherein the positioning means (32) comprises a cursor (33) sliding between two guides (34, 34'), activated by the second parallel axis oscillator (25') and provided at one end with an articulated joint (37); a spike (39) and a rod (40), adjustably tied at an angle to one another and connected to said articulated joint (37) and a rotary bush (41) wherein the free end of rod (40) is inserted; said spike (39) being provided at the free end with a cavity (43) for hooking the yarn.
7. The device for sorting weft yarns according to any of the preceding claims, wherein the means for locking and cutting (44) the yarn comprises an L-shaped structure (45), pivoted on a pin (46) in correspondence of the free end of the longer vertical side and oscillating around said pin (46) under the action of the third conjugated cam oscillator (25''); a mobile plate (48) slidably connected to the horizontal side of structure (45) by two pistons (49) and kept at a distance from the latter by compression springs (50); a cursor (51) sliding along the vertical side of said structure (45) through the action of the fourth conjugated cam oscillator (25''') and having the protruding free end bent at a right angle, so as to form a base (53) parallel and opposite to the mobile plate (48), a cutting blade (54) being fixed to said L-shaped structure (45), in such a way as to protrude from its horizontal side to an extent a little shorter than the distance from the surface of said side and plate (48).
8. The device for sorting weft yarns according to any of the preceding claims, characterised in that it also comprises a weft-guide rod (55) located in correspondence of the positioning means (32) to keep the trajectory of yarn (4) in the position suitable to cause it to be taken up by said positioner.
9. The device for sorting weft yarns according to any of the preceding claims, characterised in that it also comprises a weft-guide support (56) placed between the locking and cutting means (44) and the

loom fabric, said support comprising a base (60), two protruding walls (58, 59) in correspondence of two adjoining sides of said surface, a groove (57) defined by said walls being inclined and forming an edge (61) in correspondence of groove (57); the yarn, sliding along the inclined wall and entering said groove when it is beaten by the comb against the fabric being formed.

5

10

15

20

25

30

35

40

45

50

55

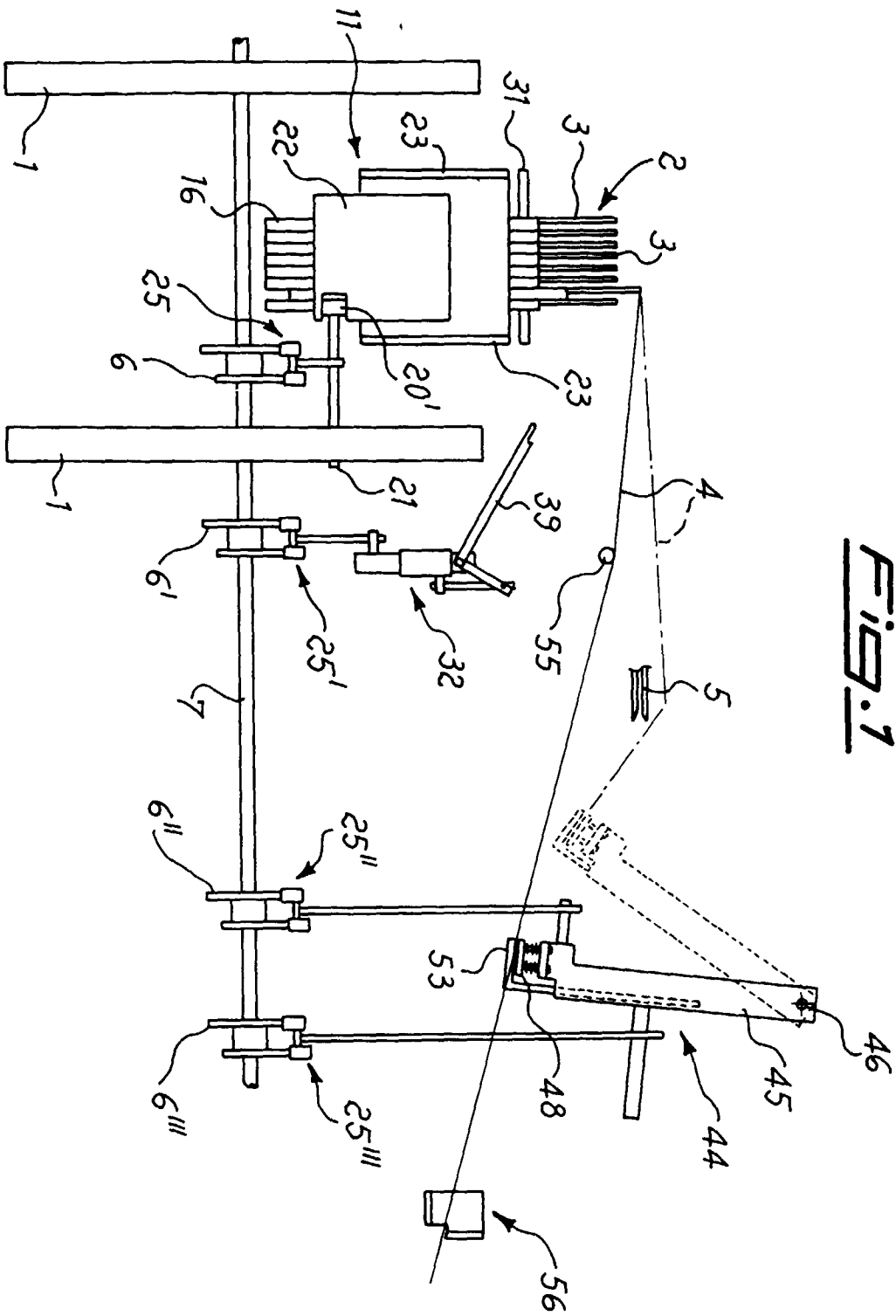
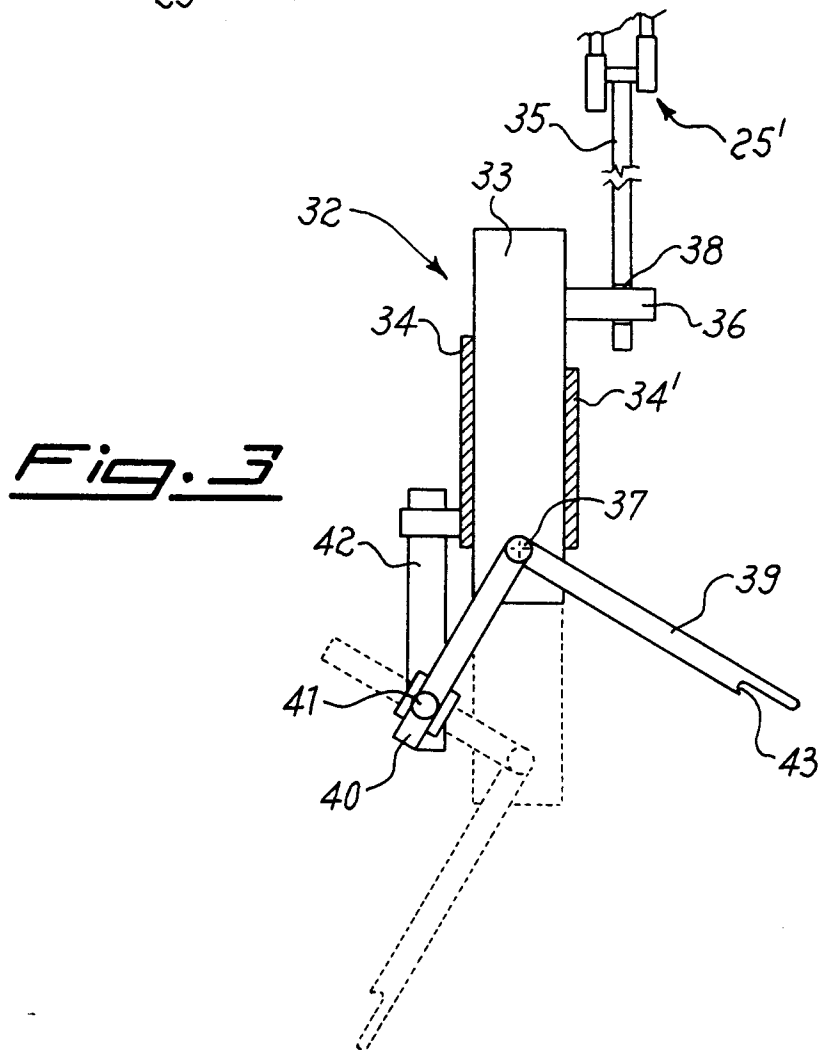
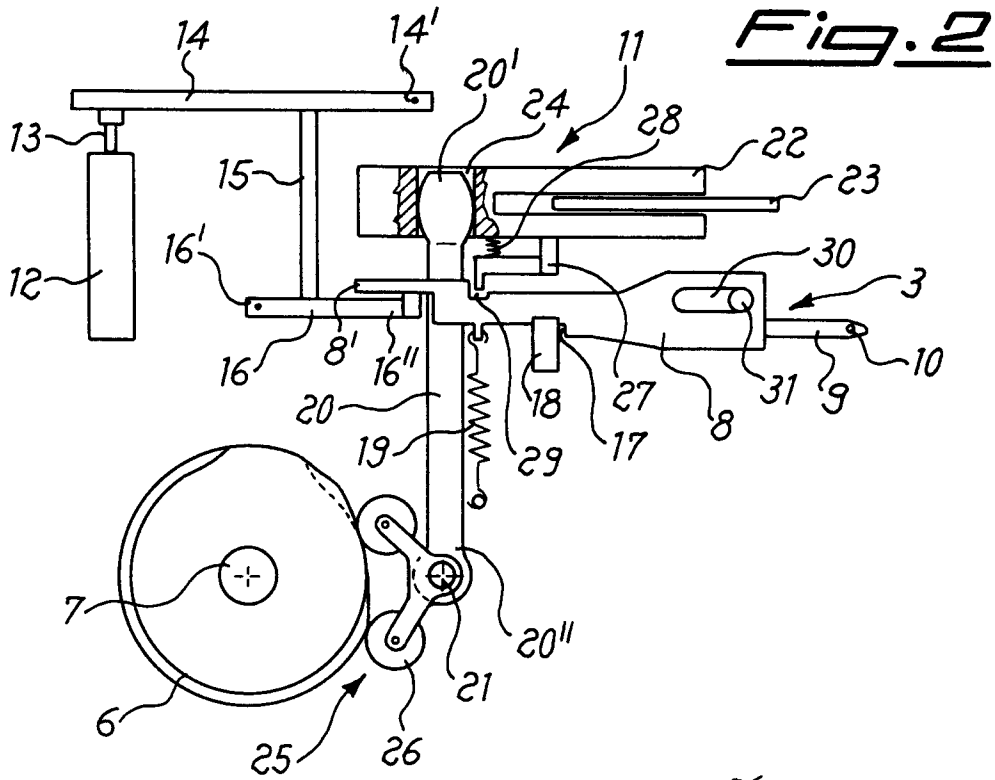


Fig. 1



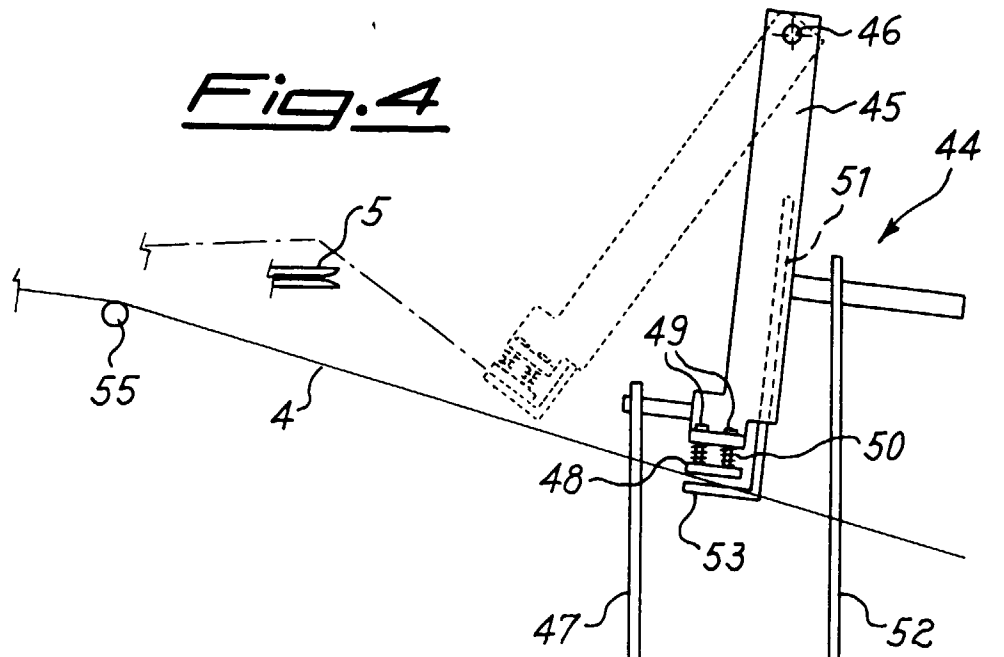


Fig. 5

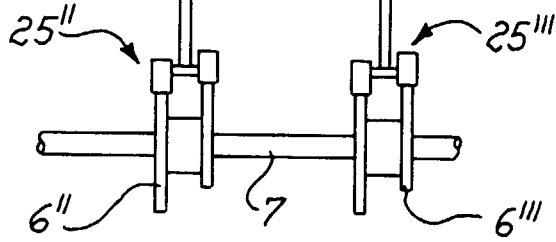
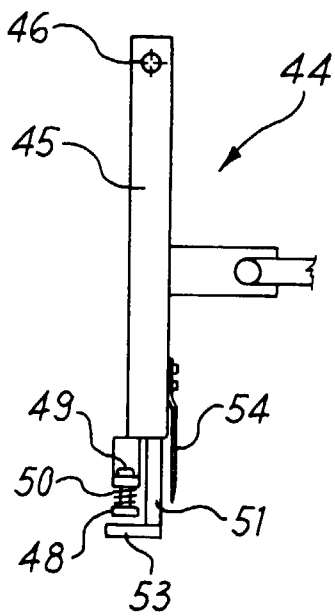


Fig. 6

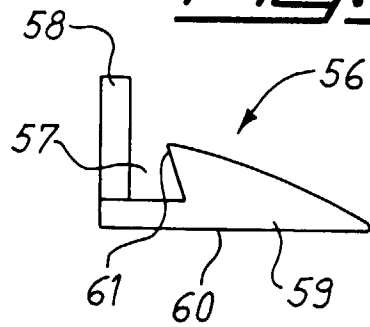
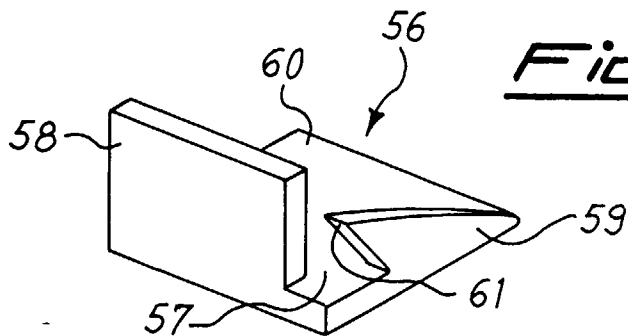


Fig. 7





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 83 0090

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	DE 30 42 053 C (LINDAUER DORNIER) 11 November 1982 * column 8, line 58 - column 9, line 16; figures *	1	D03D47/38
A	DE 25 26 766 A (JEAN GÜSKEN) 9 September 1976 * column 8, line 14 - line 44; figure 5 *	1	
A	GB 2 130 608 A (DORNIER GMBH LINDAUER) 6 June 1984 * abstract; figures *	1	
A	DE 31 24 358 A (VAUPEL TEXTILMASCH) 17 February 1983 * page 19, line 5 - page 20, line 28; figures 7-9 *	1	
A	GB 2 233 355 A (NUOVO PIGNONE SPA) 9 January 1991		
A	BE 641 519 A (GROSSENHAIN) 16 April 1964		
A	BE 646 349 A (JEAN GÜSKEN) 31 July 1964		TECHNICAL FIELDS SEARCHED (Int.Cl.6) D03D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 August 1997	Examiner Rebiere, J-L
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			

EPO FORM 1503 01.82 (P/M/C01)