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(71) Applicant : **Kabushiki Kaisha Toyoda Jidoshokki Seisakusho**
1, Toyoda-cho 2-chome, Kariya-shi
Aichi-ken (JP)

(72) Inventor : **Kanayama, Hiroyuki, c/o K. K. TOYODA**
JIDOSHOKKI SEISAKUSHO, 1, Toyoda-cho 2-chome
Kariya-shi, Aichi-ken (JP)
Inventor : **Shinbara, Masami, c/o K. K. TOYODA**
JIDOSHOKKI SEISAKUSHO, 1, Toyoda-cho 2-chome
Kariya-shi, Aichi-ken (JP)

(74) Representative : **Hammer, Bruno, Dr.**
c/o Gebrüder Sulzer AG, KSR/Patente/0007
CH-8401 Winterthur (CH)

(54) Weft handling apparatus in a shuttleless loom.

(57) To provide a weft handling apparatus offering high durability and a high degree of success in weft cutting operation.

Weft cutting means including a stationary upper cutting blade (1) and a movable lower cutting blade (2) is mounted on a slay (16). An air cylinder (8) as the drive means for driving the weft cutting means is fixed to a bracket (10) which is fixedly disposed relative to the loom frame, and adapted to operate on the movable cutting blade (2) to swing for cutting a weft by interaction with its associated fixed cutting blade (1)

Because the weft cutting means is arranged close to the fluid outlet of the main nozzle, weft cutting can be effected with a high degree of success and the length of weft extending out from the nozzle which is formed after the cutting can be made short, so that failure in the first pick in restarting of the loom can be prevented. Disposition of the drive means on a non-swinging portion of the loom is advantageous in improved durability, reduced inertial mass, increase in loom speed, and ease of maintenance.

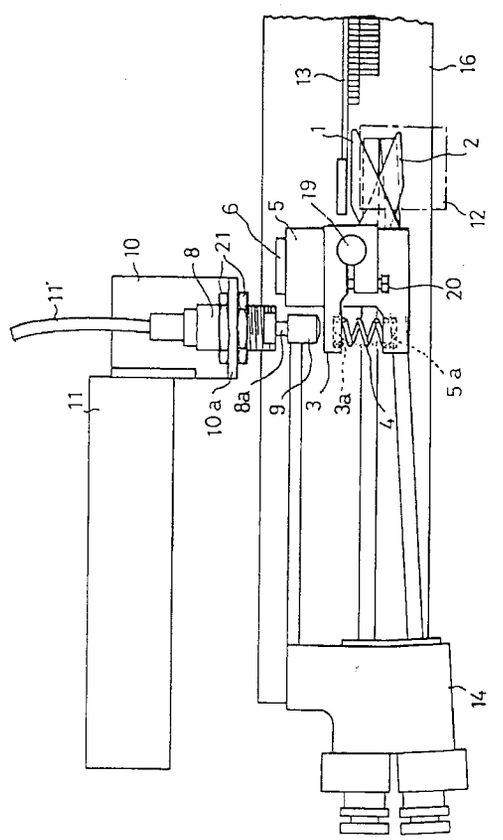

Fig. 1

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The present invention relates to an apparatus for handling a weft in a shuttleless loom. More specifically, it relates to an improved apparatus for cutting a weft with a high degree of reliability at a position adjacent the fluid outlet of a main weft inserting nozzle in a shuttleless loom in performing a series of steps necessary for disposing of a faulty weft resulting from failure in weft insertion and beaten by a read to the cloth fell of fabric.

Similar apparatuses for cutting a weft at a position adjacent a main weft inserting nozzle are disclosed by Publication of the Japanese Patent Application No. 62-184146 (1987) and Publication of the Japanese Utility Model Application No. 62-129084 (1987). In these apparatuses, their weft cutter (a pair of scissors) and drive for driving the cutter are both disposed adjacently to the fluid outlet end of a main nozzle which is fixedly mounted on a swingable slay of a loom.

In the prior art apparatuses disclosed by these Publications having the weft cutter located near the main nozzle, weft cutting can be effected with a high degree of certa inty or success. Because the drive for the cutter is mounted on the swingable slay, however, it is subjected to swinging motion at a high speed, which gives rise to a problem of durability of the drive and also makes it disadvantageous to speed up the loom operation.

Another Publication, the Japanese Patent Application No. 63-112753 (1988) discloses another apparatus in which its weft cutter (a pair of scissors) and its drive are both mounted on a stationary (non-swinging) part of a loom and the cutter is adapted to move to its operative position adjacent the fluid outlet of a main nozzle to make a weft cut.

In the apparatus according to the above Publication having its weft cutter mounted on the non-swingable portion of the laom, there arises no prob lem with durability of the drive as encountered in the earlier cited two Publications, but it requires a mechanism for moving the cutter between the operative and retracted positions, which will inevitably make the apparatus larger in size and call for additional space for installation. In Addition, the apparatus is disadvantageous in that the movement of the cutter to its operative position with accuracy entails difficulty in controlling the movement. Reliability in weft cutt.ing operation is thus poor. Furthermore, cutting would have to be mede at a distance from the nozzle outlet for the sake of safety, with the result that the length of weft portion extending from the nozzle outlet which is formed after cutting becomes too long, so that a failure may be invited in weft insertion which is to be made after completion of disposing of a faulty weft and the subsequent restart of the loom.

Prior art apparatus having the cutter mountdd adjacently to the main nozzle outlet on the slay can offer good certainty in weft cutting, but its drive swingable together with the slay may be subjected to damage, thus having a problem with its durability. On the other hand, prior art apparatus having the cutter fixed relative to loom's frame independently of the slay is advantageous in terms of durability, but lacks certainty in weft cutting because the cutter has to be moved toward the main nozzle each time weft cutting is to be made.

It is an object of the present invention to provide an apparatus which is capable of solving the problem of poor durability due to mounting both of the cutter and its drive on the slay, and also of ensuring a high degree of certainty in weft cutting by disposing the weft cutter adjacently to the fluid out of a main nozzle.

The inventor has accomplished the present invention in view of the situation that the weft cutter need be operated only in the event that a weft insertion has failed and also that cutting of a weft at a position es close to the fluid outlet of the main nozzle as possible can contribute greatly to success in weft insertion which is to be made after completion of disposing of a faulty weft and the subsequent restart of the loom.

The above object of the invention is accomplished by an apparatus in a shuttleless loom comprising weft cutting means mounted on a slay of the loom adjacently to the fluid outlet of a main weft inserting nozzle and drive means for driving said weft cutting means, said drive means being fixed relative to a loom frame independently of said weft cutting means, and said weft cutting means and said drive means therefor being engegeable with each other for effecting a weft cut.

In the apparatus according to the invention, the weft cutter is arranged on the slay at a position. close to the m,ain weft inserting nozzle so that the length of weft portion extending out from the nozzle which is formed after cutting can be made short. The drive means for the cutter is not mounted on the slay, but fixed relative to the loom frame so that possible damage to the drive means caused otherwise by swinging motion of the slay can be prevented successfully.

According to the invention, it is so arranged that the drive means is engageable with the weft cutter when the apparatus is placed in its operative position. Actuating the drive means in this operative position causes the cuttet to be activated to make a cut with a high degree of success.

The following will describe in detail an embodiment of weft handling apparatus of the present invention with reference to the accompanying drawings.

FIG. 1 is a plan view showing the apparatus constructed according to - the invention, with a duct shown in FIG. 2 omitted for the sake of clarity.

FIG. 2 is a front view shawing the apparatus of FIG. 1.

FIG. 3 is a schematic front view showing ,an air jet loom having the apparatus of the invention incor-

porated therein.

Referring to FIGS. 1, 2, 3, there are provided two main weft inserting nozzles 14 on a slay 16 which swings back and forth in operation of the loom. Though two main nozzles 14 are used in the embodiment for multi-color weaving, a single nozzle may be used. The slay 16 carries a reed 13 including a number of dents or reed wires formed with recesses in alignment with each other in the direction of weft insertion to defibe a weft guide passage.

Referring to FIG. 3, the main nozzle 14 is supplied with a weft Y from a weft measuring and storage de vice 34 of a known type having a stop pin 34a engageable with weft winding surface of the device, and the weft Y introduced through the nozzle 14 is flown into a weft guide passage (not shown) of the reed 3 by being entrained by air injected from the nozzle at controlled timing. A weft cutter 35 is located substantially in line with the cloth fell of a woven fabric on the lateral side thereof adja cent the main nozzle 14. The cutter 35 is adapted to cut each we£t which has been inserted through a warp shed and beaten by the reed 13 to be woven to the fabric, but extends from the main nozzle 14 in continuation with its succeeding portion of weft. On the side of the loom opposite to the main nozzle 14 i.s arranged a weft sensor 36 for detecting the presence or absence of the leading end of each inserted weft. If a weft fails to reach the weft sensor 36, i.e. if a weft fails to be inserted properly, an air cylinder 37 is actuated to move and hold the weft cutter 35 in its inoperative position so that the faulty weft resulting from the feilure in weft insertion and beaten by the read 13 to the cloth fell, which faulty weft is depicte.d by reference numeral 15 In FIG. 3, lies extending from the main nozzle 14 without being cut by the cutter 35.

Above the main nozzle 14 is arranged a weft disposing device including a weft introducing duct 7, an air guide 39 and a suction duct 40. A blow nozzle 12, which is also part of the weft disposing device, is provided below the weft insertion passage immediately downstream of the mein hozzle 14 in confronting relation to inlet 7a of the weft introducing duct 7. The weft disposing device further includes a pair of nip rollers, i. e. a driven roller 43 and a pressing r oller 45, dibposed between the duct 7 and the air guide 39. The roller 43 is driven by a motor 42, while the pressing roller 45 is supported by a piston rod of an air cylinder 44 and shiftable by operation of the cylinder between its operative position where the rolle.r 45 is in pressing contact with its associated Toller 43 and its inoperative position where the roller 45 is retracted away from its counterpart 43. A weft sensor 46 is provided for detecting a weft between the air guide 39 and the suction duct 40.

As shown in FIG. 3, the air cylinder 37 for the weft cutter 35, the blow nozzle 12, the suction duct 7 and the cylinder 44 for the roller 45 are connected to a common air reservoir 51 though solenoid valves 47, 48, 49 and 50, respectively.

It is so controlled that, in the event of a failure in weft insertion, the blow nozzle 12 is activated to blow the portion of weft succeeding the faulty weft 15 into the duct 7 and to then guide the weft portion toward the suction duct 40 in which suction is then created. Afterwards, the weft portion is cut off from the faulty weft 15 and pulled by the- paired rollers 43, 45 for disposal through the suction duct 40.

Immediately above the main nozzle 14 is arranged a weft cutter comprising a pair of separate cutting blades 1, 2 for cutting the succeeding weft portion at a position adjacent the main nozzle 14 before it is pulled by the rollers 43, 45. To describe more specifically while having reference to FIGS. 1 and 2, a first stationary cutting blade 1 is fixed to the bottom of a bracket 5 having an L-shape with a projection 5a and carried by a holder 6 which is in turn fixed to the slay 16.

The bracket 5 has formed therein a hole 5b through which a pin 19 is rotatably inserted, and a second movable cutting blade 2 is fixedly connected to the bottom end of the pin 19, as most clearly seen in FIG. 2.

As shown in FIG. 1, a J-shaped cutter lever 3 is fas-tened round the upper end of the pin 19 by a bolt 20 for swinging motion about the pin 19.

A spring 4 is installed between the projection 5a of the bracket 5, to which the stationery blade 1 is fixed, and a recless 3a formed in the longer portion of the J-shaped lever 3, for urging the lever 3 in the direction that causes the pin 19 to rotate in clockwise direction as viewed in FIG. 1 so as to move the second-blade 2 away from the first fixed blade 1. Thus, the spring 4 functions to hold the cutting blades 1, 2 in their opened position during normal operation of the loom. In other words, pushing the long portion of the lever 3 toward the projection 5a of the bracket 5 while overcoming the pressure of the spring 4 causes the second blade 2 to move toward the fixed blade 1 to make a cutting motion. The paired blades 1, 2 are positioned such that the swingable range of the lower blade 2 intersects a passage along which a weft extends from the main nozzle 14 toward the duct 7 to permit cutting of that weft by interaction of the stationary blade 1 and its associated swingable blade 2.

An air cylinder 8 is supported by an L-shaped bracket 10 which is fixedly mounted to loom frame (not shown) via a support shaft 11. More specifically, the cylinder 8 is fixed to the bent distal end 10a of the L-shaped bracket 10 by means of a pair of fastening nuts 21, and the bracket 10 is in turn fixedly connected to the support shaft 11 fixed to the frame. The cylinder 8 has a piston rod 8a whose distal end has a rounded cap 9 attached thereto and a pipe 11′ connected to the cylinder for supplying air under pressure thereto. As shown i n FIG. 1, the cylinder 8 is positioned such that the long portion of the lever 3 can be brought close to

and in facing reiation to the cap 9 on the piston rod 8a when the sley 16 i.s swung back to its retracted position (e.g. 180° of crank angle of the loom).

In the above retracted positi,on of the slay 16, the tip end of the cap 9 is spacad at a small distance from the long portion of the lever 3. By actuating the cylinder 8 with the slay 16 thus retracted, the cap 9 on the extending piston rod 8a presses the lever 3, thereby causing the movable blade 2 to swing about the pin 19 to make a cut of a weft portion then extending through the duct 7.

The following will describe operation of the apparatus. If a weft fails to be inserted properly through a warp shed and to teach the terminal end of weft insertion passage opposite to the main nozzle 14, as indicated by the faulty weft 15 in FIG. 3, the weft sensor 36 operetes to respond to the absence of an inserted weft. Accordingly, the weft cutter 35 (FIG. 3) for cutting an inserted weft during normal weaving operation is placed in an inoperative state.

The loom is rotated by inertia for about one turn. During this loom rotation, the stop pin 34a of the weft measuring and storage device 34 is kept in contact with the weft winding surface to prevent the succeeding weft portion from being released therefrom and flown through the nozzle.

Subsequently, the solenoid valves 48, 49 are opened to acti,vate the blow nozzle 12 and to generate a suction in the duct 40. Then the stop pin 34a is disengaged from the winding surface to rel ease a length of wef t for one pick. The released weft portion succeeding the faulty weft 15 is blown into the duct 7 by air under pressure issued from the blow nozzle 12 and further moved through the air guide 39 to the suction duct 40. With this weft portion thus extending in continuation with the faulty weft 15, the loom is brought to a stop, e.g. at a crank angle of about 300°.

Then, the loom is reversed by automatic or manual inching operation to a crank angle of about 180° where an open warp shed is formed with the slay 16 retracted as shown in FIG. 1. in this state, the cap 9 on the piston rod 8a of the cylinder 8 is positioned clear of the long portion of the lever 3 with a small space left therebetween.

The solenoid valve 50 is opened to actuate the cylinder 44 thereby to move the roller 45 into pressing contact with its associated roller 43 for nipping and holding therebetween the succeeding weft portion then extending-through the duct 7, the air guide 39 and part of the suction duct 40, as indicated by dotted line in FIG. 3. Part of this weft portion is positioned between the stationary and movable blades 1, 2 adjacent the outlet of the main nozzle 14.

In this state, a valve (not shown) is opened manually or automatically as one of the steps of a series for disposing of the faulty weft 15, for supplying air under pressure to the air cylinder 8 through its pipe 11′. Accordingly, the air cylinder 8 is actuated to extend its piston rod 8a. The cap 9 on the piston rod 8a pushes the long portion of the lever 3, so that the lower cutter blade 2 is rotated with the pin 19 and the weft portion lying from the main nozzle 14 toward the duct 7 is cut off by intqraction of the weft cutting blades 1, 2. After such cutting is made, the drive Toller 43 in contact with the roller 45 is activated to rotate, thereby pulling out the faulty weft 15 from the cloth fell for disposal of the weft 15 together with part of its succeeding weft portion through the suction duct 40. After known remaining steps for the weft disposal have been performed, the loom is restarted for resuming weaving operation.

The control C, C′ does not allow actuation of the piston 8a with cap 9, when the loom is not in normal weaving operation. As a consequence the actuation of the cutter is allowed only when e.g. a faulty weft yarn is to be removed by the weft handling apparatus.

It is to be noted that the present invention is not limited to the above-described embodiment, but it may be practiced in other forms of apparatus. For example, the weft cutting blades 1, 2 may be located at any convenient positions other than the position above the main nozzle 14 as in the above embodiment. The drive means, or the cylinder 8, for driving the movable blade 2 may be arranged on opposite side of the slay 16 or above the slay when it is retracted.

[EFFECT OF THE INVENTION)

According to the present invention, because the weft cutting means is arranged close to the fluid outlet of the main nozzle, weft cutting can be effected with a high degree of success and the length of weft ex.tehding out from the nozzle which is formed after cutting can be short enough, so that failure in the first pick in restarting of the loom, in particular, weft insertion failure due to entangling öf the weft with a weft from other nozzle in case of multi-color weaving, or entanglin g with warps at the inlet of a shed, can be prevented.

Additionally, disposition of the drive means on a non-swinging portion of the loom is advantageous in improved durability, reduced inertial mass, increase in loom speed, and ease of maintenance. To provide a weft handling apparatus offering high durability and a high degree of success in weft cutting operation.

Weft cutting means including a stationary upper cutting blade 1 and a movable lower cutting blade 2 is mounted on a slay 16. An air cylinder 8 as the drive means for driving the weft cutting means is fixed to a bracket 10 which is fixedly disposed relative to the loom frame, and adapted to operate on the movable cutting blade 2 to swing for cutting a weft by interaction with its associated fixed cutting blade 1.

Because the weft cutting means is arranged close to the fluid outlet of the main nozzle, weft dutting can

be effected with a high degree of success and the length of weft extending out from the nozzle which is formed after the cutting can be made short, so that failure in the first pick in restarting of the loom can be prevented. Disposition of the drive means on a non-swinging portion of the loom is advantageous in improved durability, reduced inertial mass, increase in loom speed, and ease of maintenance.

BRIEF EXPLANATION OF THE DRAWINGS

FIG. 1 is a plan view showing a weft handling apparatus constructed according to the invention.

FIG. 2 is a front view showing the apparatus of FIG. 1.

FIG. 3 is a schematic front view showing an air jet loom having the apparatus of the invention incorporated therein.

1 Fixed upper cutting blade
2 Movable lower cutter blade
3 Cutter lever
4 Spring
8 Air cylinder
9 Cap
13 Reed
14 Main nozzle
15 Faulty weft
16 Slay

Claims

1. Weft handling apparatus in a shuttleless loom comprising weft cutting means (1, 2) mounted on a slay (16) of the loom adjacently to the fluid outlet of a main weft inserting nozzle (14) and drive means (8, 8a, 9) for driving said weft cutting means (2), said drive means (8 ,8a, 9) being fixed relative to a loom frame independently of said weft cutting means (1, 2), and said weft cutting means (1, 2) and said drive means (8, 8a, 9) therefor being engageable with each other for effecting a weft cut.

2. Weft handling apparatus as claimed in claim 1, said cutter means mounted on the slay comprising a fixed cutting blade (1) and a movable cutting blade (2) driven by the drive means (8, 8a, 9).

3. Weft handling apparatus as claimed in claim 1 or claim 2, said drive means (8, 8a, 9) being fluid pressure, preferably air pressure actuated

4. Weft handling apparatus as claimed in any of claims 1 to 3, further including control means (C, C′) not allowing to operate said cutter drive means (8, 8a, 9) when the loom is in weaving operation.

5. Shuttleless air jet loom with a weft handling apparatus as claimed in any of claims 1 to 4.

Fig. 1

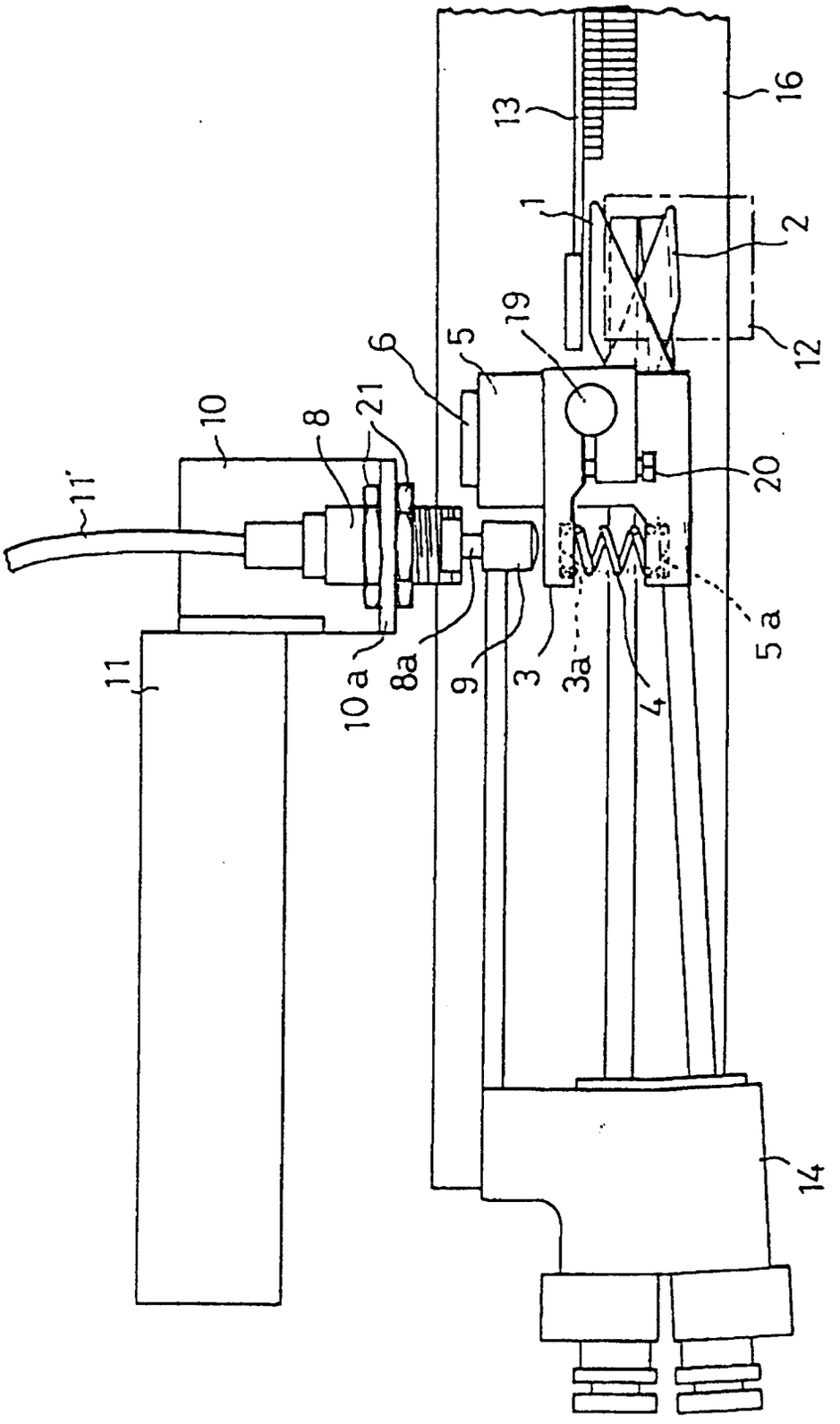


Fig. 2

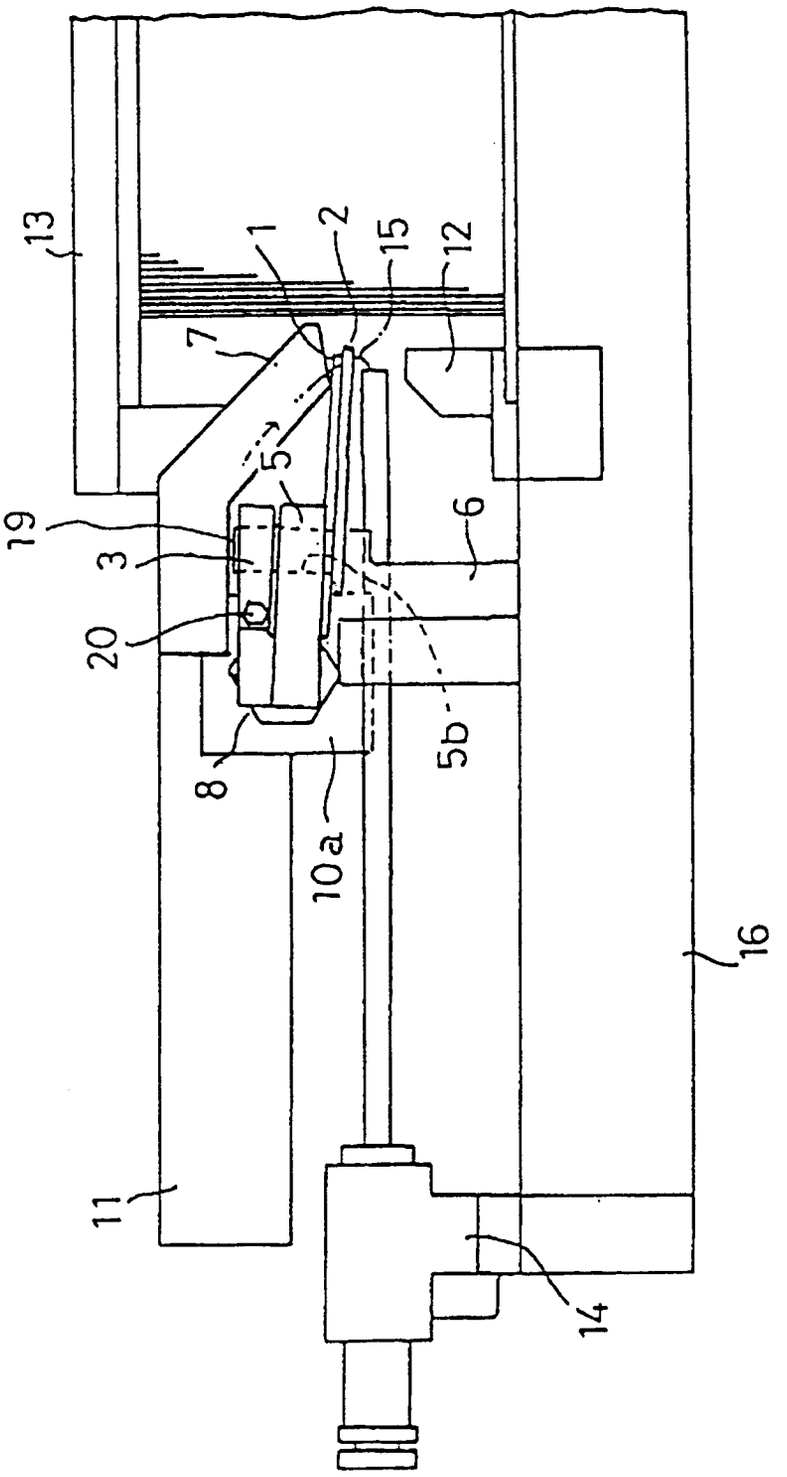
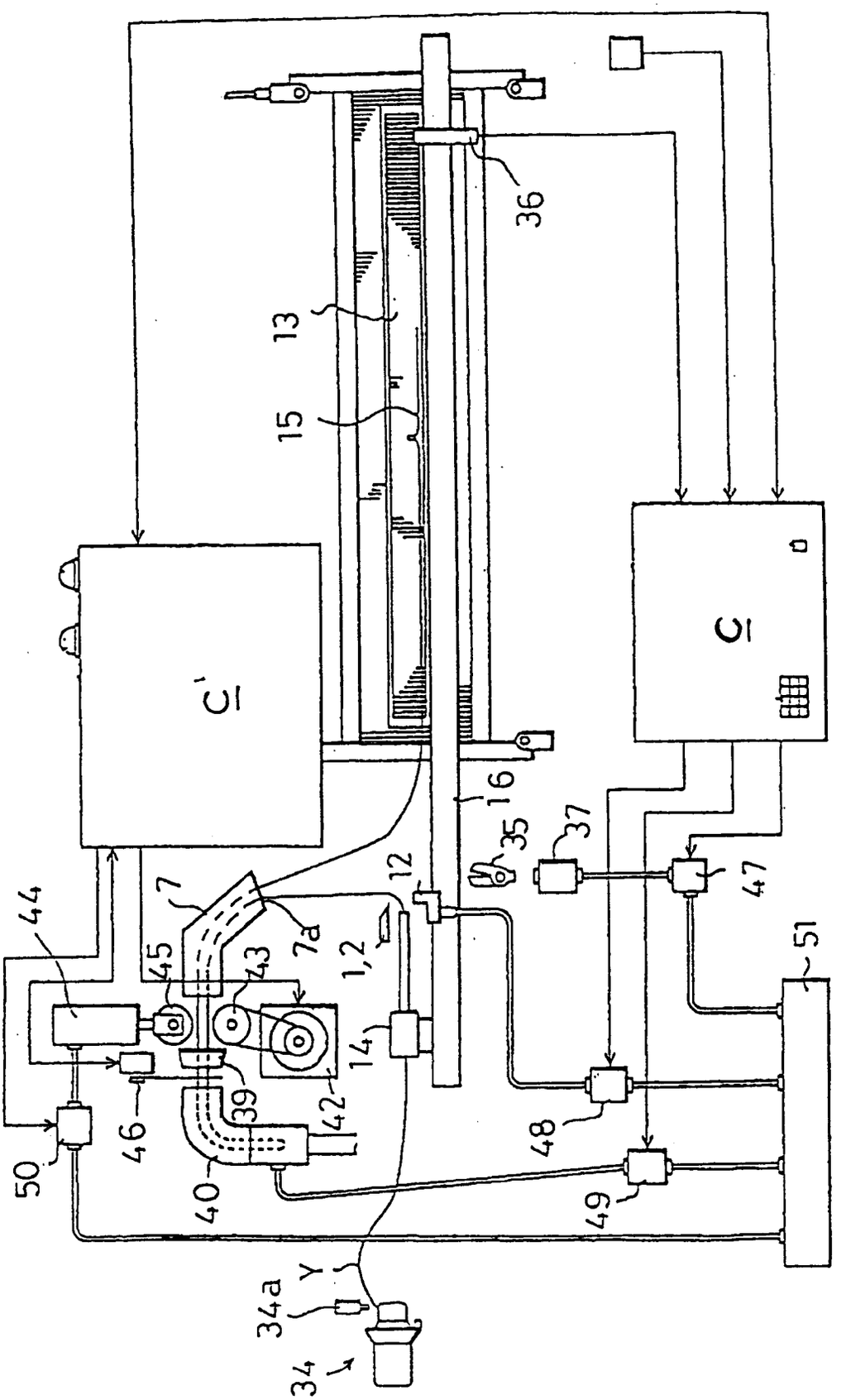


Fig. 3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EUROPEAN SEARCH REPORT

Application Number

EP 92 81 0410

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.5)
X Y	DE-A-2 656 091 (NISSAN) * page 8, line 19 - page 9, line 6; figures 1-4 * ---	1,2,5 3,4	D03D49/70 D03D51/08 D03D47/36
Y	EP-A-0 207 470 (NISSAN) * page 21, line 1 - line 8; figures 3,11 * ---	3,4	
A	EP-A-0 007 543 (VAN DE WIELE) * figures * ---	1,2	
A A,D	EP-A-0 200 168 (TSUDAKOMA) & JP-A-62 129 084 (...) ---		
A	EP-A-0 318 861 (ELITEX) -----		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	07 SEPTEMBER 1992	REBIERE J.L.

CATEGORY OF CITED DOCUMENTS

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