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(54) DEVICE FOR CUTTING A FIBROUS WEB

GERÄT ZUM SCHNEIDEN EINES FASERNETZES

DISPOSITIF DE COUPE D'UNE BANDE FIBREUSE

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Description

FIELD OF THE INVENTION

[0001] The invention relates to a device that is used in connection with fibrous web machines; paper and cardboard machines, in particular, for cutting a fibrous web by a pressurized medium. In particular, the invention relates to a device for cutting the fibrous web by a pressurized medium, the device comprising:

- a beam that is arranged essentially transversally to the direction of travel of the fibrous web;
- a carriage, which is adapted to move and to which a nozzle for cutting the fibrous web is attached;
- a line for guiding the pressurized medium to the nozzle, the first end of the line being adapted to be connected to a pressure feed and the second end of the line being adapted to move in connection with the carriage.

PRIOR ART

[0002] EP 1022381 *Casper et Hilker* represents a similar type of technology, corresponding to the patent US 6135000 and its priority application CA 2260290, which can be considered the closest descriptions of the prior art. Accordingly, when replacing the machine roll of the reel-up of the paper machine, it is well-known to use a water jet to cut the fibrous web by a special device. The device comprises at least one, preferably two carriages, which are moved on a guide bar and which comprise nozzles that move along with the carriage for shooting the water jet(s) to cut the moving fibrous web. In addition to the moving nozzles, the device also comprises moving hose wheels, the purpose of which is to keep the high-pressure hoses, which lead to the nozzles, directly conveyed during the fast movement of the carriage. The longitudinal feed of the hose is synchronously connected to the movement of the carriage and the feed can be controlled both during the cutting and the return movement.

[0003] Furthermore, the patent US 5782426 *Kinnunen et Mikkonen* discloses a method and a device for cutting a moving fibrous web by the reel-up of the paper machine. Another prior art device is disclosed in EP1022380 A2.

OBJECT OF THE INVENTION AND A SHORT DESCRIPTION

[0004] The object of the present invention is to reduce or even eliminate the problems occurred in the prior art of the publications mentioned above.

[0005] To realize the objects mentioned above, among others, the device according to the invention is characterised in further comprising a guide trough for forming the guide of the line, that the line is adapted to move in the guide trough as an essentially U-shape loop, the distance between the first end and the second end changing in accordance with the position of the carriage, and that the movement of the line is arranged to be provided by the movement of the carriage.

[0006] With a lighter structure, the device takes less room and can be fitted in the dry end of the machine, such as paper or board machine, which produces the fibrous web, in a more flexible and versatile manner, which is of benefit when modernising, as the existing space utilization is limited because of the web transfer, framework and any limitations dictated by the building. The lighter structure can be utilized with a thinner beam structure due to smaller bends, as the masses that move in connection with the beam are lighter than in the technology known earlier. Due to the lighter masses that are moved, the movements of the carriages can be rendered quicker, the accelerations higher, and the forces and structures required by the decelerations after the quick movements can be smaller. The amount of moving mass can be reduced, as only the carriages are moved without separate actuation mechanisms for moving the hoses. In the known technology, a good control of the hoses is a requirement for the quick movement of the carriage.

[0007] In addition, the operation of the device can be rendered more reliable, the benefit caused by this decreasing the break time caused by the device and improving the effectiveness of the production line. Bending of the high-pressure lines is minimized in the manner presented, whereby the life of these components remains as long as possible.

[0008] The object of the present invention is to possibly provide a solution, by which the device can be built in a more profitable and lighter way and as many as possible components that can be standardised can be used in the assembly. As a result, maintenance in the event of a possible failure is easy, e.g., by replacing the standardised components from a storage. It should be remembered that the price of a lost hour of production of the machine, such as paper machine, which produces the fibrous web, can be quite considerable.

[0009] The embodiment examples and advantages mentioned herein refer to the device according to the invention, when applicable, even though it is not always separately mentioned.

SHORT DESCRIPTION OF THE DRAWINGS

[0010] In the following, the invention is described in detail with reference to the appended schematic drawings, wherein

Fig. 1 shows the device as an isometric view on the side of the nozzles.

Fig. 2 is an isometric view of a linear module, viewed from the side of the drive shaft.

Fig. 2A shows the cross section of the linear module.

Fig. 3 is an isometric view of a pressure section.

Fig. 4A shows the cross section of the beam along the section A-A of Fig. 1.

Fig. 4B is an isometric view of the energy transfer chain that is possibly used in the support of the line.

Fig. 5A is a top view of the travel of the line in a guide trough, when the cutting is approaching its extreme position.

Fig. 5B is a top view of the travel of the line in the guide trough after the cutting movement and during the return movement.

Fig. 5C is a top view of the travel of the line in the guide trough after the cutting movement, when the carriage with its nozzle has returned to the home position.

Fig. 6 shows a typical position of the beam on the reel-up of the paper or board machine.

Fig. 7A is a side view of a seal that is installed in the nozzle opening.

Fig. 7B is a side view of the seal that is installed in the nozzle opening and the nozzle at the point of cutting.

Fig. 8A shows the travel of the line as a curved loop, supported by a flat belt.

Fig. 8B shows the cross section A - A of the flat belt and the line of Fig. 8A.

Fig. 9 shows the cross section of the flat belt and the line, supported on the guide trough by magnets.

Fig. 10 shows the cross section of the flat belt and the line, supported on the guide trough by grooves.

Fig. 11 is a top view of the beam that comprises an integrated booster module.

Fig. 12A is a top diagram of the movement of the lines, wherein the stiff lines are turned around the first ends of the lines.

Fig. 12B is a top diagram of the movement of the lines, wherein the flexible lines are moved linearly in the transversal direction.

Fig. 13 is a top view of the beam, the introduction of its lines being arranged according to Fig. 12B.

Fig. 14 is a side view of a lightweight beam.

Fig. 15 is a top view of the lightweight beam.

Fig. 16 shows a partial cross section of the lightweight beam.

Fig. 17 is a diagrammatic top view of a simple belt-driven beam.

Fig. 18 shows the check valve and the high-pressure filter integrated into the pressure section.

[0011] The invention of this application relates to a device for cutting a fibrous web by a pressurized medium, the device comprising:

- a beam that is arranged essentially transversally to the direction of travel of the fibrous web;
- a carriage, which is adapted to move and to which a nozzle is attached to cut the fibrous web;
- a line for conveying the pressurized medium to the nozzle, the first end of the line being adapted to be connected to a pressure feed and the second end of the line being adapted to move in connection with the carriage;

characterised in further comprising a guide trough for forming the guide of the line, that the line is adapted to move in the guide trough as an essentially U-shape loop, when the distance between the first end and the second end changes in accordance with the position of the carriage, and that the movement of the line is arranged to be provided by the movement of the carriage fitted in a linear modules.

[0012] In the first embodiment of the invention for cutting the moving fibrous web, the guide bar extends across the fibrous web, so that part of the length of the guide bar is, at both edges, partly outside the fibrous web. The guide bar can be one-piece or, preferably two-piece, whereby partly overlapping guide bars are formed on the centre line of the fibrous web. The guide bar or pair of guide bars is in an essentially cross direction to the moving web. The cross direction refers to the cross direction with respect to the making direction of the fibrous web that travels in the fibrous web machine. Due to the overlapping guide bars, the area of the centre line comprises a small area that can be cut twice. Correspondingly, when the fibrous web moves, this initial position provides a wedge when the fibrous web is cut, and guiding the wedge, e.g., by blowing air, is an essential part of the replacement of the reel-up, for example.

[0013] The guide bar or pair of guide bars is preferably built into the elongated linear module. The entire guide bar structure can be provided as one entity, so that the linear module already comprises fixing points for attaching to the framework, an inner structure for providing the longitudinal movement and a fixing point for the actuator, which can be, e.g., a servomotor. Furthermore, there are fixing points in the moving carriage that can be built di-

rectly into the linear module. Due to the fixing points, the line that conveys the pressurized medium can further be attached to the carriage. The linear module comprises guide surfaces that are defined by the guide bars for the longitudinal movement, the carriage being adapted to move on the guide surfaces. The dynamic of the carriage is transmitted, e.g., through a cogged belt rotation. The cogged belt rotation is driven, e.g., by the servomotor or a stepper motor. The structure is rendered advantageous by the fact that, regarding the power transmission, the control and tensioning of the cogged belt are also connected to the modular structure, as well as a suitable gear transmission to provide the adequate power and velocity.

[0014] The bearing structure of the device across the fibrous web is preferably a beam of a sheet metal structure, whereby numerous advantages are obtained in its manufacture, transportation and installation. The sheet metal structure can consist of hollow sections, in at least one of which a suitably narrow space can be reserved, in particular, which is adapted to guide the line that conveys the pressurized medium. The guiding effect is of benefit during the movement of the carriage. The guiding effect can be used during the cutting and the return movement of the carriage. The purpose of the guiding effect is to feed the line parallel with the move-ment of the carriage in a controlled manner, without having to feed the line in its longitudinal direction in the direction of cutting, when the movement is fast. Correspondingly, the movement can be carried out slower during the return movement, whereby the line has time to settle in the narrow space in a controlled manner.

[0015] Regarding its operation, the line is preferably rigid enough against bending and its surface is slippery, whereby it does not have a tendency to get entangled with itself, when there is extra length available. Particularly, the movement of the line is supported by a supported surface below, which is preferably surface-treated with an agent that lowers the friction, e.g., plastic, Teflon or a dry slip agent, such as silicon.

[0016] In the second embodiment of the invention, an energy transfer chain can be used, which is adapted to control the line in the guide trough. By means of the energy transfer chain, a good and reliable longitudinal control of the line can be ensured during cutting and the return movement in a case, where the line is not allowed to move freely according to the movement of the carriage only. The energy transfer chain is preferably adapted to travel on its side, whereby it can be supported by means of the supported surface.

[0017] In the third embodiment of the invention, the assembly of the device can be implemented by an integrated booster module, which is delivered and assembled as one entity. Preassembly is carried out earlier in clean premises, where the entry of refuse and impurities into the system can be prevented, as impurities tend to block up the nozzles, impairing or preventing the cutting result. The preassembly can be delivered as a hermetic unit whereby, in the event of installation, it must merely be attached in place mechanically and connected electrically and pneumatically, and a delivery hose for the medium must be arranged, preferably belonging to the system of a low pressure area. After the delivery hose, preliminary filtering of the medium is arranged.

[0018] In the fourth embodiment of the invention, the line is not fed in its longitudinal direction with respect to the movement of the carriage, but the travel of the line is arranged sideways to the line. The lines have flexibility in the longitudinal direction and transversally in the direction of bending. The line is preferably rendered the form of a spiral and, when the carriage moves, the flexibilities mentioned above allow the carriage to move across the entire fibrous web or over a half of the width of the fibrous web at a high speed and acceleration. In the arrangement, the first end of the line is thus in a different place in the machine direction than the second end of the line, which follows the moving carriage along the guide bar.

[0019] In the fifth embodiment of the invention, the structure of the carriage is lightweight and its movement is guided by slipper pads. The slipper pads between the carriage and the guide bar can be detached and, thus, easily maintained. The slipper pads preferably consist of Teflon. The movement of the carriage is implemented by pulling it by a clogged belt and the clogged belt is fitted between two clogged belt pulleys to be driven and controlled. The longitudinal feed of the line during cutting and the reeling during the return movement are arranged in the direction of the guide bar from the reel(s).

[0020] In the sixth embodiment of the invention, a check valve and/or a high-pressure filter are integrated into the pressure section. An advantage of the integration is that the mass that moves with the carriage decreases and the total mass in the beam decreases. The check valve is needed to keep the pressure line pressurized, whereby the cutting can be started more easily and reliably. No air is allowed into the pressure line, the removal of which at the beginning of the cutting stage would disturb the cutting. Blowing air out as an air volume portion at the beginning of the cutting would also unnecessarily wear down the nozzle. The high-pressure filter is preferably located near the end of the pressurized line, whereby a possible replacement of the high-pressure filter in the event of a blockage generally opens the entire pressure line at one blow.

[0021] In an embodiment of the invention, the control of the line is possible by means of a flat belt, whereby the flat belt is used beside the line to stiffen the same and to facilitate the control. The flat belt can preferably consist of spring metal. The invention utilizes the differences of stiffness of the flat belt in transverse bending.

[0022] A typical water cutting device according to the invention is implemented by the carriages that are built to move the nozzle, so that the moving mass is as small as possible. In the invention, the movement of the lines is provided by simply moving the carriages, and no dif-

ferent mechanisms are needed for the quick or slow movement of the lines to deal with the length that is fed or the length that is reeled off. According to the invention, moving the line between the first end and the second end in a manner corresponding to the movement of the carriage can be achieved by the movement of the carriage. By removing extra devices or structures with respect to the known technology, the device can be rendered light, economic and inventive.

DETAILED DESCRIPTION OF THE EXAMPLES OF THE FIGURES

[0023] Fig. 1 is an isometric view of the beam 10 intended for water cutting, viewed from the side of the nozzles 2, i.e., the side of the fibrous web 1. The figure shows the paths of the nozzles 2, which partly overlap and are visible in openings 26. In a manner typical of sheet metal structures, the beam 10 can either be supported at its ends and/or somewhere in between; e.g., at Bessel points (the support is not shown). Inside the beam 10, there are linear modules 5, which are preferably well-equipped units that comprise a guide bar 6, a carriage 3, power transmission for moving the carriage 3 and adequate stiffness to carry itself, whereby it can be considered a so-called self-supporting make. At the ends of the linear modules 5, servomotors 7 are installed, for which the linear modules also comprise equipped power supply shafts. The linear modules 5 can preferably be installed as such and, when needed, they are easy to replace with a corresponding spare part in connection with maintenance. Between the spaces reserved for the linear modules 5, guide troughs 13 are built for an advantageous control of the lines 4. The guide trough 13 is a space reserved for the line 4, wherein the movement of the line 4 can be guided in a controlled manner, preferably bent into a U-shape loop. The guide trough 13 is a limited elongated space, which is limited by a supported surface 13A below and bearing surfaces 131, 132 on the sides.

[0024] Fig. 2 is an isometric view of the linear module 5, viewed from the side of the power supply shaft. The linear module 5 preferably comprises a carriage 3 that is integrated into the guide bars 6. Using the linear module 5 is appropriate, due to the complete standard of equipment that it provides in a compact form, comprising a power supply 51, among others. It provides the speed and acceleration needed for the cutting and the effective and safe deceleration that is needed after the cutting. The linear module 5 also comprises sufficient stiffness against bending, this self-supporting quality being of advantage in the installation and transportation.

[0025] Fig. 2A shows the linear module 5 cut in sections. To provide a linear motion, an essential part consists of the guide bars 6 as a longitudinal bearing, and rolls 36 in the direction guided by them; the motion of the carriage 3 being implementable by means of the guide bars 6 and the rolls 36 in the elongated direction of the linear module 5. The figure shows two rolls (one in cross section), but to stabilize the direction of motion, at least three rolls 36, installed in sequence, are needed. The rolls 36 are fitted with bearings in connection with the carriage 3. The contact between the rolls 36 and the guide bars 6 is based on a spherical surface, whereby the carriage 3 is able to move easily without a great friction. The direction of motion of the linear guide bar 5 in the figure is the direction of the viewer's eye. The linear module 5 comprises a power transmission 51 for moving the carriage 3. The power transmission 51 comprises a cogged belt 14, cogged belt pulleys and a drive, such as a servomotor 7, a stepper motor or the like. A portion of the cogged belt 14 is also attached in connection with the carriage 3, the belt being adapted to travel in the form of an elongated loop inside the linear guide bar 5. Suitable openings are made in the structure of the linear guide bar 5 for the travel of the cogged belt 14. The other end of the cogged belt 14 comprises a fitted gearing and a cogged belt pulley 16 (not shown), by means of which the carriage 3 can be moved, e.g., by the servomotor 7. The carriage 3 comprises fixing points 37 for attaching the line 4 and the pressure section 11. Correspondingly, the fixing points 37 are also provided for attaching the linear module 5. The body of the linear module 5 is preferably made of an aluminium, aluminium alloy or other sheet metal, whereby industrially manufactured profiles can be used in its manufacture, e.g., by extrusion. Furthermore, empty chambers can be made in the body by ribbing, whereby the weight is reduced.

[0026] Fig. 3 shows the pressure section 11 in an isometric view, so that the travel of a pressure channel 35 from the inlet to the outlet is shown by a dashed line. The pressure channel 35 runs through a narrow material neck MK, which in the assembly is adapted so as to run in a guide groove 17, cf. Fig. 4. The idea of the pressure channel 35 is that the pressure of the medium, e.g., water, is transferred through it from the side of the guide trough 13 into contact with the carriage 3 in the linear module 5. The material neck MK is adapted to run in the guide trough 13 in the elongated guide groove 17. The material neck MK is narrowed, so that the guide groove 17 does not offer the line 4 an opportunity to get into the guide groove 17 or, through that, from the guide trough 13 to the side of the linear module. The guide groove 17 is preferably narrower than the diameter of the line 4 to make this even more secure. The edges of the guide groove 17 are slightly rounded, bevelled or ground, so that its edges do not prematurely wear out the surface of the line 4. In this way, the second end 4B of the line 4 is conveyed to the pressure section 11 and further through the pressure channel 35 to the nozzle 2 in connection with the carriage 3. The pressure section 11 is fitted into the beam 10, so that the material neck MK runs in the guide groove 17. The pressurized medium is conveyed to the nozzle 2, so that the pressure section 11 comprises the narrowed material neck MK for the elongated guide groove 17 and the pressure channel 35 is conveyed along the said material neck MK for conducting

the pressurized medium from the line 4 to the nozzle 2.

[0027] Fig. 4A shows the cross section of the beam 10 that is suited to water cutting, along the section A-A of Fig. 1. The beam 10 comprises spaces for each cutting portion over and below the same, respectively. This description concentrates on the lower half and the upper one is the same, in practice, but implemented upside down and in a different place on the beam 10 in the longitudinal direction. In the lower space reserved for the linear module 5, the carriage 3 is visible next to it, the pressure section 11 being installed in the carriage. The pressurized medium is fed through the pressure feed 21 and through the line 4 in the guide trough 13 into the pressure section 11. Pressure formation in the medium is preferably provided by a pneumatic high-pressure pump 8 (not shown), from which a feed is connected to the pressure feed 21. The piping from the high-pressure pump 8 can be implemented by flexible or rigid pipework. Generally, the pressure feed 21 refers to the pressure, which is formed directly by the pump or the like and which can be used immediately by the pump or conducted closer to the actuator along a transmission path through a set of channels, or connected directly to a functional device, such as the nozzle 2.

[0028] The line 4 is adapted to run in the guide trough 13 through a loop, which makes a turn of about 180 degrees before arriving in the inlet opening of the pressure section 11, which in the figure is on the upper edge behind the pressure section 11. The line 4 thus makes a U-shape loop, which is not clearly shown in this illustration. In the pressure section 11, the medium is conducted to the outlet opening (downwards in the figure) and the pressure is conveyed in a lateral directon to the nozzle 2. Parallel to the movement of the carriage 3, an elongated opening 26 is adapted, comprising a seal 25. The nozzle 2 is adapted to move in the elongated gap of the seal 25 in the direction of the viewer's eye. The seal 25 can comprise, e.g., rubber as a butt joint, the moving nozzle 2 opening it slightly, or be implemented by means of stiff bristles, which the nozzle bends outwards or sidewards.

[0029] The beam 10 can be divided into different spaces in various ways; Fig. 4 A shows one way. At the installation stage, the line 4 in the guide trough 13 is adapted to run through one U-shape (180 degrees) loop. This loop is adapted between bearing surfaces 131, 132, so that the loop tends to press against these bearing surfaces 131, 132. The control of the line 4 is based on the space of motion defined by the bearing surfaces 131, 132 in the lateral direction, inside of which space the line 4 is fitted. The vertical control in the guide trough 13 is based on the fact that the elevation of the guide trough 13 is low, whereby the line 4 cannot cause entanglement. The line 4 is adapted to move on a supported surface 13a, which is preferably a surface horizontal to the normal of the beam 10 in the guide trough 13. The inner surfaces of the guide trough 13 are thus utilized in forming a guide for the line. The guide is thus produced by the interaction of the inner surfaces and the outer surface of the line 4 and the stiffness of the line 4. The height of the guide trough 13 is preferably 1.5-5 times the diameter of the line. At least one of the walls that limit the guide trough so as to be low can be made of at least somewhat transparent material, whereby the behaviour of the line can be monitored visually or by means of a computer vision, for example. The inner surface of the guide trough 13 or the surface of the line 4 can be treated or coated with a material, which improves the travel or movability of the line, reduces the friction or otherwise decreases the premature wearing of the line 4.

[0030] The line 4 makes a U-shape loop in the guide trough 13, the cross section of which is adapted to suit the bending radius of line 4 in a first direction and the diameter of line 4 in a second direction. The advantageous control of the loop is based on the fixed attachment of the line 4 at its first end 4A, whereby moving the second end 4B of the line 4 inevitably results in that the U-shape loop follows this movement in a controlled manner. The speed of the U loop is about half of the speed of motion of the second end 4B of the line 4. Due to the controlled movement, the speed of motion of the line 4 can be increased to 10/sec and the motion of the line 4 in the guide trough 13 is still controlled without separate feed reels or similar means of the line 4, which would support the line 4 mechanically or in another way on the curved inside of the U loop. Consequently, the line 4 is adapted to be fed or pulled, in the U shape and supported with respect to the flexural centre KP, from outside the line 4.

[0031] The pressure section 11 is adapted to run in the guide groove 17, through which the pressurized medium can be conducted from the guide trough 13 on the side of the linear module 5 and into contact with the nozzle 2. In the figure, the guide groove 17 is depicted narrower than the line 4, whereby the line 4 cannot get stuck in the guide groove 17 that runs in parallel. The guide groove 17 forms an elongated opening, which has a smaller principal dimension in the narrower direction and a larger principal dimension in the longer direction. The smaller principal dimension of the opening is preferably smaller than the diameter of the line 4 or the width of the energy transfer chain 18. Consequently, the moving parts are protected against adhering to the edges of the elongated guide groove 17 in the direction of motion.

[0032] Fig. 4B shows the energy transfer chain 18, which is adapted to guide the line 4 in the guide trough 13. By means of the energy transfer chain 18, a good and reliable longitudinal control of the line 4 can be ensured during cutting and the return movement in a case, where the line 4 is not allowed to move freely according to the movement of the carriage 3. The energy transfer chain 18 is preferably adapted to travel on its side, whereby it is supported by the supported surface 13A. The energy transfer chain 18 can be used to easily implement the supported 180-degree turn of the line 4. The line 4 is adapted to run between the first end 4A and the second end 4B, supported by the energy transfer chain 18. The first end of the energy transfer chain 18 is firmly fixed to

the guide trough 13 at the end of the line 4, which in this application is called the first end 4A.

[0033] Fig. 5 A is a top view of the travel of the line 4 in the guide trough 13, when the cutting is approaching its extreme position. The direction of cutting is marked with an arrow. The pressure feed 21 is at the first end 4A of the line 4, which is fixed. The second end 4B of the line is in the moving carriage 3. For clarity's sake, only the nozzle 2 of the carriage 3 is shown. In a progressive movement, the line 4 mainly follows the movement of the nozzle 2 linearly, as the line 4 is pulled forward. The line 4 moves in the space between the bearing surfaces 131, 132 and it is arranged so as to travel in a U shape between the bearing surfaces 131, 132, whereby the flexural centre KP of the curvature of the U-shape loop is in the middle of the loop. The space between these also comprises a partition wall 133, which is installed in the longitudinal direction and which divides the space between the bearing surfaces 131, 132 and can limit the space of motion of the line 4. The partition wall 133 can be extendable and/or movable. The movement of the line 4 is limited by the supported surface 13 A below. When bending around the flexural centre (KP), the line 4 is supported by at least one of the following: the bearing surfaces 131, 132 or the partition wall 133.

[0034] Fig. 5B is a top view of the travel of the line 4 in the guide trough 13 after the cutting movement and during the return movement. The nozzle 2, i.e., mainly the second end 4B of the line 4 is pushed from its extreme position back to its home position, i.e., the position before cutting. Naturally, the line 4 then also tends to escape sidewards at least to some extent, i.e., it is difficult to control the line 4 by pushing. The partition wall 133 now limits the space on the sides sufficiently, whereby the line 4 must travel in its main direction, i.e., towards its home position. The loop, which the line 4 makes, travels ahead of the nozzle 2 at a velocity of about a half of that of,the nozzle 2. One of the properties of the line 4 is that, regarding its bending stiffness, its smallest bending radius R without a permanent deformation is slightly smaller than half of the distance of the bearing surfaces 131, 132. The line 4 thus tends to push against the bearing surfaces 131, 132. Furthermore, the flexural centre KP of the line 4 is adapted to move in the direction of motion of the carriage 3. In the guide trough 13, the line 4 is adapted to straighten in a manner similar to the progressive motion of the carriage 3. The pressure feed 21 is further arranged through a fixed point.

[0035] Fig. 5C is a top view of the travel of the line 4 in the guide trough 13 after the cutting movement, when the carriage 3 with its nozzle 2 has returned to the home position. Consequently, Figs. 5A, 5B and 5C show a function, wherein the motion of the line 4 is provided by the motion of the carriage 3 only. In the operation of the device, during the cutting or the return movement, the flexural centre KP of the line 4 is adapted to move in the direction of the guide bar 6. By a suitable selection of the properties of the line 4, the running speeds of the carriages 3 and the surface properties of the guide trough 13 in the operation of the device during cutting or the return movement, it is possible to feed the line 4 in a curved form, corresponding to the movement of the carriage 3, without an inner curved support against the line 4, whereby no support or feed of the line 4 is needed and the weight of the structure can be reduced. Normally, the velocity of cutting is higher than that of the return movement but, generally, the return movement does not need to be very quick, as there is usually enough time for the next cutting.

[0036] Fig. 6 shows a typical position of the beam 10 suitable for water cutting on the reel-up of the paper or board machine. The fibrous web 1 is brought to the reel-up through rollers. The beam 10 is preferably adapted to a web transfer defined by the rollers, wherein the fibrous web 1 travels on a straight plane, i.e., the distance of the beam 1 from the fibrous web 1 is as constant as possible to ensure a good cutting result; in this case, between a paper guide roller 34 and a reel-up drum 30.

[0037] When the roll is replaced, the nozzles 2 of the beam 10 cut the necessary slits in the fibrous web 1, which slits run through the nip between the reel-up drum 30 and an empty machine roll iron 33 in the direction of a blowpipe 32, the air blast released from the blowpipe raising the fibrous web 1 onto the machine roll iron 33. The machine roll 29 that is being completed can be detached from the nip contact of the reel-up drum 30 and the reeling continues onto the machine roll iron 33. The blowpipe 32 can also be located in another place, depending on the way of replacing the roll (e.g., below the fibrous web 1, if the machine roll being completed is detached from the nip before the replacement and before cutting the fibrous web 1). As there are various ways of replacing the roll, the way of replacement and its side layout shown herein is an example and not intended to limit the use of the device. The device can also be used in the web feeding to raise the fibrous web onto the empty machine roll iron 33 after the fibrous web 1 on the reel-up has gained its full width. In roll replacement and web feeding, the fibrous web 1 is inclined to follow onto the machine roll iron 33, as the air layer rotating around the machine roll iron 33 tends to guide the fibrous web 1 in that direction. This is particularly the case, when the nip between the machine roll iron 33 and the reel-up drum 30 is safely closed. To guide the fibrous web 1 around the machine roll iron 33, the air flow of the blowpipe 32 is also used.

[0038] Fig. 7A shows the nozzle 2, which can be adapted so as to move in the flexible opening 26 in the direction of the guide bar 6. In this way, the nozzle 2 is protected against shredded paper and the cuttings that are generated when cutting the fibrous web 1. The cuttings consist of a paste formed by broken fibres and the medium which, when drying, may cause blockage and barriers to the movement of the nozzle 2 and the running of the medium; particularly when cutting tissue paper. The flexible opening 26 can consist of, e.g., two rubber sheets, which are

installed in a butt joint in parallel to the direction of the guide bar 6. The nozzle 2 runs along the butt joint at a speed defined by the carriage 3. When travelling, the nozzle 2 opens slightly the butt joint, so that the nozzle 2 is able to spray through the gap of the butt joint without disturbances, Fig. 7B. In the active cutting area, the seals 25 may run in the direction of the guide bar 6 at the same distance and, in the non-active cutting area (e.g., in a rest position and a service position), the distance of the seal 25 from the nozzle 2 may change, so that the nozzle 2 remains covered or that the nozzle 2 is uncovered to be maintained. The butt joint can comprise so much compression at the frontal faces that the seals 25 bend outwards from the plane according to the attachments. The seal 25 can also be implemented by means of stiff bristles, which are attached to the edge of the seal 25 at one end thereof. The bristles are arranged opposite each other and the nozzle 2 runs in the gap, which is limited by the bristles on both sides. The edges of the seals 25 or the bristles can be designed or selected so that they do not decelerate the movement of the nozzle 2. Correspondingly, their resistance to motion does not essentially change with time, whereby the cutting motion and speed remain constant for a long time.

[0039] Fig. 8A shows the flat belt 19, which is suitable to support the line 4 and characterised in its differences in stiffnes in the lateral bending. Its lateral bending stiffness in the first direction is multiple in relation to the second direction. The second direction differs from the first lateral direction by 90 degrees. The figure shows the pressure feed 21 to the first end 4A of the line and the nozzle 2 to the second end 4B, which is adapted to be movable. The flat belt 19 runs next to the line 4; in this case, in the form of a curve on the side of the inner curve. The cross section A-A illustrates the position in Fig. 8B.

[0040] If the flat belt 19 consists of metal, it can be ferromagnetic and its control, keeping in place, attachment to the rest position and release can be implemented by means of magnets 20, Fig. 9. The magnets 20 can be permanent magnets or electromagnets. By means of the successive permanent or electromagnets that are essentially installed in a queue, the release and attachment of the flat belt 19 and the line 4 can be implemented as sequential events in time, whereby the long line 4 can be controlled along its length. The starting of the carriage 3 can be controlled by means of the holding power of the magnets 20. The magnets 20 that resist the moving force keep the carriage 3 in the starting position, until the carriages 3 can be shooted by releasing the holding power of the magnets 20. The magnets 20 are firmly attached in place, e.g., to the structure adjacent to the guide trough 13. Typically, the magnets 20 are elongated magnetic tapes.

[0041] The flat belt 19 can also be guided so that it is forced into a form according to a preferred path of the line 4, which form the flat belt 19 tends to conform to. In that case, the flat belt 19 can comprise spring metal, which is provided with a desired prestress. The prestressed state can be the shape the line 4 obtains in the cutting position or cut position, corresponding to the state, or the shape the line 4 obtains in its rest position, corresponding to the state. An unstressed state can also be any state that corresponds to the shape of the flat belt 19, existing during cutting. In this way, at the starting of the carriage 3, the line 4 tends to straighten in the direction of the motion of carriage 3. The motion then accelerates and it is easy to control the line 4. When the carriage 3 moves, bypassing the unstressed state and attaching the line 4 in the second direction hardly decelerates the motion, as the mass slowness of the carriages 3 at high speeds tends to maintain the motion.

[0042] The flat belt 19 can also be guided by means of a groove in the longitudinal direction, Fig. 10. The purpose of the groove is to prevent the combination of the line 4 and flat belt 19 from hanging or distorting. In the case of guiding in the groove, the flat belt 19 is moved by pulling or pushing along the groove. The length of the groove is not necessarily the entire length of travel, e.g., on the curve according to Fig. 8A.

[0043] Fig. 11 is a top view of an integrated booster module 9. It can comprise high-pressure filters 28, which are robust enough for any defect particles. The high-pressure filter 28 may comprise, e.g., a filter based on 150 holes, which can enable as many as 149 holes that are blocked by particles, but yet allows pressure supply to the nozzles 2 through one hole. The diameters of the openings of nozzles 2 are within 0.06-0.40 mm and the pressure used within 800-2000 bar. The integrated booster module 9 can also be delivered as a spare part, whereby its replacement next to the exsisting one in the event of a failure enables a quick shutdown without a great loss of production.

[0044] A space for the integrated booster module 9 is prepared in the beam 10, in which it is easy to install. The figure shows a web transfer by the reel-up, as the fibrous web 1 can be reeled up during reeling. As the integrated booster module 9 is easy to replace, it can be replaced, e.g., during running. The pressure feed 21 from the high-pressure pump 8 is detached and the integrated booster module 9 can be lowered to the floor below the fibrous web. A new substitutive integrated booster module 9 can be connected in place, re-connect the pressure feed 21, and the maintenance is essentially carried out without breaking the fibrous web 1.

[0045] The comparison of Figs. 12A and 12B with each other shows the idea of the fourth embodiment as a basic diagram. Fig. 12A shows a slightly impractical method, wherein the lines 4 of a fixed measure are moved by twisting aroung the first ends 4A. It is obvious that the second ends 4B of the lines 4 yield curved cutting lines, whereby the solution is not very practical. On the contrary, by providing the lines 4 with longitudinal flexibility and moving the second ends 4B of the lines 4 linearly in the transverse direction, a desired cutting can be implemented, Fig. 12B. The stretching line 4 can be at the end of the nozzle 2 or the line 4 can be so long that there is no

need for a line 4 made of a solid pipe.

[0046] Fig. 13 shows a solution according to this principle on the reel-up. For the lines 4, a housing 38 is preferably built, in which the lines 4 can move, shielded against shredded paper or the like. Part of the length of the lines 4 can also be implemented using a hard pipe in the area of the first end 4A and/or the second end 4B. It is relatively easy to replace the lines 4 in the shielded housing; when needed, by opening the housing, detaching the lines from the first end 4A and the second end 4B, and to replace them with new lines 4. In this embodiment, the location of the beam 10 neither limits nor influences the direction of cutting but the fibrous web 1 that moves both in the horizontal and vertical direction (or something between) can be cut. The bottom level in the shielded housing 38 should be built so as to use, as the basis of dimensioning, the weight of a serviceman rather than simply that of the lines 4. The extreme positions of the lines 4, the initial position thereof on the centre line of the fibrous web machine and, after the cutting, on the edges of the fibrous web 1 are presented.

[0047] Fig. 14 shows a side view of an embodiment based on a lightweight carriage 3, wherein the motion of the carriage 3 is guided by slipper pads 12. The slipper pads 12 between the carriage and the guide bar 6 can be detached and, thus, easily maintained. The slipper pads 12 can preferably consist of Teflon. The movement of the carriage 3 is implemented by pulling by the clogged belt 14 and the clogged belt 14 is adapted to be driven and controlled between two clogged belt pulleys 16. The longitudinal feed of the line 4 during cutting and the reeling during the return movement are arranged in the direction of the guide bar 6 from a separate reel 22.

[0048] The reel 22 is driven in synchronization with the motion of the carriage 3. The line 4 in a pressurized state is on the reel 22. The pressurized medium is fed into the line 4 through the rotational fitting 24 placed on the axis of the reel 22, the fitting allowing the rotation of the reel 22, when the line 4 is in the pressurized state. Keeping the line 4 at a suitable tension in the longitudinal direction is possible by an adjustable spring, which can be the rotational spring 23R on the axis of the reel 22 or the translation spring 23T at the end of the line 4 on the side of the nozzle 2.

[0049] To carry out cutting, both carriages 3 can have their own reel 22 of line 4, whereby the device consists of two units. This can also be implemented so that the line 4 of the second nozzle 2 does not necessarily need a reel 22 of its own, but the line 4 can be extended from the first nozzle 2 to the second nozzle 2 in a way similar to a belt or another pulling member. In that case, the reel 22 is located on the other edge of the fibrous web 1 that is to be cut, the line 4 runs across the fibrous web 1 and the line 4 extends past the first nozzle 2 over the entire fibrous web 1 to the other edge of the fibrous web machine. The other edge of the fibrous web machine comprises a rotating guide roller 15, through the periphery of which the line 4 is returned over the fibrous web 1 again, whereby the line 4 ends in the second nozzle 2. The axis of the guide roller 15 is preferably parallel with the axis of the reel 22. When the carriages 3 move, the line 4 moves in a controlled manner to both nozzles 2, conveyed by the reel 22 and the guide roller 15. The line 4 can make only half a rotation around the guide roller 15, or one, two, three etc. whole rotations in addition to this. The extra rotations ensure a better grip around the guide roller 15. The guide roller 15 can be freely rotating, provided with a small drive, or connected to a dummy coupling. The carriage 3 can be driven next to a manhole 39 to be maintained.

[0050] Fig. 15 is a top view of an embodiment based on a lightweight carriage 3, the body plate above the beam 10 being removed to expose the structure. To run the reel 22, there is a servomotor 7, which can drive the carriage 3 to a desired position for cutting, web feeding or maintenance.

[0051] Fig. 16 shows a partial cross section of an embodiment based on the lightweight carriage 3, as viewed from the end. The carriage 3 is supported by means of slipper pads 12 and moved by the cogged belt 14. The line 4 in the vicinity of the nozzle 2 preferably consists of a rigid pipe, from which it can be connected to the flexible line 4 to carry out reeling. The slipper pads 12 are preferably shaped so as to comprise different gradations, angles or flanges, which can support and control the travel and motion of the carriage 3. Correspondingly, these gradations, angles and flanges can be shaped to have corresponding surfaces on the side of the beam 10, whereby the longitudinal guide surfaces of the beam 10 can be implemented. Due to the structure, the slipper pads 12 are made so as to be easily replaced.

[0052] According to this embodiment, it is also possible to make a simple solution to move two carriages. Fig. 17 is a diagrammatic top view of a simple belt-driven device. In the arrangement, the cogged belt 14, a belt or other similar pulling member is arranged between the reel 22 and the guide roller 15. The cogged belt 14 is returned back across the fibrous web 1. The first nozzle 2 is placed along the first crossing and the second nozzle 2 is placed along the second crossing. When the cogged belt 14 returns across the fibrous web 1 on the second crossing, it can be returned back onto the reel 22 (as Fig. 17 shows) or it can be conveyed onto a separate rotating member that is used. The cutting motion is provided by moving the cogged belt 14, whereby both nozzles 2 move simultaneously. The line 4 follows the cogged belt 14, moving to each nozzle 2 separately.

[0053] Fig. 18 shows a modification for implementing the pressure section 11. Between the pressure section 11 and the nozzle 2 ("outlet") and/or inside the pressure section 11, a check valve 27 and a high-pressure filter 28 can also be integrated, whereby the high-pressure medium can be conveyed to the nozzle 2 thorough them. The integrated solution enables the mass of the pressure section 11 and, through that, the mass in the carriage 3 to be decreased, whereby the structure of the beam 10

can be further lightened. The check valve 27, which is preferably spring-loaded, provides the advantage that the medium inside the line 4 does not exit between cuts. When re-starting cutting, the pressure strokes are smaller and, correspondingly, the device does not spill the medium onto the fibrous web 1 or the floor. Cutting can be started immediately. As there is no air in the line 4 instead of medium when the cutting is started, no pressure stroke is formed in the nozzle 2 by air. A stroke in the nozzle 2 due to the air volume would wear down the nozzle 2 prematurely. Installing the high-pressure filter 28 in the vicinity of the nozzle 2 facilitates maintenance, as the high-pressure filter 28, in practice, is at the end of the pressurized line. Generally, the replacement of the high-pressure filter 28 opens any blockages in the pressurized line. The built-in solutions according to Fig. 18 are possible, when borings larger than them are made in the pressure section 11, respectively, to enable the installation.

[0054] The figures show one preferred embodiment example according to the invention only. The figures do not separately show matters secondary to the main idea of the invention, which are known as such or obvious to those skilled in the art, such as power sources or support structures possibly required by the invention. It is obvious to those skilled in the art that the invention is not limited to the examples presented above only, but the invention may vary within the claims presented hereinafter. The dependent claims present some possible embodiments of the invention and are not as such to be considered as limiting the scope of the invention.

Markings used in the figures:

[0055]

1 - fibrous web
2 - nozzle
3 - carriage
4 - line
4A - first end of line
4B - second end of line
5 - linear module
51 - power transmission
6 - guide bar
7 - servomotor
8 - high-pressure pump
9 - integrated booster module
10 - beam
11 - pressure section
12 - slipper pad
13 - guide trough
13A - supported surface
131, 132 - bearing surfaces
133 - partition wall
14 - cogged belt
15 - guide roller
16 - cogged belt pulley
17 - guide groove
18 - energy transfer chain
19 - flat belt
20 - magnet
21 - pressure feed
22 - reel
23R - rotation spring
23T - translation spring
24 - rotational fitting
25 - seal
26 - opening
27 - check valve
28 - high-pressure filter
29 - machine roll
30 - reel-up drum
31 - reel-up
32 - blow pipe
33 - machine roll iron
34 - paper guide roller
35 - pressure channel
36-roll
37 - fixing point
38 - housing
39 - manhole
KP - flexural centre
MK - material neck

Claims

1. A device for cutting a fibrous web (1) by a pressurized medium, comprising:

- a beam (10) that is arranged essentially transversally to the direction of travel of the fibrous web (1);
- a carriage (3) that is adapted to move, to which a nozzle (2) for cutting the fibrous web (1) is attached;
- a line (4) for conveying the pressurized medium to the nozzle (2), the first end (4A) of the line (4) being adapted to be connected to a pressure feed (21) and the second end (4B) of the line (4) being adapted to move in connection with the carriage (3);

characterised in further comprising a guide trough (13) for forming the guide of the line (4), that the line (4) is adapted to move in the guide trough (13) as an essentially U-shape loop, when the distance between the first end (4A) and the second end (4B) changes according to the position of the carriage (3), and that the movement of the line (4) is arranged to be provided by the movement of the carriage (3) fitted in a linear module (5).

2. A device according to claim 1, **characterised in that** the device is fitted in the vicinity of a reel-up (31) to

perform a roll replacement of the reel-up (31) or web feeding to the machine roll iron (33).

3. A device according to claim 1, **characterised in that** the line (4) is arranged to move horizontally to the normal of the beam (10) on the supported surface (13A) of the guide trough (13).

4. A device according to claim 2, **characterised in that** the linear module (5) comprises a power transmission (51) for moving the carriage (3).

5. A device according to claim 4, **characterised in that** the power transmssion (51) comprises a cogged belt (14), cogged belt pulleys (16) and a drive, such as a servomotor (7), stepper motor or the like.

6. A device according to claim 1, **characterised in that** the guide trough (13) is adapted to limit the space of motion of the line (4) within the bearing surfaces (13A, 131, 132, 133) of the guide trough (13).

7. A device according to claim 1, **characterised in that** the line (4) is adapted to straighten out in the guide trough (13) in a manner similar to the progressive motion of the carriage (3).

8. A device according to claim 1, **characterised in that** the line (4) is adapted to bend around the flexural centre (KP) of the line (4) in the space defined by the guide trough (13), the line (4) being supported in the bending by at least one of the following: the bearing surfaces (131, 132) or a partition wall (133).

9. A device according to claim 1, **characterised in that** the flexural centre (KP) of the line (4) is adapted to move in the direction of motion of the carriage (3)

10. A device according to claim 1, **characterised in that** the line (4) is adapted to move on its side against a horizontal supported surface (13A), supported by a moving energy transfer chain (18), between the first end (4A) and the second end (4B).

11. A device according to claim 1, **characterised in that** the line (4) is adapted to be fed or pulled in a U shape, supported with respect to the flexural centre (KP), from outside the line (4).

12. A device according to claim 1, **characterised in that** the second end (4B) of the line (4) is conveyed to a pressure section (11) and further through a pressure channel (35) to the nozzle (2) in connection with the carriage (3).

13. A device according to claim 12, **characterised in that** the pressure section (11) comprises a narrowed material neck (MK) for an elongated guide groove (17) and the pressure channel (35) is conveyed along the said material neck (MK) to conduct the pressurized medium from the line (4) to the nozzle (2).

14. A device according to claim 12, **characterised in that** the pressure channel (35) is integrated into conveying the high-pressure medium through a check valve (27) and/or high-pressure filter (28) to the nozzle (2).

15. A device according to claim 1, **characterised in that** the device is carried by a sheet metal-structured beam (10).

Patentansprüche

1. Vorrichtung zum Schneiden einer Faserbahn (1) mittels eines unter Druck stehenden Mediums, welche Folgendes aufweist:

- einen Balken (10), der im Wesentlichen quer zu der Bewegungsrichtung der Faserbahn (1) angeordnet ist;
- einen Schlitten (3), der dafür vorgesehen ist, sich zu bewegen, und an dem eine Düse (2) zum Schneiden der Faserbahn (1) angebracht ist;
- eine Leitung (4) zum Fördern des unter Druck stehenden Mediums zu der Düse (2), wobei das erste Ende (4A) der Leitung (4) dafür vorgesehen ist, mit einer Druckzufuhr (21) verbunden zu werden, und das zweite Ende (4B) der Leitung (4) dafür vorgesehen ist, sich in Verbindung mit dem Schlitten (3) zu bewegen;

dadurch gekennzeichnet, dass
sie des Weiteren einen Führungstrog (13) zum Bilden der Führung der Leitung (4) aufweist, dass die Leitung (4) dafür vorgesehen ist, sich in dem Führungstrog (13) als eine im Wesentlichen U-förmige Schleife zu bewegen, wenn sich der Abstand zwischen dem ersten Ende (4A) und dem zweiten Ende (4B) gemäß der Position des Schlittens (3) ändert, und dass die Bewegung der Leitung (4) dafür vorgesehen ist, durch die Bewegung des in einem Linearmodul (5) untergebrachten Schlittens (3) erzeugt zu werden.

2. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
die Vorrichtung in der Nähe eines Aufrollers (31) angeordnet ist, um einen Rollentausch des Aufrollers (31) oder die Bahnzuführung zu der Maschinenrolle (33) durchzuführen.

3. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
die Leitung (4) dafür vorgesehen ist, sich horizontal

zu der Normalen des Balkens (10) auf der abgestützten Fläche (13A) des Führungstrogs (13) zu bewegen.

4. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
das Linearmodul (5) eine Kraftübertragung (51) zum Bewegen des Schlittens (3) aufweist.

5. Vorrichtung nach Anspruch 4,
dadurch gekennzeichnet, dass
die Kraftübertragung (51) einen Zahnriemen (14), Zahnriemenräder (16) und einen Antrieb, wie zum Beispiel einen Servomotor (7), einen Schrittmotor oder ähnliches, aufweist.

6. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
der Führungstrog (13) dafür vorgesehen ist, den Bewegungsraum der Leitung (4) innerhalb der Lagerflächen (13A, 131, 132, 133) des Führungstrogs (13) zu begrenzen.

7. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
die Leitung (4) dafür vorgesehen ist, sich in dem Führungstrog (13) auf eine der progressiven Bewegung des Schlittens (3) ähnliche Art und Weise zu richten.

8. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
die Leitung (4) dafür vorgesehen ist, sich um den Biegemittelpunkt (KP) der Leitung (4) in dem durch den Führungstrog (13) festgelegten Raum zu biegen, wobei die Leitung (4) beim Biegen durch wenigstens eines der folgenden unterstützt wird: die Lagerflächen (131, 132) oder eine Trennungswand (133).

9. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
der Biegemittelpunkt (KP) der Linie (4) dafür vorgesehen ist, sich in der Richtung der Bewegung des Schlittens (3) zu bewegen.

10. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
die Leitung (4) dafür vorgesehen ist, sich auf ihrer Seite gegen eine horizontal abgestützte Fläche (13A), unterstützt durch eine sich bewegende Energieübertragungskette (18), zwischen dem ersten Ende (4A) und dem zweiten Ende (4B) zu bewegen.

11. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
die Leitung (4) dafür vorgesehen ist, in einer U-Form, im Hinblick auf den Biegemittelpunkt (KP) gestützt, von außerhalb der Leitung (4) zugeführt oder gezogen zu werden.

12. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
das zweite Ende (4B) der Leitung (4) zu einem Druckbereich (11) und weiter durch einen Druckkanal (35) zu der in Verbindung mit dem Schlitten (3) stehenden Düse (2) geführt wird.

13. Vorrichtung nach Anspruch 12,
dadurch gekennzeichnet, dass
der Druckbereich (11) einen verengten Materialhals (MK) für eine längliche Führungsnut (17) aufweist und der Druckkanal (35) entlang des Materialhalses (MK) geführt wird, um das unter Druck stehende Medium von der Leitung (4) zu der Düse (2) zu leiten.

14. Vorrichtung nach Anspruch 12,
dadurch gekennzeichnet, dass
der Druckkanal (35) in die Förderung des Hochdruckmediums durch ein Rückschlagventil (27) und/oder einen Hochdruckfilter (28) zu der Düse (2) integriert ist.

15. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
die Vorrichtung von einem aus einem Metallblech hergestellten Balken (10) getragen ist.

Revendications

1. Dispositif de coupe d'une bande fibreuse (1) à l'aide d'un fluide pressurisé, comprenant :

- une poutre (10) qui est disposée sensiblement transversalement au sens de déplacement de la bande fibreuse (1) ;
- un chariot (3) qui est apte à se déplacer, auquel une buse (2) servant à couper la bande fibreuse (1) est attachée ;
- une ligne (4) de convoyage du fluide pressurisé vers la buse (2), la première extrémité (4A) de la ligne (4) étant apte à être connectée à une alimentation en pression (21) et la seconde extrémité (4B) de la ligne (4) étant apte à se déplacer en connexion avec le chariot (3) ;

caractérisé en ce qu'il comprend en outre une goulotte de guidage (13) pour former le guide de la ligne (4), que la ligne (4) est apte à se déplacer dans la goulotte de guidage (13) sous forme d'une boucle sensiblement en forme de U lorsque la distance entre la première extrémité (4A) et la seconde extrémité (4B) change en fonction de la position du chariot (3) et que le mouvement de la ligne (4) est conçu pour être créé per le mouvement du chariot (3) ajusté dans un module linéaire (5).

2. Dispositif selon la revendication 1, **caractérisé en ce que** le dispositif est ajusté à proximité d'une enrouleuse (31) afin de réaliser un remplacement de rouleau de l'enrouleuse (31) ou de l'alimentation en bande du fer de la machine à cylindre (33).

3. Dispositif selon la revendication 1, **caractérisé en ce que** la ligne (4) est conçue pour se déplacer horizontalement à la normale de la poutre (10) sur la surface supportée (13A) de la goulotte de guidage (13).

4. Dispositif selon la revendication 2, **caractérisé en ce que** le module linéaire (5) comprend une transmission électrique (51) pour déplacer le chariot (3).

5. Dispositif selon la revendication 4, **caractérisé en ce que** la transmission électrique (51) comprend une courroie crantée (14), des poulies de courroie crantée (16) et un entraînement comme un servomoteur (7), un moteur pas à pas ou similaire.

6. Dispositif selon la revendication 1, **caractérisé en ce que** la goulotte de guidage (13) est apte à limiter l'espace de mouvement de la ligne (4) dans les surfaces porteuses (13A, 131, 132, 133) de la goulotte de guidage (13).

7. Dispositif selon la revendication 1, **caractérisé en ce que** la ligne (4) est apte à se redresser dans la goulotte de guidage (13) d'une manière similaire au mouvement progressif du chariot (3).

8. Dispositif selon la revendication 1, **caractérisé en ce que** la ligne (4) est apte à se recourber autour du centre de flexion (KP) de la ligne (4) dans l'espace défini par la goulotte de guidage (13), la ligne (4) étant supportée dans la courbure par au moins un des éléments suivants : les surfaces porteuses (131, 132) ou une cloison de séparation (133).

9. Dispositif selon la revendication 1, **caractérisé en ce que** le centre de flexion (KP) de la ligne (4) est apte à se déplacer dans le sens de mouvement du chariot (3).

10. Dispositif selon la revendication 1, **caractérisé en ce que** la ligne (4) est apte à se déplacer sur son côté vers une surface supportée horizontalement (13A), supportée par une chaîne de transfert d'énergie (18), entre la première extrémité (4A) et la seconde extrémité (4B).

11. Dispositif selon la revendication 1, **caractérisé en ce que** la ligne (4) est apte à être apportée ou tirée en forme de U supporté depuis l'extérieur de la ligne (4) par rapport au centre de flexion (KP).

12. Dispositif selon la revendication 1, **caractérisé en ce que** la seconde extrémité (4B) de la ligne (4) est convoyée vers une section de pression (11) et plus loin à travers un canal de pression (35) vers la buse (2) en connexion avec le chariot (3).

13. Dispositif selon la revendication 12, **caractérisé en ce que** la section de pression (11) comprend un col de matériau rétréci (MK) pour une gorge de guidage allongée (17) et le canal de pression (35) est convoyé le long dudit col de matériau (MK) pour conduire le fluide pressurisé de la ligne (4) vers la buse (2).

14. Dispositif selon la revendication 12, **caractérisé en ce que** le canal de pression (35) est intégré dans le convoyage du fluide à haute pression à travers une soupape de contrôle (27) et/ou un filtre à haute pression (28) vers la buse (2).

15. Dispositif selon la revendication 1, **caractérisé en ce que** le dispositif est supporté par une poutre structurée avec un feuillard métallique (10).

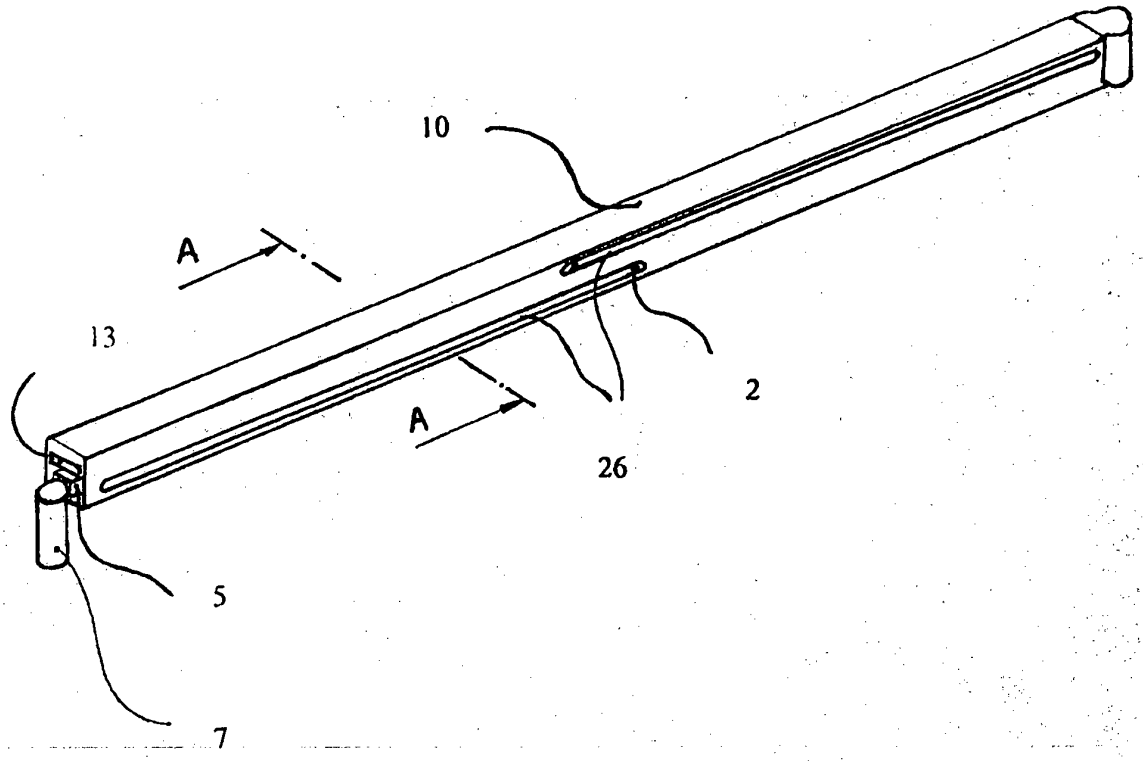

FIG 1

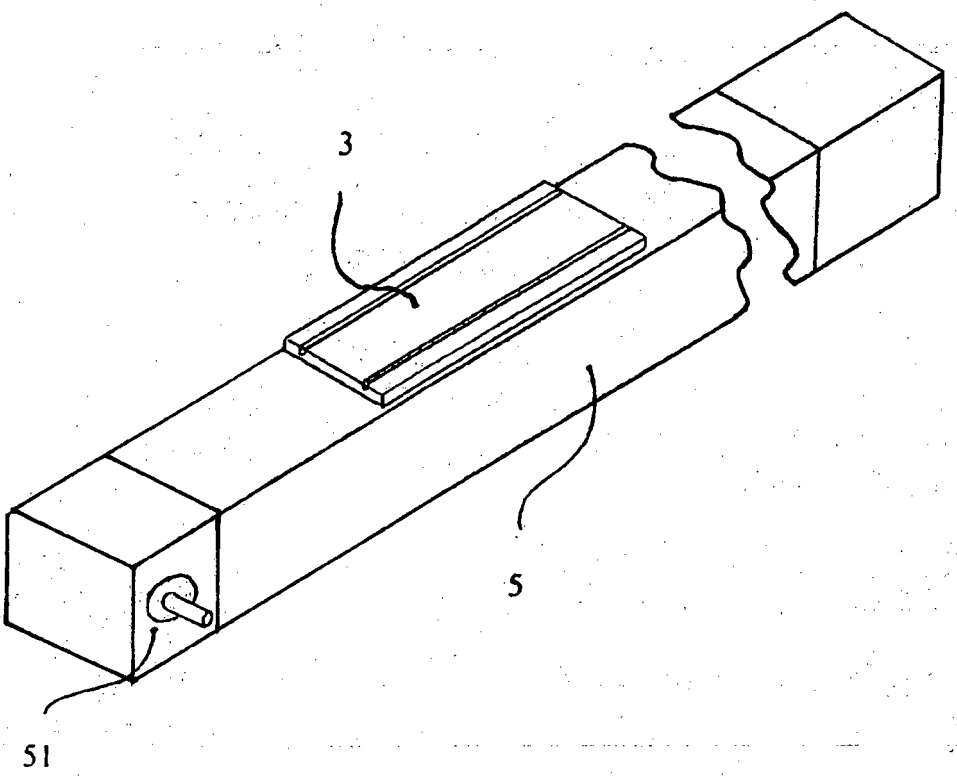

FIG 2

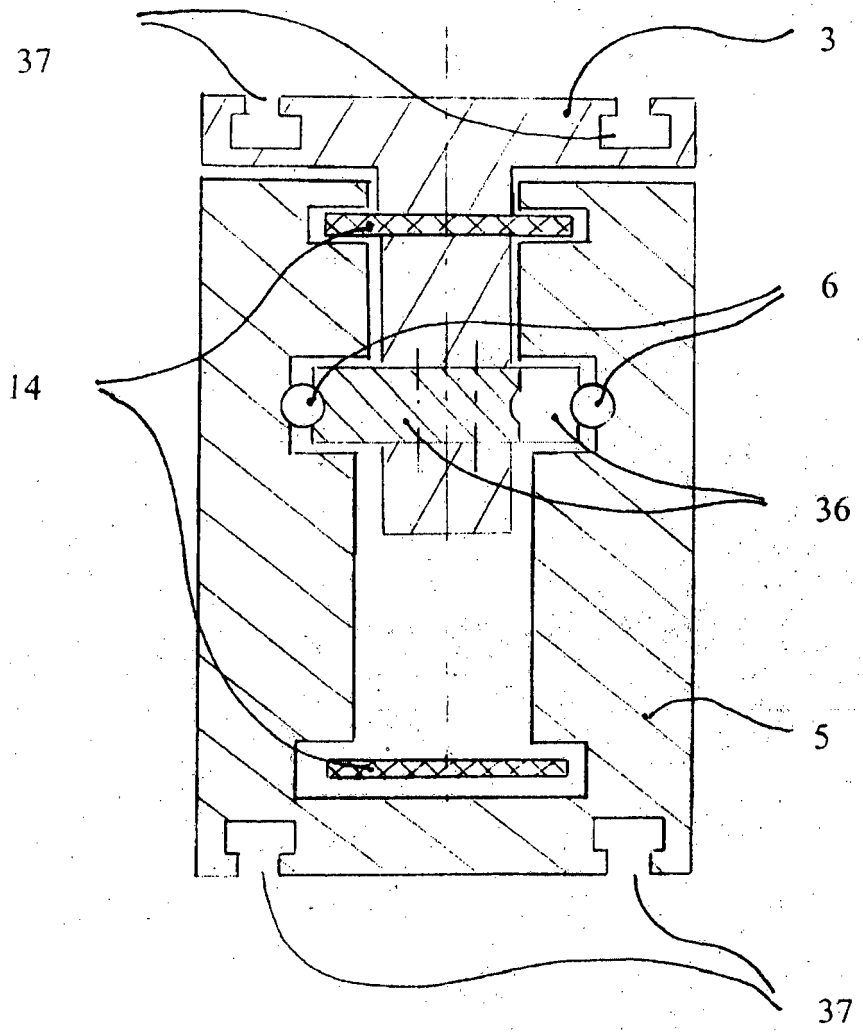

FIG 2A

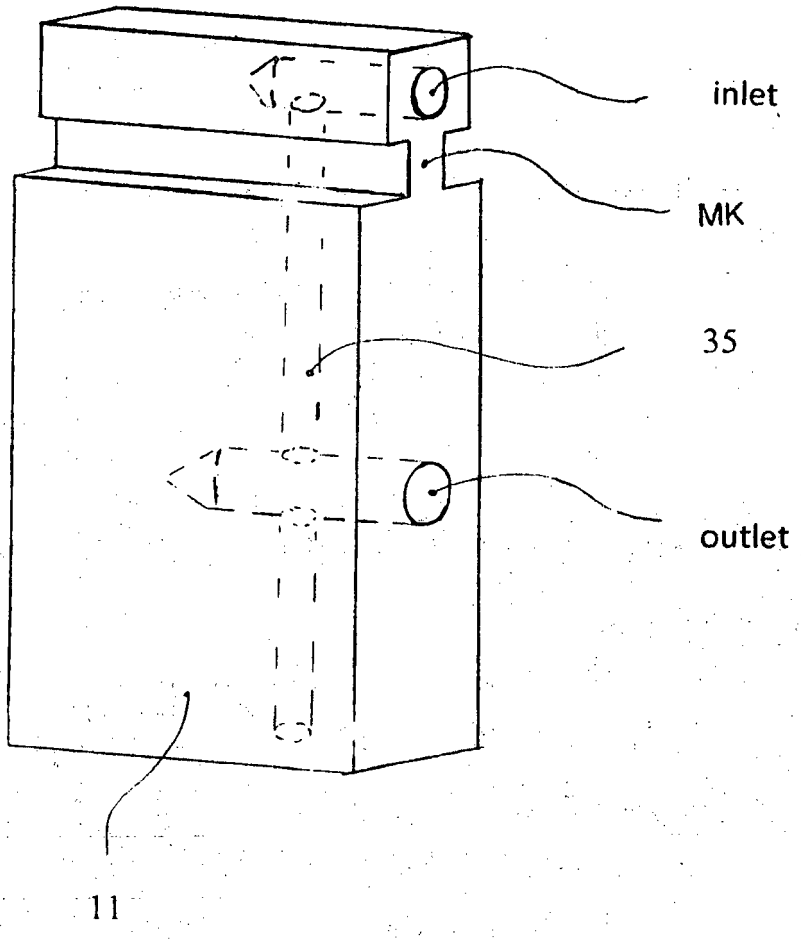

FIG 3

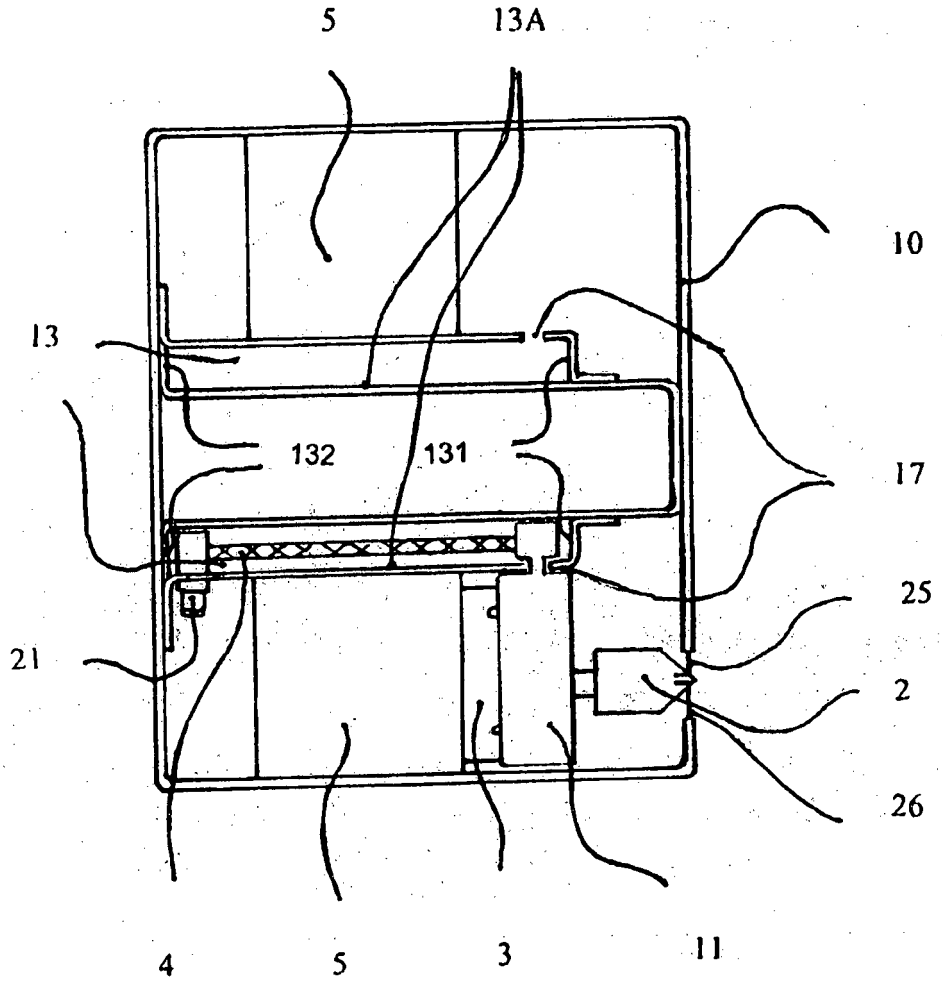

FIG 4A

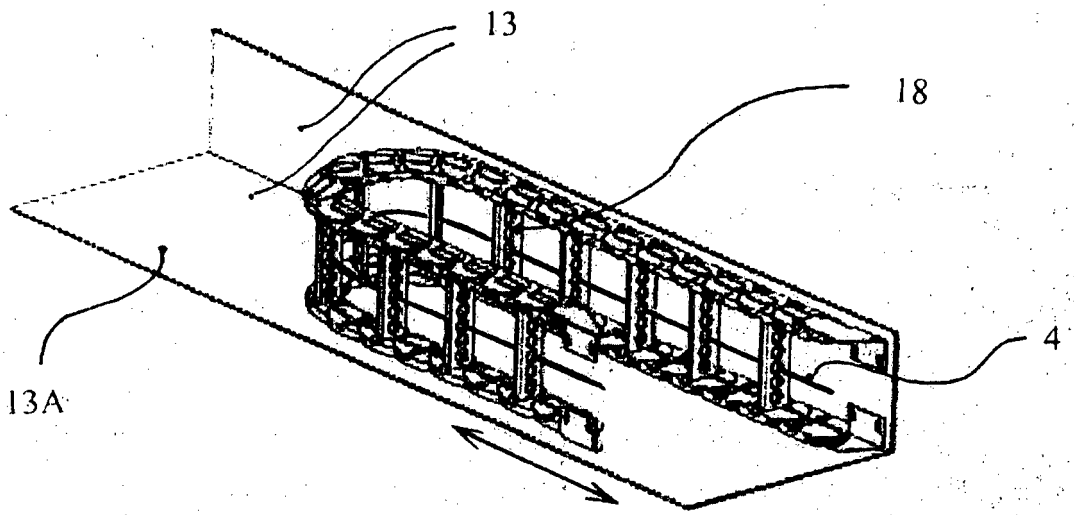

FIG 4B

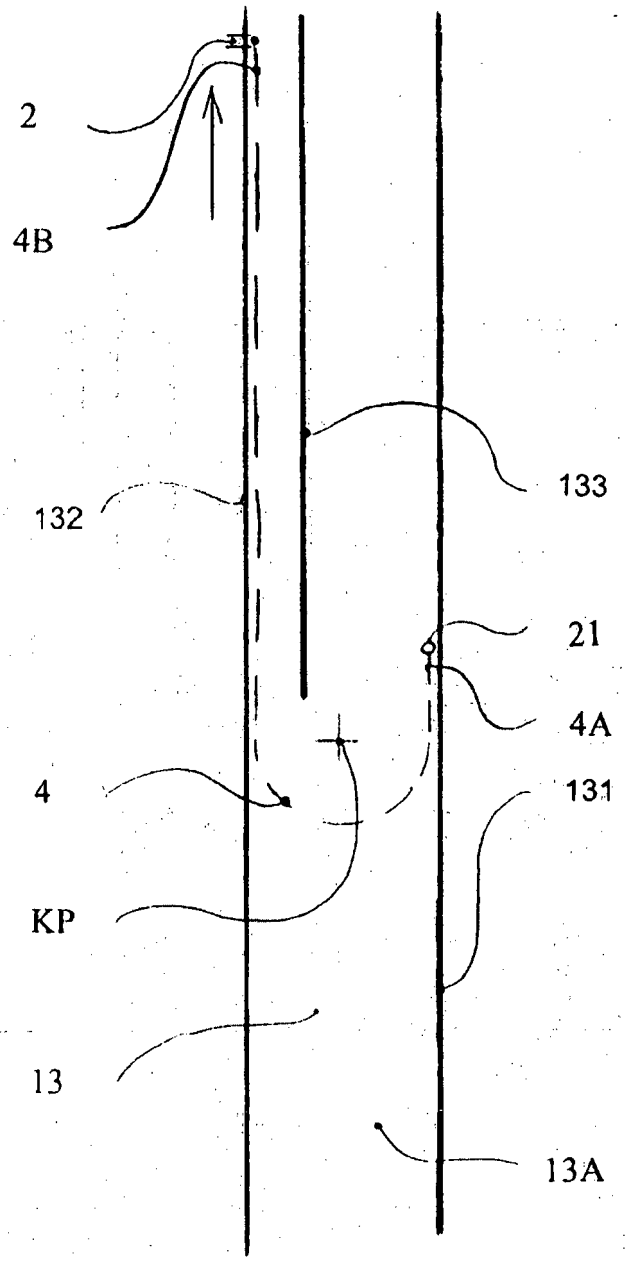

FIG 5A

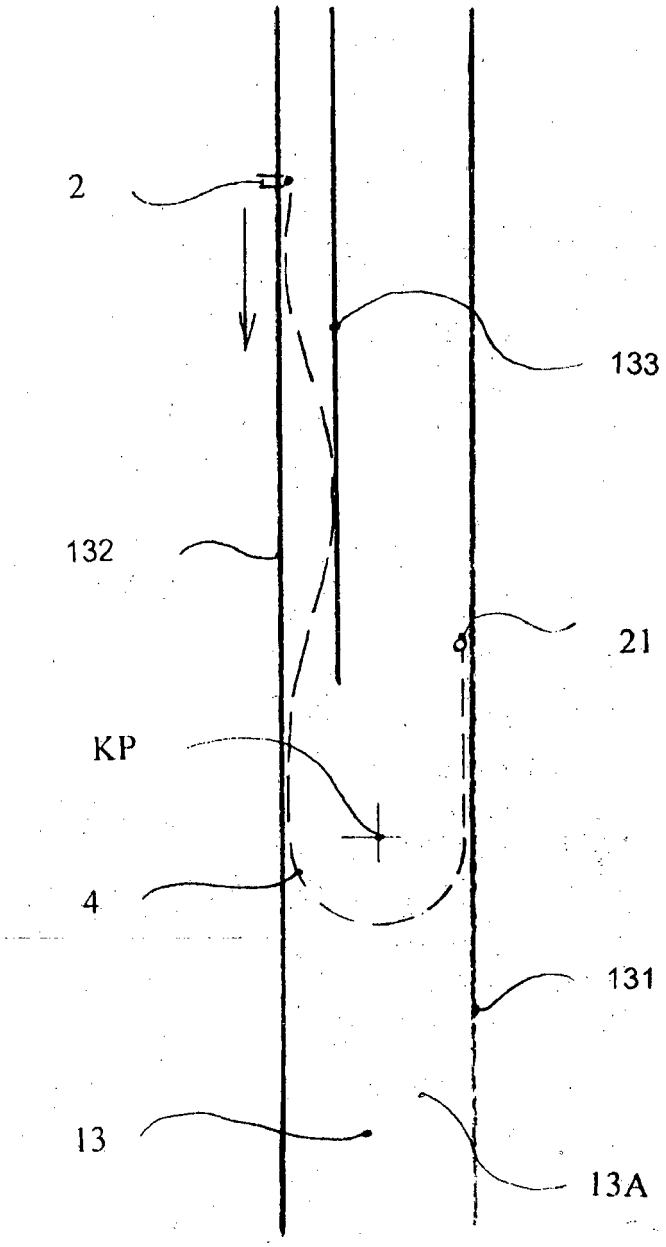

FIG 5B

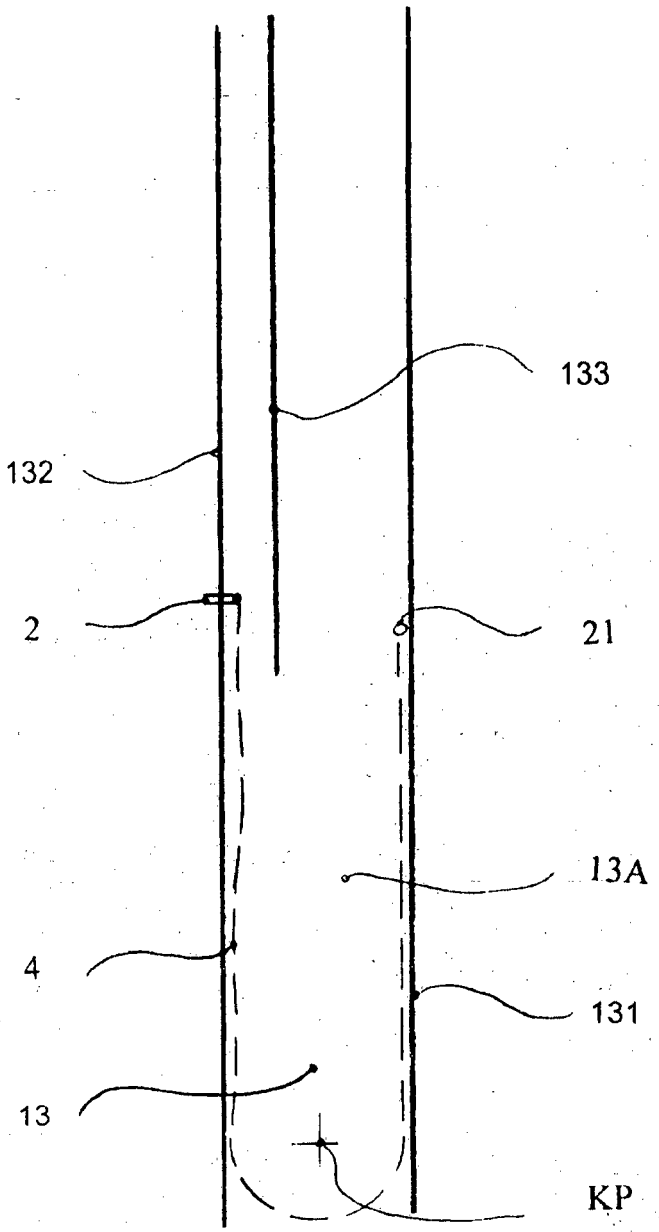

FIG 5C

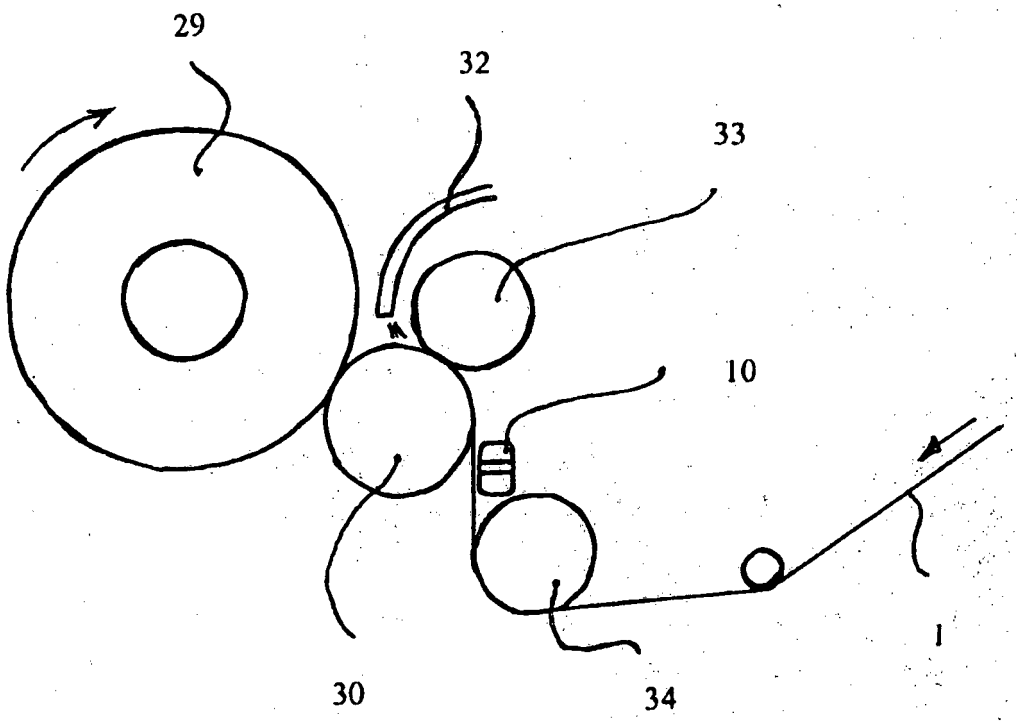

FIG 6

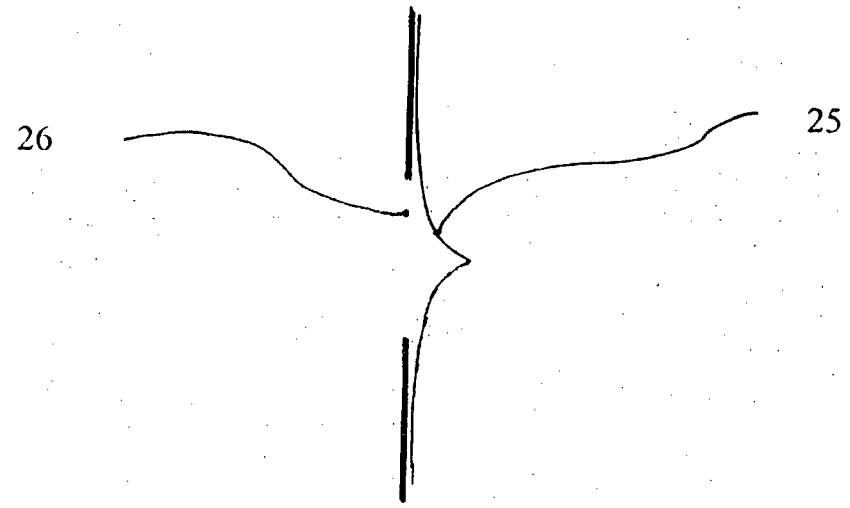

FIG 7A

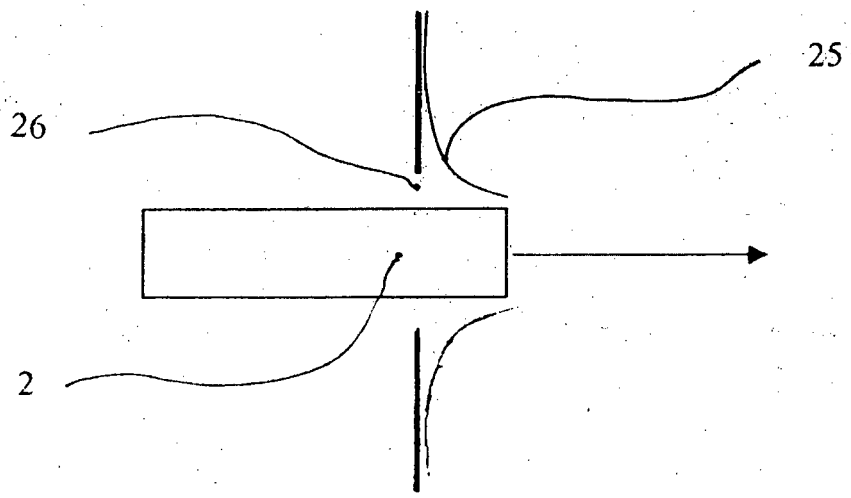

FIG 7B

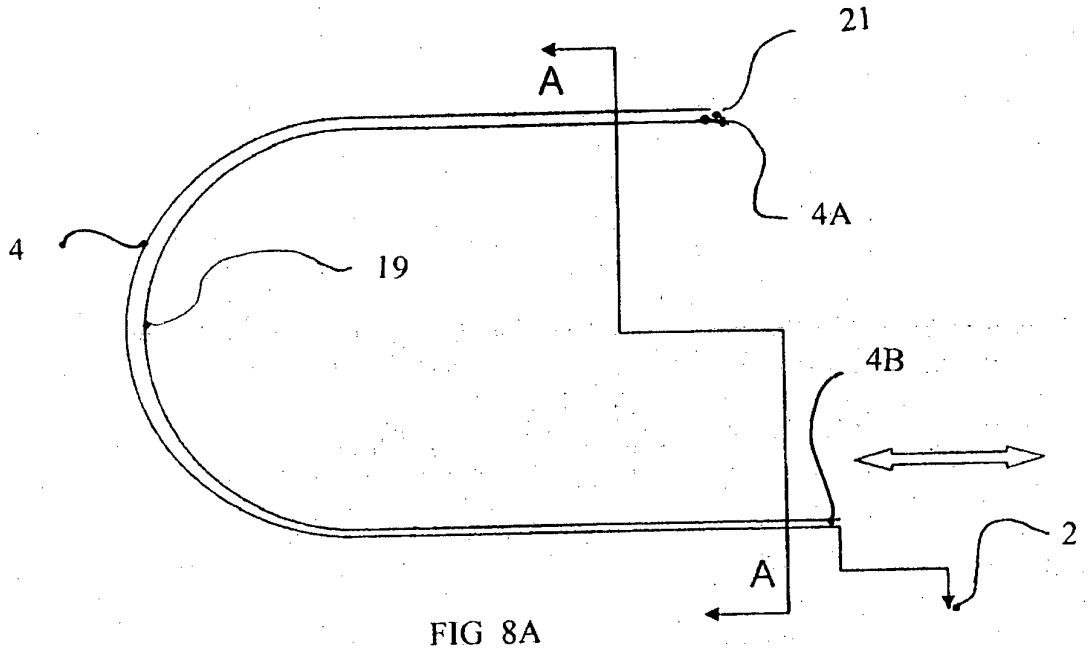

FIG 8A

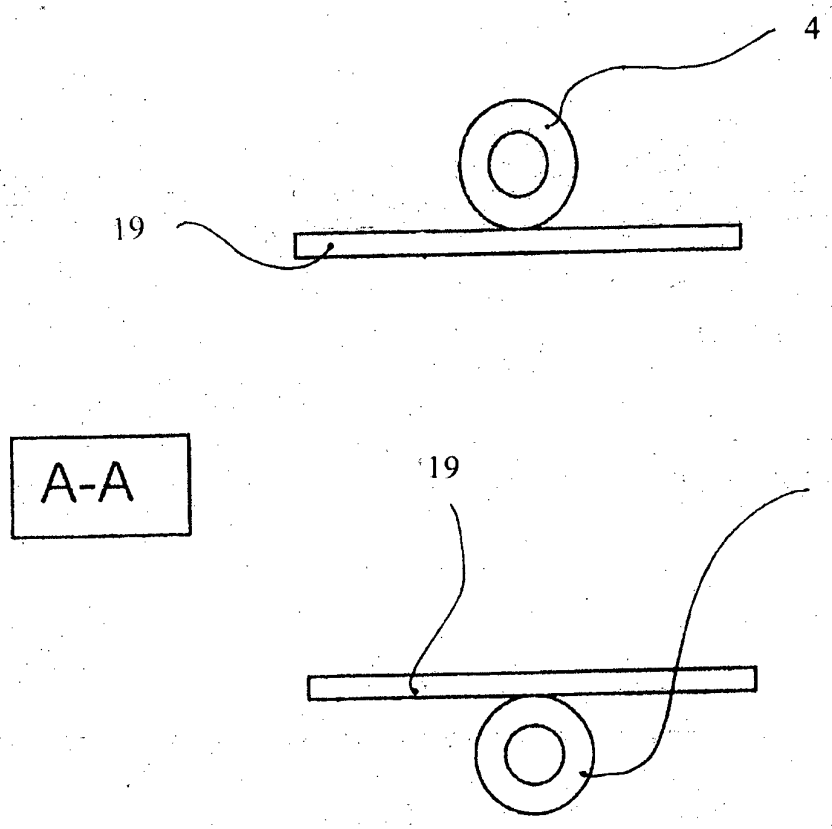

FIG 8B

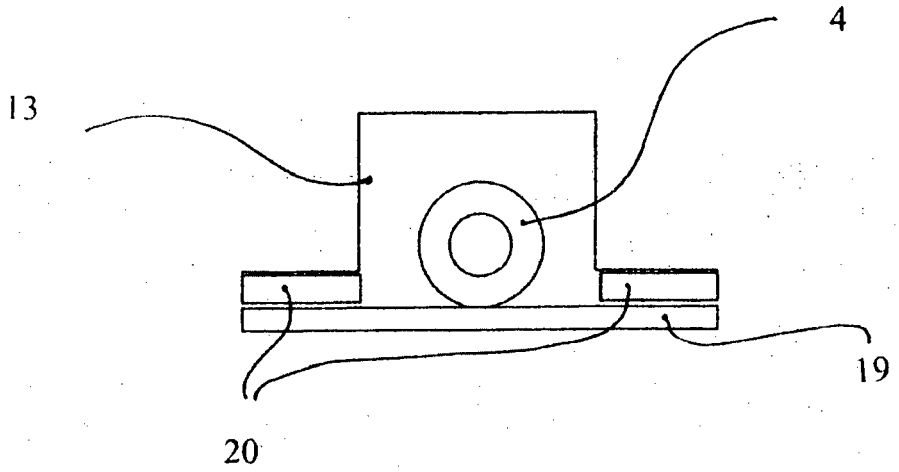

FIG 9

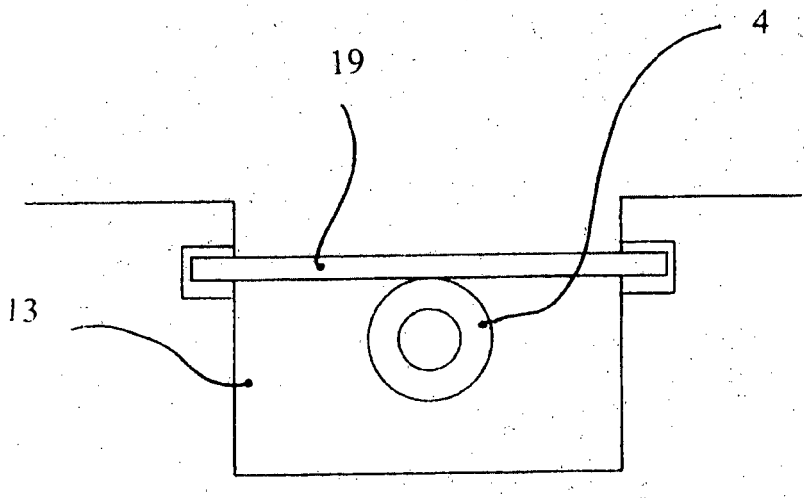

FIG 10

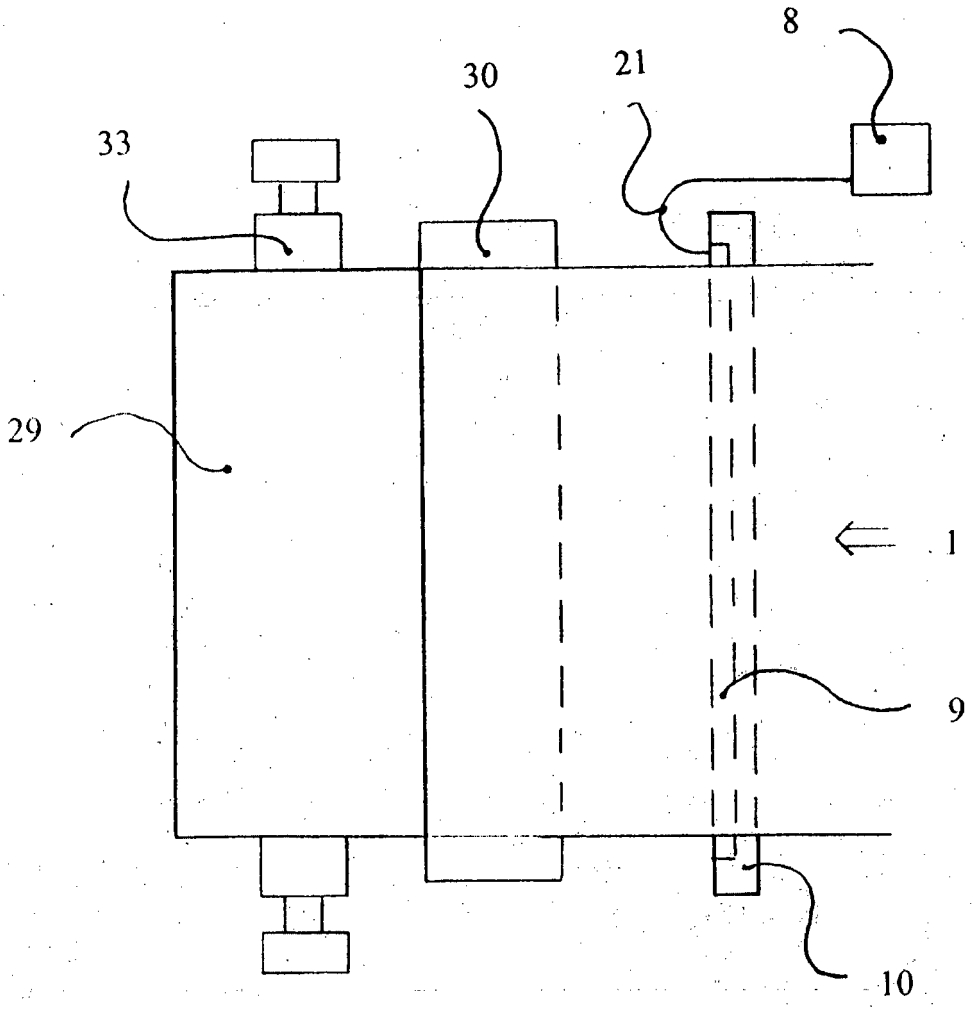

FIG 11

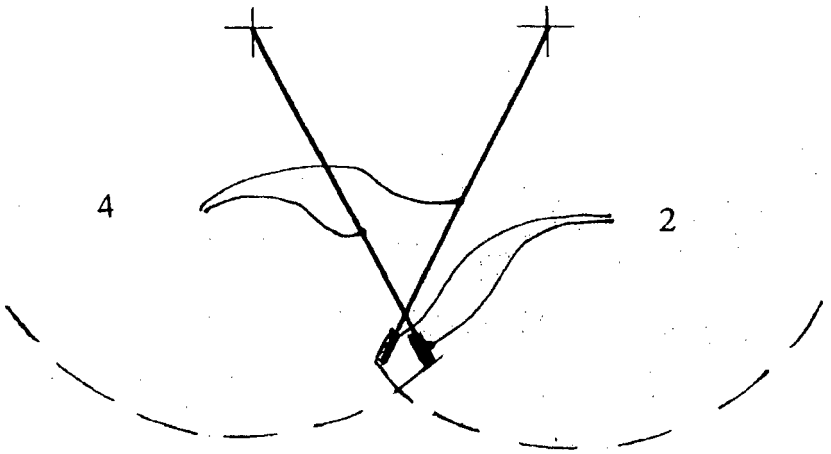

FIG 12A

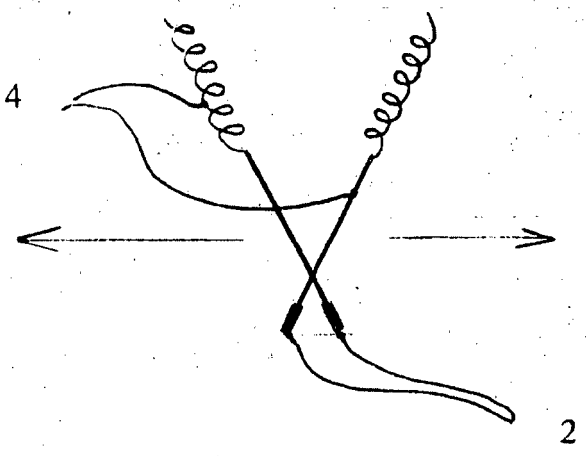

FIG 12B

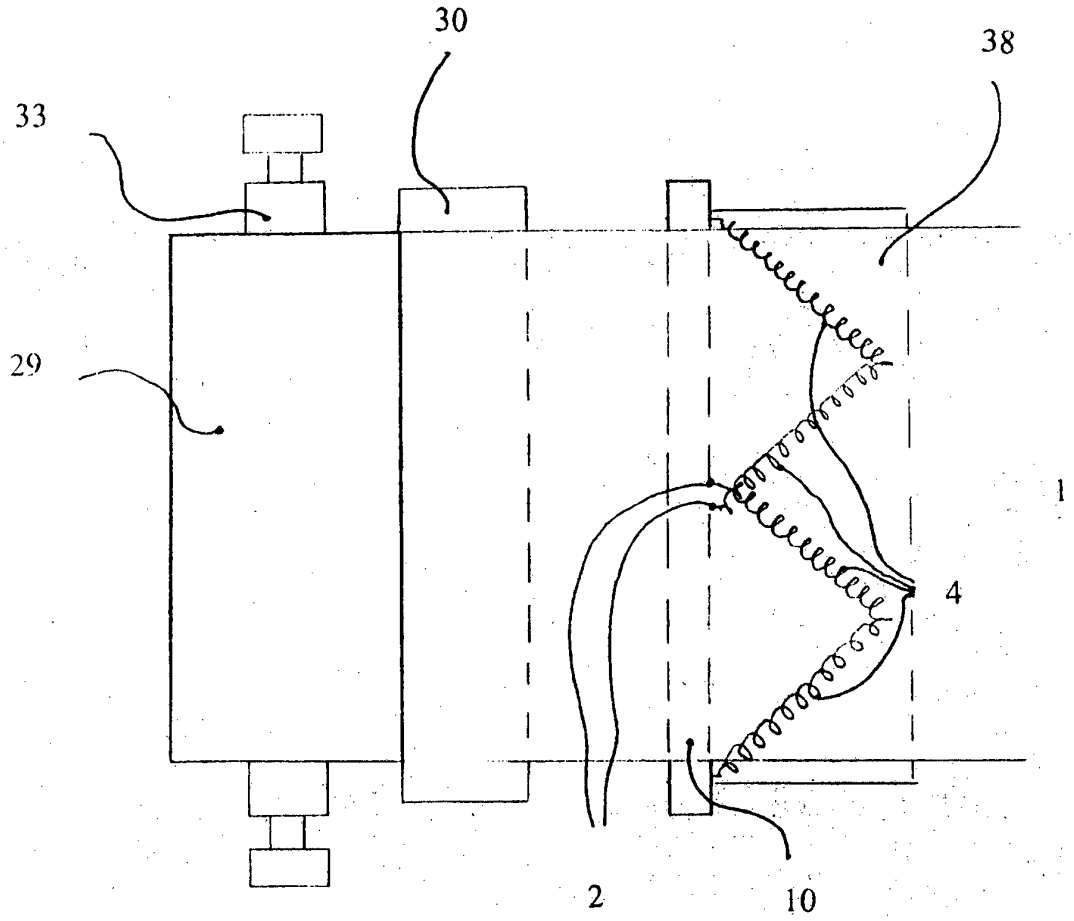

FIG 13

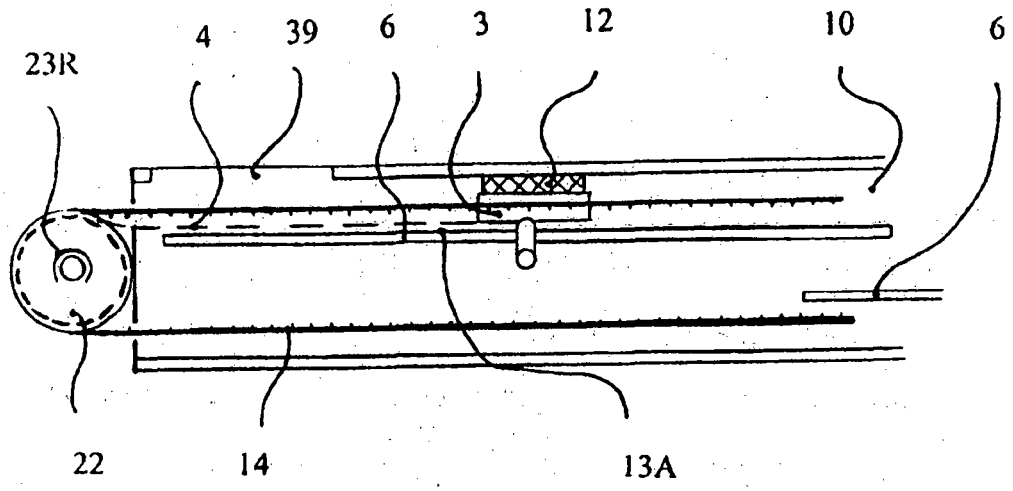

FIG 14

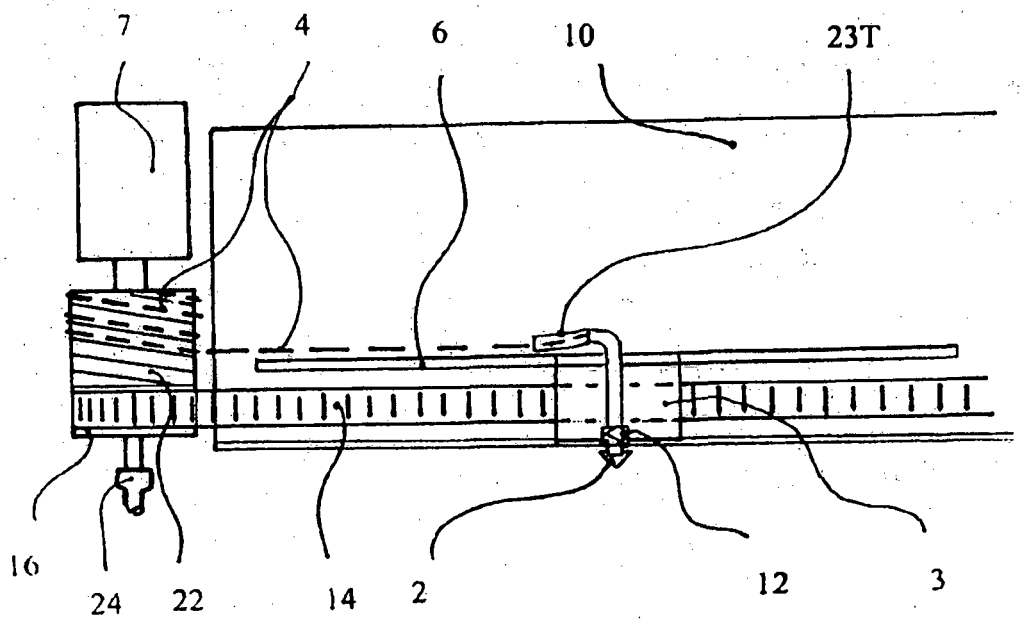

FIG 15

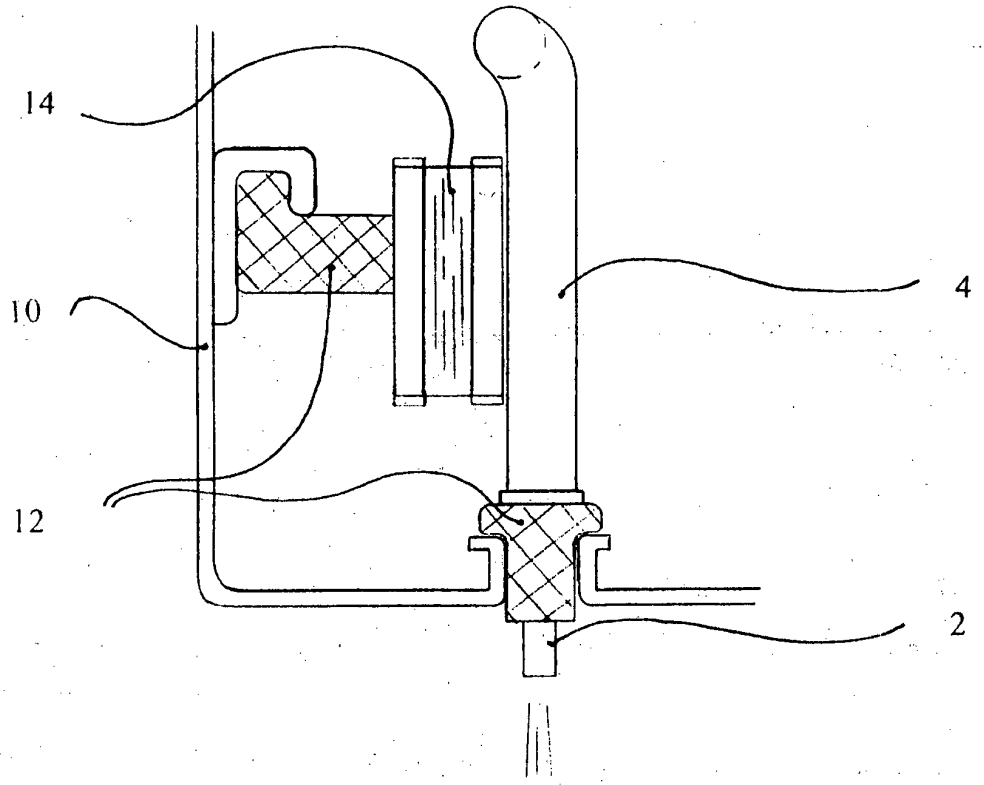

FIG 16

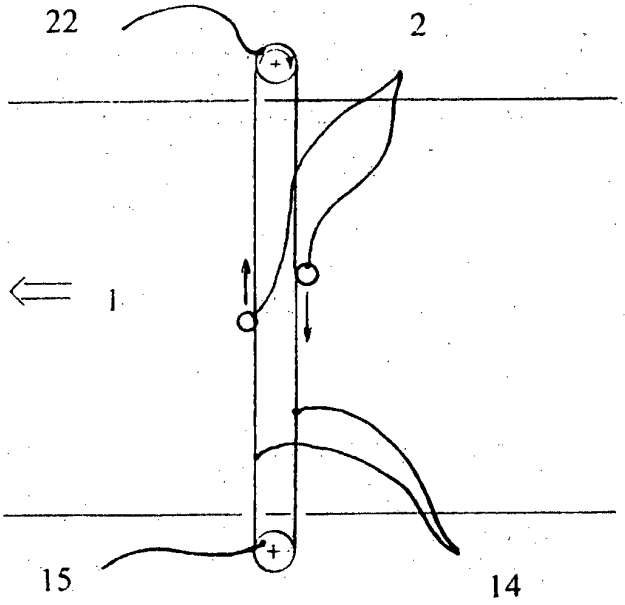

FIG 17

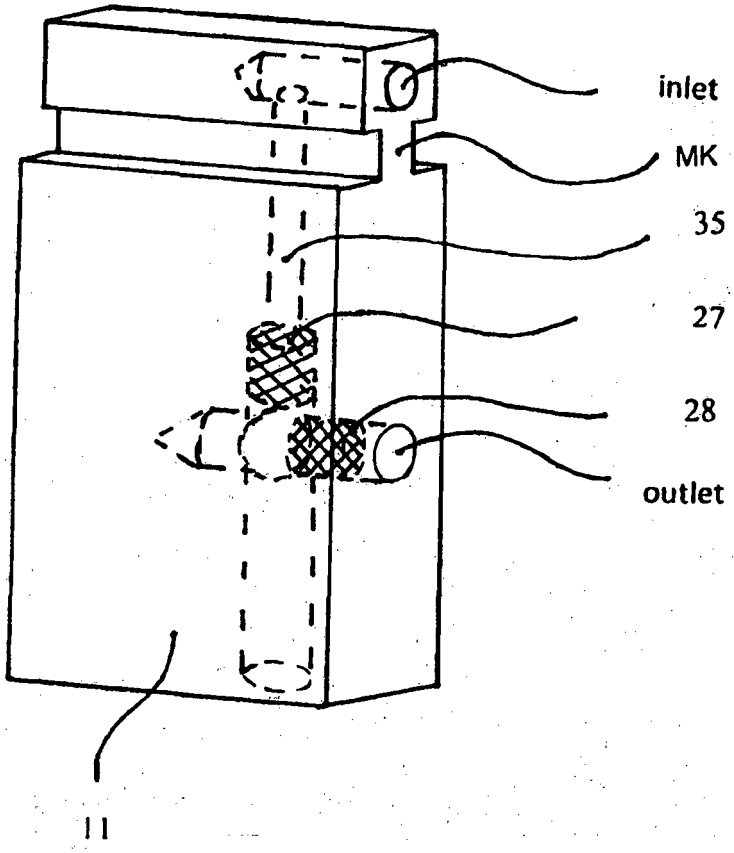

FIG 18

REFERENCES CITED IN THE DESCRIPTION

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- EP 1022380 A2 **[0003]**