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(54) **DEVICE AND METHOD FOR CATCHING AND STRETCHING WEFT THREADS IN WEAVING MACHINES**

VORRICHTUNG UND VERFAHREN ZUR ERFASSUNG UND DEHNUNG VON SCHUSSFÄDEN BEI EINER WEBMASCHINE

DISPOSITIF ET PROCÉDÉ DE SAISIE ET D'ÉTIRAGE DES FILS DE TRAME DANS UNE MACHINE À TISSER

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Description

[0001] The invention relates to a device for catching and stretching weft threads, to a weaving machine provided with a device of this type and to a method for catching and stretching weft threads.

[0002] It is known to use devices for catching and stretching a weft thread inserted through a guide channel into a shed of a weaving machine. In this case, an end of an inserted weft thread is held after arrival at the other side of the shed and before this weft thread is bound into the warp threads.

[0003] EP 1722019 A1 describes a stretching device for weft threads in an airjet weaving machine that comprises a stretching blower, which is attached to a back side of a reed, and which comprises a catching channel for weft threads, which is attached to the front side of the reed. The end of the inserted weft thread is deflected transversely to the direction of insertion toward the catching channel by an air flow from the stretching blower.

[0004] In order to avoid that the end of the weft thread inserted through the shed and that extends past the fabric edge is drawn back into the shed or into the fabric, it is known to provide so called "catch threads". In general, a small number of catch threads are provided. Catch threads of this type run next to a shed parallel to the warp threads. The catch threads hold the ends of the inserted weft threads which protrude past the fabric edge until these ends are cut off by waste scissors or the like.

[0005] For this purpose, the catch threads usually form a separate shed which can be closed earlier than the shed formed by warp threads. This allows to bind the weft thread as early as possible with the catch threads and also to bind the weft thread with a desired tension required for weaving.

[0006] However, when using catch threads, separate shed formation means for catch threads have to be provided. In addition, the catch threads themselves are waste, separate bobbins with catch threads have to be provided and a device is necessary for cutting off the catch threads from the fabric.

[0007] DE 8804276 U1 describes a pneumatic thread clamp for holding an end of a weft thread that has been inserted through the shed before the weft thread is bound by warp threads. IT 1251847 describes a thread clamp placed on a weaving sley for holding a free end of an inserted weft thread.

[0008] US 4,976,292 describes a device for holding inserted ends of weft threads that comprises a number of blades which are alternately positioned above and below and between which an inserted end of a weft thread is held by means of friction.

[0009] US 3,901,286 describes a weaving machine wherein a weft thread is inserted from one side and can interact with a device attached at the level of the opposite side or other side. This device is carried by the weaving sley and is adapted to catch, to grip and to stretch the weft thread inserted through the shed. In this case, this

device comprises a guide element and an air injector, wherein these are attached to the end of the guide channel of the reed and wherein the outlet of the guide element is bent toward the air injector perpendicularly to the guide channel in the reed. In this case, a slot in the side wall of the aforementioned air injector extends from the suction opening along a part of the length of the injector and a thread clamp is located in a fixed position between the fabric edge and the air injector. When the reed is in the beat-up position, the thread clamp is positioned in the path of the end of the inserted weft thread that extends from the fabric edge toward the air injector.

[0010] US 3,908,710 describes a weaving machine with a blowing device on one side and on the other side a device attached to the weaving sley for catching and stretching weft threads inserted through the shed. To the reed a guide element is attached which is attached to the reed displaceable in the direction of insertion. This guide element is attached in the extension of the guide channel in the reed and ends perpendicularly to the direction of insertion and in the beat-up direction of the reed. Toward the beat-up side, the receiving channel is open over its entire length. A thread clamp driveable by the weaving sley, scissors and a pneumatic suction nozzle attached transversely to the direction of insertion are also provided.

[0011] JP 51-88664 describes a device for catching and stretching weft threads inserted through a shed comprising a resilient thread clamp and a suction nozzle mounted on the weaving sley. In this case, the suction nozzle is placed to exert a suction force perpendicularly to a direction of insertion of a weft thread. A guide element with ventilation openings is attached at the level of the guide channel of the reed in order to transversely deflect the weft thread toward the suction nozzle and the thread clamp.

[0012] WO 2009/007076 A1 describes a device for tucking-in an end of an inserted weft thread and a pneumatic tucking-in device which moves together with the weaving sley. A holding blower is provided which holds an inserted weft thread until this is tucked-in by the tucking-in device. The pneumatic tucking-in device blows on the tucked-in end of the weft thread until this is bound by the warp threads.

[0013] It is the object of the invention to provide a device for catching and stretching weft threads, a weaving machine with a device of this type and a method for catching and stretching weft threads, wherein the weft thread is held with sufficient tension until the free end thereof is cut off, wherein the free end is kept short and wherein the use of catch threads can be avoided.

[0014] This object is solved by a device for catching and stretching a weft thread inserted through a guide channel into a shed of a weaving machine, wherein a pneumatic suction nozzle, a thread clamp for weft threads and a guide element for guiding a weft thread from the guide channel to the suction nozzle are attached to the weaving sley, wherein the guide element is at-

tached in order to deflect the weft thread over a limited angle of about 15° to about 45° with respect to the direction of insertion, wherein the guide element ends in the direction of insertion with a guide part for deflecting the weft thread, wherein the guide part is arranged at said limited angle of about 15° to about 45° with respect to the direction of insertion, wherein the suction nozzle is attached at an associated angle in order to catch the weft thread at this angle of about 15° to about 45°, wherein an inlet of the suction nozzle is arranged substantially in the extension of the guide part, and wherein an edge close to the inlet of the suction nozzle that is directed toward a fabric is positioned further from the reed than the opposite edge of the inlet.

[0015] The device according to the invention allows that, when the weft thread is beaten up, the free end of the inserted weft thread is drawn further past the beat-up line, so that during the beating-up a tension is exerted on the weft thread. This is advantageous to form a strong and uniform fabric edge. The strong and uniform fabric edge is achieved inter alia because the end of the inserted weft thread is brought to a position past the beat-up line and because the weft thread is held in that position with sufficient tension. A position past the beat-up line is defined as a position at a distance from the beat-up line in the direction away from the reed toward the fabric. By moving the weft thread past the beat-up line, the weft thread can be beaten up by the reed under greater tension. The moving of the inserted weft thread to a position past the beat-up line ensures additional tension in the weft thread and the keeping of the weft thread in this tensioned state is advantageous for obtaining a strong and uniform fabric edge.

[0016] This allows to form a strong and uniform fabric edge without the use of so called catch threads. As the thread clamp and the suction nozzle can be attached in front of the reed, the device according to the invention can be used both with a so called uninterrupted or continuous reed and with a reed which ends with the fabric. Of course, in addition to a reed which ends with the fabric, it is also possible to place next to the reed an additional reed, which may also be referred to as reed element, which forms together with the reed a guide channel for weft threads.

[0017] According to the invention, the suction nozzle is attached in order to bring a weft thread out of the guide channel in the reed in a direction toward the fabric. For example, the guide part of the guide element that is positioned close to the suction nozzle and the suction nozzle are attached at a limited angle of about 35° with respect to the direction of the guide channel. The attaching of the suction nozzle at an angle allows the stretching of the weft thread to take place as soon as the weft thread is caught, wherein the advancing of the weft thread is also used in order to stretch the weft thread. This means that the speed of the weft thread is used for stretching the weft thread and that the suction nozzle can exert a force, in particular a suction force, on the weft thread with a

component substantially in the direction of insertion; this is advantageous in order to be able to weave fast. If the suction nozzle is attached at an angle, an edge close to the inlet of the suction nozzle that is directed toward the shed is attached further from the reed than the opposite edge of the inlet. This is advantageous for guiding and positioning a weft thread which is deflected from the guide channel of the reed.

[0018] The guide element deflects an inserted weft thread from the guide channel of the reed before the weft thread reaches the suction nozzle. This is advantageous for increasing the weaving speed and for stretching the weft thread.

[0019] According to one embodiment, the guide element comprises a portion, in particular a tunnel-shaped portion, which is attached in the guide channel of the reed. Preferably, the tunnel-shaped portion has over its entire length an opening directed toward the fabric and toward the thread clamp; more particularly, the guide element has over its entire length a U-shaped cross section which allows a weft thread to leave the guide element in a direction away from the guide channel in the reed toward the fabric. This allows the guide element to be manufactured in a simple manner. Optionally, the guide element can be provided with holes or slots.

[0020] According to one embodiment of the invention, the guide element guides a weft thread from a guide channel in the reed to a suction nozzle attached close to the reed. In this case, the guide element can be attached in a guide channel of the reed or the guide element can be fastened to the suction nozzle, wherein the guide element is attached in such a way that the guide element abuts against the guide channel of the reed. These embodiments are particularly advantageous, as a so called continuous reed can be used. This also allows the device according to the invention to be attached along the reed in various positions which are adapted to the width of the fabric to be woven. Fabrics having any width can be woven using a reed of this type and a device according to the invention. The guide element allows a weft thread to be deflected toward the suction nozzle. In this case, the guide element is attached in a position lying before the suction nozzle in the direction of insertion of the weft thread.

[0021] According to one embodiment, the suction nozzle is attached close to the reed in order to bring a weft thread into the thread clamp; in particular, a ring-jet suction nozzle is attached in order to bring a weft thread into the thread clamp. The suction nozzle is attached to the weaving sley and moves with the reed. In a ring-jet suction nozzle, a suction operation is obtained by blowing past the inlet of the suction nozzle. Preferably, the diameter of the inlet is selected so as to be sufficiently large to allow weft threads to pass easily through the suction nozzle. After the thread clamp has clamped the inserted weft thread taken up by the suction nozzle, the suction operation of the suction nozzle can be interrupted. Because of that an air consumption for the suction operation

can be considerably reduced.

[0022] According to one embodiment of the invention, a thread clamp is attached in order to clamp an inserted weft thread at a distance from the reed close to the suction nozzle. According to one embodiment of the invention, a suction nozzle is attached in order to bring the weft thread to the thread clamp. In the direction of insertion of the weft thread, the guide element can be attached at least partially before the thread clamp, which allows to deflect the weft thread before the thread clamp and to increase the weaving speed.

[0023] According to one embodiment, the guide element is attached at least partially before the thread clamp in the direction of insertion, this means in the direction of movement of the weft thread. This allows that a weft thread is already brought out of the guide channel before this reaches the suction nozzle. This allows that the weft thread is clamped in the thread clamp earlier in the weaving cycle and can be brought further away from the guide channel of the reed, this means is moved closer toward the beat-up line before the weft thread is clamped by the thread clamp.

[0024] According to one embodiment of the invention, the thread clamp is adapted to be activated in any position of the weaving sley; more particularly, the thread clamp is a pneumatically controlled thread clamp. An independently controllable thread clamp allows to select moments of clamping and/or releasing as desired, for example depending on the moment of arrival of the inserted weft thread, depending on the moment that a defined, for example the penultimate winding is drawn off from a rewinder and/or depending on the characteristics of the inserted weft thread. The thread clamp can be activated at an appropriate moment in the weaving cycle, wherein the moment can be stored in a control unit or can be variably controlled by a control unit as a function of an arrival of a weft thread detected by a weft thread detector and/or of other parameters. According to one embodiment, the weft thread is for example clamped when the top of the weft thread has reached its outermost position outside the shed. For example, the pneumatic thread clamp comprises a fixed jaw and a movable jaw, preferably a bottom fixed jaw and a top movable jaw. A pressure element and/or a synthetic layer can be attached to one or to both jaws in order to obtain a correct clamping operation.

[0025] According to one embodiment of the invention, a holding device is attached to the frame of the weaving machine at the level of a position adapted for taking up a weft thread clamped by the thread clamp and for holding the taken up weft thread with sufficient tension. In this case, the holding device comprises a suction jaw which is attached at the level of the beat-up line close to the fabric edge. In this case, the holding device is attached in a position close to a thread cutting device which is attached between the holding device and the fabric. The holding device is attached to the weaving machine in a defined position which is adapted both for taking over a

weft thread clamped by the thread clamp in a position past the beat-up line and to hold the weft thread with sufficient tension until the free end of the weft thread is cut off and/or is bound by the warp threads.

[0026] When a weaving sley of the weaving machine moves forward to beat up the inserted weft thread which is held by the thread clamp, the weft thread is brought into an appropriate position for a hand-over to the holding device. The thread clamp releases the weft thread close to the beat-up and the weft thread is subsequently kept under tension by the holding device. When weaving continues, the fabric moves with respect to the stationary holding device. During this movement, the weft thread is held with sufficient tension by the holding device until the free end of the weft thread is cut off by the thread cutting device close to the fabric edge. If the weaving machine is provided with a temple for the fabric, the thread cutting device can be mounted on a support of a temple. By mounting the thread cutting device on the temple it is possible to cut off the weft threads so as to be acceptably short, while still sufficient space remains available for mounting the holding device.

[0027] According to one embodiment, the holding device comprises a holding blower at the level of the suction jaw of the holding device for exerting a force on the weft thread. Exerting a force, in particular a suction force, allows to maintain sufficient tension in the weft thread even when an inserted weft thread moves together with the fabric and its position changes with respect to the stationary holding device as a result of a movement of the fabric. According to one embodiment, the holding device has a suction jaw with a number of adjoining openings, wherein an opening is directed toward the reed, a lateral opening is directed toward the fabric and a lateral opening is directed away from the fabric, wherein the lateral opening of the suction jaw close to the fabric is longer than a lateral opening further away from the fabric.

[0028] According to one embodiment, the holding device, in particular the suction jaw, is adapted for receiving and removing cut-off thread ends. In this case, the holding device serves to keep the end of the weft thread tensioned and to remove the cut-off thread ends. The suction jaw has for example a width of at least 8 mm.

[0029] According to still another embodiment, the guide element further comprises a flat part which can be attached between the lamellae of a reed. This allows to fix the guide element to the reed in a simple manner, for example by gluing and the like. The flat part can also be fixed to the back side of the reed, for example by using a bolt connection and/or a clamping connection. The flat part also serves in this case to cover a possible opening between the lamellae of the reed and the guide element in order to prevent that a weft thread gets stuck between the reed and the guide element. According to a further embodiment, the guide element comprises a fastening part which for example allows to fix the guide element to the front side of the reed, for example by using a bolt connection and/or a clamping fastening.

[0030] According to one embodiment, a thread detector is attached at the level of the reed for monitoring if a weft thread extends to the guide element and/or the suction nozzle. A thread detector of this type can consist of a thread detector as described in EP 0943024, the content of which is hereby incorporated in the application.

[0031] According to one embodiment, a guide tube with an outlet which is directed toward the guide channel of the reed is connected to the suction nozzle. This arrangement allows to below a weft thread which has been sucked up out of the guide channel back into the guide channel of the reed, for example to a thread detector attached in the reed, as described in EP 0943024. This can allow to remove an incorrectly inserted weft thread. According to another embodiment, a weft thread is brought to a second suction nozzle for removing incorrectly inserted weft threads, which is attached next to the reed such as is described in EP 0310804, the content of which is hereby likewise incorporated in the application.

[0032] This object is likewise solved by a weaving machine comprising a device for catching and stretching a weft thread according to the invention.

[0033] The object is likewise solved by a method for catching and stretching a weft thread inserted through a guide channel into a shed of a weaving machine, wherein a pneumatic suction nozzle, a thread clamp for weft thread and a guide element for guiding a weft thread from the guide channel to the suction nozzle, which guide element ends in the direction of insertion with a guide part for deflecting the weft thread, are attached to the weaving sley, wherein the guide part is arranged at a limited angle of about 15° to about 45° with respect to the direction of insertion, the method comprising deflecting the weft thread by means of the guide element over said limited angle of about 15° to about 45° with respect to the direction of insertion, and catching and stretching the weft thread while moving at this limited angle of about 15° to about 45° in a suction nozzle attached to the weaving sley at an associated angle and having an inlet arranged substantially in the extension of the guide part, wherein an edge close to the inlet of the suction nozzle that is directed toward a fabric is positioned further from the reed than the opposite edge of the inlet. In this case, the thread end of the weft thread that extends toward the suction nozzle can be clamped by a thread clamp, the clamped thread end can be moved before beat-up to a position past the extension of the beat-up line, the aforementioned thread end can be taken up by a holding device provided on the frame of the weaving machine and the aforementioned thread end can be held after beat-up by the holding device with sufficient tension.

[0034] By deflecting an inserted weft thread at the other side of the shed out of the guide channel in the reed, the weft thread can be moved away from the reed in the direction toward the beat-up line, be taken up by a suction nozzle while it can move further in the direction toward the beat-up line and subsequently be clamped by a thread clamp. In this case, before the beating-up of the

weft thread, the weft thread is moved away from the reed in the direction toward the beat-up line, which allows to stretch the weft thread additionally during the beating-up. Subsequently, the clamped weft thread can be taken over by a holding device and be taken up in the holding device after being released by the thread clamp. As weaving continues, the fabric moves with respect to the holding device and the beaten-up weft thread continues to be held by the holding device with sufficient tension until the weft thread is sufficiently bound by the warp threads and the free end of the weft thread is cut off.

[0035] Further features and advantages of the invention will emerge from the following description of the embodiments illustrated in the drawings, in which:

figure 1 is a plan view of a portion of a weaving machine with a device according to the invention;

figure 2 is a view in the direction indicated by arrow F2 in figure 1 perpendicularly to the reed, wherein the weaving sley with the reed is positioned in a rear-most position;

figure 3 is a view in the direction indicated by arrow F3 in figure 2 of a holding device attached to the frame of the weaving machine;

figure 4 is a view in the direction indicated by arrow F4 in figure 3 of a holding device;

figure 5 is a simplified view in the direction indicated by arrow F5 in figure 2 of a thread clamp attached to the weaving sley;

figure 6 is a view in the direction indicated by arrow F6 in figure 5 of a thread clamp;

figure 7 is a simplified view in the direction indicated by arrow F7 in figure 2 of a guide element;

figure 8 is a simplified cross section taken along the line VIII-VIII in figure 7;

figure 9 is a variant of figure 2;

figures 10 to 17 show the embodiment of figure 2 in various positions in order to illustrate a method according to the invention;

figure 18 is a variant of figure 9.

[0036] Figures 1 and 2 show a portion of an airjet weaving machine comprising a reed 1 and a device 2 according to the invention. The reed 1 is assembled of a plurality of lamellae 3 with a U-shaped profiling that are attached next to one another and that together form a U-shaped guide channel 4 for weft threads. During weaving, a weft thread is brought into a shed by means of an air flow into

the U-shaped guide channel 4 that transports the weft thread through the U-shaped guide channel 4 in the reed 1. This air flow is generated by a main blower (not shown), as well as by a number of auxiliary blowers (not shown) positioned along the guide channel 4. The reed 1 is fastened in a known manner to a schematically illustrated weaving sley 5. The reed 1 is in this case embodied continuously and extends to past the device 2 according to the invention.

[0037] A pneumatic suction nozzle 6 attached close to the reed 1, a thread clamp 7 for weft threads and a guide element 8 attached in the guide channel 4 for guiding a weft thread from the guide channel 4 to the suction nozzle 6 are also fastened to the weaving sley 5. In the direction of insertion B, the guide element 8 is positioned before the suction nozzle 6 and allows a weft thread to be guided from the guide channel 4 to the suction nozzle 6.

[0038] As is made clear in figure 2, the guide element 8 comprises a guide part 9; more particularly, the guide element 8 ends in the direction of insertion B with a guide part 9 which is attached at a limited angle A of about 35° with respect to the direction of insertion B. The guide part 9 allows the weft thread to be deflected in the direction toward the suction nozzle 6 over a limited angle with respect to the direction of insertion B. The suction nozzle 6 can catch a weft thread moving at this angle and furthermore guide it through the suction nozzle 6. The inlet 10 of the suction nozzle 6 is arranged substantially in the extension of the guide part 9. The suction nozzle 6 is fastened in the beat-up direction C in front of the reed 1 and allows a weft thread to be moved from the guide channel 4 in the beat-up direction C, this means a weft thread to be moved toward the fabric 11. The edge 36 close to the inlet 10 of the suction nozzle 6 that is directed toward the fabric 11 is positioned further from the reed 1 than the opposite edge 37 of the inlet 10.

[0039] The thread clamp 7 is attached in order to clamp an inserted weft thread extending into the suction nozzle 6 close to the suction nozzle 6 at a distance from the reed 1. Thereby the suction nozzle 6 is in a position such that a weft thread taken up by the suction nozzle 6 moves toward the thread clamp 7 in order to be located at the level of the thread clamp 7.

[0040] The device also comprises a holding device 12 which is attached to the frame of the weaving machine. The holding device 12 is fastened at the level of a position close to the beat-up line 14 and close to the fabric edge 15 that is adapted for taking up a weft thread clamped by the thread clamp 7 and for holding the taken up weft thread with sufficient tension. The holding device 12 comprises a suction jaw 13 which is attached at the level of the beat-up line 14 of the fabric 11 close to the fabric edge 15. A schematically shown thread cutting device 16 is attached close to the fabric edge 15 in a position between the fabric edge 15 of the fabric 11 and the holding device 12. The thread cutting device 16 can consist of known scissors which are for example driven by a motor, for example scissors of the type as known from DE

2435397. Furthermore, the device also comprises a thread detector 17 in order to detect the arrival of a weft thread past the shed. The thread cutting device 16 can be fastened to a support of a temple 38.

[0041] The suction nozzle 6 is for example formed by a ring-jet suction nozzle, wherein the suction operation is obtained by the blowing force of a number of blowing nozzles 18 which blow in a passage 19 of the suction nozzle 6 that is positioned opposite the inlet 10 of the suction nozzle 6. In a guide channel 4 having a height of about 6 mm, the diameter of the inlet 10 may for example be selected as 8 mm. The blowing nozzles 18 are provided with compressed air via a supply line 20 which is connected to a compressed air source 22 via a shut-off valve 21. A suction pipe 23 is fastened to the suction nozzle 6 in order to remove weaving dust and the like. Another embodiment of a ring-jet suction nozzle is for example known from US 3880198. The suction nozzle 6 is fastened by a fastening piece 24 to the weaving sley 5, while the supply line 20 is connected to the suction nozzle 6 via a coupling piece 25. In this embodiment, the fastening piece 24 allows the suction nozzle 6 to be set at a plurality of angles, for example at a limited angle between 15° and 45° and for example about 35°. When the suction nozzle 6 is set at a defined angle, an appropriate associated guide element 8 can be attached. If a defined guide element 8 is attached, the suction nozzle 6 can be set at an appropriate associated angle.

[0042] The holding device 12 shown in figures 3 and 4 comprises a suction jaw 13 which is formed by a tube 26 which is partially closed off at the leading end by walls 27 and 28 between which a slot-shaped opening 29 is provided. The opening 29 is adjoined by two slot-shaped openings 30 and 31 each extending over a defined distance along the tube 26 in longitudinal direction. The opening 30, which is directed toward the suction nozzle 6, extends over a shorter distance in the longitudinal direction of the tube 26 than the opening 31 which is directed toward the fabric 11. The tube 26 at the level of the openings 29 to 31 has for example a width of 8 mm. The openings 29 to 31 are positioned in such a way that a weft thread arrives in the openings 29 to 31 during the beating-up of the weft thread. Furthermore the suction jaw 13 comprises a blower 32 which is connected to a compressed air source 34 via a shut-off valve 33. The suction operation of the suction jaw 13 is for example obtained by the airjet 35 from the blower 32 which blows onto the oblique wall 27 and/or by a suction operation which is exerted via the removal tube 64 which is connected to the tube 26. The compressed air source 34 can of course be replaced by the compressed air source 22. The holding device 12 is fastened to the frame 73 of the weaving machine in an adjustable position via a fastening element 72, more particularly with the suction jaw 13 close to the beat-up line 14 in order to allow a weft thread to be taken up.

[0043] The thread clamp 7 shown in figures 5 and 6 comprises a bottom, fixedly arranged jaw 39 and a top,

movable jaw 40 which is driven pneumatically. The jaw 39 comprises for example a wear-resistant and elastic synthetic layer. In an embodiment the jaw 39 comprises a wear-resistant layer, for example a metal blade, that is supported by an elastic layer, for example a synthetic or a rubber layer having damping properties. The jaw 40 is embodied in one piece with a lever arm 41 which can be driven by a pneumatic cylinder 42 or 43 in both directions. The cylinders 42, 43 are respectively connected to a compressed air source 46 via a shut-off valve 44, 45. The compressed air source 46 can be replaced by the compressed air source 22 or 34. The shut-off valves 44 and 45 can be controlled by the control unit 47 of the weaving machine.

[0044] The control unit 47 can also control various other components of the weaving machine, in particular inter alia the shut-off valves 21 and 33. The control unit 47 also interacts with the thread detector 17 in order to allow the shut-off valves 21, 33, 44 and 45 to be controlled at an appropriate moment in the weaving cycle or in any position of the weaving sley 5. The pneumatically commanded thread clamp 7 is adapted to allow to be controlled in any position of the weaving sley. The thread clamp 7 further comprises a support 48 which is fastened by a fastening element 49 and a clamping element 50 to a cross bar 51 of the weaving sley 5 which moves back and forth, which cross bar 51 also carries the reed 1. The reed 1 comprises a U-shaped guide channel 4 which is delimited inter alia by a beat-up face 77 for beating up weft threads against the beat-up line 14. Furthermore, the weaving sley 5 also comprises a sley shaft 52 and support elements 53 connecting the cross bar 51 and the sley shaft 52. The jaw 40 is fastened to the support 48 so as to be rotatable about an axis 54.

[0045] The guide element 8 shown in figures 7 and 8 comprises a tunnel-shaped portion 55, more particularly a U-shaped portion with vertical walls 58, 59 and 60, an upper wall 61 and a lower wall 62 that is positioned at the level of the guide channel 4 in the lamellae 3 of the reed 1. The portion 55 comprises an entrance 63 which almost adjoins the walls of the guide channel 4. The guide element 8 ends, in the direction of movement of the weft thread, with the guide part 9, which guide part 9 is substantially formed by a vertical wall 60. The wall 60 adjoins the vertical wall 58 via the vertical wall 59, which wall 58 almost adjoins the guide channel 4. The vertical wall 59 has an angle to the direction of insertion B that is about half the angle A of the vertical wall 60 and allows a weft thread to be gradually deflected along the walls 58, 59 and 60 of the guide element 8. The portion 55 comprises over its entire length an opening 56 which is directed toward the fabric 1 and toward the thread clamp 7. Furthermore the guide element 8 comprises a flat part 57 which can be attached between lamellae 3 of a reed 1, for example can be glued there in between in order to fasten the guide element 8 to the reed 1. The flat part 57 is positioned close to the entrance 63. The opening 56 allows a weft thread to move out of the guide element 8

in the direction D. Figure 7 also shows a shed 69 which is formed between warp threads 70 and 71.

[0046] Figure 9 describes a variant embodiment wherein a guide tube 65 is connected to the suction nozzle 6 with an outlet 66 which is directed toward the guide channel 4. This allows to detect an incorrectly inserted weft thread by a second thread detector 67 and/or to remove an incorrectly weft thread. In this embodiment, the guide element 8 is fastened by a support 68 to the suction nozzle 6 so that the guide element 8 is arranged at the level of the guide channel 4. In the embodiment of figure 9, the guide element 8 is arranged at the level of a reed 74, which may also be referred to as reed element, which is arranged in the extension of the reed 1 for beating up weft threads. The reed 74 has in this case almost the same shape as the reed 1 so that a continuous guide channel 4 is formed along the reeds 1 and 74. Of course, more than two reeds can be arranged next to one another in one another's extension in order to jointly form a continuous guide channel 4. According to a variant (not shown), the guide element 8 can likewise be fastened by a support to the reed 1 or 74. Nevertheless, the device according to the invention is particularly suitable for interacting with a continuous reed 1, so that the attaching of an additional reed 74 can be avoided. In this embodiment, the suction jaw 13 of the holding device 12 has a narrowing shape in a direction away from the blowing device 32.

[0047] The method according to the invention, wherein a weft thread 75 is deflected by a guide element 8 over a limited angle A with respect to the direction of insertion B and caught at this angle A in a suction nozzle 6, will be explained further with reference to figures 10 to 17.

[0048] A weft thread 75 is inserted through the guide channel 4 in the shed 69 to a position past the fabric edge 15. In this case, the thread end 76 of the inserted weft thread 75 is deflected by the guide element 8 out of the guide channel 4 of the reed 1 at a limited angle A before the weft thread 75 reaches the suction nozzle 6 and is caught by the suction nozzle 6. A position as shown in figure 10 is in this case reached. During the catching, the shut-off valve 21 for the suction nozzle 6 is activated so that the suction nozzle 6 can exert a force on the weft thread 75. As a result of the limited angle A by which the weft thread 75 is deflected, the weft thread 75 is guided substantially at its insertion speed to the suction nozzle 6, allowing the inertia of the moving weft thread 75 and the air current through the guide channel 4 to be used in order to stretch the weft thread 75. The shape of the guide element 8 allows in this case the weft thread 75 together with the air current through the guide channel 4 to be progressively deflected, as a result of which the weft thread 75 and the air current move further into the suction nozzle 6 almost at the same speed as through the shed 69. As a result of the force of the suction operation of the suction nozzle 6 and the inertia of the weft thread 75, the weft thread 75 is moved away from the guide channel 4 and out of the guide element 8, so that a position as

shown in figure 11 is successively reached.

[0049] Subsequently, the weft thread 75 is advanced until the thread end 76 of the weft thread 75 is located between the jaws 39, 40 of the thread clamp 7, as shown in figure 12. In this position, the shut-off valves 44, 45 are controlled in such a way that the thread clamp 7 is closed. As the thread clamp 7 is commanded pneumatically, the thread clamp 7 can be closed at any moment in the weaving cycle, allowing the thread clamp 7 to close at a moment that the thread end 76 is located in the thread clamp 7. The thread clamp 7 is for example closed after a set time delay after a thread detector of a prewinder (not shown) detects for example the unwinding of the penultimate or last winding and/or after a set time delay after the thread detector 17 detects a weft thread 75 which has arrived. This allows to clamp each weft thread 75 at a suitable moment in the weaving cycle. When the thread clamp 7 clamps the weft thread 75 as shown in figure 13, the shut-off valve 21 of the suction nozzle 6 can be closed, allowing the suction operation of the suction nozzle 6 to be terminated from a position as shown in figure 13. This allows to limit the air consumption of the suction nozzle 6. The activating of the auxiliary blowers can also be interrupted from the moment that the thread clamp 7 clamps the weft thread 75. This allows to limit considerably the air consumption of the auxiliary blowers compared to known weaving machines wherein the auxiliary blowers for example continue to blow until the weft thread is almost bound.

[0050] In the meantime, the reed 1 moves with the device 2 and the clamped weft thread 75 toward the beat-up line 14, so that the clamped thread end 76 moves past the extension of the beat-up line 14 and the weft thread 75 makes contact with the beat-up line 14 as shown in figure 14. Subsequently, the reed 1 advances toward the beat-up line 14 and the thread end 76 is drawn further past the beat-up line 14, so that an elongation is imposed on the thread end 76 and an additional tension is exerted on the weft thread 75, as the weft thread 75 is bent around the fabric 11 at the level of the fabric edge 15. In order to further increase the tension in the weft thread 75, the weft thread 75 can in this case also be bent at the level of the opening 30, as shown in figure 15. The fact that the weft thread 75 rests against the opening 30 also allows to position the weft thread 75 opposite the blower 32. Subsequently, the weft thread 75 is beaten up by the beat-up face 77 of the reed 1 completely against the beat-up line 14, as shown in figure 16. While the weft thread 75 is beaten up, the weft thread 75 is likewise bound by the warp threads 70, 71. In this case, the device 2 according to the invention allows the weft thread 75 to be kept under sufficient tension at the level of the fabric edge 15 while it is beaten up, so that a good weaving-in of the weft thread 75 can be obtained at the level of the fabric edge 15.

[0051] From the position of figure 15, the weft thread 75 is located at the level of the suction jaw 13 of the holding device 12, wherein a force is exerted by the suc-

tion jaw 13 on the weft thread 75. As the reed 1 subsequently moves away from the beat-up line 14 or after the weft thread 75 has been beaten up, the weft thread 75 is held by the holding device 12 at sufficient tension. Subsequently, the thread clamp 7 is opened; more particularly, the thread clamp is for example opened shortly after beating up the weft thread 75 and before the weft thread 75 would be drawn away from the beat-up line 14 by the thread clamp 7. In this case, the thread end 76 is taken up further and kept under tension by the holding device 12, as shown in figure 17. A holding device 12 holds in this case a plurality of weft threads past the fabric edge 15 until those close to the fabric edge 15 are cut off by the thread cutting device 16. Subsequently, the cut-off thread end 76 is removed via the removal tube 64 of the holding device 12. The weaving cycle of figures 10 to 17 can subsequently be repeated.

[0052] As shown in figure 18, the suction nozzle 6 has a fastening piece 24 that is fastened to the weaving sley 5 with bolts 78. The distance of the fastening piece 24 and/or its inclination with respect to the weaving sley 5 can be adjusted by providing intermediate plates 79 having a defined thickness, for example 0,5mm to 2mm, and/or having a wedge-shaped form in the length direction of the weaving sley 5, for example a wedge-shape of a few degrees. In this embodiment the guide tube 65 connected to the suction nozzle 6 has a slit 80 that is provided near the outlet 66 in the direction away from the guide channel 4. This allows air to escape out of the guide tube 65 mainly in a direction as indicated with arrows 81, so that an incorrectly inserted weft thread is guided smoothly to the second thread detector 67. The suction operation of the suction jaw 13 of the holding device 12 may be obtained by a ring-jet 82. The flat element 57 of the guide element 8 is fixed to the reed 1 by means of a clamping fastening 83, for example a spring blade clips that protrudes through an opening in the flat element 57 or as known from EP 133 153.

[0053] In the case of weak yarns, the thread clamp 7 can for example already be opened before the weft thread 75 is beaten up against the beat-up line 14, which prevents that the tension in the weak yarn would rise too high. After opening the thread clamp 7 the weft thread 75 is in this case also further held by the holding device 12. According to a further variant, the clamping force with which the thread clamp 7 clamps the weft thread 75 can be set in accordance with a value, for example at a value allowing the weft thread 75 to be sufficiently clamped and/or allowing the weft thread 75 to slide through the thread clamp 7 at a too high tension in the weft thread 75. The clamping force can also be set in accordance with a pattern, for example so as to be high when the clamping begins and lower when the reed 1 is located closer to the beat-up line 14.

[0054] The device, the weaving machine and the method according to the invention are of course not limited to the embodiments which have been described by way of example and are illustrated in the figures. The device,

the weaving machine and the method can likewise be embodied within the scope of protection of the claims in accordance with variant embodiments, shapes and dimensions. Combinations of the illustrated embodiments that come under the scope of protection of the claims are also possible.

Claims

1. Device for catching and stretching a weft thread (75) inserted through a guide channel (4) into a shed (69) of a weaving machine, wherein a pneumatic suction nozzle (6) for catching the weft thread (75), a thread clamp (7) for clamping the weft thread (75) and a guide element (8) for guiding the weft thread (75) from the guide channel (4) to the suction nozzle (6) are attached to a weaving sley (5), **characterized in that** the guide element (8) is attached to the weaving sley (5) in order to deflect the weft thread (75) over a limited angle (A) of about 15° to about 45° with respect to the direction of insertion (B), **in that** the guide element (8) ends in the direction of insertion with a guide part (9) for deflecting the weft thread (75), wherein the guide part (9) is arranged at said limited angle (A) of about 15° to about 45° with respect to the direction of insertion (B), **in that** the suction nozzle (6) is attached to the weaving sley (5) at an associated angle in order to catch and stretch the weft thread (75) moving at said limited angle (A) of about 15° to about 45°, and **in that** an inlet (10) of the suction nozzle (6) is arranged substantially in the extension of the guide part (9), wherein an edge (36) close to the inlet (10) of the suction nozzle (6) that is directed toward a fabric (11) is positioned further from the reed (1) than the opposite edge (37) of the inlet (10).
2. Device according to claim 1, **characterized in that** the guide element (8) comprises a U-shaped portion (55) with vertical walls (58, 59, 60), an upper wall (61), and a lower wall (62), and with an opening (56) extending over its entire length, which opening (56) is directed toward a fabric (11), wherein the U-shaped portion (55) is arranged in the guide channel (4) of the reed (1).
3. Device according to claim 1 or 2, **characterized in that** the guide element (8) guides a weft thread (75) from the guide channel (4) in a reed (1) to the suction nozzle (6) attached close to the reed (1).
4. Device according to claim 1, 2 or 3, **characterized in that** the guide element (8) is attached in the guide channel (4) of the reed (1).
5. Device according to any one of claims 1 to 4, **characterized in that** the guide part (9) is attached at an angle (A) of about 35° with respect to the direction of insertion (B).
6. Device according to any one of claims 1 to 5, **characterized in that** a thread clamp (7) is attached in order to clamp an inserted weft thread (75) at a distance from the reed (1) close to the suction nozzle (6).
7. Device according to any one of claims 1 to 6, **characterized in that** the suction nozzle (6) is attached in order to bring the weft thread (75) to the thread clamp (7).
8. Device according to claim 6 or 7, **characterized in that** the thread clamp (7) is adapted to be activated in any position of the weaving sley (5), more particularly **in that** the thread clamp (7) is a pneumatically controlled thread clamp (7).
9. Device according to any one of claims 1 to 8, **characterized in that** a holding device (12) is attached to the frame (73) of the weaving machine at the level of a position adapted for taking up a weft thread (75) clamped by the thread clamp (7) and for holding the taken up weft thread (75) with sufficient tension.
10. Device according to claim 9, **characterized in that** the holding device (12) comprises a suction jaw (13) which is attached at the level of the beat-up line (14) close to the fabric edge (15).
11. Device according to claim 9 or 10, **characterized in that** the holding device (12) is attached in a position close to a thread cutting device (16) which is attached between the holding device (12) and the fabric (11).
12. Weaving machine, **characterized in that** the weaving machine comprises a device according to any one of claims 1 to 11.
13. Method for catching and stretching a weft thread (75) inserted through a guide channel (4) into a shed (69) of a weaving machine, wherein a pneumatic suction nozzle (6) for catching the weft thread (75), a thread clamp (7) for clamping the weft thread (75) and a guide element (8) for guiding the weft thread (75) from the guide channel (4) to the suction nozzle (6), which guide element (8) ends in the direction of insertion with a guide part (9) for deflecting the weft thread (75), are attached to the weaving sley (5), wherein the guide part (9) is arranged at a limited angle (A) of about 15° to about 45° with respect to the direction of insertion (B), the method comprising deflecting the weft thread (75) by means of the guide element (8) over said limited angle (A) of about 15° to about 45° with respect to the direction of insertion (B), and catching and stretching the weft thread (75)

while moving at this limited angle (A) of about 15° to about 45° in a suction nozzle (6) attached to the weaving sley (5) at an associated angle and having an inlet (10) arranged substantially in the extension of the guide part (9), wherein an edge (36) close to the inlet (10) of the suction nozzle (6) that is directed toward a fabric (11) is positioned further from the reed (1) than the opposite edge (37) of the inlet (10).

14. Method according to claim 13, **characterized in that** the thread end (76) of the weft thread (75) that extends toward the suction nozzle (6) is clamped by a thread clamp (7), **in that** the clamped thread end (76) is moved before beat-up to a position past the extension of the beat-up line (14), **in that** the aforementioned thread end (76) is taken up by a holding device (12) provided on the frame (73) of the weaving machine and **in that** the aforementioned thread end (76) is held after beat-up by the holding device (12) with a sufficient tension.

Patentansprüche

1. Vorrichtung zum Fangen und Strecken eines durch einen Führungskanal (4) in ein Webfach (69) einer Webmaschine eingetragenen Schussfadens (75), wobei eine pneumatische Saugdüse (6) zum Fangen des Schussfadens (75), eine Fadenklemme (7) zum Klemmen des Schussfadens (75) und ein Führungselement (8) zum Führen des Schussfadens (75) aus dem Führungskanal (4) zu der Saugdüse (6) auf einer Weblade (5) angebracht sind, **dadurch gekennzeichnet, dass** das Führungselement (8) auf der Weblade (5) angebracht ist, um den Schussfaden (75) über einen begrenzten Winkel (A) von etwa 15° bis etwa 45° gegenüber der Eintragsrichtung (B) abzulenken, dass das Führungselement (8) in der Eintragsrichtung mit einem Führungsteil (9) zum Ablenken des Schussfadens (75) endet, wobei das Führungsteil (9) im obengenannten begrenzten Winkel (A) von etwa 15° bis etwa 45° gegenüber der Eintragsrichtung (B) angeordnet ist, dass die Saugdüse (6) in einem zugehörigen Winkel auf der Weblade (5) angebracht ist, um den Schussfaden (75), der sich im obengenannten begrenzten Winkel (A) von etwa 15° bis etwa 45° bewegt, zu fangen und zu strecken, und dass ein Einlass (10) der Saugdüse (6) im Wesentlichen in Verlängerung des Führungsteils (9) angeordnet ist, wobei ein Rand (36) nahe dem Einlass (10) der Saugdüse (6), der zu einem Gewebe (11) gerichtet ist, weiter vom Webblatt (1) positioniert ist als der gegenüberliegende Rand (37) des Einlasses (10).
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Führungselement (8) ein U-förmiges Teil (55) mit vertikalen Wänden (58, 59, 60),

einer Oberwand (61) sowie einer Unterwand (62) und mit einer Öffnung (56), die sich über seine gesamte Länge erstreckt, umfasst, welche Öffnung (56) zu einem Gewebe (11) gerichtet ist, wobei das U-förmige Teil (55) im Führungskanal (4) des Webblatts (1) angeordnet ist.

3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Führungselement (8) einen Schussfaden (75) aus dem Führungskanal (4) in ein Webblatt (1) zu der nahe des Webblatts (1) angebrachten Saugdüse (6) führt.
4. Vorrichtung nach Anspruch 1, 2 oder 3, **dadurch gekennzeichnet, dass** das Führungselement (8) im Führungskanal (4) des Webblatts (1) angebracht ist.
5. Vorrichtung nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** das Führungsteil (9) in einem Winkel (A) von etwa 35° gegenüber der Eintragsrichtung (B) angebracht ist.
6. Vorrichtung nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** eine Fadenklemme (7) zum Klemmen eines eingetragenen Schussfadens (75) in einem Abstand vom Webblatt (1) nahe der Saugdüse (6) angebracht ist.
7. Vorrichtung nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** die Saugdüse (6) angebracht ist, um den Schussfaden (75) zu der Fadenklemme (7) zu bringen.
8. Vorrichtung nach Anspruch 6 oder 7, **dadurch gekennzeichnet, dass** die Fadenklemme (7) angepasst ist, um in jeder Position der Weblade (5) aktiviert zu werden, insbesondere, dass die Fadenklemme (7) eine pneumatisch gesteuerte Fadenklemme (7) ist.
9. Vorrichtung nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** eine Haltevorrichtung (12) an dem Gestell (73) der Webmaschine im Bereich einer zum Aufnehmen eines durch die Fadenklemme (7) geklemmten Schussfadens (75) und zum Halten des aufgenommenen Schussfadens (75) mit ausreichender Spannung angepassten Position angebracht ist.
10. Vorrichtung nach Anspruch 9, **dadurch gekennzeichnet, dass** die Haltevorrichtung (12) einen Saugmund (13) umfasst, der im Bereich der Anschlaglinie (14) nahe des Geweberandes (15) angebracht ist.
11. Vorrichtung nach Anspruch 9 oder 10, **dadurch gekennzeichnet, dass** die Haltevorrichtung (12) in einer Position nahe einer Fadenschneideeinrichtung

(16) angebracht ist, die zwischen der Haltevorrichtung (12) und dem Gewebe (11) angebracht ist.

12. Webmaschine, **dadurch gekennzeichnet, dass** die Webmaschine eine Vorrichtung nach einem der Ansprüche 1 bis 11 enthält. 5
13. Verfahren zum Fangen und Strecken eines durch einen Führungskanal (4) in ein Webfach (69) einer Webmaschine eingetragenen Schussfadens (75), wobei eine pneumatische Saugdüse (6) zum Fangen des Schussfadens (75), eine Fadenklemme (7) zum Klemmen des Schussfadens (75) und ein Führungselement (8) zum Führen des Schussfadens (75) aus dem Führungskanal (4) zu der Saugdüse (6), welches Führungselement (8) in der Eintragsrichtung mit einem Führungsteil (9) zum Ablenken des Schussfadens (75) endet, auf der Weblade (5) angebracht sind, wobei das Führungsteil (9) in einem begrenzten Winkel (A) von etwa 15° bis etwa 45° gegenüber der Eintragsrichtung (B) angeordnet ist, wobei das Verfahren ein Ablenken des Schussfadens (75) mittels des Führungselements (8) über obengenannten begrenzten Winkel (A) von etwa 15° bis etwa 45° gegenüber der Eintragsrichtung (B), und ein Fangen und Strecken des Schussfadens (75) beim Bewegen in diesem begrenzten Winkel (A) von etwa 15° bis etwa 45° in einer Saugdüse (6), die auf der Weblade (5) in einem zugehörigen Winkel angebracht ist und einen im Wesentlichen in Verlängerung des Führungsteils (9) angeordneten Einlass (10) aufweist, umfasst, wobei ein Rand (36) nahe dem Einlass (10) der Saugdüse (6), der zu einem Gewebe (11) gerichtet ist, weiter vom Webblatt (1) positioniert ist als der gegenüberliegende Rand (37) des Einlasses (10). 10 15 20 25 30 35
14. Verfahren nach Anspruch 13, **dadurch gekennzeichnet, dass** das Fadenende (76) des Schussfadens (75), das sich zur Saugdüse (6) erstreckt, durch eine Fadenklemme (7) geklemmt wird, dass das geklemmte Fadenende (76) vor dem Anschlag zu einer Position hinter der Verlängerung der Anschlaglinie (14) bewegt wird, dass das obengenannte Fadenende (76) durch eine Haltevorrichtung (12) aufgenommen wird, die an dem Gestell (73) der Webmaschine vorgesehen ist, und dass das obengenannte Fadenende (76) nach dem Anschlag durch die Haltevorrichtung (12) mit einer ausreichenden Spannung gehalten wird. 40 45 50

Revendications

1. Dispositif pour capturer et étirer un fil de trame (75) inséré à travers un canal de guidage (4) dans une foule (69) d'une machine à tisser, dans lequel une buse d'aspiration (6) pneumatique pour capturer le 55

fil de trame (75), un pince-fil (7) pour serrer le fil de trame (75) et un élément de guidage (8) pour guider le fil de trame (75) du canal de guidage (4) vers la buse d'aspiration (6) sont disposés sur un battant (5), **caractérisé en ce que** l'élément de guidage (8) est disposé sur le battant (5) pour dévier le fil de trame (75) selon un angle (A) limité d'environ 15° à environ 45° par rapport à la direction d'insertion (B), **en ce que** l'élément de guidage (8) finit dans la direction d'insertion avec une partie de guidage (9) pour dévier le fil de trame (75), dans lequel la partie de guidage (9) est disposée audit angle (A) limité d'environ 15° à environ 45° par rapport à la direction d'insertion (B), **en ce que** la buse d'aspiration (6) est disposé à un angle associé sur le battant (5) pour capturer et étirer le fil de trame (75) se déplaçant audit angle (A) limité d'environ 15° à environ 45°, et **en ce qu'**une entrée (10) de la buse d'aspiration (6) est disposée sensiblement dans le prolongement de la partie de guidage (9), dans lequel un bord (36) à proximité de l'entrée (10) de la buse d'aspiration (6) qui est dirigée vers un tissu (11) est positionné plus loin du peigne (1) que le bord (37) opposé de l'entrée (10).

2. Dispositif selon la revendication 1, **caractérisé en ce que** l'élément de guidage (8) comprend une partie en forme de U (55) avec des parois verticales (58, 59, 60), une paroi supérieure (61) et une paroi inférieure (62), et ayant une ouverture (56) s'étendant sur toute sa longueur, laquelle ouverture (56) est dirigée vers un tissu (11), dans lequel la partie en forme de U (55) est disposée dans le canal de guidage (4) du peigne (1).
3. Dispositif selon la revendication 1 ou 2, **caractérisé en ce que** l'élément de guidage (8) guide un fil de trame (75) du canal de guidage (4) dans un peigne (1) à la buse d'aspiration (6) disposée à proximité du peigne (1).
4. Dispositif selon la revendication 1, 2 ou 3, **caractérisé en ce que** l'élément de guidage (8) est disposé dans le canal de guidage (4) du peigne (1).
5. Dispositif selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** la partie de guidage (9) est disposée à un angle (A) d'environ 35° par rapport à la direction d'insertion (B).
6. Dispositif selon l'une quelconque des revendications 1 à 5, **caractérisé en ce qu'**un pince-fil (7) est disposé pour serrer un fil de trame (75) inséré à une distance du peigne (1) à proximité de la buse d'aspiration (6).
7. Dispositif selon l'une quelconque des revendications 1 à 6, **caractérisé en ce que** la buse d'aspiration

(6) est disposée pour amener le fil de trame (75) vers le pince-fil (7).

8. Dispositif selon la revendication 6 ou 7, **caractérisé en ce que** le pince-fil (7) est adapté pour être activé dans toutes les positions du battant (5), plus particulièrement que le pince-fil (7) est un pince-fil (7) à commande pneumatique. 5
9. Dispositif selon l'une quelconque des revendications 1 à 8, **caractérisé en ce qu'un** dispositif de maintien (12) est disposé sur le bâti (73) de la machine à tisser au niveau d'une position adaptée pour prendre un fil de trame (75) serré par le pince-fil (7) et pour maintenir le fil de trame (75) pris avec une tension suffisante. 10 15
10. Dispositif selon la revendication 9, **caractérisé en ce que** le dispositif de maintien (12) comprend une bouche d'aspiration (13) qui est disposée au niveau de la ligne de frappe (14) à proximité du bord du tissu (15). 20
11. Dispositif selon la revendication 9 ou 10, **caractérisé en ce que** le dispositif de maintien (12) est disposé dans une position à proximité d'un dispositif de coupe de fil (16) qui est disposé entre le dispositif de maintien (12) et le tissu (11). 25
12. Machine à tisser, **caractérisée en ce que** la machine à tisser comprend un dispositif selon l'une quelconque des revendications 1 à 11. 30
13. Procédé pour capturer et étirer un fil de trame (75) inséré à travers un canal de guidage (4) dans une foule (69) d'une machine à tisser, dans lequel une buse d'aspiration (6) pneumatique pour capturer le fil de trame (75), un pince-fil (7) pour serrer le fil de trame (75) et un élément de guidage (8) pour guider le fil de trame (75) du canal de guidage (4) vers la buse d'aspiration (6), lequel élément de guidage (8) finit dans la direction d'insertion avec une partie de guidage (9) pour dévier le fil de trame (75), sont disposés sur le battant (5), dans lequel la partie de guidage (9) est disposée à un angle (A) limité d'environ 15° à environ 45° par rapport à la direction d'insertion (B), le procédé comprenant la déviation du fil de trame (75) au moyen de l'élément de guidage (8) audit angle (A) limité d'environ 15° à environ 45° par rapport à la direction d'insertion (B), et la capture et l'étirement du fil de trame (75) en se déplaçant à cet angle (A) limité d'environ 15° à environ 45° dans une buse d'aspiration (6) disposée sur le battant (5) à un angle associé et ayant une entrée (10) disposée sensiblement dans le prolongement de la partie de guidage (9), dans lequel un bord (36) à proximité de l'entrée (10) de la buse d'aspiration (6) qui est dirigée vers un tissu (11) est positionné plus loin du peigne 35 40 45 50 55

(1) que le bord (37) opposé de l'entrée (10).

14. Procédé selon la revendication 13, **caractérisé en ce que** l'extrémité de fil (76) du fil de trame (75) s'étendant vers la buse d'aspiration (6) est serrée par un pince-fil (7), **en ce que** l'extrémité de fil (76) serrée est déplacée avant la frappe vers une position au-delà du prolongement de la ligne de frappe (14), **en ce que** l'extrémité de fil (76) susmentionnée est prise par un dispositif de maintien (12) prévu sur le bâti (73) de la machine à tisser et **en ce que** l'extrémité de fil (76) susmentionnée est maintenue après la frappe par le dispositif de maintien (12) avec une tension suffisante.

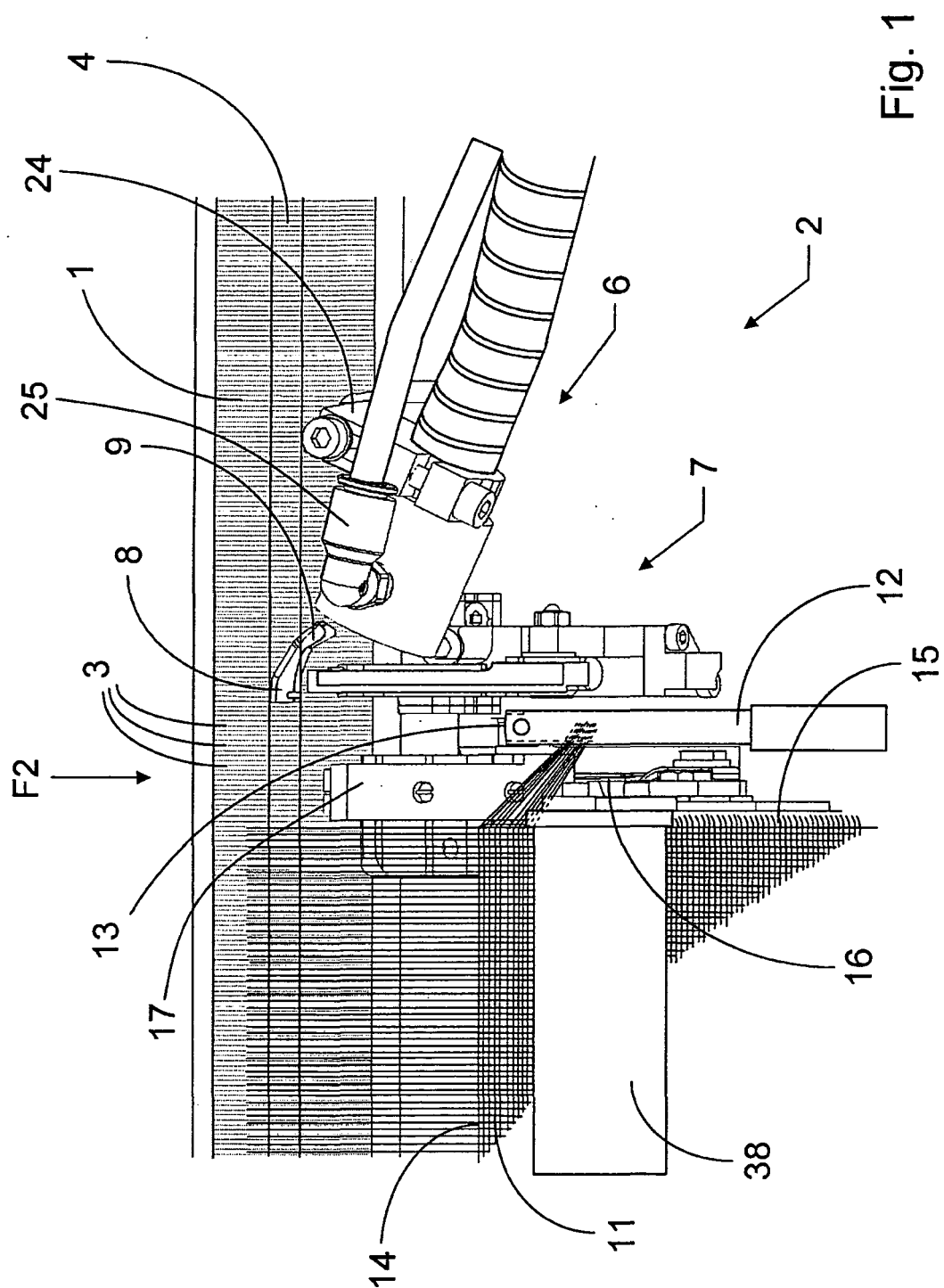


Fig. 1

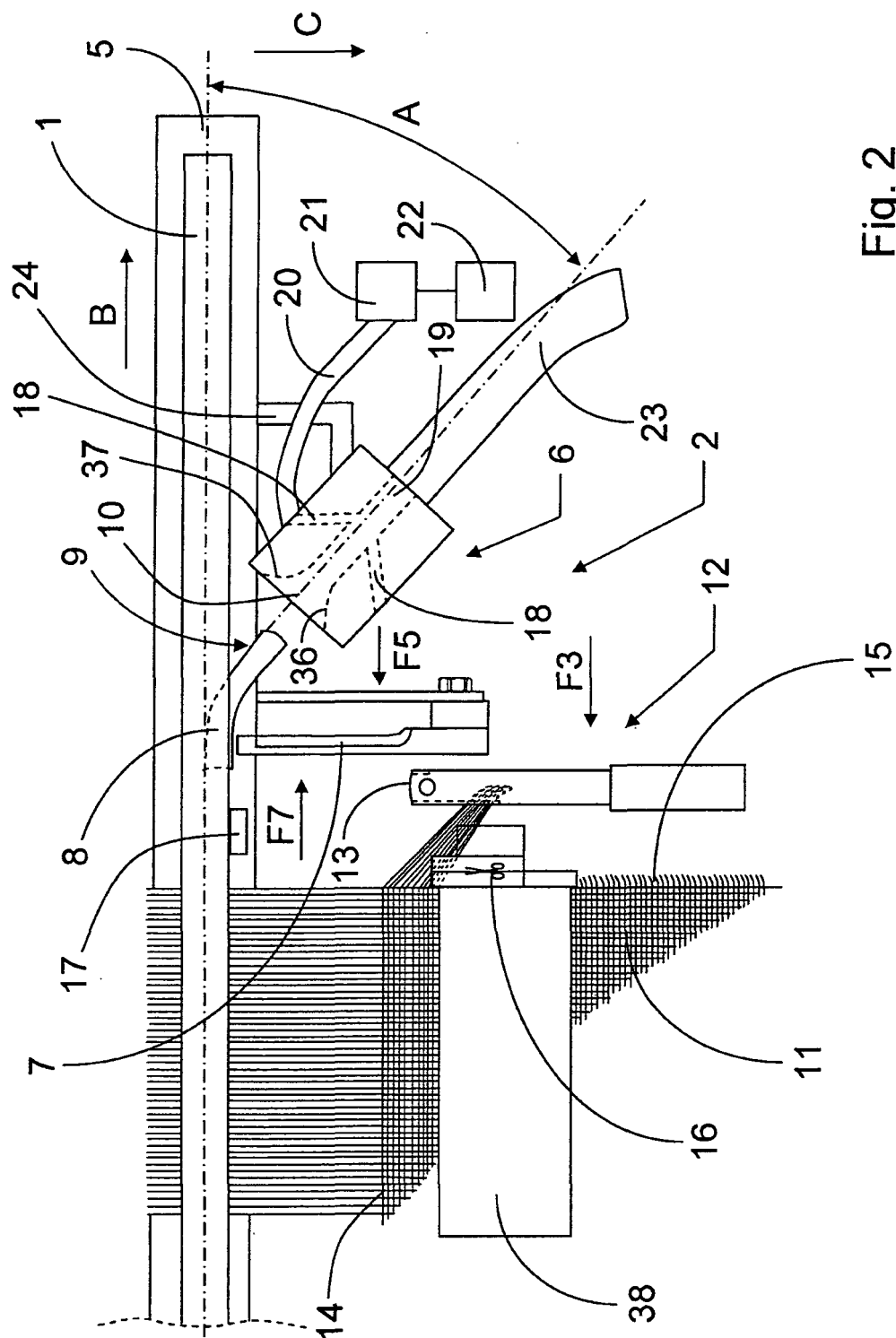


Fig. 2

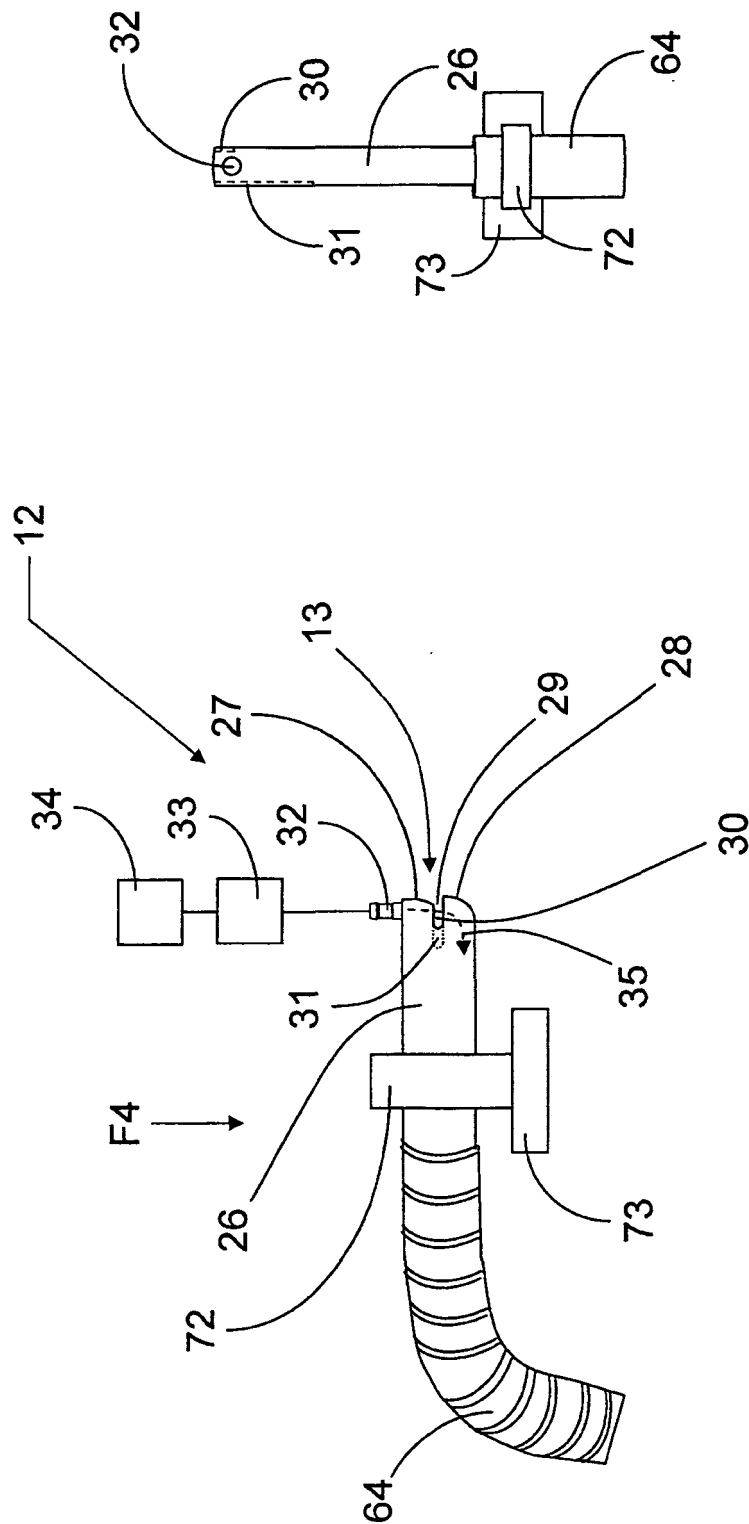


Fig. 4

Fig. 3

Fig. 6

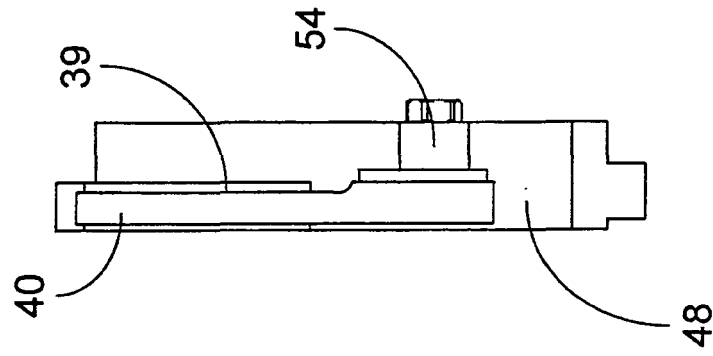


Fig. 5

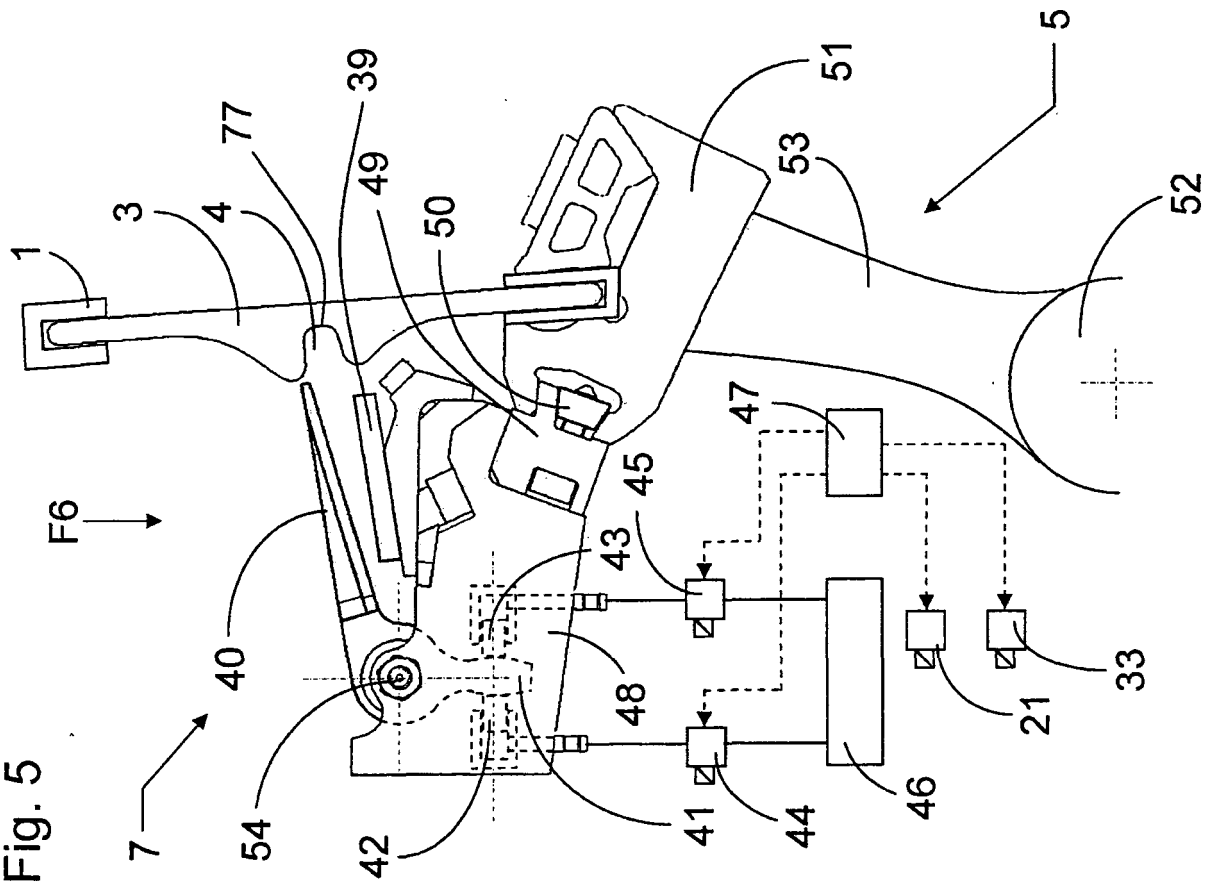


Fig. 7

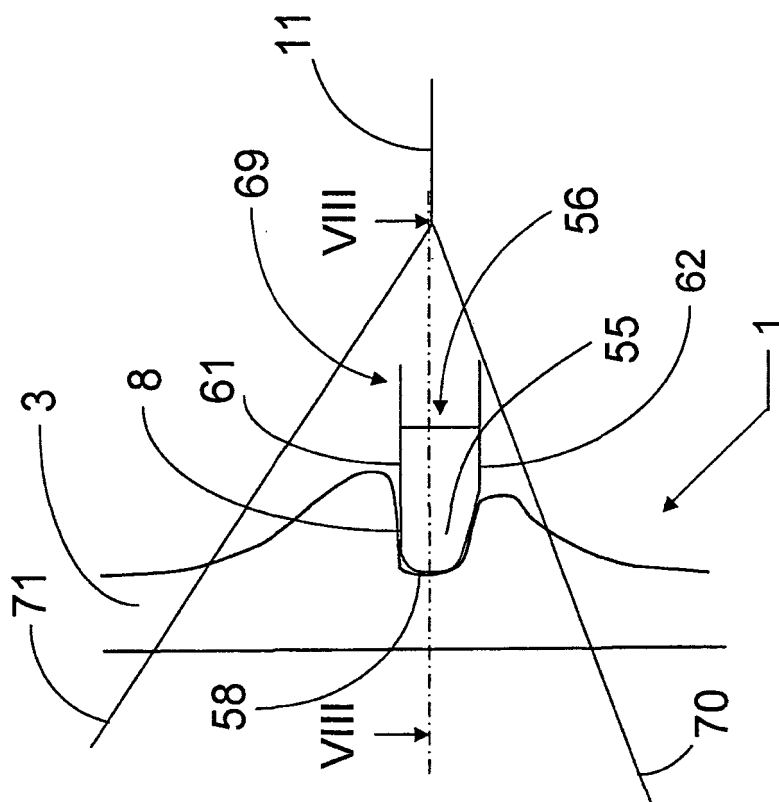
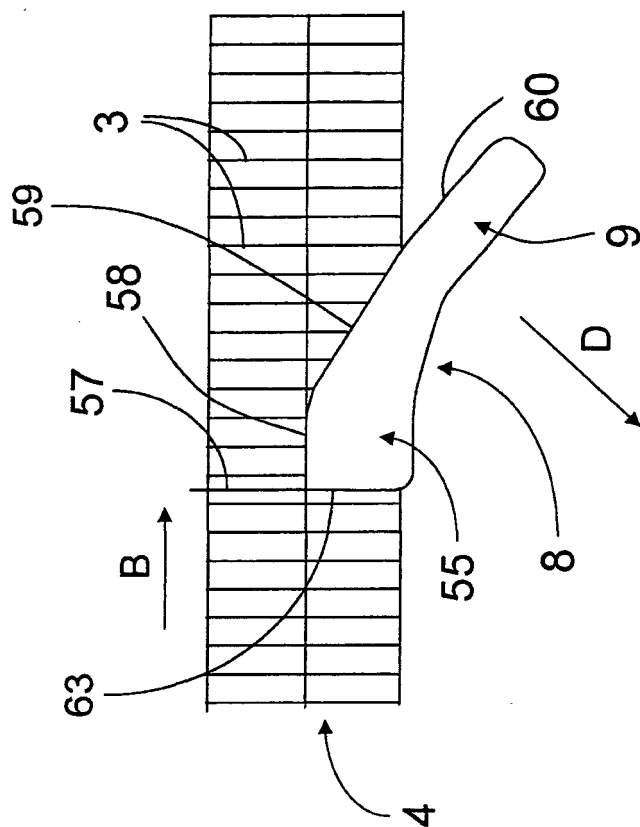


Fig. 8



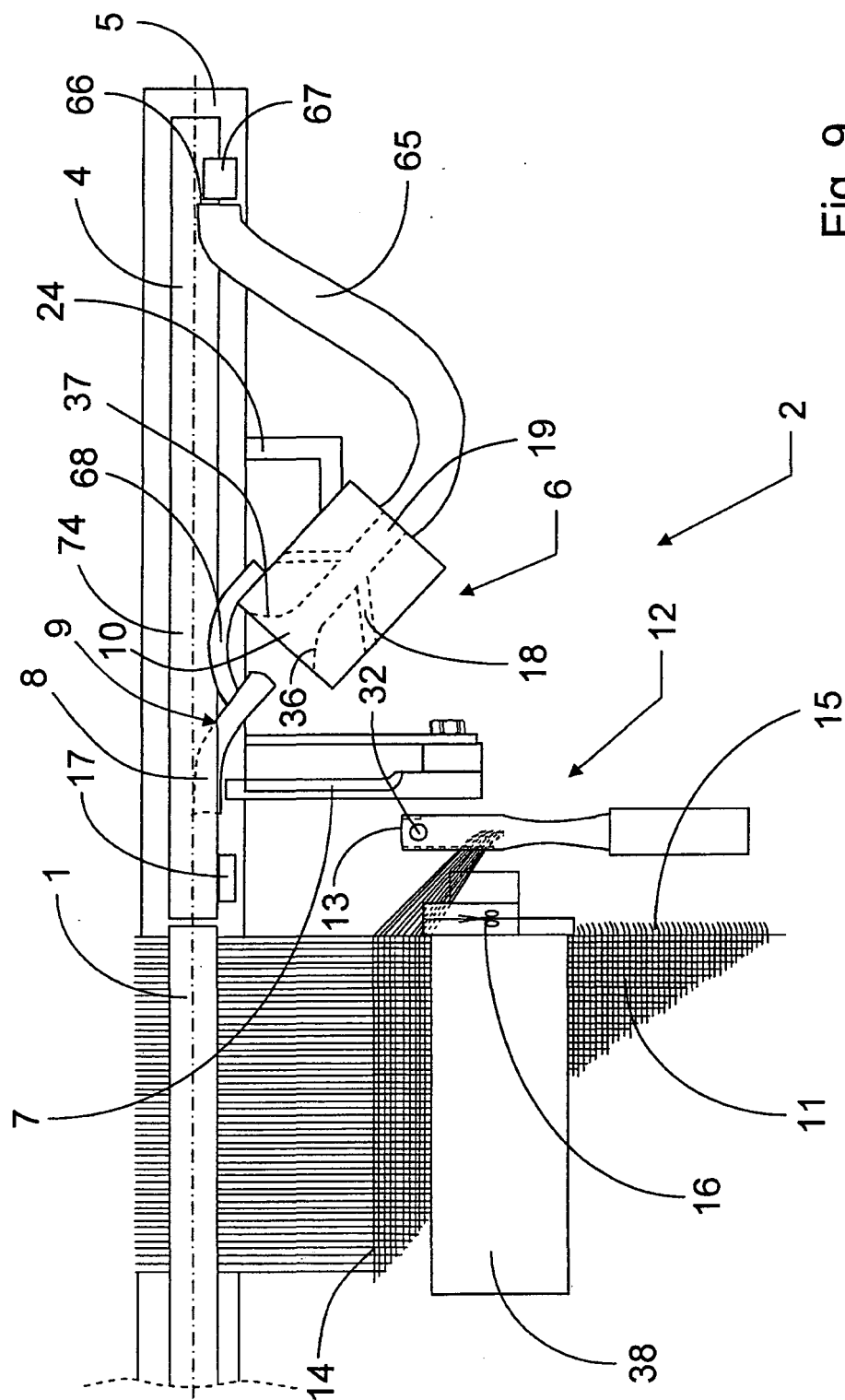


Fig. 9

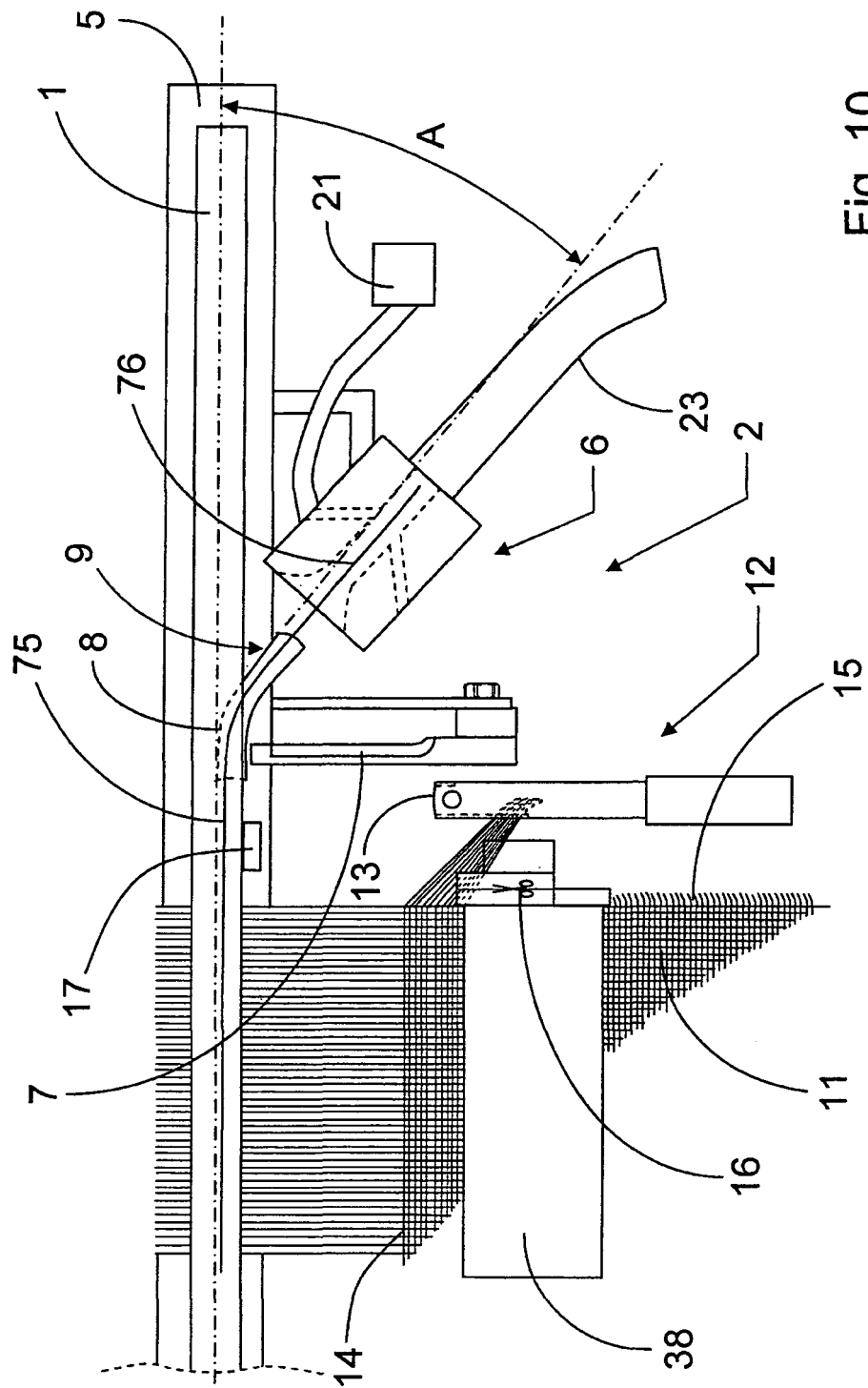


Fig. 10

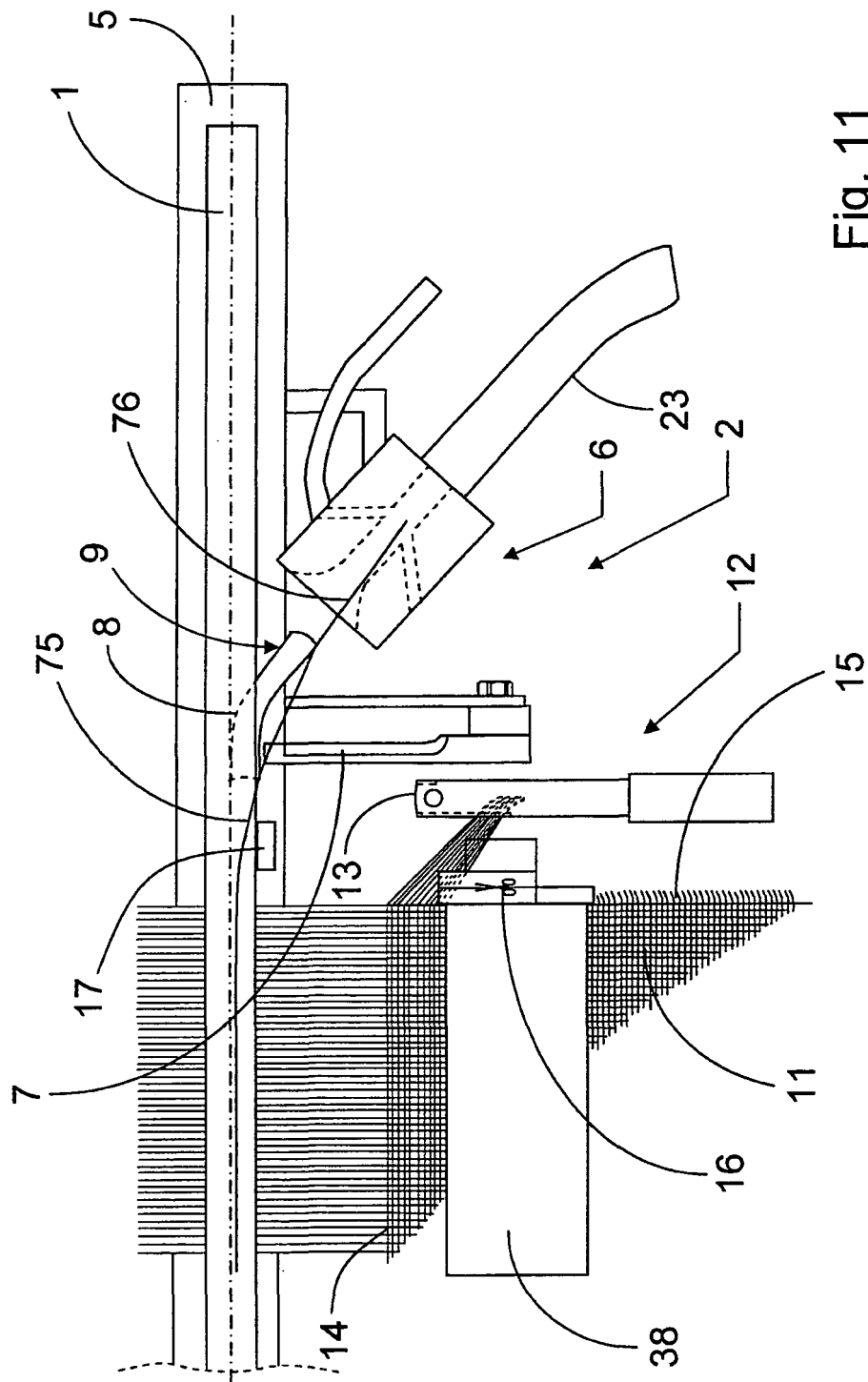
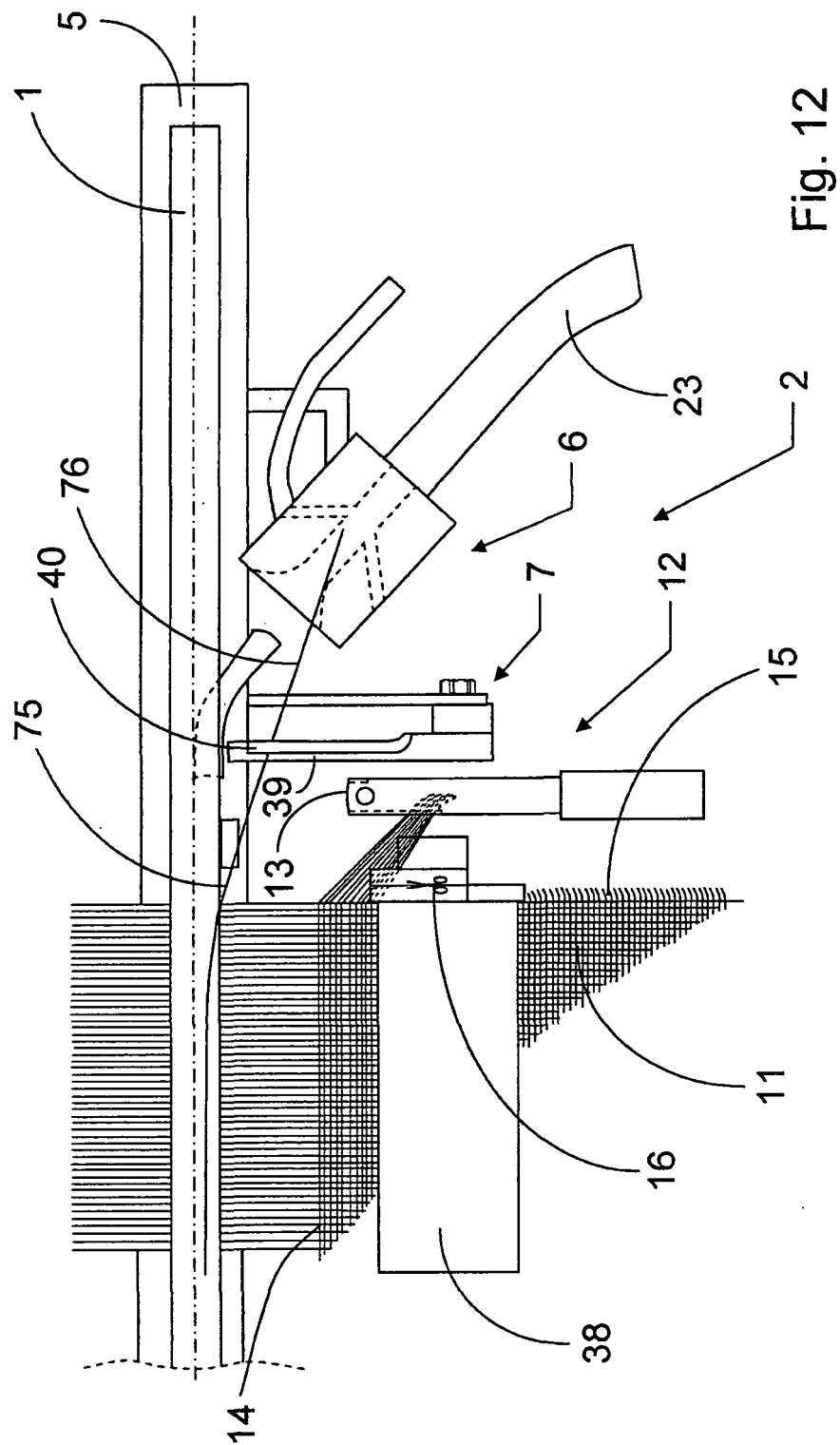
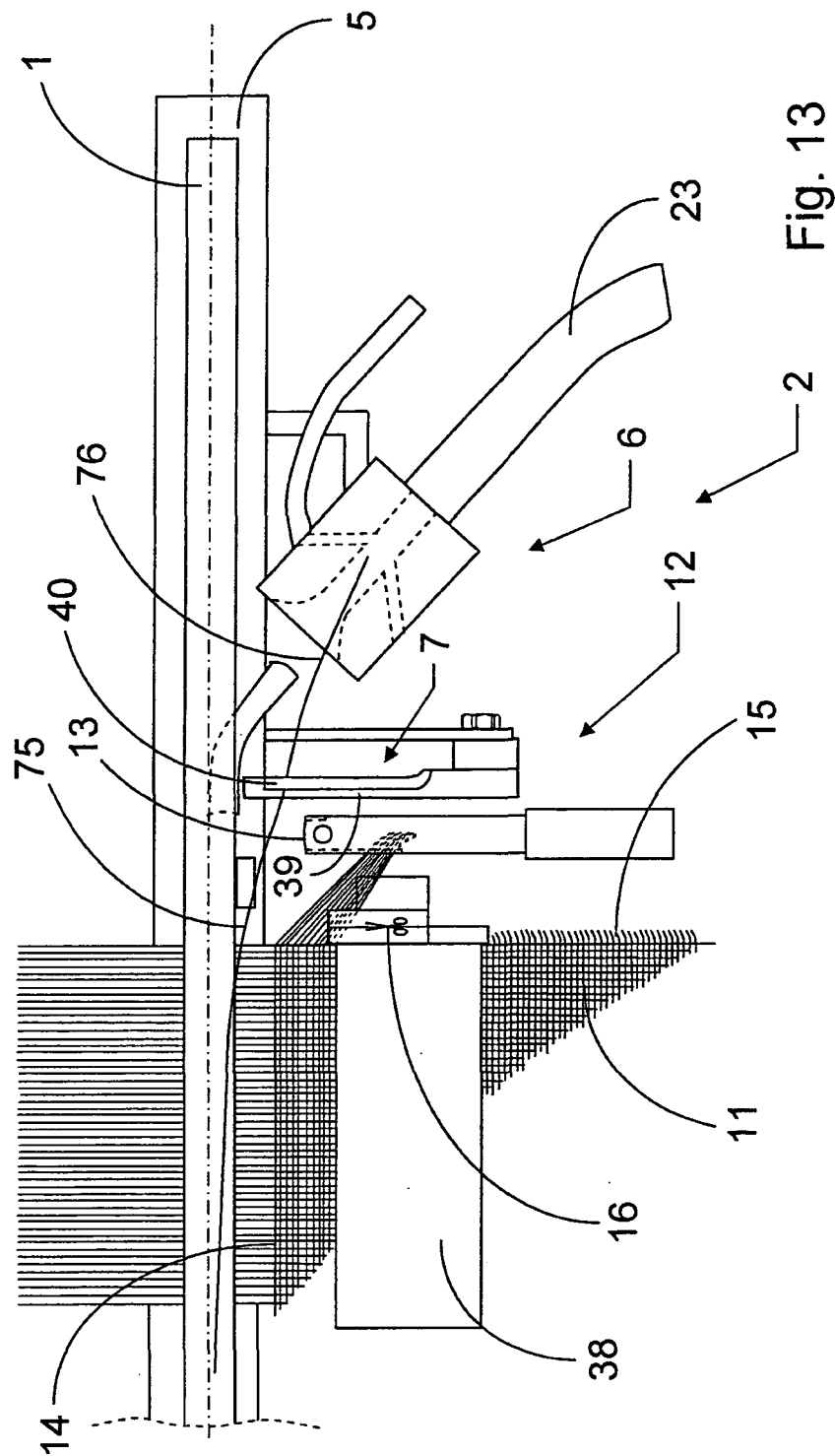
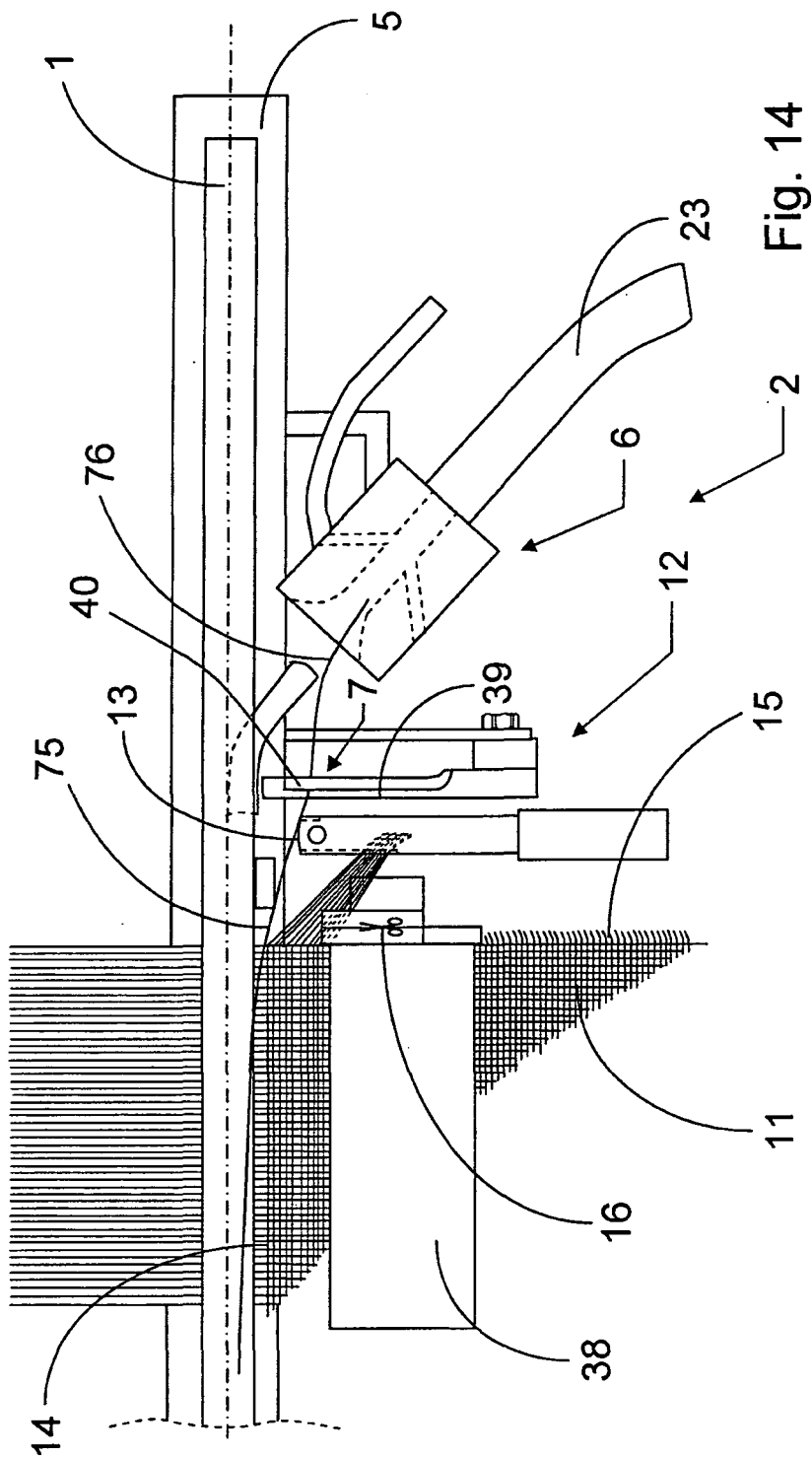
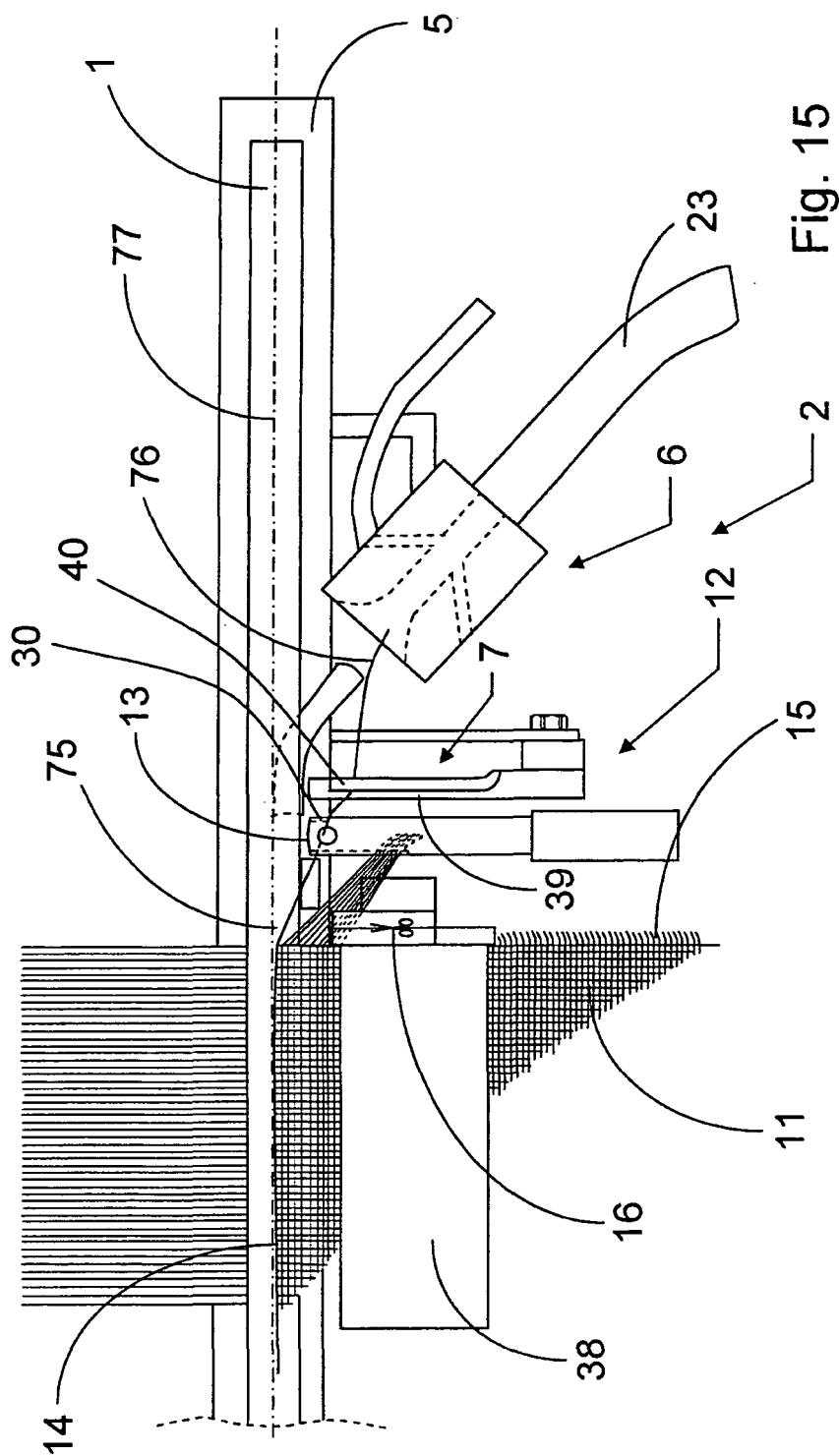


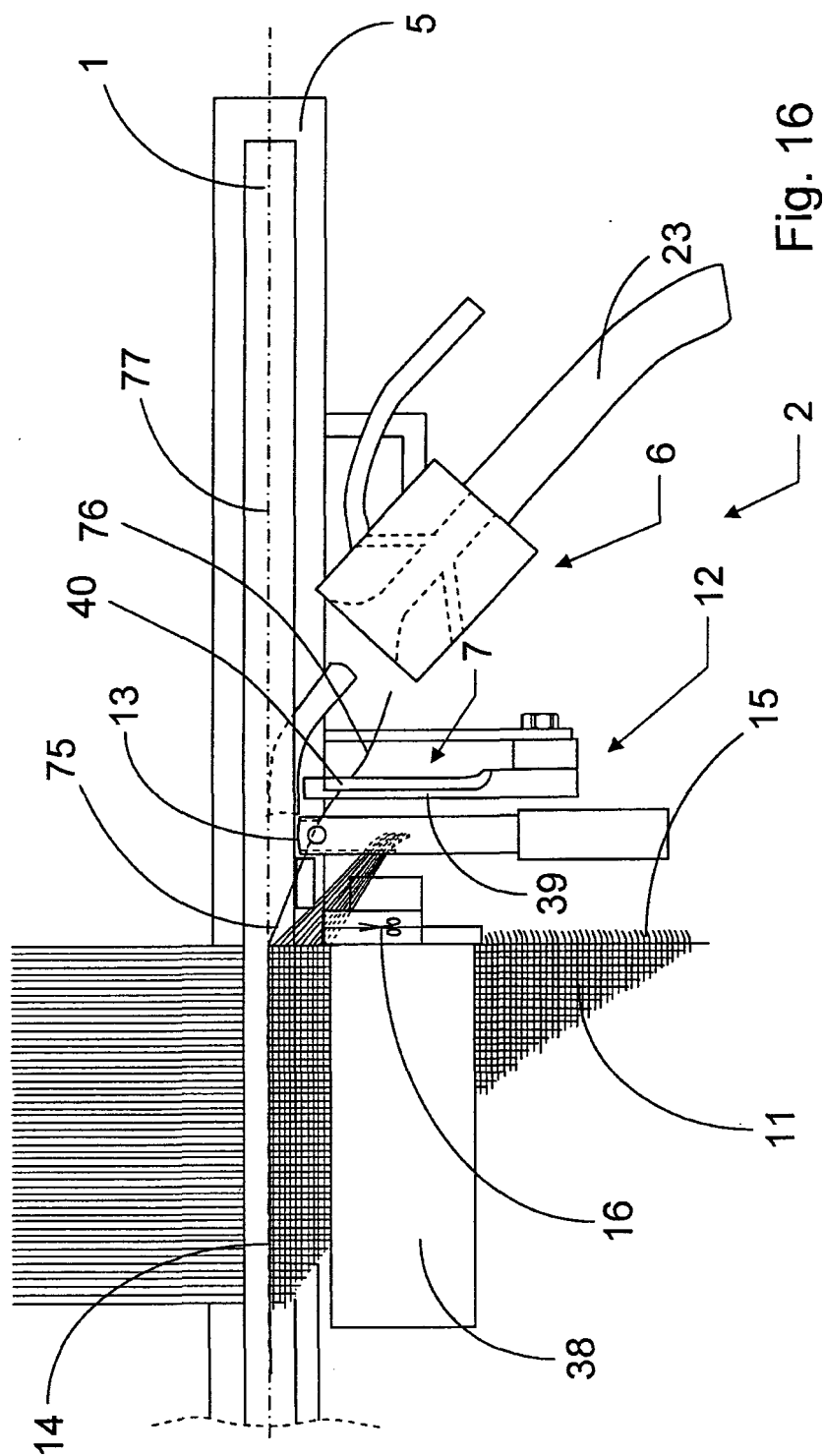
Fig. 11

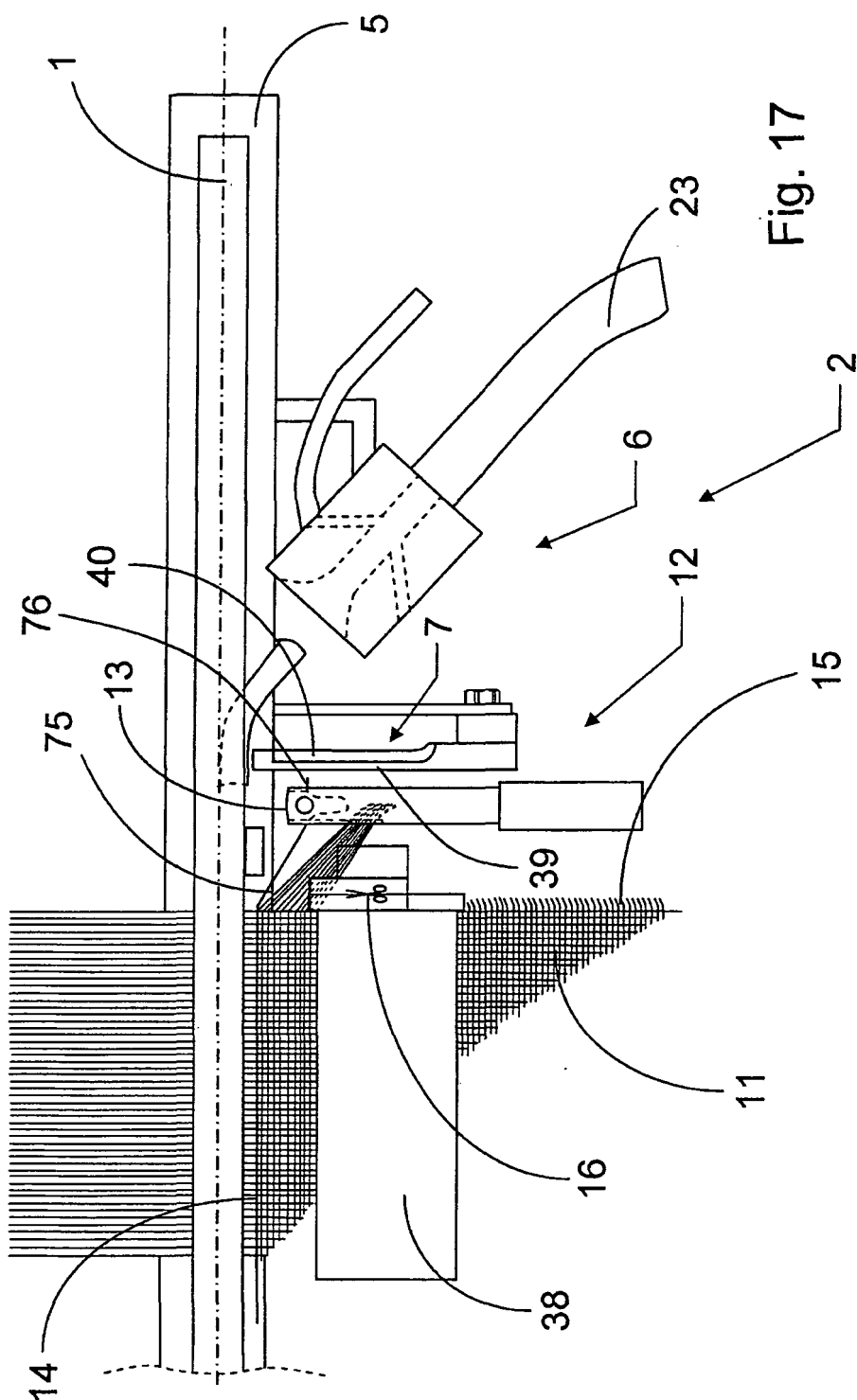












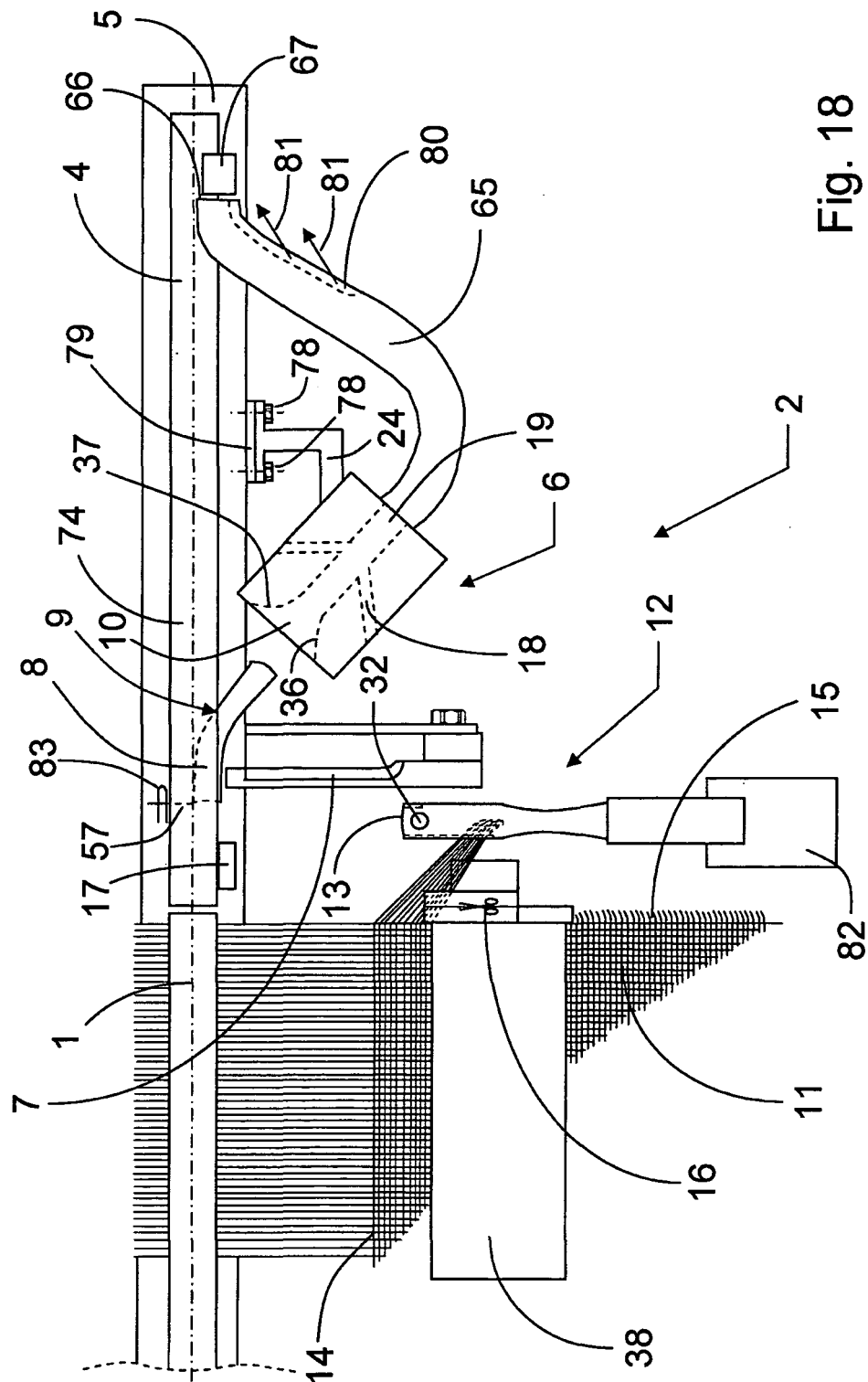


Fig. 18

REFERENCES CITED IN THE DESCRIPTION

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