



(11) **EP 2 812 472 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:

28.09.2016 Bulletin 2016/39

(21) Application number: **13704750.2**

(22) Date of filing: **06.02.2013**

(51) Int Cl.:

D03D 47/30 (2006.01)

(86) International application number:

PCT/EP2013/052280

(87) International publication number:

WO 2013/117564 (15.08.2013 Gazette 2013/33)

(54) **DEVICE FOR CATCHING AND STRETCHING A WEFT THREAD, WEAVING MACHINE AND METHOD FOR CATCHING AND STRETCHING A WEFT THREAD**

VORRICHTUNG ZUM ERFASSEN UND SPANNEN EINES SCHUSSFADENS, WEBMASCHINE UND VERFAHREN ZUM ERFASSEN UND SPANNEN EINES SCHUSSFADENS

DISPOSITIF PERMETTANT DE RETENIR ET D'ÉTIRER UN FIL DE TRAME, MACHINE À TISSER ET PROCÉDÉ PERMETTANT DE RETENIR ET D'ÉTIRER UN FIL DE TRAME

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **08.02.2012 BE 201200078**

(43) Date of publication of application:

17.12.2014 Bulletin 2014/51

(73) Proprietor: **Picanol**

8900 Ieper (BE)

(72) Inventor: **Ghesquiere, Marnix**

B-8930 Lauwe (BE)

(74) Representative: **Patentanwälte**

**Ruff, Wilhelm, Beier, Dauster & Partner mbB
Kronenstraße 30
70174 Stuttgart (DE)**

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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] For catching a leading end of a weft thread inserted into a shed (also referred to as "inserted weft thread" in the following) and for holding the inserted weft thread with a desired tension, the use of so-called "catching threads" is known from the prior art. The catching threads run in parallel to the warp threads next to the shed and form a separate shed which may be closed earlier than the normal shed via associated shed-forming means, so as to bind the inserted weft thread at an appropriate moment and with an appropriate tension. By holding the end parts of the inserted weft thread, it is avoided that the weft threads, which extend beyond the fabric edge after the insertion, are pulled back into the fabric.

[0003] In order to avoid catching threads, US 6,206,051 B1 provides a mechanism for removing a weft thread end including a weft thread suction device and a weft thread tensioning device. During weaving, a leading end part of an inserted weft thread reaching the arrival side is caught and held tensioned by the weft thread tensioning device. Then, the weft thread thus held in the shed is beaten into the fabric fell by the beat-up motion of the reed. The weft thread suction device is provided with a first and a second suction opening. When the leading end part of the weft thread approaches the first suction opening, the sucking operation of the weft thread tensioning device is stopped in order to suck the leading end part of the weft thread through the first suction opening into the weft thread suction device. An additional blower arranged on a member combined with the reed may be provided to blow air towards the first suction opening from behind the dents of the reed.

[0004] GB 2 009 798 A discloses a weft yarn end treating device comprising a sucking device arranged stationary on the weaving machine in an extension of an insertion path of a weft thread and a plurality of loop-shaped belts for holding weft thread ends. The device further comprises a hook member which reciprocally moves and is arranged to hitch the end portion of an inserted weft thread caught by the sucking device and then to thrust this end portion between the belts.

[0005] It is an 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 of the weft thread is cut off, wherein the free end is kept short and wherein the use of catching threads can be avoided.

[0006] This object is solved by a device according to claim 1, more in particular a device for catching and stretching a weft thread inserted into a shed of a weaving machine, comprising a weft thread stretching device ar-

ranged stationary on the weaving machine in an extension of an insertion path of the weft thread for catching the leading end part of the inserted weft thread and stretching the caught weft thread, a weft thread holding device arranged stationary on the weaving machine in a region of the beat-up line for holding the leading end part of at least one beaten up weft thread, and a moveable guiding device for guiding the caught weft thread towards the weft thread holding device, wherein the guiding device is adapted for limiting a displacement of the inserted weft thread in a direction transverse to the moving direction of the guiding device upon guiding the caught weft thread towards the weft thread holding device, wherein the guiding device is arranged on the sley for movement with the sley, and wherein the guiding device is positioned at a distance from the reed away from the beat-up line in order to avoid interference of the guiding device with weft threads upon insertion of the weft threads.

[0007] A weft thread inserted into a shed is caught and stretched in order to avoid that the inserted weft thread is pulled back into the shed and/or the fabric. The caught and stretched weft thread is referred to as caught weft thread in the following. In one embodiment, the caught weft thread is held by means of the weft thread stretching device until the weft thread is transferred to the weft thread holding device. In other embodiments, additional clamping devices are provided for holding the caught weft thread at least partly upon the movement of the weft thread to the weft thread holding device. A weft thread introduced into the weft thread holding device is referred to as "introduced weft thread" in the following.

[0008] When the guiding device is moved, the caught weft thread is brought towards the weft thread holding device. A stationary arrangement of the weft thread stretching device is advantageous in order to avoid a heavy load on the sley of the weaving machine. However, a stationary weft thread stretching device may exert a pulling action on a caught weft thread in a direction transverse to a movement direction of the guiding device, while guiding the caught weft thread towards the weft thread holding device. By providing a guiding device that is adapted for limiting a displacement of the caught weft thread in a direction transverse to the moving direction of the guiding device upon guiding the caught weft thread towards the weft thread holding device, a reliable transfer of the caught weft thread towards the weft thread holding device is achieved while the weft thread is held with a defined tension.

[0009] The guiding device is arranged on the sley for movement with the sley in order to avoid the necessity of an additional mechanism for moving the guiding device. Further, the guiding device is positioned on the sley at a distance from the reed away from the beat-up line in order to avoid interference with inserted weft threads upon insertion of the weft threads.

[0010] Upon insertion, the weft thread needs to pass the guiding device for reaching the weft thread stretching device provided beyond the reed. Only after the weft

thread is caught by the weft thread stretching device, an interaction between the caught weft thread and the guiding device is desired for moving the caught weft thread towards the weft thread holding device.

[0011] In a preferred embodiment the weft thread holding device is provided with an entry slit between a fabric edge of the fabric and the movement path of the guiding device, which entry slit is adapted for receiving a weft thread transversally to its longitudinal direction.

[0012] In the context of the application, an entry slit is defined as a narrow opening through which a weft thread can be introduced into the weft thread holding device. The entry slit extends at least partially essentially in the longitudinal direction of the weft thread to be introduced and, hence, is adapted for receiving a weft thread transversally to the longitudinal direction of the weft thread. In preferred embodiments, the entry slit extends at least essentially in parallel to the beat-up line of the fabric. The weft thread is introduced into the weft thread holding device via the entry slit by a movement of the guiding device with the caught weft thread beyond the entry region of the entry slit. The entry slit has a limited width transverse to the moving direction of the guiding device. As the displacement of the weft thread transverse to the moving direction is limited by means of the guiding device, it is avoided that the guiding device pushes the weft thread above or below the entry slit, instead of through the entry slit and into the weft thread holding device. Thereby, a reliable introduction is ensured despite a potential pulling action of the weft thread stretching device on the caught weft thread, in particular pulling actions in a direction transverse to the moving direction. A risk of damaging the weft thread upon insertion is minimized, which damaging could otherwise result in a broken weft thread, of which the remaining part is not long enough to be held by the weft thread holding device.

[0013] In a preferred embodiment, the entry slit is adapted for retaining a weft thread introduced into the weft thread holding device via the entry slit. Thereby, the entry slit prevents that the weft thread introduced into the weft thread holding device is pulled backwards and out of the weft thread holding device by the guiding device when the guiding device is moving away from the beat-up line and the weft thread is not yet bound by the warp threads. In particular in high speed weaving machines, such a retention is advantageous.

[0014] In one embodiment, a width of the entry slit is delimited, in order to allow a retention function of the entry slit. In one embodiment, the entry slit is delimited by at least one retaining edge, preferably two mutually opposing retaining edges. The retaining edges avoid or at least restrict a retraction or withdrawal of introduced weft threads from the weft thread holding device. In one embodiment, the retaining edges are provided in the form of barbs or hooks. In other embodiments, the retaining edges are formed as undercut regions.

[0015] In a preferred embodiment, the guiding device comprises a hook-shaped guiding element provided with

a recess having inwardly converging sidewalls for receiving the weft thread. The recess is formed for example wedge-shaped and has one or two inclined sidewalls. Upon movement of the guiding device, the caught weft thread is pulled rearwards into the recess, for example by means of the stationary weft thread stretching device. The inwardly converging sidewalls allow an entry region of the recess to be chosen sufficiently high in order to avoid an interference of the guiding device with the weft threads upon insertion prior to a catching of the weft thread by the weft thread stretching device and/or for allowing a reliable introduction of the caught weft thread into the recess. At the bottom of the recess, weft threads are guided upon their movement towards the weft thread holding device for an introduction of the weft threads into the entry slit having a limited width.

[0016] When weaving with the same weaving machine, the position of the beat-up line may vary, for example due to the use of different warp threads and/or weft threads, due to different weaving patterns and/or weaving speeds and/or due to other influences on a weaving machine setup. Hence, a distance between a rearmost reversal point of the sley and the beat-up line may vary when beating up a weft thread. In case the guiding device is not fixed on the sley, a movement path of the guiding device may be adjusted. However, according to the invention, the guiding device is arranged on the sley in order to avoid the need of an additional moving mechanism. In order to compensate the variance in the position of the beat-up line and to ensure that the caught weft thread is introduced with a defined introduction depth into the weft thread holding device, in one embodiment the weft thread holding device is adjustably arranged on the weaving machine and the position of the weft thread holding device is matched to the beat-up line.

[0017] In another embodiment, the guiding device comprises an adjustable stopping element for adjusting the depth of the recess. By use of an adjustable stopping element, the depth of the recess of the guiding element can be adjusted, thereby an introduction depth of the weft thread into the weft thread holding device via the entry slit may be varied. The adjustable stopping element allows matching the depth of the recess to a position of the beat-up line chosen under certain weaving conditions for ensuring an essentially constant introduction or a constant introduction depth of the weft thread via the entry slit. In this way it is possible to avoid the necessity of changing a position of the weft thread holding device, which position also influences how the already beat-up weft threads are presented to and cut by a cutting device. In one embodiment, the adjustable stopping element may be formed as a small plate, arranged on the guiding device in such way that the adjustable stopping element reduces the depth of the recess. In other words, the adjustable stopping element is arranged close to a ground of the recess. Preferably, the stopping element is replaceable mounted on the guiding device allowing for a replacement of the stopping element in case the stopping

element is worn out. As the stopping element is the element of the guiding device most subjected to wear, the overall lifetime of the guiding device is extended.

[0018] In preferred embodiments, the weft thread holding device comprises a suction nozzle with a suction opening, at which suction opening the entry slit is provided. The suction nozzle of the weft thread holding device is also referred to as holding nozzle. The holding nozzle is provided with the suction opening having an aperture on the rear side, facing the reed. The suction opening in preferred embodiments is in the form of a suction pipe or suction tube. Via the suction nozzle a continuous suction force or suction action may be exerted for holding the introduced weft threads after these weft threads are released from the weft thread stretching device. In preferred embodiments, the holding nozzle has a waste duct arranged to remove weft thread end parts, which have been cut off by a thread cutting device, by sucking the end parts through the waste duct. The holding nozzle in this embodiment has two functions, it serves both to keep introduced weft threads tensioned and to remove the cut off weft thread ends. The suction opening is provided with the entry slit for allowing the caught weft thread to be inserted transversely to the longitudinal direction of the weft thread by the guiding device. In one embodiment, the entry slit is formed integrally or at least partially integrally with the suction opening. In preferred embodiments, the entry slit is not symmetrical with respect to a plane perpendicular to the fabric and parallel to the fabric edge, wherein a depth of the entry slit at a side facing away from the fabric edge is less than the depth of the entry slit on the side facing the fabric edge.

[0019] In another embodiment, at least at an entry region of the entry slit a cross section of the entry slit decreases from a distal end towards the suction nozzle for leading the weft thread towards the suction nozzle. In other words, the entry slit is wider on the rear side, that is facing the reed, and narrows towards the front side, that is facing away from the reed. Thereby, the walls of the entry slit may support the guiding device when guiding the weft thread towards the inside of the weft thread holding device. However, when guiding a caught weft thread towards the holding nozzle via walls of the entry slit, the weft thread is pushed forward into the weft thread holding device. A pushing force is more damaging to a weft thread than the pulling force exerted by the weft thread stretching device for pulling the weft thread into the recess of the guiding element. Therefore, in preferred embodiments, the recess of the guiding element is chosen sufficiently narrow at a bottom or ground thereof for allowing a precise positioning of the weft thread with respect to the weft thread holding device, wherein only little or no guiding support is required from the walls of the entry slit.

[0020] In another embodiment, at least one auxiliary nozzle is provided in the region of the entry slit of the weft thread holding device blowing towards the inside of the weft thread holding device in a direction away from the reed. The auxiliary nozzle provides an additional holding

force for holding already introduced weft threads and for hindering introduced weft threads from being pulled out the weft thread holding device. Thereby, the auxiliary nozzle supports the introduction of a weft thread into the weft thread holding device and the holding of introduced weft threads.

[0021] The weft thread stretching device is arranged stationary on the weaving machine, next to the reed and the guiding element in the extension of the insertion path. Preferably, the weft thread stretching device comprises a suction nozzle, in particular a ring-jet suction nozzle, the opening of which is directed towards a guiding channel of the reed if the reed is in its most rearward position, away from the beat-up line. Preferably, a ring-jet suction nozzle with a sufficient large diameter is chosen as a stretching nozzle in order to allow a good catching and stretching of the weft thread and in order to allow large amounts of weft thread to pass easily through it, in case a removal of a wrongly inserted weft thread is necessary. In one embodiment, a ring-jet suction nozzle as disclosed in WO2011/000561 is used.

[0022] In other embodiments, a stationary auxiliary suction nozzle is provided for removing wrongly inserted weft threads. The stationary auxiliary suction nozzle comprises a large opening and is only operated when a removal of wrongly inserted weft threads becomes necessary.

[0023] According to a preferred embodiment, the weft thread stretching device is connected to a control unit, wherein the weft thread stretching device is controlled by the control unit so that the weft thread stretching device is activated upon insertion of a weft thread into the shed for catching the inserted weft thread and is deactivated when or after the caught weft thread is beaten up or has been beaten up. For example, in case the weft thread stretching device is a suction nozzle, in one embodiment, the weft thread stretching device is connected to a compressed-air tank via a valve, wherein the valve is controlled so that the weft thread stretching device is activated upon insertion of a weft thread into the shed for catching the inserted weft thread and is deactivated when or after the caught weft thread is beaten up or has been beaten up.

[0024] In one embodiment, the end part of the inserted weft thread is caught by the weft thread stretching device and held by the weft thread stretching device until the weft thread is transferred to the weft thread holding device and held by the weft thread holding device.

[0025] In an alternative embodiment, the guiding device is provided with a thread clamp, in particular an active thread clamp. In one embodiment, at least one jaw or both jaws of the thread clamp are arranged for forming a hook-shaped guiding element. In this case, the weft thread is inserted, stretched by the weft thread stretching device and, thereafter, held by the thread clamp.

[0026] When providing a thread clamp, arrangement is made for providing that during the forward movement and/or during beat-up, an inserted weft thread, in partic-

ular the end part of the inserted weft thread, is still held by the weft thread stretching device and, therefore, is pulled into the thread clamp between the two clamping elements. After the weft thread is clamped and held with sufficient force by the thread clamp, the weft thread stretching device may be deactivated. The thread clamp is positioned for guiding the end part of the clamped weft thread into the weft thread holding device via the entry slit of the weft thread holding device.

[0027] In one embodiment, the thread clamp is provided with an adjustable stopping element, which defines the depth of the opening defined by the two clamping elements.

[0028] Preferably, an active thread clamp is provided. In the context of the application, a thread clamp which may be opened or closed by exerting a defined force, for example a hydraulically, pneumatically or motor driven thread clamp is referred to as an active thread clamp. An active thread clamp allows for an independent operation of the thread clamp. In one embodiment, a thread clamp as described in WO 2011/000561 is used.

[0029] The object is further solved by a weaving machine comprising a device for catching and stretching a weft thread.

[0030] The object is further solved by a method according to claim 14, more in particular a method for catching and stretching a weft thread inserted into a shed of a weaving machine using a device with a weft thread stretching device, a weft thread holding device arranged stationary on the weaving machine in a region of a beat-up line, and a moveable guiding device, arranged for movement with the sley and positioned at a distance from the reed away from the beat-up line, wherein the method comprises catching and stretching the leading end part of the weft thread at an extension of an insertion path of the weft thread by means of the weft thread stretching device, guiding the caught weft thread towards the weft thread holding device by means of the guiding device while limiting a displacement of the caught weft thread in a direction transverse to the moving direction of the guiding device, and introducing the caught weft thread into the weft thread holding device via an entry slit.

[0031] According to a preferred embodiment, the weft thread holding device is continuously activated for taking over and holding inserted weft threads, and the weft thread stretching device is activated upon insertion of a weft thread into the shed for catching the inserted weft thread and is deactivated when or after the caught weft thread is beaten up or has been beaten up. In one embodiment, the weft thread holding device and/or the weft thread stretching device comprise a suction nozzle, wherein in an activated state a suction force is provided for example by exerting a negative pressure.

[0032] Further features and advantages of the invention will emerge from the following description of the embodiments illustrated in the drawings.

figure 1: is a schematic plan view of a part of a weav-

ing machine with a device according to a first embodiment of the invention during insertion of a weft thread;

figure 2: is a perspective view of a part of the weaving machine shown in figure 1;

figure 3: is a perspective view of a part of the weaving machine with the device shown in figure 1 seen from the rear side of a reed;

figure 4: is a schematic drawing showing a detail of a weft thread holding device and a guiding device of the weaving machine with the device shown in figure 1;

figure 5: is a schematic plan view of the weaving machine shown in figure 1 during movement of a sley towards a beat-up line;

figure 6: is a schematic plan view of the weaving machine shown in figure 1 during beat-up;

figure 7: is a schematic plan view of the weaving machine shown in figure 1 during a backward movement of the sley away from the beat-up line;

figure 8: is a schematic plan view of the weaving machine shown in figure 1 during binding;

figure 9: is a perspective view of a part of a weaving machine similar to figure 2 with a device according to a second embodiment of the invention;

figure 10: is a schematic side view of a detail of the device shown in figure 9;

figure 11: is a schematic side view of a variant embodiment of a weft thread holding device to be used in a device shown in figure 1 or 9; and

figure 12: is a schematic plan view of the variant shown in figure 11.

[0033] Figure 1 is a schematic plan view of a part of a weaving machine with a device 1 according to a first embodiment of the invention during insertion of a weft thread 2. Fig. 2 and 3 show perspective views of a part of a weaving machine similar to Fig. 1.

[0034] The weft thread 2 is inserted in a shed 30 formed between planes of warp threads 3 by selectively raising and lowering warp threads 3. During insertion, the weft thread 2 is supported in a known way by relay nozzles 4 (see Fig. 1) and guided in a guiding channel 509 (see Fig. 2) of a reed 5, which guiding channel 509 determines the insertion path 510 of the inserted weft thread. In the depicted embodiment, a weft detector 6 is arranged at the end of the insertion path next to the reed 5 to detect

the arrival of the weft thread 2.

[0035] The leading end part 2f of the inserted weft thread 2 is caught and stretched with a predetermined tension by a weft thread stretching device 7. As schematically shown, the weft thread stretching device 7 is arranged stationary on the weaving machine in an extension of an insertion path of the weft thread 2 determined by the guiding channel 509, for example by means of a cantilever or beam 700.

[0036] The reed 5 is attached to the sley 500 (see Fig. 3) and moved towards a beat-up line 800 of a fabric 8 for a beat-up motion. The weft thread 2, that is caught and stretched by the weft thread stretching device 7, as schematically shown in Fig. 1, is moved with the reed 5 towards the beat-up line 800 and is beaten into the fabric 8.

[0037] In accordance with the application, a weft thread holding device 9 is arranged stationary on the weaving machine in a region of a beat-up line 800 for holding the leading end parts of a number of beaten up weft threads 2d. As mentioned above, the weft thread stretching device 7 is also arranged stationary on the weaving machine, at a distance from the beat-up line 800 in the extension of an insertion path of the weft thread 2. A moveable guiding device 10 is provided for guiding the caught weft thread 2 towards the weft thread holding device 9. As shown in Fig. 1, the guiding device 10 is positioned at a distance from the reed 5 away from the beat-up line 800 in order to avoid interference of the guiding device 10 with weft threads upon insertion of the weft threads.

[0038] The stationary arranged weft thread stretching device 7 exerts a pulling action in a direction transverse to a movement direction B of the guiding device 10 on the caught weft thread (not shown in Figs. 2 and 3) when the caught weft thread is moved towards the weft thread holding device 9. As can be seen in Figs. 2 and 3, the guiding device 10 is adapted for limiting a displacement of the caught weft thread in a direction transverse to the moving direction of the guiding device 10 upon guiding the caught weft thread towards the weft thread holding device 9.

[0039] The weft thread holding device 9 is provided with an entry slit 900 (as can be seen in Figs. 2 and 3) between the fabric edge 801 of the fabric 8 and the movement path 110 of the guiding device 10. The entry slit 900 extends parallel to the beat-up line 800 and is adapted for receiving a weft thread transversally to the longitudinal direction of the weft thread. The guiding device 10 guides a caught weft thread to be introduced into the weft thread holding device 9 via the entry slit 900 and to be transferred to the weft thread holding device 9 while upholding a sufficient tension of the weft thread in order to avoid that the weft thread is pulled back into the fabric 8 or the shed.

[0040] A cutting device 11 (see Figs. 1 and 3) is provided between a fabric edge 801 of the fabric 8 and the weft thread holding device 9 for cutting the ends of weft threads after they are bound by the warp threads 3. The cutting device 11 is arranged close to the fabric edge 801

for minimizing the length of the ends of the bound weft threads protruding beyond the fabric 8. The cut-off ends are removed via a duct 901 (see Fig. 1) provided with the weft thread holding device 9.

[0041] In the depicted embodiment, an auxiliary suction nozzle 12 is provided for removing wrongly inserted weft threads. A weft detector 120 (see Fig. 1) is arranged near, i.e. just before, in or just after, the auxiliary suction nozzle 12 for removing a wrongly inserted weft thread. The wrongly inserted weft threads are removed via a duct 121 provided with the auxiliary suction nozzle 12.

[0042] In the depicted embodiment, the weft thread stretching device 7 and the weft thread holding device 9 comprise a ring-jet suction nozzle, each. In the context of the application, a ring-jet suction nozzle is defined as a suction device, wherein a suction effect is obtained by blowing compressed air into the suction device. For this purpose, in the depicted embodiment, the weft thread stretching device 7 and the weft thread holding device 9 are each connected to a compressed-air tank 13 via supply lines 130 with a valve 131 and a pressure regulator 132 (see Fig. 1). According to one embodiment, the valve 131 between the weft thread stretching device 7 and the compressed-air tank 13 is activated upon insertion of a weft thread into the shed for catching the inserted weft thread and is deactivated when or after the caught weft thread 2a is beaten up or has been beaten up. In other embodiments, at least the valve 131 between the weft thread holding device 9 and the compressed-air tank 13 is omitted, wherein a continuous suction action is exerted by the weft thread holding device 9.

[0043] The suction nozzle 902 of the weft thread holding device 9, more particular the ring-jet suction nozzle, is provided with a suction opening 903 in the form of a suction trunk or suction tube. The suction opening 903 or suction tube has an essentially V-shaped distal end that opens toward the reed 5 with two entry regions 904 (see Fig. 3), which are inclined with respect to the plane of the fabric 8 for forming the entry slit 900. The entry slit 900 extends essentially perpendicular or perpendicular to the longitudinal direction of the tubular suction opening 903 for introducing the weft thread into the weft thread holding device 9 transversally to the longitudinal direction of the weft thread. In preferred embodiments, a continuous suction force or suction action is exerted by the suction nozzle 902 for holding the ends of introduced weft threads and of bound weft threads 2d with a defined tension after these weft threads are released from the weft thread stretching device 7.

[0044] Further, in the depicted embodiment an auxiliary nozzle 14 is provided in the region of an entry slit 900 (see Figs. 2 and 3) of the weft thread holding device 9 blowing towards the inside of the weft thread holding device 9 in a direction away from the reed 5 and towards the suction nozzle 902 for supporting the introduction of a weft thread 2 into the weft thread holding device 9. The auxiliary nozzle 14 is connected to the compressed-air tank 13 via a supply line 130 with a valve 131 and a

pressure regulator 132. In preferred embodiments, a suction action of the auxiliary nozzle 14 is applied only upon the introduction of the caught weft thread into the entry slit 900 for reducing an air-consumption.

[0045] At an entry region of the entry slit 900, a cross-section of the entry slit 900 decreases from a distal end towards the suction nozzle 902 of the weft thread holding device 9 allowing the caught weft thread 2b to be guided towards the inside of the weft thread holding device 9 along entry regions 904 of the entry slit 900. The entry slit 900 is further adapted for retaining an introduced weft thread 2b. For this purpose, in the embodiment shown in Fig. 4, the entry slit 900 is delimited by two mutually opposing retaining edges 905. The retaining edges 905 are slightly inclined towards the inside of the weft thread holding device 9 allowing for an undisturbed introduction of a weft thread into the weft thread holding device 9, while restricting a retraction of the introduced weft thread 2b. In the depicted embodiment, the retaining edges 905 are formed on a panel element 906 attached to the suction opening 903 in the region of the entry slit 900 on the side not facing the fabric edge 801.

[0046] Fig. 4 is a schematic drawing showing a detail of the weft thread holding device 9. More particular, Fig. 4 shows the panel element 906 of the weft thread holding device 9 provided with the retaining edges 905, and the guiding device 10 of the device 1 shown in Figs. 1 to 3. Further, in Fig. 4 a caught weft thread 2a, which is guided by the guiding device 10, and an introduced weft thread 2b, which is introduced into the weft thread holding device 9, are shown. As explained above, in the embodiment as shown in Fig. 3, the auxiliary nozzle 14 is provided in the region of the entry slit 900 of the weft thread holding device 9, which auxiliary nozzle 14 is blowing towards the inside of the weft thread holding device 9 as shown by arrows 140 in Fig. 4.

[0047] In the embodiment shown in Figs. 1 to 4, the guiding device 10 comprises a hook-shaped guiding element 100 with a recess 101 having inwardly converging sidewalls 102 for receiving the caught weft thread 2a. The guiding device 10 further comprises an adjustable stopping element 103 for adjusting the depth of the recess 101 (see also Fig. 3). The adjustable stopping element 103 is pivotable as indicated with an arrow 141 in Fig. 4. A bolt 104 is provided for adjusting a position of the adjustable stopping element 103. As shown in Fig. 3, the bolt 104 is arranged in a position which is easily accessible after the device 1 is mounted on the weaving machine.

[0048] Figs. 5 to 8 schematically show parts of a weaving machine and a device 1 for catching and stretching a weft thread inserted into a shed similar to the presentation of Fig. 1. For the same or similar elements, identical reference signs are used. As shown in Fig. 1, the leading end part of the weft thread 2 inserted into the shed is caught and stretched at an extension of an insertion path of the weft thread by means of the weft thread stretching device 7. A weft thread 2 inserted into a shed is caught

for avoiding that it is pulled back into the fabric 8 and is referred to as caught weft thread 2a. As shown in Fig. 5, the caught weft thread 2a is guided towards the weft thread holding device 9 by means of the guiding device 10. In preferred embodiments, the guiding device 10 is arranged on the sley 500 (see Fig. 3) of the weaving machine and advanced towards the beat-up line 800 with the reed 5. The movement direction of the reed 5 and the guiding device 10 towards the beat-up line 800 is schematically represented with an arrow B. The weft thread holding device 9 is arranged between the fabric edge 801 and the movement path 110 of the guiding device 10.

[0049] As shown in Fig. 6, the caught weft thread 2a is introduced into the weft thread holding device 9 during beat-up. In the depicted embodiment, the caught weft thread 2a is still held and stretched by the weft thread stretching device 7 upon introduction into the weft thread holding device 9. As will be explained in more detail with respect to Figs. 9 and following, alternative arrangements for holding the weft thread upon introduction into the weft thread holding device 9 are possible. A weft thread introduced into the weft thread holding device 9 is referred to as introduced weft thread 2b. In preferred embodiments, after the weft thread is introduced into the weft thread holding device 9, the suction action for stretching the caught weft thread 2a with the weft thread stretching device 7 is stopped. In the meanwhile the weft thread 2b is sucked into the weft thread holding device 9 and leaves the weft thread stretching device 7.

[0050] As shown in Fig. 7, the introduced weft thread 2b is held in the weft thread holding device 9 and stretched by the weft thread holding device 9 during a backward movement of the sley with the guiding device 10 away from the beat up line 800. Preferably, as also shown in Fig. 7, the bound weft threads 2d, which are bound by the warp threads 3 are cut by the cutting device 11 as the fabric 8 advances. The cut-off ends are removed via the duct 901 shown in Fig. 1.

[0051] As shown in Fig. 8, the free ends of introduced weft threads 2b (shown in Fig. 7) that are sucked into the weft thread holding device 9, are held and stretched by the weft thread holding device 9 until these weft threads are bound by the warp threads 3.

[0052] Figs. 9 and 10 schematically show a second embodiment of a device 1 for catching and stretching a weft thread inserted into a shed of a weaving machine, wherein Fig. 9 shows a view similar to the view of the device shown in Fig. 2, and Fig. 10 shows in more detail a guiding device 10. For the same or similar elements, identical reference signs are used and no detailed description of these elements is provided. In the embodiment according to Figs. 9 and 10, the guiding device 10 is provided with an active thread clamp 105. The guiding device 10 is arranged on the sley for movement with the reed 5. The guiding device 10 is positioned at a distance from the reed 5 away from the beat-up line 800 in order to avoid interference of the guiding device 10 with the

weft threads upon insertion of the weft threads.

[0053] The thread clamp 105 of Fig. 9 is shown in more detail in Fig. 10. The thread clamp 105 is an active thread clamp, which is driven by a pneumatic drive 15. The thread clamp 105 comprises a bottom, fixedly arranged jaw 16 and a top, movably mounted jaw 17, which is driven pneumatically. In the depicted embodiment, the fixedly arranged jaw 16 comprises an elastically mounted clamping element 160 that is formed by a plate 161 that is supported by an elastic layer 162. The clamping element 160 has for example a substantially flat clamping surface. The elastic layer 162 is for example formed by a restoring element exerting a return force, for example an elastic layer 162 in the shape of a synthetic layer or a rubber layer. Such an elastic layer 162 preferably also has damping properties. This allows obtaining a correct clamping function. The plate 161 forms a wear-resistant layer and consists for example of a metal plate. The movably arranged jaw 17 comprises a clamping part 170 that can co operate with the clamping element 160. The clamping part 170 has for example a substantially flat clamping surface.

[0054] The movably arranged jaw 17 is formed integrally with a drive lever arm 18 which can be driven in both directions by the pneumatic drive 15. The pneumatic drive 15 comprises pneumatic cylinders 151 and 152.

[0055] The drive lever arm 18 and the movably arranged jaw 17 are part of a unit, which is mounted rotatable about an axis 19. The pneumatic cylinders 151, 152 are respectively connected to a compressed air source (not shown) via shut-off valves (not shown). The compressed air source can be the same as the compressed-air tank 13 shown in Fig. 1. In preferred embodiments, a control unit is provided for controlling the shut-off valves. In preferred embodiments, the control unit used for controlling the shut-off valves can also control various other components of the weaving machine, for example the valve 131 shown in Fig. 1. According to the depicted embodiment, the thread clamp 105 further comprises a stop lever arm 20 that can co-operate with a stop 21. The stop 21 can be mounted in an adjustable position by a positioning element 22, for example a setting screw. Further, in the embodiment shown the stop 21 comprises a stopping element 23 that can co-operate with the stop lever arm 20 and that for example is formed of a material with damping properties.

[0056] The operation is as follows: When the thread clamp 105 is closed with a certain force, the clamping part 170 and the clamping part of the clamping element 160 contact each other and the stop lever arm 20 beats up against the stop 21, so that the clamping force is restricted and the moveable jaw 17 does not act with full force on the plate 161 of the fixedly arranged jaw 16.

[0057] According to a variant, the stopping element 23 features damping properties and this allows an elastic deformation during the co-operation with the stop lever arm 20. When the stop lever arm 20 beats up against the stop 21, impact forces are damped. Therefore, it is pos-

sible to control the pneumatic drive 15 with a large force, so that the thread clamp 105 can close fast enough and there is also sufficient clamping force present just after the closing, while the damping properties of the stopping element 23 are advantageous to restrict the impact of the beating up against the stop 21.

[0058] The pneumatically driven thread clamp 105 is adapted to allow to be controlled for opening or closing in any position of the sley 500. In preferred embodiments, the thread clamp 105 is controlled for clamping an inserted weft thread upon the beat-up motion of the reed 5. The inserted weft thread is caught and stretched by the weft thread stretching device 7 and transferred to the thread clamp 105 when the thread clamp 105 passes the weft thread stretching device 7. The weft thread 2a caught by the thread clamp 105 is subsequently introduced into the weft thread holding device 9. Upon this transfer to the weft thread holding device 9 the thread clamp 105 is operated to release the caught weft thread 2a.

[0059] Preferably the guiding device 10 comprising a thread clamp 105 is also provided with an adjustable stopping element 103, which defines the depth of the opening formed by the two clamping elements 160, 170. In case the drive 15 of the thread clamp 105 is not driven, the thread clamp 105 of Fig. 10 can herewith act as the hook-shaped guiding element 100 of Fig. 4. In case the drive 15 of the thread clamp 105 is driven, the thread clamp 105 of Fig. 10 can also act as the hook-shaped guiding element 100 of Fig. 4 that guides the caught weft thread 2a towards the weft thread holding device 9 and can thereby, for example for relatively elastic weft threads, in addition to the weft thread stretching device 7 prevent that the weft thread is pulled back into the fabric.

[0060] Fig. 11 and 12 show a variant embodiment of a weft thread holding device 9 to be used in a device 1 shown in Fig. 1 or 9. The weft thread holding device 9 shown in Figs. 11 and 12 comprises a suction opening 903, which is formed by a tube. The aperture of the suction opening 903 faces the reed 5. At a distal end of the suction opening 903 the entry slit 900 is provided.

[0061] The entry slit 900 is formed by two grooves 907, 908, which are arranged into the tube that is forming the suction opening 903. The two grooves 907, 908 are provided in two parallel planes. The groove 908 which is arranged in use of the weft thread holding device 9 closer to the fabric edge 801 (see Fig. 1 or 9) is sufficiently long in order to allow introduced weft threads to be held and stretched until these are bound by the warp threads 3 without bending the introduced weft threads about a ground of the groove 908, i.e. for allowing the weft threads to extend in an essentially straight line between the weft thread holding device 9 and the fabric edge 801. The groove 907 at the opposite side of the suction opening 903 is provided with two mutually opposing retaining edges 905. The retaining edges 905 are slightly inclined towards the inside of the weft thread holding device 9 in order to allow an undisturbed introduction of a weft thread

(not shown), while restricting a retraction or withdrawal of the introduced weft thread. The retaining edges 905 are preferably provided at an entry region 904 of the entry slit 900 as shown in Figs. 11 and 12. Therefore, the groove 908 is longer than the groove 907. In other embodiments, the groove 907 extends beyond the retaining edges 905 provided for example in the form of a number of barbs and has the same length as the groove 908.

[0062] An auxiliary nozzle 14 is provided in the region of the entry slit 900 of the weft thread holding device 9, which auxiliary nozzle 14 is blowing towards the inside of the weft thread holding device 9.

[0063] The device, the weaving machine with the device 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 claims in accordance with variant embodiments, shapes and dimensions. Combinations of the illustrated embodiments that fall under the claims are also possible.

Claims

1. Device for catching and stretching a weft thread (2) inserted into a shed of a weaving machine, comprising a weft thread stretching device (7) arranged stationary on the weaving machine in an extension of an insertion path of the weft thread (2) for catching the leading end part of the inserted weft thread (2) and stretching the caught weft thread (2a), a weft thread holding device (9) arranged stationary on the weaving machine in a region of a beat-up line (800) for holding the leading end part of at least one beaten up weft thread, and a moveable guiding device (10) for guiding the caught weft thread (2a) towards the weft thread holding device (9), wherein the guiding device (10) is adapted for limiting a displacement of the caught weft thread (2a) in a direction transverse to the moving direction of the guiding device (10) upon guiding the caught weft thread (2a) towards the weft thread holding device (9), wherein the guiding device (10) is arranged on a sley (500) for movement with the sley (500), and wherein the guiding device (10) is positioned at a distance from a reed (5) away from the beat-up line (800) in order to avoid interference of the guiding device (10) with weft threads (2) upon insertion of the weft threads (2).
2. Device for catching and stretching a weft thread according to claim 1, **characterized in that** the weft thread holding device (9) is provided with an entry slit (900) between a fabric edge (801) of the fabric (8) and the movement path of the guiding device (10), which entry slit (900) is adapted for receiving a weft thread (2) transversally to its longitudinal direction.
3. Device for catching and stretching a weft thread according to claim 2, **characterized in that** the entry slit (900) is adapted for retaining a weft thread introduced into the weft thread holding device (9) via the entry slit (900), for example the entry slit (900) is delimited by at least one retaining edge (905), preferably two mutually opposing retaining edges (905).
4. Device for catching and stretching a weft thread according to claim 1, 2 or 3, **characterized in that** the guiding device (10) comprises a hook-shaped guiding element (100) provided with a recess (101) having inwardly converging sidewalls (102) for receiving the weft thread (2).
5. Device for catching and stretching a weft thread according to claim 4, **characterized in that** the guiding device (10) comprises an adjustable stopping element (103) for adjusting the depth of the recess (101).
6. Device for catching and stretching a weft thread according to any one of claims 1 to 5, **characterized in that** the weft thread holding device (9) comprises a suction nozzle (902) with a suction opening (903), at which suction opening (903) the entry slit (900) is provided.
7. Device for catching and stretching a weft thread according to claim 6, **characterized in that** at least at an entry region of the entry slit (900) a cross section of the entry slit (900) decreases from a distal end towards the suction nozzle (902) for leading the weft thread towards the suction nozzle (902) of the weft thread holding device (9).
8. Device for catching and stretching a weft thread according to any one of claims 2 to 7, **characterized in that** at least one auxiliary nozzle (14) is provided in the region of the entry slit (900) of the weft thread holding device (9) blowing towards the inside of the weft thread holding device (9) in a direction away from the reed (5).
9. Device for catching and stretching a weft thread according to any one of claims 1 to 8, **characterized in that** the weft thread stretching device (7) comprises a suction nozzle, in particular a ring-jet suction nozzle, the opening of which is directed towards a guiding channel (509) of the reed (5), if the reed (5) is in its most rearward position, away from the beat-up line (800).
10. Device for catching and stretching a weft thread according to any one of claims 1 to 9, **characterized in that** an auxiliary suction nozzle (12) is provided for removing wrongly inserted weft threads.

11. Device for catching and stretching a weft thread according to any one of claims 1 to 10, **characterized in that** the weft thread stretching device (7) is connected to a control unit, wherein the weft thread stretching device (7) is controlled by the control unit so that the weft thread stretching device (7) is activated upon insertion of a weft thread into the shed for catching the inserted weft thread and is deactivated when or after the caught weft thread (2a) is beaten up or has been beaten up.
12. Device for catching and stretching a weft thread according to any one of claims 1 to 11, **characterized in that** the guiding device (10) is provided with a thread clamp, in particular an active thread clamp (105).
13. Weaving machine, **characterized in that** the weaving machine comprises a device (1) for catching and stretching a weft thread according to any one of claims 1 to 12.
14. Method for catching and stretching a weft thread (2) inserted into a shed of a weaving machine, using a device (1) according to any one of claims 1 to 12 with a weft thread stretching device (7), a weft thread holding device (9) arranged stationary on the weaving machine in a region of a beat-up line (800), and a moveable guiding device (10), arranged for movement with a sley (500) and positioned at a distance from a reed (5) away from the beat-up line (800), wherein the method comprises: catching and stretching the leading end part of the weft thread (2) at an extension of an insertion path of the weft thread (2) by means of the weft thread stretching device (7), guiding the caught weft thread (2a) towards the weft thread holding device (9) by means of the guiding device (10) while limiting a displacement of the caught weft thread (2a) in a direction transverse to the moving direction of the guiding device (10), and introducing the caught weft thread (2a) into the weft thread holding device (9) via an entry slit (900).
15. Method for catching and stretching a weft thread according to claim 14, **characterized in that** the weft thread holding device (9) is continuously activated for taking over and holding inserted weft threads, and the weft thread stretching device (7) is activated upon insertion of a weft thread into the shed for catching the inserted weft thread and is deactivated when or after the caught weft thread (2a) is beaten up or has been beaten up.

Patentansprüche

1. Vorrichtung zum Fangen und Strecken eines in ein Webfach einer Webmaschine eingetragenen

Schussfadens (2), umfassend eine Schussfadenstreckvorrichtung (7), die stationär an der Webmaschine in einer Verlängerung einer Eintragsbahn des Schussfadens (2) zum Fangen des vorderen Endteils des eingetragenen Schussfadens (2) und zum Strecken des gefangenen Schussfadens (2a) angeordnet ist, eine Schussfadenhaltevorrichtung (9), die stationär an der Webmaschine in einem Bereich einer Anschlaglinie (800) zum Halten des vorderen Endteils von mindestens einem angeschlagenen Schussfaden angeordnet ist, und eine bewegbare Führungsvorrichtung (10) zum Führen des gefangenen Schussfadens (2a) zu der Schussfadenhaltevorrichtung (9), wobei die Führungsvorrichtung (10) zum Begrenzen einer Verschiebung des gefangenen Schussfadens (2a) in einer Richtung quer zur Bewegungsrichtung der Führungsvorrichtung (10) beim Führen des gefangenen Schussfadens (2a) zu der Schussfadenhaltevorrichtung (9) ausgebildet ist, wobei die Führungsvorrichtung (10) auf einer Weblade (500) für eine Bewegung mit der Weblade (500) angeordnet ist, und wobei die Führungsvorrichtung (10) in einem Abstand von einem Webblatt (5) entfernt von der Anschlaglinie (800) positioniert ist, um Interferenzen der Führungsvorrichtung (10) mit Schussfäden (2) beim Eintragen der Schussfäden (2) zu vermeiden.

2. Vorrichtung zum Fangen und Strecken eines Schussfadens nach Anspruch 1, **dadurch gekennzeichnet, dass** die Schussfadenhaltevorrichtung (9) mit einem Eintrittsschlitz (900) zwischen einer Gewebekante (801) des Gewebes (8) und der Bewegungsbahn der Führungsvorrichtung (10) versehen ist, welcher Eintrittsschlitz (900) zur Aufnahme eines Schussfadens (2) quer zu seiner Längsrichtung ausgebildet ist.
3. Vorrichtung zum Fangen und Strecken eines Schussfadens nach Anspruch 2, **dadurch gekennzeichnet, dass** der Eintrittsschlitz (900) zum Festhalten eines durch den Eintrittsschlitz (900) in die Schussfadenhaltevorrichtung (9) eingebrachten Schussfadens ausgebildet ist, zum Beispiel der Eintrittsschlitz (900) durch mindestens eine Haltekante (905), vorzugsweise zwei gegenüberliegende Haltekanten (905), begrenzt wird.
4. Vorrichtung zum Fangen und Strecken eines Schussfadens nach Anspruch 1, 2 oder 3, **dadurch gekennzeichnet, dass** die Führungsvorrichtung (10) ein hakenförmiges Führungselement (100) enthält, das mit einer Aussparung (101) mit nach innen konvergierenden Seitenwänden (102) zum Aufnehmen des Schussfadens (2) versehen ist.
5. Vorrichtung zum Fangen und Strecken eines Schussfadens nach Anspruch 4, **dadurch gekenn-**

zeichnet, dass die Führungsvorrichtung (10) ein anpassbares Anschlagelement (103) zum Anpassen der Tiefe der Aussparung (101) enthält.

6. Vorrichtung zum Fangen und Strecken eines Schussfadens nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Schussfadenhaltevorrichtung (9) eine Saugdüse (902) mit einer Saugöffnung (903) enthält, bei welcher Saugöffnung (903) der Eintrittsschlitz (900) vorgesehen ist. 5
7. Vorrichtung zum Fangen und Strecken eines Schussfadens nach Anspruch 6, **dadurch gekennzeichnet, dass** mindestens an einem Eintrittsbereich des Eintrittsschlitzes (900) ein Querschnitt des Eintrittsschlitzes (900) sich von einem distalen Ende zur Saugdüse (902) hin verringert, um den Schussfaden zu der Saugdüse (902) der Schussfadenhaltevorrichtung (9) zu führen. 10
8. Vorrichtung zum Fangen und Strecken eines Schussfadens nach einem der Ansprüche 2 bis 7, **dadurch gekennzeichnet, dass** mindestens eine Hilfsdüse (14) im Bereich des Eintrittsschlitzes (900) der Schussfadenhaltevorrichtung (9) vorgesehen ist, die zur Innenseite der Schussfadenhaltevorrichtung (9) in eine Richtung weg vom Webblatt (5) bläst. 15
9. Vorrichtung zum Fangen und Strecken eines Schussfadens nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** die Schussfadenstreckvorrichtung (7) eine Saugdüse enthält, insbesondere eine Ringstrahl-Saugdüse, deren Öffnung zu einem Führungskanal (509) des Webblatts (5) hin gerichtet ist, wenn sich das Webblatt (5) in seiner hintersten Position, entfernt von der Anschlaglinie (800) befindet. 20
10. Vorrichtung zum Fangen und Strecken eines Schussfadens nach einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet, dass** eine Hilfssaugdüse (12) zum Entfernen von falsch eingetragenen Schussfäden vorgesehen ist. 25
11. Vorrichtung zum Fangen und Strecken eines Schussfadens nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** die Schussfadenstreckvorrichtung (7) mit einer Steuereinheit verbunden ist, wobei die Schussfadenstreckvorrichtung (7) durch die Steuereinheit so gesteuert wird, dass die Schussfadenstreckvorrichtung (7) beim Eintragen eines Schussfadens in das Webfach aktiviert wird, um den eingetragenen Schussfaden zu fangen, und beim Anschlagen des gefangenen Schussfadens (2a) oder nachdem er angeschlagen wurde deaktiviert wird. 30
12. Vorrichtung zum Fangen und Strecken eines 35

Schussfadens nach einem der Ansprüche 1 bis 11, **dadurch gekennzeichnet, dass** die Führungsvorrichtung (10) mit einer Fadenklemme, insbesondere einer aktiven Fadenklemme (105), versehen ist.

13. Webmaschine, **dadurch gekennzeichnet, dass** die Webmaschine eine Vorrichtung (1) zum Fangen und Strecken eines Schussfadens nach einem der Ansprüche 1 bis 12 enthält. 40
14. Verfahren zum Fangen und Strecken eines in ein Webfach einer Webmaschine eingetragenen Schussfadens (2), unter Verwendung einer Vorrichtung (1) nach einem der Ansprüche 1 bis 12 mit einer Schussfadenstreckvorrichtung (7), einer Schussfadenhaltevorrichtung (9), die stationär auf der Webmaschine in einem Bereich einer Anschlaglinie (800) angeordnet ist, und einer bewegbaren Führungsvorrichtung (10), die zum Bewegen mit einer Weblade (500) angeordnet ist und in einem Abstand von einem Webblatt (5) entfernt von der Anschlaglinie (800) positioniert ist, wobei das Verfahren umfasst: Fangen und Strecken des vorderen Endteils des Schussfadens (2) in einer Verlängerung einer Eintragsbahn des Schussfadens (2) mittels der Schussfadenstreckvorrichtung (7), Führen des gefangenen Schussfadens (2a) zu der Schussfadenhaltevorrichtung (9) mittels der Führungsvorrichtung (10), während eine Verschiebung des gefangenen Schussfadens (2a) in einer Richtung quer zur Bewegungsrichtung der Führungsvorrichtung (10) begrenzt wird, und Einbringen des gefangenen Schussfadens (2a) durch einen Eintrittsschlitz (900) in die Schussfadenhaltevorrichtung (9). 45
15. Verfahren zum Fangen und Strecken eines Schussfadens nach Anspruch 14, **dadurch gekennzeichnet, dass** die Schussfadenhaltevorrichtung (9) für die Übernahme und das Halten von eingetragenen Schussfäden kontinuierlich aktiviert wird, und die Schussfadenstreckvorrichtung (7) beim Eintragen eines Schussfadens in das Webfach aktiviert wird, um den eingetragenen Schussfaden zu fangen, und beim Anschlagen des gefangenen Schussfadens (2a) oder nachdem er angeschlagen wurde deaktiviert wird. 50

Revendications

1. Dispositif pour capturer et étirer un fil de trame (2) inséré dans une foule d'une machine à tisser, comprenant un dispositif (7) pour étirer un fil de trame disposé fixe sur la machine à tisser dans un prolongement d'une voie d'insertion du fil de trame (2) pour capturer la partie d'extrémité avant du fil de trame inséré (2) et pour étirer le fil de trame capturé (2a), un dispositif (9) pour maintenir un fil de trame disposé 55

- fixe sur la machine à tisser dans une région d'une ligne de frappe (800) pour maintenir la partie d'extrémité avant d'au moins un fil de trame frappé, et un dispositif de guidage mobile (10) pour guider le fil de trame capturé (2a) vers le dispositif (9) pour maintenir un fil de trame, dans lequel le dispositif de guidage (10) est adapté pour limiter un déplacement du fil de trame capturé (2a) dans une direction transversale à la direction de déplacement du dispositif de guidage (10) lors du guidage du fil de trame capturé (2a) vers le dispositif (9) pour maintenir un fil de trame, dans lequel le dispositif de guidage (10) est disposé sur un battant (500) pour se déplacer avec le battant (500), et dans lequel le dispositif de guidage (10) est positionné à une distance d'un peigne (5) loin de la ligne de frappe (800) afin d'éviter toute interférence du dispositif de guidage (10) avec des fils de trame (2) lors de l'insertion des fils de trame (2).
2. Dispositif pour capturer et étirer un fil de trame selon la revendication 1, **caractérisé en ce que** le dispositif (9) pour maintenir un fil de trame est prévu d'une fente d'entrée (900) entre un bord de tissu (801) du tissu (8) et la voie de déplacement du dispositif de guidage (10), laquelle fente d'entrée (900) est adaptée pour recevoir un fil de trame (2) transversalement à sa direction longitudinale.
 3. Dispositif pour capturer et étirer un fil de trame selon la revendication 2, **caractérisé en ce que** la fente d'entrée (900) est adaptée pour retenir un fil de trame introduit dans le dispositif (9) pour maintenir un fil de trame à travers la fente d'entrée (900), par exemple, la fente d'entrée (900) est limitée par au moins un bord de retenue (905), de préférence deux bords de retenue opposés (905).
 4. Dispositif pour capturer et étirer un fil de trame selon la revendication 1, 2 ou 3, **caractérisé en ce que** le dispositif de guidage (10) comprend un élément de guidage (100) en forme de crochet prévu d'une encoche (101) avec des parois latérales (102) convergeant vers l'intérieur pour recevoir le fil de trame (2).
 5. Dispositif pour capturer et étirer un fil de trame selon la revendication 4, **caractérisé en ce que** le dispositif de guidage (10) comprend un élément d'arrêt réglable (103) pour régler la profondeur de l'encoche (101).
 6. Dispositif pour capturer et étirer un fil de trame selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** le dispositif (9) pour maintenir un fil de trame comprend une buse d'aspiration (902) avec une ouverture d'aspiration (903), la fente d'entrée (900) est prévue dans laquelle ouverture d'aspiration (903).
 7. Dispositif pour capturer et étirer un fil de trame selon la revendication 6, **caractérisé en ce qu'**au moins dans une région de la fente d'entrée (900) une section transversale de la fente d'entrée (900) diminue à partir d'une extrémité distale vers la buse d'aspiration (902) pour conduire le fil de trame vers la buse d'aspiration (902) du dispositif (9) pour maintenir un fil de trame.
 8. Dispositif pour capturer et étirer un fil de trame selon l'une quelconque des revendications 2 à 7, **caractérisé en ce qu'**au moins une buse auxiliaire (14) est prévue dans la région de la fente d'entrée (900) du dispositif (9) pour maintenir un fil de trame soufflant vers l'intérieur du dispositif (9) pour maintenir un fil de trame dans une direction loin du peigne (5).
 9. Dispositif pour capturer et étirer un fil de trame selon l'une quelconque des revendications 1 à 8, **caractérisé en ce que** le dispositif (7) pour étirer un fil de trame comprend une buse d'aspiration, en particulier une buse d'aspiration annulaire à jet, dont l'ouverture est dirigée vers un canal de guidage (509) du peigne (5), si le peigne (5) est dans sa position la plus arrière, loin de la ligne de frappe (800).
 10. Dispositif pour capturer et étirer un fil de trame selon l'une quelconque des revendications 1 à 9, **caractérisé en ce qu'**une buse d'aspiration auxiliaire (12) est prévue pour enlever les fils de trame insérés incorrectement.
 11. Dispositif pour capturer et étirer un fil de trame selon l'une quelconque des revendications 1 à 10, **caractérisé en ce que** le dispositif (7) pour étirer un fil de trame est connecté avec une unité de commande, dans lequel le dispositif (7) pour étirer un fil de trame est commandé par l'unité de commande de sorte que le dispositif (7) pour étirer un fil de trame est activé lors de l'insertion d'un fil de trame dans la foule pour capturer le fil de trame inséré et est désactivé lorsque ou après le fil de trame capturé (2a) est frappé ou a été frappé.
 12. Dispositif pour capturer et étirer un fil de trame selon l'une quelconque des revendications 1 à 11, **caractérisé en ce que** le dispositif de guidage (10) est prévu d'un pince-fil, en particulier un pince-fil actif (105).
 13. Machine à tisser, **caractérisée en ce que** la machine à tisser comprend un dispositif (1) pour capturer et étirer un fil de trame selon l'une quelconque des revendications 1 à 12.
 14. Procédé pour capturer et étirer un fil de trame (2) inséré dans une foule d'une machine à tisser, utili-

sant un dispositif (1) selon l'une quelconque des revendications 1 à 12 avec un dispositif (7) pour étirer un fil de trame, un dispositif (9) pour maintenir un fil de trame disposé fixe sur la machine à tisser dans une région d'une ligne de frappe (800), et un dispositif de guidage mobile (10), disposé pour se déplacer avec un battant (500) et positionné à une distance d'un peigne (5) loin de la ligne de frappe (800), dans lequel le procédé comprend : capturer et étirer la partie d'extrémité avant du fil de trame (2) dans un prolongement d'une voie d'insertion du fil de trame (2) au moyen du dispositif (7) pour étirer un fil de trame, guider le fil de trame capturé (2a) vers le dispositif (9) pour maintenir un fil de trame au moyen du dispositif de guidage (10) en limitant un déplacement du fil de trame capturé (2a) dans une direction transversale à la direction de déplacement du dispositif de guidage (10), et à introduire le fil de trame capturé (2a) dans le dispositif (9) pour maintenir un fil de trame à travers une fente d'entrée (900).

15. Procédé pour capturer et étirer un fil de trame selon la revendication 14, **caractérisé en ce que** le dispositif (9) pour maintenir un fil de trame est activé continuellement pour prendre et maintenir des fils de trame insérés, et le dispositif (7) pour étirer un fil de trame est activé lors de l'insertion d'un fil de trame dans la foule pour capturer le fil de trame inséré et est désactivé lorsque ou après le fil de trame capturé (2a) est frappé ou a été frappé.

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Fig. 1

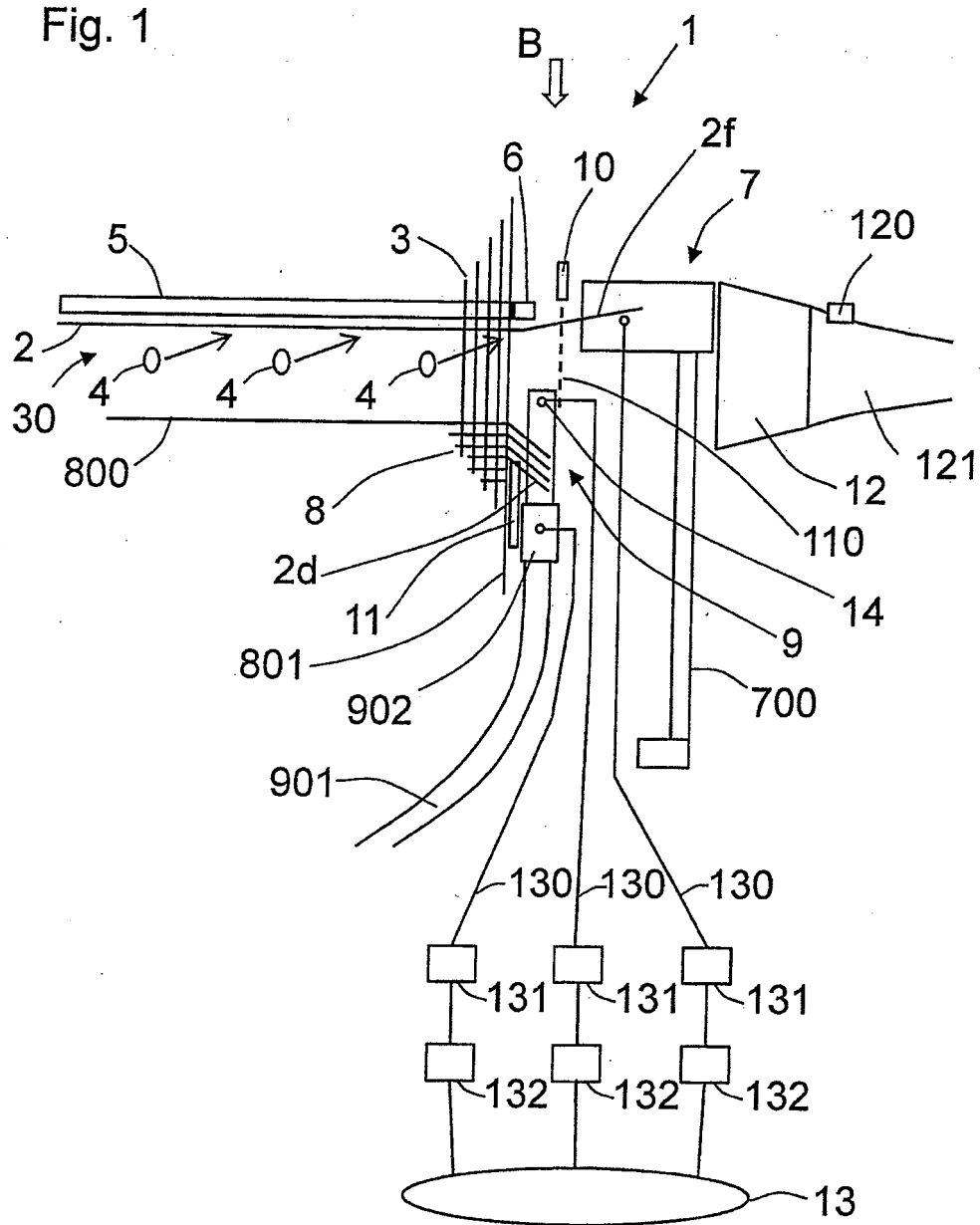


Fig. 2

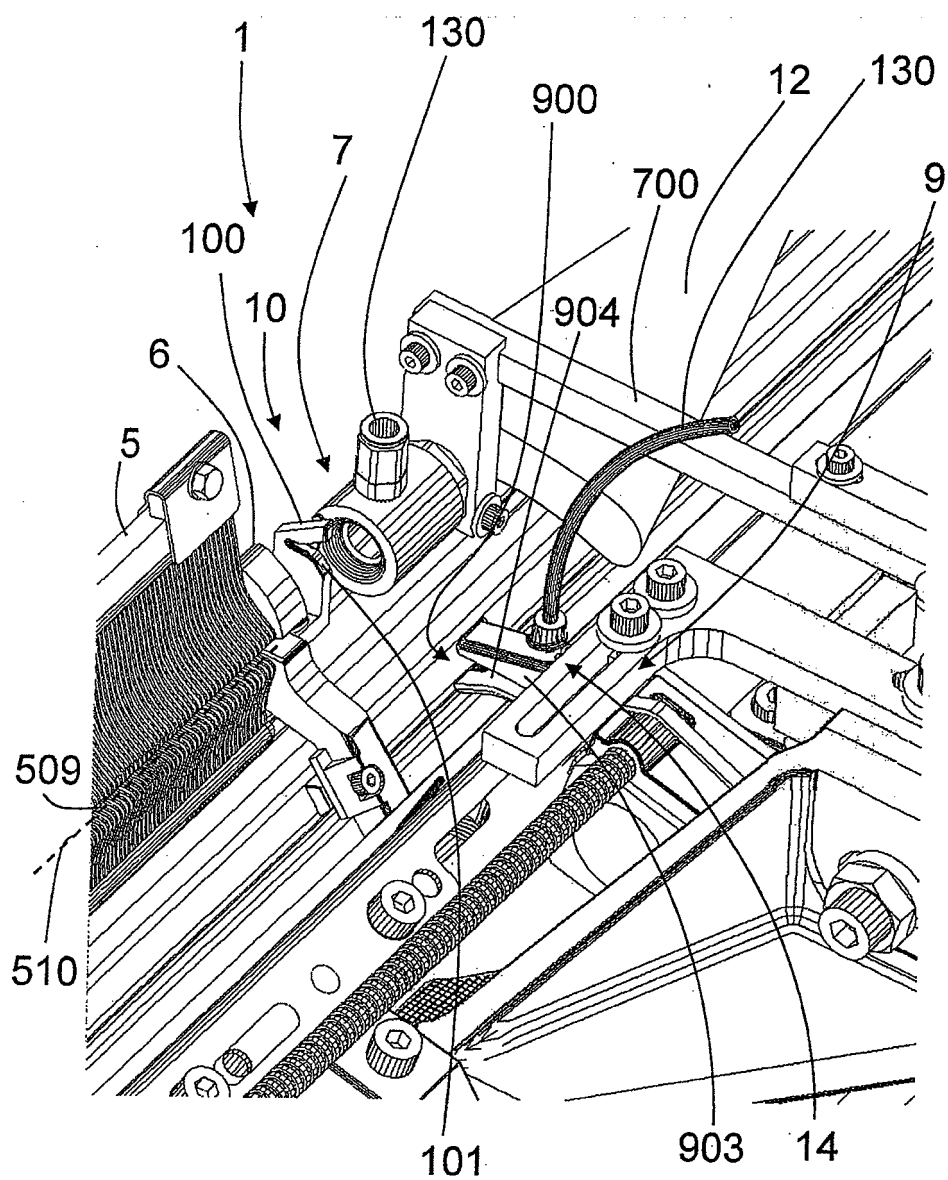


Fig. 3

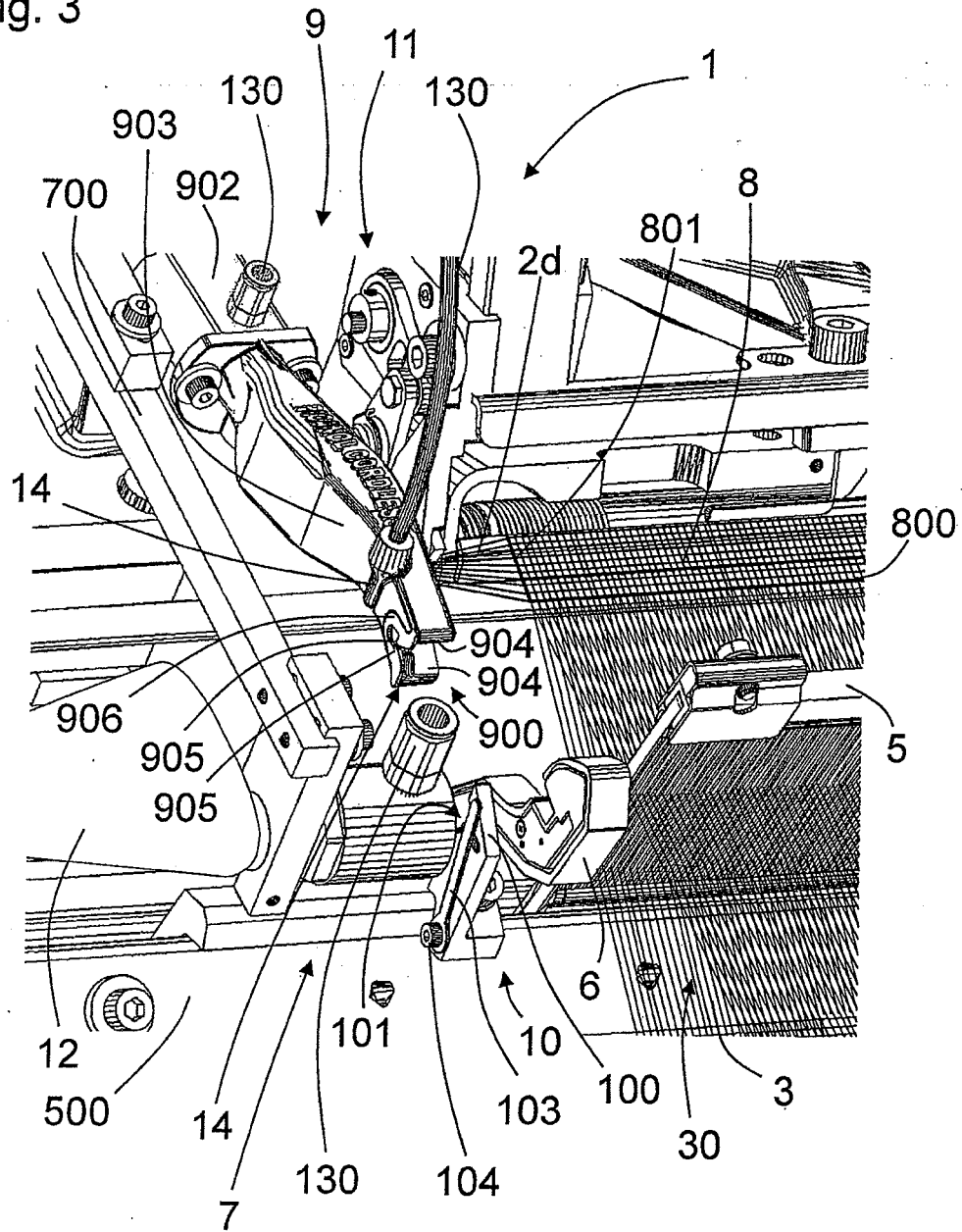


Fig. 4

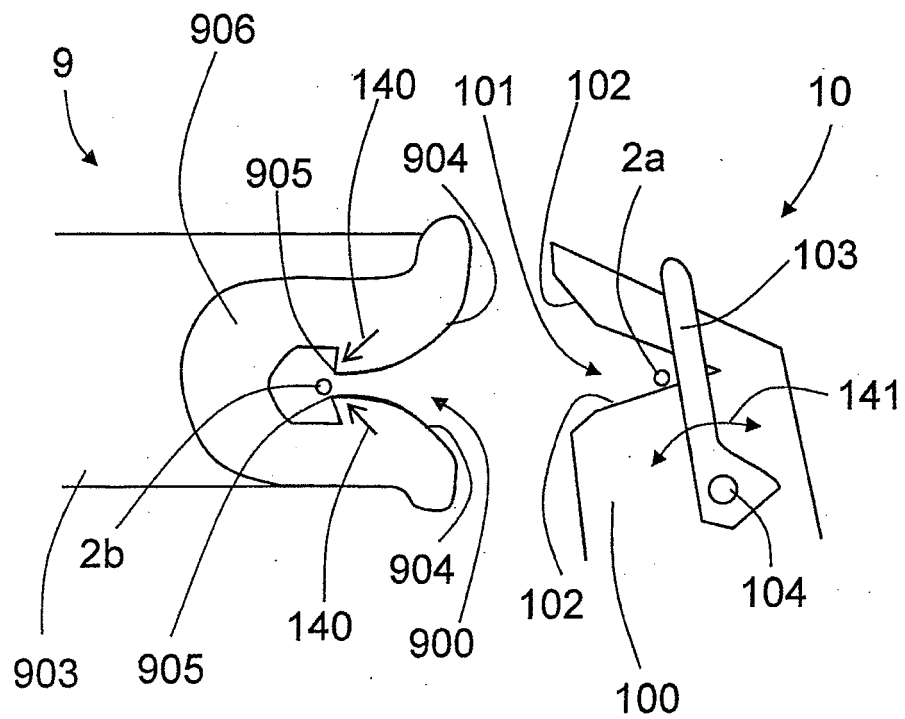


Fig. 5

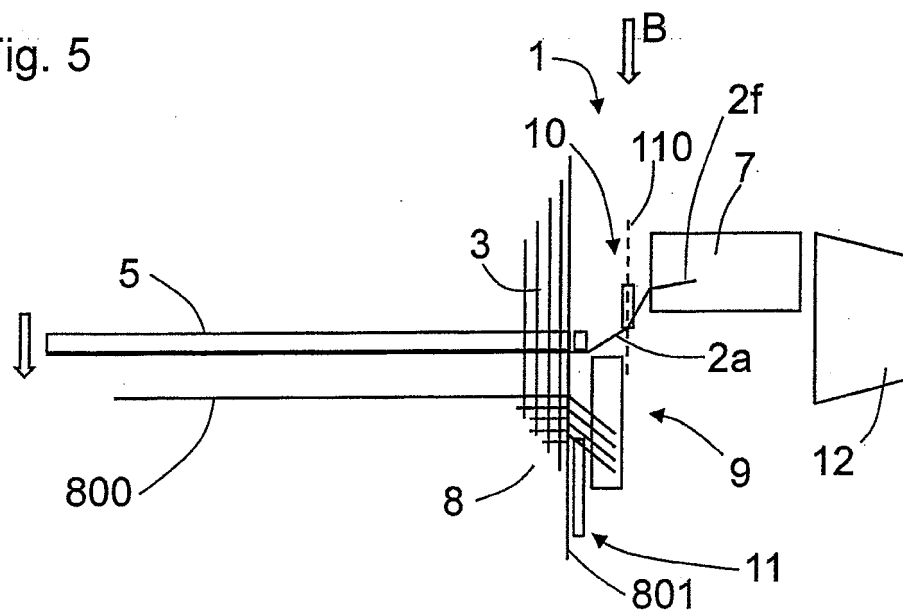


Fig. 6

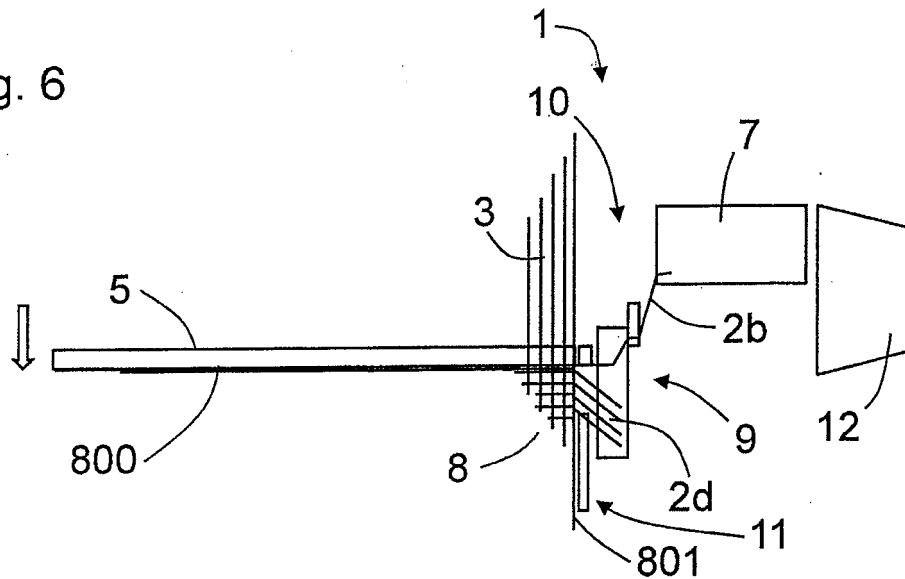


Fig. 7

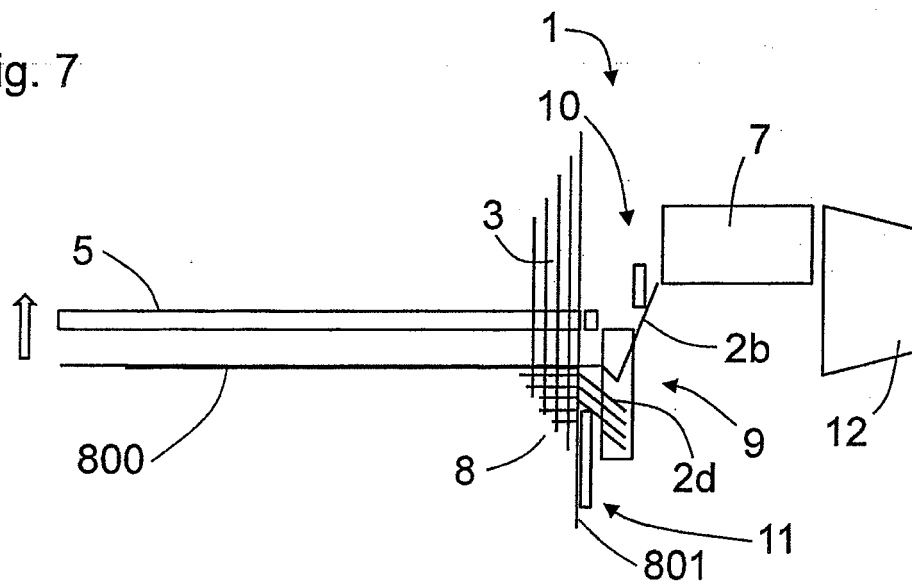


Fig. 8

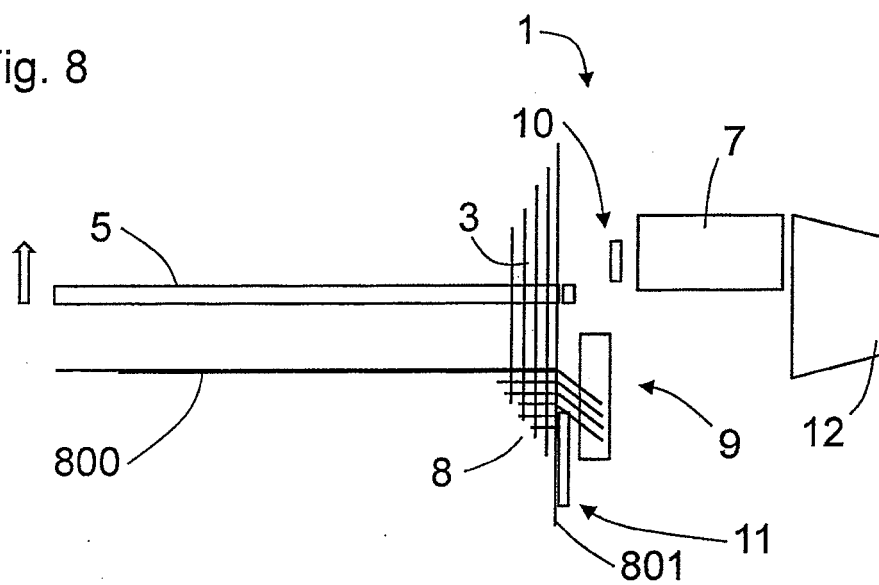


Fig. 9

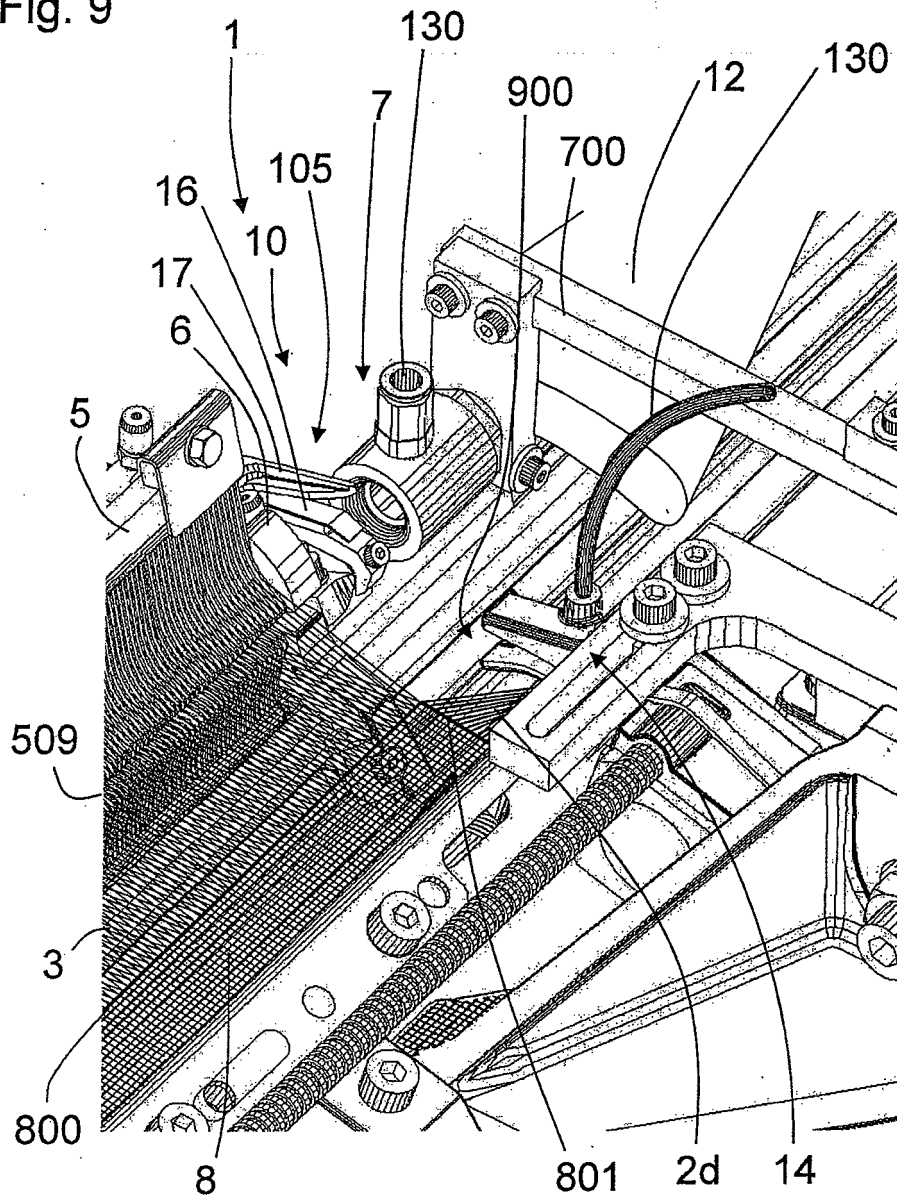


Fig. 10

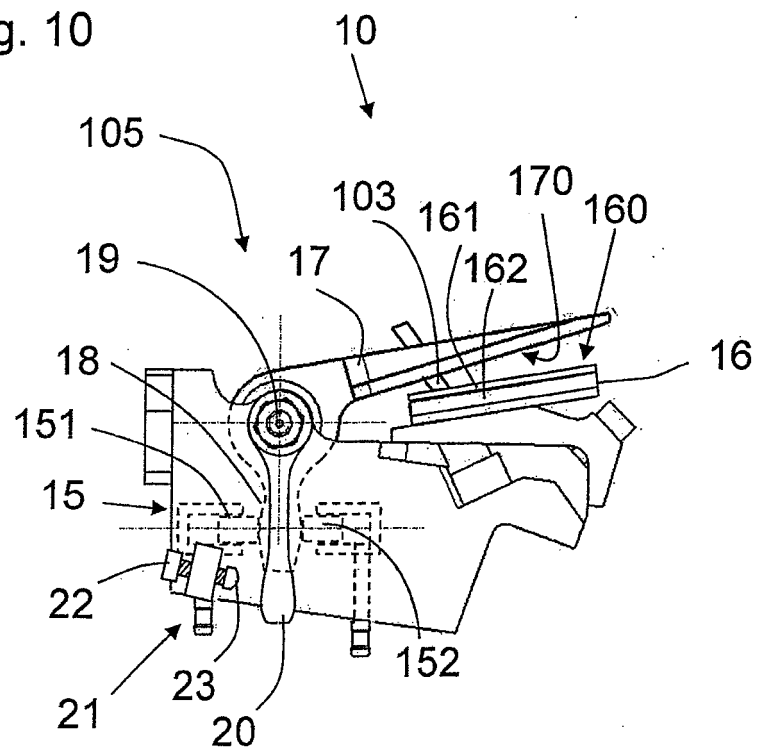


Fig. 11

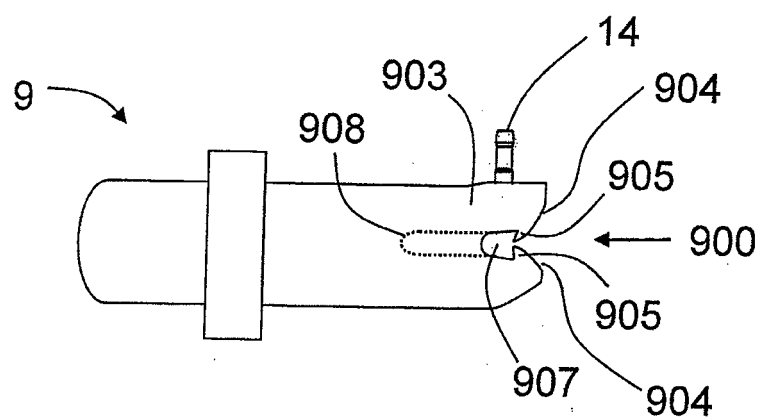
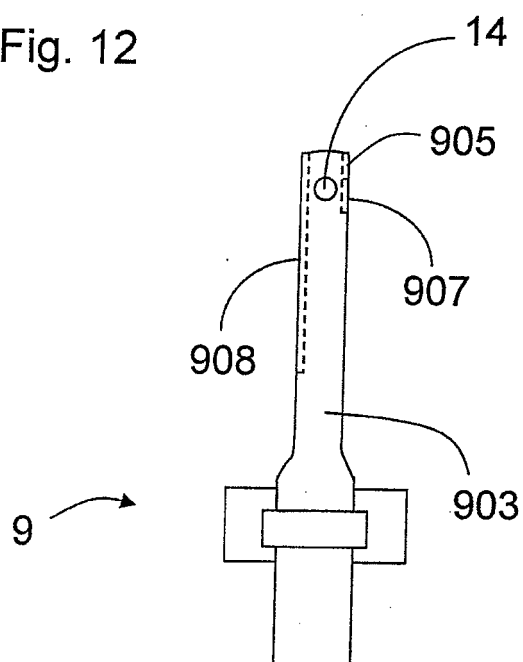


Fig. 12



REFERENCES CITED IN THE DESCRIPTION

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