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(54) **APPARATUS FOR PRESENTING WEFT THREADS**

VORRICHTUNG ZUM VORLEGEN VON SCHUSSFÄDEN

APPAREIL PERMETTANT DE PRÉSENTER DES FILS DE TRAME

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EP 2 893 067 B1

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Description

[0001] The invention relates to an apparatus for presenting weft threads to an insertion device of a weaving machine, wherein at least one presenting element, such as a needle, is mounted displaceable in longitudinal direction between a rest position and a feed position by means of a crank mechanism.

[0002] An apparatus which selects and presents weft threads to an insertion device of a weaving machine is shown for example in EP 0 598 264 B1. This apparatus comprises at least one needle for presenting a weft thread to the insertion device and driving means with an individual crank and an individual drive motor for selectively moving the needle between a rest position and a feed position, wherein the needle is directly connected to the crank and wherein guiding means are provided at each needle for guiding the needle in the movement between the rest and feed positions and for compensating transverse movements of the crank.

[0003] JP 10-212641 A and CN 2628554 Y each show an apparatus which selects and presents weft threads to an insertion device of a weaving machine using a crank, wherein a connecting rod is provided between a needle presenting the weft thread and the crank, and the needle is mounted displaceable in longitudinal direction.

[0004] It is an object of the invention to provide an apparatus of the type described above, wherein a large stroke of the presenting elements is possible at high speeds.

[0005] This object is solved by an apparatus for presenting weft threads to an insertion device of a weaving machine, comprising at least one presenting element mounted displaceable in the longitudinal direction between a rest position and a feed position and a crank mechanism with a crank and a connecting rod for driving the at least one presenting element, wherein the at least one presenting element is connected to the connecting rod, wherein the connecting rod is supported by a guiding element, and wherein the guiding element is able to compensate transverse forces exerted on the connecting rod by the crank, so that the presenting element is only subjected to forces in its longitudinal direction.

[0006] By providing the guiding element for supporting the connecting rod, perpendicular forces, that occur when the connecting rod is driven by the crank, are compensated by the guiding element and not transferred to the presenting element. Thereby, frictional forces in bearing points of the presenting element are avoided and the presenting element may be moved with high speeds over a large distance in its longitudinal direction.

[0007] In one embodiment, the presenting element is connected to the connecting rod by a pivot, wherein the pivot is formed at the height of the guiding element. In particular, a sleeve or an axle of the pivot is formed integrally with the guiding element. Due to this, the number of elements to be moved and thereby the inertia of the crank mechanism is minimized.

[0008] According to another embodiment, the presenting element comprises a thread receiving end, wherein the connecting rod is attached to the opposite end of the presenting element. The thread receiving element is designed as a thread eye or thread clamp for receiving the weft thread to be presented.

[0009] In a preferred embodiment, a frame is provided, wherein the presenting element and the connecting rod are mounted to the frame. The frame may comprise a plurality of frame parts. In preferred embodiments, only one frame part is provided, allowing for a simple design with a high stiffness.

[0010] According to one embodiment, the frame is provided with a guide groove extending in the longitudinal direction of the presenting element, wherein the guiding element is slidably disposed in said guide groove.

[0011] In preferred embodiments, the at least one presenting element is mounted displaceable to the frame by at least one bearing point, preferably by two bearing points. Preferably, the at least one bearing point comprises a bearing bush for receiving the respective presenting element and a support on which the bearing bush is attached to the frame. The support on which the bearing bush is attached to the frame preferably comprises an elastic rubber socket. Due to the mounting of the presenting elements with "elastic" supports, the presenting elements are allowed to move within defined limits with the weft thread. In addition or as an alternative, the bearing bush comprises a pin received rotatably by the support for allowing the presenting elements to move with the weft thread.

[0012] According to another embodiment, the frame is provided with a recess for accommodating the crank in order to allow a movement of the crank. Thereby, walls of the recess may be used as end stops for the movement of the crank.

[0013] In another embodiment, each presenting element together with the respective frame and the respective crank mechanism forms one module. The apparatus can comprise a plurality of presenting elements depending on the number of weft yarns required for a certain fabric. Providing a module simplifies a matching of the number of presenting elements to the requirements of a certain fabric. Moreover, the module may be exchanged as a unit in case of defect.

[0014] According to a preferred embodiment, a drive motor is assigned to the crank mechanism, such that the crank is driven by its own drive motor.

[0015] The drive motor is preferably integrated in the module. In one embodiment, the motor is arranged to drive the crank to and fro over a defined angular range. The motor may also be arranged to rotate in one direction, wherein the presenting element is moved in longitudinal direction only, as the direction of rotation does not influence the linear movement direction of the presenting element.

[0016] In a preferred embodiment, the connecting rod is attached to the crank on the outer side of the crank.

With this arrangement, a height of the module perpendicular to the plane of the crank can be minimized.

[0017] In preferred embodiments, the presenting element is a needle with a thread eye. In another embodiment, the presenting elements are arranged with yarn clamps such as are known in the art.

[0018] Preferred embodiments are defined in the dependent claims and the drawings.

[0019] In the following, an embodiment of the invention will be described in detail based on several schematic drawings in which

Figs. 1 - 3

are perspective schematic views of an apparatus for selecting and presenting weft threads with a presenting element according to the invention, wherein the presenting element is shown in three different positions.

Figs. 4 - 6

are schematic front views corresponding to that of Figs. 1 to 3.

Fig. 7

shows a cross section at the height of the guiding element and a bearing point.

[0020] Figs. 1 to 3 show a single module 1 of an apparatus for presenting weft threads, more particularly an apparatus for presenting weft threads to a gripper of a gripper weaving machine. In preferred embodiments, the apparatus comprises a plurality of identical modules 1. In such an apparatus for selecting and presenting weft threads the modules, for example, can be disposed as the modules in EP 0 598 264 A1.

[0021] Each module 1 comprises a presenting element 2, wherein in Figs. 1 and 4 the presenting element 2 is in a rest position, in Figs. 3 and 6 the presenting element 2 is in a feed position, and in Figs. 2 and 5 the presenting element 2 is in an intermediate position. In the embodiment shown the presenting element 2 is designed as a needle, one end 41 of which includes a thread eye 20 for guiding a weft thread (not shown).

[0022] The different modules 1 of an apparatus in one embodiment are arranged in one plane. When arranged in one plane, the presenting elements in one embodiment are directed to one common point, as known from EP 0 362 089 A1. In other embodiments, the presenting elements are arranged in a so called fan arrangement, as known from EP 0 638 677 A1. In a preferred embodiment the presenting elements are arranged in a plane and the modules can be arranged in two rows as known from EP 0 598 264 A1.

[0023] Each module 1 further comprises a crank mechanism 3 with a crank 30 and a connecting rod 31, a drive motor 4 with a shaft 40 and a frame 5 on which the presenting element 2, the crank 30, the connecting rod 31 and the drive motor 4 are mounted. The drive motor 4 is

connected via the crank mechanism 3 to the presenting element 2.

[0024] The connecting rod 31 is pivotably attached to the crank 30 by a pivot 32. The connecting rod 31 is attached to the crank 30 on the outer side of the crank 30, i.e. on the side facing away from drive motor 4.

[0025] The presenting element 2 is attached to the connecting rod 31 at the end 42 opposite the thread eye 20 by a pivot 60. Further, the presenting element 2 is mounted to the frame 5 by two bearing points 7 for a longitudinal movement of the presenting element 2. As shown in Fig. 7, the bearing points 7 each comprise a bearing bush 70, wherein the presenting element 2 passes through the bearing bush 70, and a support 71 by which the bearing bush 70 is attached to the frame 5, for example by means of an elastic or a non-elastic pin 72. In the embodiment shown, the pin 72 is arranged rotatable in the frame 5 at a fixed position by using a bush 73.

[0026] The supports 71 provided for of the presenting elements 2 are designed as elastic rubber sockets, as a result of which the presenting elements 2 are elastically supported in the transverse direction. Hence, the presenting elements 2 are allowed to move within limits defined by the elasticity of the support 71. This movement allows that the presenting element 2 can move somewhat under the influence of forces exerted by a weft thread at the height of the thread eye 20 and/or forces that arise by supporting the presenting element 2 in three points.

[0027] The crank 30 is fixed to the shaft 40 of the drive motor 4. The drive motor 4 is arranged to a back side of the frame 5 by suitable fixing means such as screws. For allowing a movement of the crank 30, in the embodiment shown the frame 5 is provided with a recess 50. The recess 50 is formed by a base and two steps 52 projecting from the base. According to an embodiment the motor can move to and fro over an angular range of approximately 180°. In use, the range may be chosen smaller for example an angular range between approximately 90° and approximately 170° may be sufficient for an intended application. In the embodiment shown, the maximum angle of rotation of the crank 30 is bounded by the walls of the recess 50. The shape and/or size of the recess 50 may be chosen suitably. In the embodiment shown, the shape is chosen in such a way that for the rest and feed positions, shown in Figs. 1, 4 and Figs. 3, 6, respectively, the crank 30, the connecting rod 31 and the presenting element 2 are aligned.

[0028] According to a variant, a drive motor 4 may be provided that rotates in one direction, as the direction of rotation does not influence the linear movement direction of the presenting element 2. In this case no recess 50 will be provided.

[0029] Due to the movement of the crank 30, forces are acting on the connecting rod 31 in a direction transverse to the longitudinal direction of the presenting element 2. For compensating these transverse forces of the crank 30, the connecting rod 31 is supported by a guiding element 6. The guiding element 6 is able to compensate

the transverse forces, so that the presenting element 2 is only subjected to forces in its longitudinal direction, also referred to as length direction.

[0030] In the embodiment shown, the frame 5 is provided with a guide groove 51 extending in the longitudinal direction of the presenting element 2, in which guide groove 51 the guiding element 6 is slidably arranged. The material and/or the size of the guiding element 6 and the guide groove 51 are chosen for ensuring only a limited friction upon the sliding movement and to avoid wear. The guide groove 51 is for example fully open, this means extends through the frame 5, in order to prevent that weaving dust accumulates at the height of the guide groove 51.

[0031] The guiding element 6, the guide groove 51 and the bearing points 7 are aligned with the presenting element 2, i.e. are arranged in a plane passing through the axis of the presenting element 2. Due to the elasticity of the supports 71 comparatively large tolerances are allowed. Further, due to the additional guiding element 6, one of the bearing points 7 may be omitted, for example the bearing point 7 near the guiding element 6.

[0032] Upon rotation of the crank 30, the presenting elements 2 move along their longitudinal direction, wherein the stroke of the presenting elements 2 depends on the length of the crank 30. The crank 30 may be chosen comparatively large allowing for a large stroke, wherein forces in transverse direction are compensated by the guiding element 6.

[0033] As shown in Fig. 7, in the shown embodiment the guiding element 6 comprises a cylinder shaped bottom part 62, that is arranged rotatable and slidably displaceable in the guide groove 51, and a connecting part 63 that is one-piece with the bottom part 62. The connecting part 63 is one-piece with or connected to the connecting rod 31. A pivot 60 is formed between the presenting element 2 and the guiding element 6, which pivot 60 allows a mutual rotation of the connecting rod 31 and the presenting element 2. In the embodiment shown, the pivot 60 comprises an axle 65 attached to the presenting element 2 and a sleeve 64 received by the connecting part 63. The sleeve can also be replaced by a bearing.

[0034] According to a variant not shown the bottom part 62 can consist of a guide block to which a pivot 60 is arranged, which pivot 60 allows a mutual rotation of the connecting rod 31 and the presenting element 2.

[0035] The masses of the parts to be moved by the drive motor 4, namely of the crank 30, the connecting rod 31, the presenting element 2 and the guiding element 6 are comparatively small. For this purpose, the crank 30 is for example also provided with a clearance 33. As a result of the small masses, only relatively low inertias need to be overcome to move the presenting element 2. Consequently, higher operational speeds and/or the use of relatively low-power drive motors 4 are possible.

[0036] As shown in the Figs, the base surface of the frame 5 is tapering from the area of the drive motor 4 toward the end 41. This shape is advantageous for an

arrangement of the module 1 in an apparatus, but not mandatory.

[0037] Having thus described preferred embodiments of the invention and variants and modifications thereof in sufficient detail enable the person skilled in the art to make and to use the invention based on the above description and accompanying drawings, it is nevertheless intended that the invention is not be limited by the description or illustrations, but rather that it be defined solely by the appended claims.

Claims

1. Apparatus for presenting weft threads to an insertion device of a weaving machine, comprising at least one presenting element (2) mounted displaceable in the longitudinal direction between a rest position and a feed position and a crank mechanism (3) with a crank (30) and a connecting rod (31) for driving the at least one presenting element (2), wherein the at least one presenting element (2) is connected to the connecting rod (31), **characterized in that** the connecting rod (31) is supported by a guiding element (6), wherein the guiding element (6) is able to compensate transverse forces exerted on the connecting rod (31) by the crank (30), so that the presenting element (2) is only subjected to forces in its longitudinal direction
2. Apparatus according to claim 1, **characterized in that** the presenting element (2) is connected to the connecting rod (31) by a pivot (60), wherein the pivot (60) is formed at the guiding element (6).
3. Apparatus according to claim 1 or 2, **characterized in that** the presenting element (2) comprises a thread receiving end (41), wherein the connecting rod (31) is attached to the end (42) of the presenting element (2) opposite to the thread receiving end (41).
4. Apparatus according to any one of claims 1, 2 or 3, **characterized in that** a frame (5) is provided, wherein the presenting element (2) and the connecting rod (31) are mounted to the frame (5).
5. Apparatus according to claim 4, **characterized in that** the frame (5) is provided with a guide groove (51) extending in the longitudinal direction of the presenting element (2), wherein the guiding element (6) is slidably arranged in said guide groove (51).
6. Apparatus according to claim 4 or 5, **characterized in that** the at least one presenting element (2) is mounted displaceably to the frame (5) by at least one bearing point (7), preferably by two bearing points (7).

7. Apparatus according to claim 6, **characterized in that** the at least one bearing point (7) comprises a bearing bush (70) for receiving the respective presenting element (2) and a support (71) by which the bearing bush (70) is attached to the frame (5). 5
8. Apparatus according to claim 7, **characterized in that** the support (71) by which the bearing bush (70) is attached to the frame (5) comprises an elastic rubber socket. 10
9. Apparatus according to claim 7 or 8, **characterized in that** the support (71) comprises a rotatable received pin (72). 15
10. Apparatus according to any one of claims 4 to 9, **characterized in that** the frame (5) is provided with a recess (50) for accommodating the crank (30) in order to allow a movement of the crank (30). 20
11. Apparatus according to any one of claims 4 to 10, **characterized in that** each presenting element (2) together with the respective frame (5) and the respective crank mechanism (3) forms one module (1). 25
12. Apparatus according to any one of claims 1 to 11, **characterized in that** a drive motor (4) is assigned to the crank mechanism (3), such that the crank (30) is driven by its own drive motor (4). 30
13. Apparatus according to any one of claims 1 to 12, **characterized in that** the connecting rod (31) is attached to the crank (30) on the outer side of the crank (30). 35
14. Apparatus according to any one of claims 1 to 13, **characterized in that** the presenting element (2) is a needle with a thread eye (20). 40

Patentansprüche

1. Vorrichtung zum Präsentieren von Schussfäden zu einer Eintragseinrichtung einer Webmaschine, umfassend mindestens ein in Längsrichtung zwischen einer Ruheposition und einer Zufuhrposition verschiebbar montiertes Präsentationselement (2) und einen Kurbelmechanismus (3) mit einer Kurbel (30) und eine Verbindungsstange (31) zum Antreiben des mindestens einen Präsentationselements (2), wobei das mindestens eine Präsentationselement (2) mit der Verbindungsstange (31) verbunden ist, **dadurch gekennzeichnet, dass** die Verbindungsstange (31) durch ein Führungselement (6) getragen ist, wobei das Führungselement (6) von der Kurbel (30) auf die Verbindungsstange (31) ausgeübte Querkräfte kompensieren kann, so dass das Präsentationselement (2) nur in seiner Längsrichtung

mit Kräften belastet ist.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Präsentationselement (2) durch einen Zapfen (60) mit der Verbindungsstange (31) verbunden ist, wobei der Zapfen (60) an dem Führungselement (6) ausgebildet ist.
3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Präsentationselement (2) ein Faden aufnehmendes Ende (41) umfasst, wobei die Verbindungsstange (31) an dem Ende (42) des Präsentationselements (2) befestigt ist, das dem Faden aufnehmenden Ende (41) gegenüberliegt.
4. Vorrichtung nach einem der Ansprüche 1, 2 oder 3, **dadurch gekennzeichnet, dass** ein Gestell (5) vorgesehen ist, wobei das Präsentationselement (2) und die Verbindungsstange (31) am Gestell (5) montiert sind.
5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** das Gestell (5) mit einer Führungsnut (51) versehen ist, die sich in Längsrichtung des Präsentationselements (2) erstreckt, wobei das Führungselement (6) gleitend in genannter Führungsnut (51) angeordnet ist.
6. Vorrichtung nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** das mindestens eine Präsentationselement (2) an dem Gestell (5) durch mindestens einen Lagerpunkt (7), vorzugsweise durch zwei Lagerpunkte (7), verschiebbar montiert ist.
7. Vorrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** der mindestens eine Lagerpunkt (7) eine Lagerbuchse (70) zur Aufnahme des jeweiligen Präsentationselements (2) und einen Träger (71), mit dem die Lagerbuchse (70) an dem Gestell (5) befestigt ist, umfasst.
8. Vorrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** der Träger (71), mit dem die Lagerbuchse (70) an dem Gestell (5) befestigt ist, einen elastischen Gummisockel umfasst.
9. Vorrichtung nach Anspruch 7 oder 8, **dadurch gekennzeichnet, dass** der Träger (71) einen drehbar aufgenommenen Stift (72) umfasst.
10. Vorrichtung nach einem der Ansprüche 4 bis 9, **dadurch gekennzeichnet, dass** das Gestell (5) mit einer Aussparung (50) zur Unterbringung der Kurbel (30) versehen ist, um eine Bewegung der Kurbel (30) zu ermöglichen.
11. Vorrichtung nach einem der Ansprüche 4 bis 10, **dadurch gekennzeichnet, dass** jedes Präsentations-

élément (2) zusammen mit dem jeweiligen Gestell (5) und dem jeweiligen Kurbelmechanismus (3) ein Modul (1) bildet.

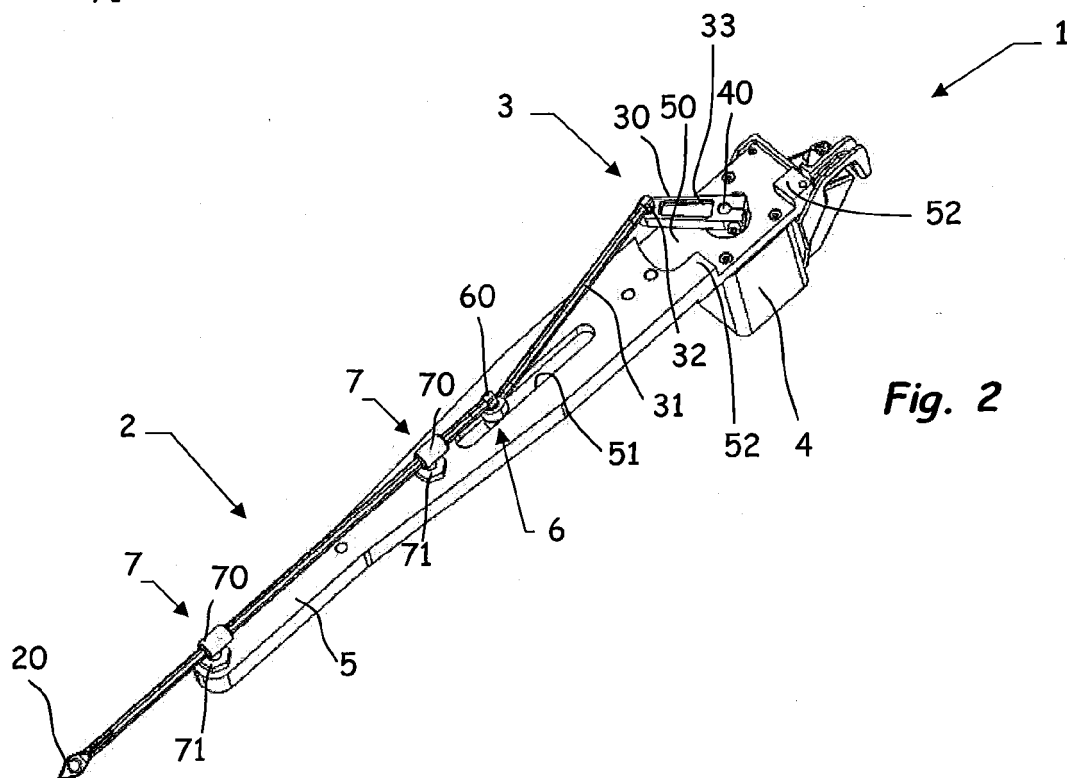
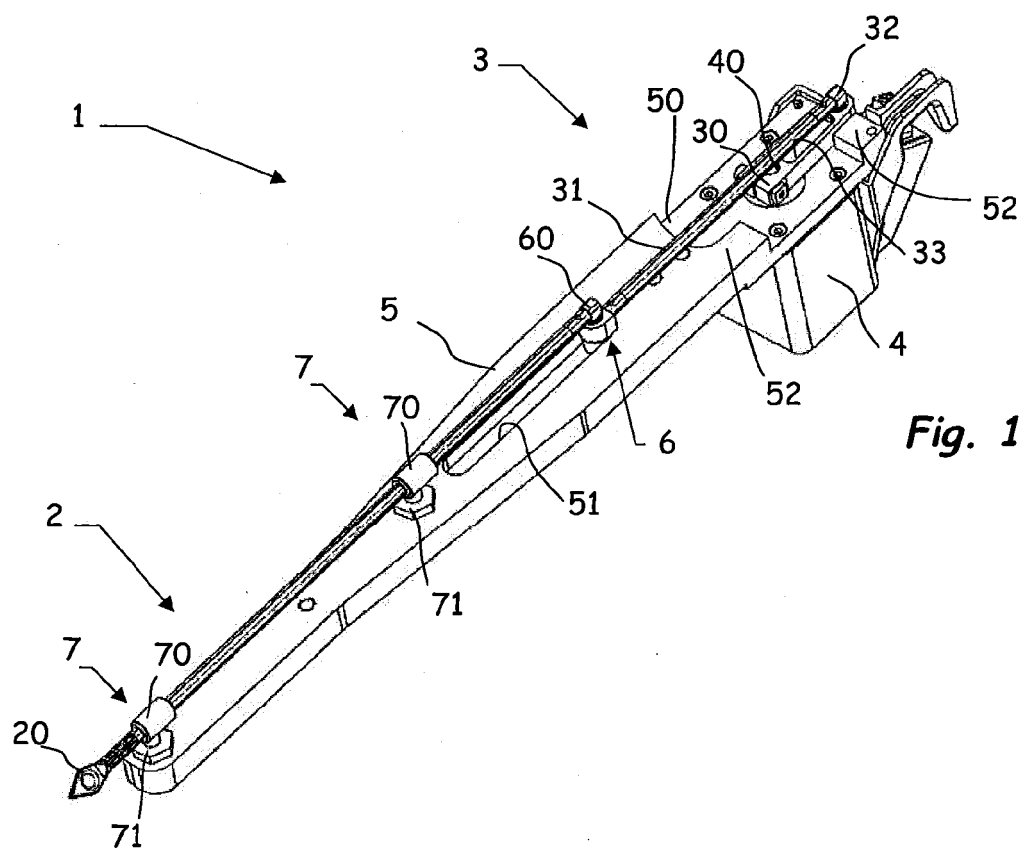
12. Vorrichtung nach einem der Ansprüche 1 bis 11, **dadurch gekennzeichnet, dass** dem Kurbelmechanismus (3) ein Antriebsmotor (4) zugeordnet ist, so dass die Kurbel (30) von ihrem eigenen Antriebsmotor (4) angetrieben ist.
13. Vorrichtung nach einem der Ansprüche 1 bis 12, **dadurch gekennzeichnet, dass** die Verbindungsstange (31) auf der Aussenseite der Kurbel (30) an der Kurbel (30) befestigt ist.
14. Vorrichtung nach einem der Ansprüche 1 bis 13, **dadurch gekennzeichnet, dass** das Präsentationselement (2) eine Nadel mit einem Fadenauge (20) ist.

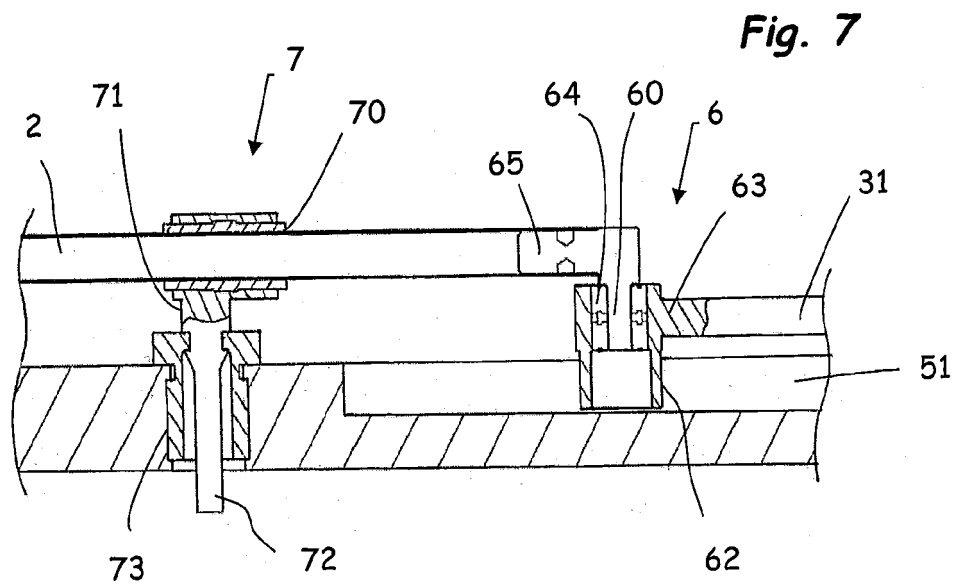
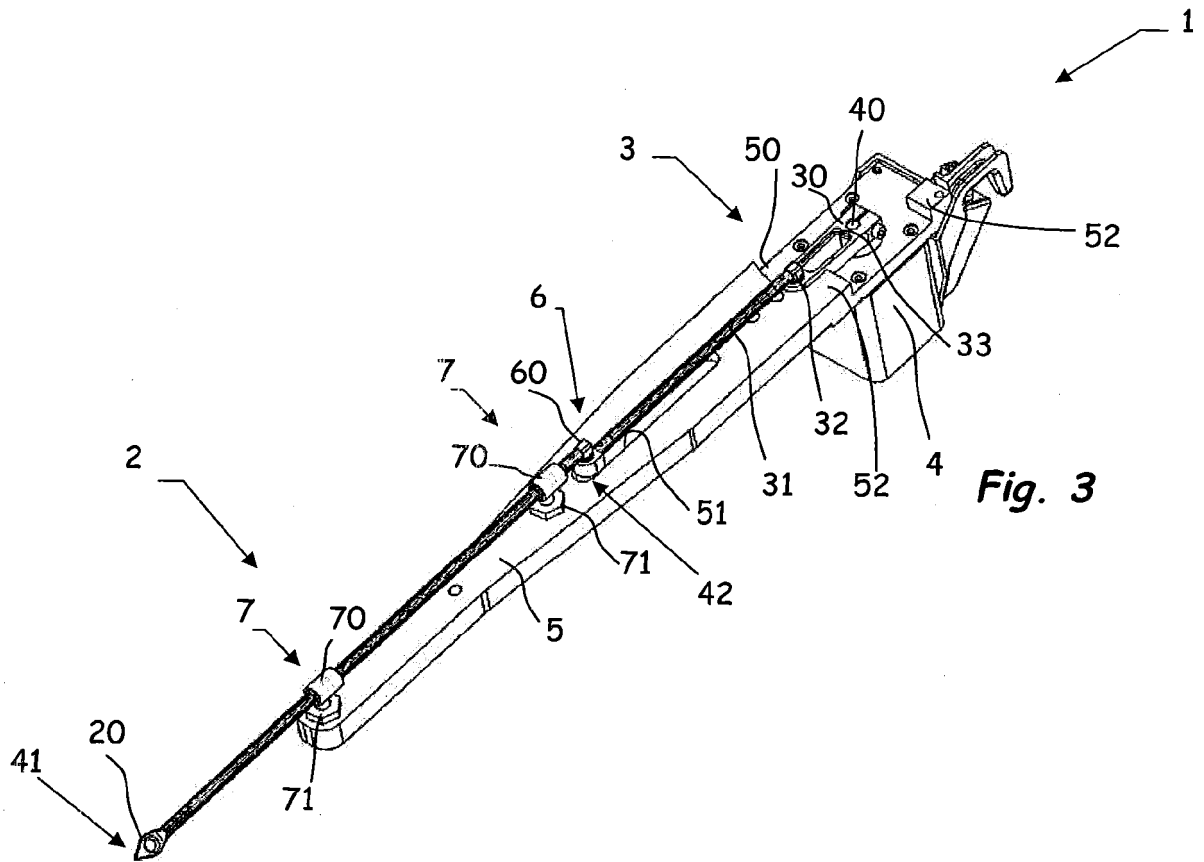
Revendications

1. Appareil pour présenter des fils de trame à un dispositif d'insertion d'une machine à tisser, comprenant au moins un élément de présentation (2) monté déplaçable dans la direction longitudinale entre une position de repos et une position d'alimentation et un mécanisme à manivelle (3) avec une manivelle (30) et une bielle (31) pour entraîner le au moins un élément de présentation (2), dans lequel le au moins un élément de présentation (2) est relié à la bielle (31), **caractérisé en ce que** la bielle (31) est supportée par un élément de guidage (6), dans lequel l'élément de guidage (6) est capable de compenser des forces transversales exercées sur la bielle (31) par la manivelle (30), de sorte que l'élément de présentation (2) est seulement soumis à des forces dans sa direction longitudinale.
2. Appareil selon la revendication 1, **caractérisé en ce que** l'élément de présentation (2) est relié à la bielle (31) par un pivot (60), dans lequel le pivot (60) est formé à l'élément de guidage (6).
3. Appareil selon la revendication 1 ou 2, **caractérisé en ce que** l'élément de présentation (2) comprend une extrémité de réception du fil (41), dans lequel la bielle (31) est fixée à l'extrémité (42) de l'élément de présentation (2) opposée à l'extrémité de réception du fil (41).
4. Appareil selon l'une quelconque des revendications 1, 2 ou 3, **caractérisé en ce qu'un** châssis (5) est prévu, dans lequel l'élément de présentation (2) et la bielle (31) sont montés au châssis (5).
5. Appareil selon la revendication 4, **caractérisé en ce que** le châssis (5) est prévu d'une rainure de guidage

(51) s'étendant dans la direction longitudinale de l'élément de présentation (2), dans lequel l'élément de guidage (6) est disposé de manière coulissante dans ladite rainure de guidage (51).

6. Appareil selon la revendication 4 ou 5, **caractérisé en ce que** le au moins un élément de présentation (2) est monté de manière déplaçable au châssis (5) par au moins un point d'appui (7), de préférence par deux points d'appui (7).
7. Appareil selon la revendication 6, **caractérisé en ce que** le au moins un point d'appui (7) comprend un coussinet (70) pour recevoir l'élément de présentation (2) respectif et un support (71) par lequel le coussinet (70) est fixé au châssis (5).
8. Appareil selon la revendication 7, **caractérisé en ce que** le support (71) par lequel le coussinet (70) est fixé au châssis (5) comprend une douille en caoutchouc élastique.
9. Appareil selon la revendication 7 ou 8, **caractérisé en ce que** le support (71) comprend une goupille (72) reçue rotative.
10. Appareil selon l'une quelconque des revendications 4 à 9, **caractérisé en ce que** le châssis (5) est prévu d'une encoche (50) pour accommoder la manivelle (30) afin de permettre un mouvement de la manivelle (30).
11. Appareil selon l'une quelconque des revendications 4 à 10, **caractérisé en ce que** chaque élément de présentation (2) ensemble avec le châssis (5) respectif et le mécanisme à manivelle (3) respectif forme un module (1).
12. Appareil selon l'une quelconque des revendications 1 à 11, **caractérisé en ce qu'un** moteur d'entraînement (4) est associé au mécanisme à manivelle (3), de sorte que la manivelle (30) est entraînée par son propre moteur d'entraînement (4).
13. Appareil selon l'une quelconque des revendications 1 à 12, **caractérisé en ce que** la bielle (31) est fixée à la manivelle (30) du côté extérieur de la manivelle (30).
14. Appareil selon l'une quelconque des revendications 1 à 13, **caractérisé en ce que** l'élément de présentation (2) est une aiguille avec un oeil-fil (20).





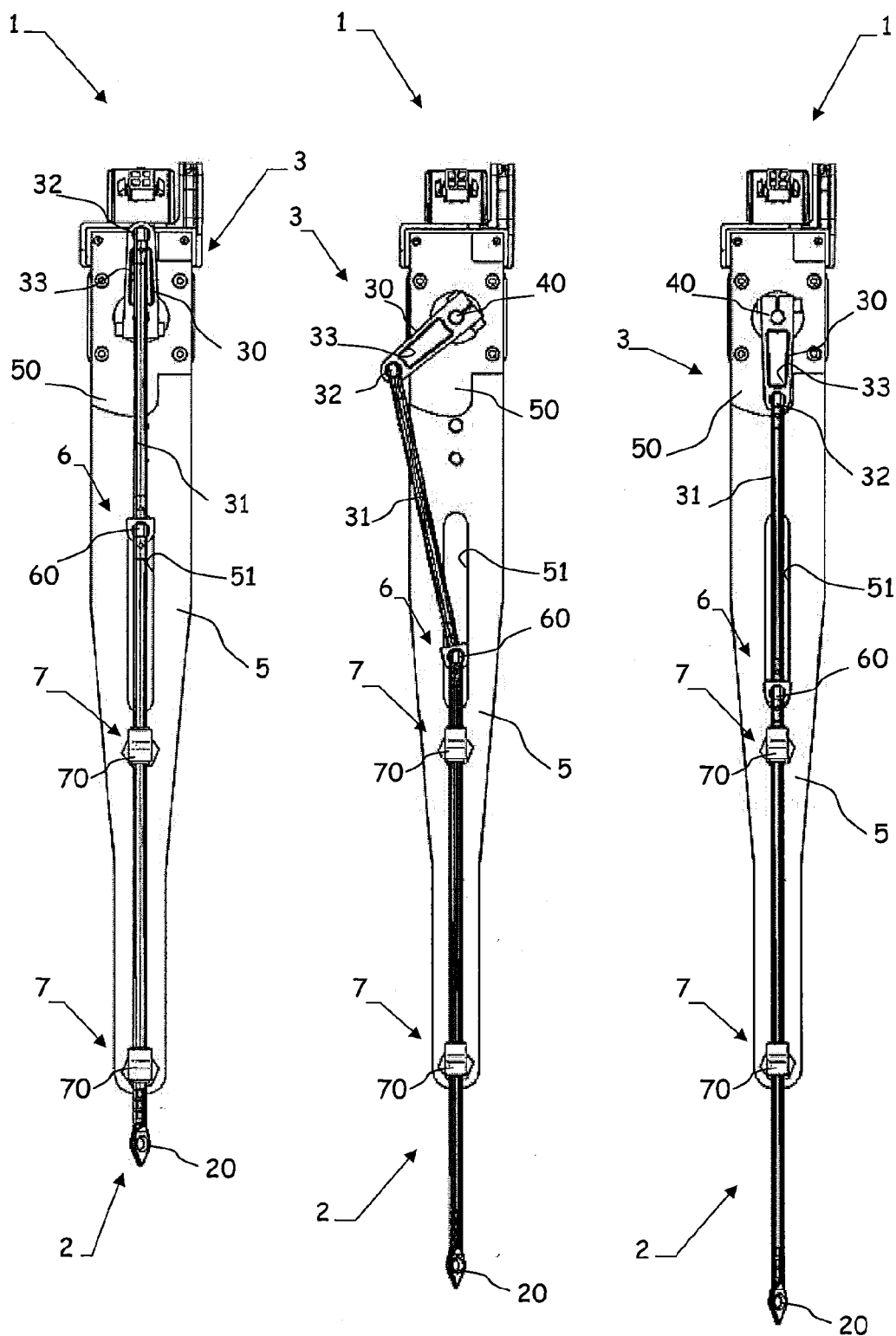


Fig. 4

Fig. 5

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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