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(54) NEEDLE FOR TRANSFERRING STITCHES FROM THE NEEDLE ITSELF TO ADJACENT NEEDLES FOR HOSIERY KNITTING MACHINES OR THE LIKE

NADEL ZUR MASCHENÜBERTRAGUNG VON DER NADEL SELBST AUF BENACHBARTE NADELN FÜR WIRKMASCHINEN ODER DERGLEICHEN

AIGUILLE PERMETTANT DE TRANSFÉRER DES POINTS DE LADITE AIGUILLE À DES AIGUILLES ADJACENTES POUR DES MACHINES D'ARTICLES DE BONNETERIE AU ANALOGUES

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(56) References cited:
EP-A1- 0 672 770 WO-A1-2007/057041
US-A- 2 997 865 US-A- 4 580 419

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Description

Technical Field

[0001] The present invention relates to a needle for transferring stitches from the needle itself to adjacent needles for knitting machines for hosiery or the like.

Background Art

[0002] In the field of knitting machines for hosiery, needles are known which are provided in order to allow to transfer a stitch or loop of knitting from one needle to an adjacent needle arranged in the same bed.

[0003] One of these needles is shown, for example, in WO-02/070799. A needle of this kind allows to transfer the stitch exclusively onto the needle that is arranged on one side of the needle that has to release the stitch.

[0004] WO2007/057041 by the same Applicant, assumed included herein as reference, illustrates a needle that is capable of transferring, according to the requirements, the stitch onto the needle that is arranged on one side or to the needle that is arranged on the opposite side of the needle that has to release the stitch.

[0005] Substantially, the needle according to WO2007/057041 comprises: a shank, a head arranged at a longitudinal or upper end of the shank, and a latch that is hinged to the shank proximate to the head, about a pivoting axis that is substantially perpendicular to the longitudinal axis of the shank and rotatable about said pivoting axis in order to open or close the head. The needle comprises at least one elastically flexible lamina, which is associated with the shank and defines, on the two opposite sides of the shank, below the latch, two receptacles, one for each side of the shank. It is possible to insert in each of these receptacles the head of an adjacent needle in order to transfer the loop of knitting, carried by the shank and arranged at the receptacles, from said needle to the adjacent needle.

[0006] This needle, during testing, has proved to be susceptible of improvements aimed mainly at reducing the wear of the lamina and of the head and at achieving higher reliability in transferring the stitch or loop of knitting.

Disclosure of the Invention

[0007] The aim of the present invention is indeed to provide a needle for transferring stitches from said needle to adjacent needles for knitting machines for hosiery or the like that ensures high durability.

[0008] Within this aim, an object of the invention is to provide a needle that allows to achieve high reliability in transferring the stitch or loop of knitting.

[0009] Another object of the invention is to provide a needle that reduces the stresses on the stitch or loop of knitting and on the portions of the needle that transfer the stitch or loop of knitting.

[0010] Still another object of the invention is to provide a needle that is highly versatile in use.

[0011] Another object of the invention is to provide a needle that can have a reduced thickness, so as to allow its use on high-fineness machines, particularly in machines with more than 12 needles per inch.

[0012] This aim, as well as these and other objects that will become better apparent hereinafter, are achieved by a needle for transferring stitches from said needle to adjacent needles for knitting machines for hosiery or the like, comprising a shank, a head that is arranged at a longitudinal or upper end of said shank and is contoured like a hook that is open toward the front side of said shank, and a latch, which is pivoted to said shank proximate to said head, about a pivoting axis that is substantially perpendicular to the longitudinal axis of said shank, and rotatable about said pivoting axis in order to open or close said head, characterized in that it comprises at least one lamina that is connected to said shank and has, on each of the two opposite sides of said shank, below said latch, a portion that can flex elastically from an inactive position, in which it is closer to the corresponding side of the shank, to an active position, in which it is spaced from the corresponding side of the shank; in said active position, said elastically flexible portion of the lamina producing an expansion of the loop of knitting that is fitted onto said shank at said elastically flexible portion of the lamina, the head of an adjacent needle being insertable in the space comprised between said elastically flexible portion of the lamina, in said active position, and the corresponding side of said shank, in order to pick up said loop of knitting by means of said adjacent needle; said lamina resting, at least with its end directed toward said head, against the corresponding side of said shank in a region that is located in front of said head so that the distance from the longitudinal axis of the shank of the end of said lamina directed toward said head is greater than the distance of the tip free end of the hook from the longitudinal axis of the shank, and said elastically flexible portion of the lamina having a region that can be superimposed laterally, on the opposite side with respect to the corresponding side of said shank, on the head of said adjacent needle inserted in the space comprised between said elastically flexible portion of the lamina, in said active position, and the corresponding side of said shank.

Brief description of the drawings

[0013] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the needle according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of the needle according to the invention, with the elastically flexible portions of the lamina in the active position;

Figure 2 is a front elevation view of the needle of Figure 1;

Figure 3 is a perspective view of the needle according to the invention, with the elastically flexible portions of the lamina in the inactive position;

Figure 4 is a front elevation view of the needle of Figure 3;

Figure 5 is a perspective view of the transfer of a loop of knitting from one needle to an adjacent needle;

Figure 6 is a front elevation view of the transfer of a loop of knitting from one needle to an adjacent needle;

Figure 7 is a side elevation view of the operating situation of Figures 5 and 6, taken from one side;

Figure 8 is a side elevation view of the operating situation of Figures 5 and 6; taken from the other side;

Figure 9 is an enlarged-scale top plan view of the operating situation of Figures 5 and 6;

Figures 10 and 11 are perspective views of the transition of the elastically flexible portions of the lamina from the active position to the inactive position during the longitudinal movement of one needle with respect to two adjacent needles;

Figure 12 is a schematic view of a portion of the needle cylinder of a circular knitting machine, extended flat and equipped with needles according to the invention, in the embodiment shown in the preceding figures;

Figure 13 is a perspective view of a first constructive variation of the needle according to the invention;

Figure 14 is a schematic perspective view of a portion of the needle cylinder of a circular knitting machine, extended flat and equipped with needles according to the invention, in the constructive variation shown in Figure 13;

Figures 15 and 16 are perspective views of the transition of the elastically flexible portions of the lamina from the active position to the inactive position during the longitudinal movement of a needle according to the invention in a second constructive variation, with respect to the needle holder of a knitting machine for hosiery or the like;

Figure 17 is a perspective view of a third constructive variation of the needle according to the invention;

Figure 18 is a view of the lamina of the needle shown in Figure 17, extended flat;

Figure 19 is a perspective view of a fourth constructive variation of the needle according to the invention;

Figure 20 is a view of the lamina of the needle shown in Figure 19, extended flat.

Ways to carrying out the invention

[0014] With reference to the figures, the needle according to the invention, generally designated by the reference numeral 1 both in the embodiment shown in Figures

1 to 12 and in the constructive variations shown in the subsequent figures, comprises: a shank 2, which has an elongated shape, a head 3 and a latch 4.

[0015] The head 3 is arranged at a longitudinal end or upper end of the shank 2 and is shaped like a hook that is open toward the front side of the shank 2, in a manner similar to known types of needle.

[0016] The latch 4 is hinged to the shank 2 proximate to the head 3, about a pivoting axis 4a that is substantially perpendicular to the longitudinal axis of the shank 2, and rotatable about the pivoting axis 4a to open or close the head 3, as in known types of needle.

[0017] The shank 2 has, along its extension, on its front side and proximate to its longitudinal end, or lower end, that lies opposite with respect to the head 3, at least one heel 5, which protrudes from its front side and can engage in a per se known manner the needle actuation cams provided in the knitting machine for hosiery or the like on which the needle 1 is to be fitted.

[0018] The needle according to the invention, in the embodiment shown in Figures 1 to 12, comprises at least one lamina 6a, 6b, which is connected to the shank 2 and has, on each of the two opposite sides 7a, 7b of the shank 2, below the latch 4, a portion 8a, 8b, which is elastically flexible from an inactive position, in which it is close to the corresponding side 7a or 7b of the shank 2, as shown in particular in Figures 3 and 4, to an active position, in which it is spaced from the corresponding side 7a or 7b of the shank 2, as shown in particular in Figures 1 and 2. In the active position, said portion 8a, 8b widens the loop of knitting 9 fitted on the shank 2 at said portion 8a, 8b of the lamina 6a, 6b and, in the space comprised between the portion 8a, 8b of the lamina 6a, 6b and the corresponding side 7a, 7b of the shank 2, when the portion 8a, 8b is in the active position, it is possible to insert the head 3 of an adjacent needle 1b to pick up the loop of knitting 9 by means of said adjacent needle 1b, as will become better apparent hereinafter.

[0019] The lamina 6a, 6b rests, at least with its end directed toward the head 3, against the shank 2 in a region located forward with respect to the head 3. Substantially, the region of said end, which constitutes the upper end of the lamina 6a, 6b, that rests against the shank 2 is shifted forward with respect to the position of the head 3.

[0020] The portion 8a, 8b of the lamina 6a, 6b has a region that can be superimposed laterally, on the opposite side with respect to the corresponding side 7a, 7b of the shank 2, on the head of an adjacent needle 1a, 1b inserted in the space comprised between the portion 8a, 8b of the lamina 6a, 6b, in the active position, and the corresponding side 7a, 7b of the shank 2.

[0021] More particularly, without altering the fact that the portions 8a, 8b can be part of a single lamina that is shaped conveniently so as to arrange the portion 8a on one side 7a of the shank 2 and the portion 8b on the opposite side 7b of the shank 2, as will be described in greater detail hereinafter, preferably there are two lami-

nas 6a, 6b, one for each side 7a, 7b of the shank 2, which are fixed, at their end directed toward the lower end of the shank 2, to the corresponding side 7a, 7b of the shank 2.

[0022] The laminas 6a, 6b are extended toward the head 3 and rest, with their end directed toward the head 3, against the corresponding side 7a, 7b of the shank 2.

[0023] Each of the laminas 6a, 6b has the respective portion 8a, 8b that can flex elastically toward or away from the corresponding side 7a, 7b of the shank 2. Each portion 8a, 8b can flex elastically toward the corresponding side 7a, 7b of the shank 2 in contrast with its elastic reaction, so as to move, in the absence of forces that act thereon, to the active position.

[0024] Each lamina 6a, 6b is contoured so as to have: a lower region 20a, 20b, which lies so as to adhere to the corresponding side 7a, 7b of the shank 2 and is fixed thereto; an intermediate region, which constitutes the portion 8a, 8b; and an upper region 11a, 11b, which ends with the upper end 12a, 12b or which, as in the illustrated embodiment, is limited to said upper end 12a, 12b that rests against the corresponding side 7a, 7b of the shank 2.

[0025] The intermediate region, which constitutes the portion 8a, 8b that can flex elastically toward and away from the corresponding side 7a, 7b of the shank 2, is preferably constituted, starting from its lower end and in the absence of forces acting thereon: by a first segment 13a, 13b, which is folded away from the corresponding side 7a, 7b of the shank 2; by a second segment 14a, 14b, which is substantially parallel to the corresponding side 7a, 7b of the shank 2; and by a third segment 15a, 15b, which is folded toward the corresponding side 7a, 7b of the shank 2.

[0026] Each portion 8a, 8b has, on its front side, a front protrusion 16a, 16b that defines, with its upper profile, a supporting shoulder 17a, 17b for the loop of knitting 9. Preferably, the supporting shoulder 17a, 17b is defined on the upper side of a front protrusion 16a, 16b of the second segment 14a, 14b of the portion 8a, 8b of the lamina 6a, 6b.

[0027] Moreover, each portion 8a, 8b has, on its rear side, a rear protrusion 18a, 18b that constitutes the region that can be superimposed laterally, on the opposite side with respect to the corresponding side 7a, 7b of the shank 2, on the head 3 of an adjacent needle 1a, 1b. Said rear protrusion 18a, 18b can engage by resting against the head 3 of the adjacent needle 1a, 1b. Preferably, the rear protrusion 18a, 18b is provided on the rear side of the second segment 14a, 14b of the portion 8a, 8b of the lamina 6a, 6b.

[0028] Conveniently, the first segment 13a, 13b of the portion 8a, 8b of the lamina 6a, 6b, at least proximate to the second segment 14a, 14b of the portion 8a, 8b of the lamina 6a, 6b, is located forward with respect to the head 3, so as to define an abutment for the latch of an adjacent needle during the transfer of the loop of knitting 9, as will become better apparent hereinafter.

[0029] The lower region 20a, 20b of the lamina 6a, 6b is fixed to the side 7a, 7b at an appropriately provided recess and the portion 8a, 8b is shifted forward with respect to said lower region 20a, 20b.

[0030] The region of the needle 1 that is occupied by the portions 8a, 8b of the laminas 6a, 6b has, along the anteroposterior direction, an increased space occupation toward the front side of the needle with respect to the contiguous regions of the shank 2.

[0031] Advantageously, the shank 2, between the latch 4 and the end of the portion 8a, 8b of the lamina 6a, 6b that is directed toward the head 3, has a region 10 for blending the shank 2 with the portion 8a, 8b of the lamina 6a, 6b.

[0032] The blending region 10 is shaped like a wedge that tapers toward the head 3.

[0033] The blending region 10 has a front face 10c, which is inclined with respect to the longitudinal axis of the shank 2 so as to blend the region occupied by the portions 8a, 8b of the laminas 6a, 6b with the segment of the shank 2 that is arranged above.

[0034] Said front face 10c of the blending region 10 has a curved lower segment that blends it with its base side.

[0035] Moreover, the blending region 10 is delimited laterally by sides 10a, 10b that are shaped, at least for a segment starting from their upper end, like a plane that is inclined with respect to the longitudinal axis of the shank 2 and move mutually closer progressively toward the head 3.

[0036] Conveniently, the lower end of the blending region 10 is wider than the distance between the two opposite sides 7a, 7b of the shank 2 in regions that are contiguous to the blending region 10.

[0037] The upper end 12a, 12b of each lamina 6a, 6b, i.e., the end that is directed toward the head 3, is connected to the blending region 10 proximate its base.

[0038] More particularly, the upper end 12a, 12b of each lamina 6a, 6b rests, so that it can slide parallel to the longitudinal axis of the shank 2, in a recess 19a, 19b formed in the corresponding side of the blending region 10.

[0039] The blending region 10 can be formed at least partly by a block that is fixed to the shank 2, as in the embodiment shown in Figures 1 to 12. In this embodiment, the upper portion of the blending region 10 is formed directly in the shank 2, while the remaining portion of the blending region 10 is obtained, as a continuation of the upper portion, in a block that is fixed rigidly to the shank 2.

[0040] As an alternative, the blending region 10 can be obtained monolithically with the shank 2, as in the constructive variation of the needle according to the invention shown in Figure 13.

[0041] In this constructive variation, the elements of the needle that correspond to the elements that have already been described with reference to Figures 1 to 12 have been designated by the same reference numerals.

[0042] Differently from the embodiment shown in Figures 1 to 12, in the embodiment shown in Figure 13 the upper ends 12a, 12b of the portions 8a, 8b of the laminas 6a, 6b are inserted slidingly within a slot 19 that is open at the front and in a downward region proximate to the base of the blending region 10.

[0043] In this constructive variation, owing to the fact that the sides 10a, 10b of the blending region are further retracted toward the rear side of the shank 2 with respect to what is provided in the embodiment shown in Figures 1 to 12, the first segment 13a, 13b of the portion 8a, 8b of the laminas 6a, 6b has a rear protrusion 22a, 22b, so as to allow said first portion 13a, 13b to engage in any case the sides 10a, 10b of the blending regions 10 of adjacent needles, provided like the needle 1, as a consequence of a longitudinal movement of the needle 1 with respect to the adjacent needles.

[0044] In the second constructive variation, shown in Figures 15 and 16, the blending region 10 is not provided with the inclined lateral sides, since the shank 2, at said blending region 10, has sides that are mutually parallel. In this second constructive variation, the blending region 10 is formed only by the front face 10c, which is inclined with respect to the longitudinal axis of the shank 2, so as to blend at the front the region occupied by the portions 8a, 8b of the laminas 6a, 6b with the portion of the shank 2 located above. Moreover, the upper ends 12a, 12b of the portions 8a, 8b of the laminas 6a, 6b are inserted slidingly within recesses 19a, 19b formed in the sides of the shank 2, in a manner similar to the embodiment shown in Figures 1 to 12.

[0045] In this second constructive variation of the needle, the other elements of the needle that correspond to the elements that have already been described with reference to Figures 1 to 12 have been designated by the same reference numerals.

[0046] In the third and fourth embodiments of the needle according to the invention, shown in Figures 17 to 20, the needle is provided substantially as in the second constructive variation, shown in Figures 15 and 16, with the difference that the two laminas 6a, 6b are provided monolithically instead of in two separate portions.

[0047] In the third constructive variation, the laminas 6a, 6b are obtained by means of a single portion 23 formed by blanking, shown in Figure 18, and folded along the line 24. The blanked portion 23 is further bent to provide the first segment 13a, 13b and the third segment 15a, 15b.

[0048] In the fourth constructive variation, the laminas 6a, 6b are obtained by means of a single portion 25 formed by blanking, shown in Figure 20, and folded along the line 26. The blanked portion 25 is further bent to provide the first segment 13a, 13b and the third segment 15a, 15b.

[0049] In the constructive variations shown in Figures 17 to 20, owing to the fact that the two laminas 6a, 6b are provided monolithically, there is a single lower region 20a for fixing the laminas monolithically to the shank 2.

[0050] The other elements of the needle in the constructive variations shown in Figures 17 to 20 that correspond to the elements already described in the preceding figures have been designated by the same reference numerals.

[0051] In all the illustrated embodiments, the portion of the shank 2 that lies between the portion 8a, 8b of the lamina 6a, 6b above the blending region 10 and the head 3 has a front cutout that reduces the front space occupation of the shank 2 so as to avoid its interference with the rear protrusion 18a, 18b of the portion 8a, 8b of the lamina 6a, 6b of the adjacent needle during the transfer of the loop of knitting 9.

[0052] By equipping a knitting machine for hosiery or the like with needles according to the invention and by providing for them an actuation as described hereafter, it is possible to transfer directly stitches or loops of knitting 9 from one needle 1 to a needle 1a or 1b that is adjacent and arranged laterally, on either side, with respect to the needle 1, without requiring additional elements that pick up the stitch or loop of knitting 9.

[0053] For the sake of simplicity and greater clarity, the method with which a stitch or a loop of knitting 9 is transferred from one needle to an adjacent needle is described generally with reference to the embodiment of the needle shown in Figures 1 to 12, without altering the fact that as regards the general aspects, this description also applies to the constructive variations of the needle shown in the subsequent figures. Particular aspects of the use of the needle according to the invention will be described also with explicit reference to some constructive variations of the needle.

[0054] For the sake of greater clarity, the needles that are adjacent to the needle 1, which must release the stitch or loop of knitting 9, have been designated by the reference numerals 1a, 1b, but can be provided, as shown, like the needle 1 described up to now.

[0055] The description of the execution of the transfer of a loop of knitting 9 from a needle 1 to an adjacent needle 1b is given, for the sake of greater clarity, with reference to a circular knitting machine for hosiery or the like, assuming that the needles between which the loop of knitting 9 is transferred are located in the needle cylinder 40 of the machine, which constitutes the needle holder of the machine, without altering the fact that the needle according to the invention can also be used in the dial of circular machines with cylinder and dial, or, more generally, on single- and two-bed rectilinear and circular machines.

[0056] In the description that follows, which will reference Figures 5 to 9, it is assumed that the needle 1, arranged between the needles 1b, 1a, is the needle that carries the loop of knitting 9 and must release it to the adjacent needle 1b, while the other needle 1a, arranged on the opposite side with respect to the needle 1b relative to the needle 1, is not affected by the transfer of the loop of knitting 9. The needle 1 is referenced hereinafter also as "releasing needle", the needle 1b is also referenced

as "receiving needle" and the needle 1a is also referenced as "inactive needle".

[0057] To transfer the loop of knitting 9 from one needle 1 to an adjacent needle 1b, the needle 1, after forming the loop of knitting 9 and after knocking over the loop of knitting formed previously, is raised, by means of the needle actuation cams with which its heel 5 engages, so as to protrude for a segment above the knitting formation plane 21, which, as is known, is formed by the sinkers, not shown for the sake of simplicity in Figures 5 to 9, which retain the loops of knitting 9 that have just been formed. The extent of the lifting of the needle 1, which must release the loop of knitting 9, is such as to bring the portion 8a, 8b of the laminae 6a, 6b at the knitting formation plane 21 and extract the portion 8a, 8b completely from the region that is occupied by the so-called "strips" that delimit laterally the seats, constituted by axial slots of the lateral surface of the needle cylinder 40, in which the needles slide. In this manner, the laminae 6a, 6b, first pressed against the shank 2 of the releasing needle 1 by the presence of the strips, move away by elastic reaction from the shank 2 with their portion 8a, 8b, which thus passes into the active position. As a consequence of the lifting of the releasing needle 1, the shank 2 of the needle 1 slides within the loop of knitting 9, which, being crossed first by the blending region 10 and then by the portion 8a, 8b of the laminae 6a, 6b up to the resting shoulder 17a, 17b, is widened progressively in a manner in which it is suitable to be crossed at least by the receiving needle 1b. In this step, the presence of the blended region 10 ensures a gradual expansion of the loop of knitting 9, avoiding excessive stresses both of the loop and of the laminae 6a, 6b.

[0058] At this point, the receiving needle 1b, onto which the loop of knitting 9 is to be transferred, is moved upward with respect to the releasing needle 1, so as to insert its open head 3 in the space comprised between the portion 8b and the shank 2 of the releasing needle 1. It should be noted that the receiving needle 1b, in this lifting, is arranged with its head 3 between the rear protrusion 18b and the side 7b of the shank 2 of the releasing needle 1. Thanks to this fact, the receiving needle 1b prevents the portion 8b of the lamina 6b from being crushed completely by the loop of knitting 9 against the side 7b of the shank 2 of the releasing needle 1 and the first segment 13b defines a front abutment that prevents the latch 4 of the receiving needle 1b from rotating about the axis 4a, assuredly keeping open the latch 4 of the receiving needle 1b, as shown in particular in Figure 7. The inactive needle 1a is in a lower position with respect to the position occupied by the receiving needle 1b, but its head 3 is in any case preferably arranged between the rear protrusion 18a and the side 7a of the shank 2, and is thus "covered" by the rear protrusion 18a, so as to not interfere with the process for transferring the loop of knitting 9, as shown in particular in Figure 8.

[0059] Subsequently, after completing the lifting of the receiving needle 1b until its head 3 lies above the knitting

formation plane 21 and therefore above the loop of knitting 9 to be engaged, the releasing needle 1 is lowered and the receiving needle 1b is lifted, preferably to the position that corresponds to the held-stitch position.

[0060] The descent of the releasing needle 1 moves the receiving needle 1b so that it protrudes with its head upward from the portion 8b of the lamina 6b. Moreover, the descent of the needle 1 causes the loop of knitting 9, arranged around the laminae 6a, 6b, to slide along the third segment 15b of the portion 8b, moving it toward the shank 2 and bringing it into the head of the receiving needle 1b.

[0061] It should be noted that since the upper end of the lamina 6b rests against the shank 2 of the releasing needle 1 in a region located in front of the head 3, the head 3 of the receiving needle 1b protrudes upward from the portion 8b of the lamina 6b practically without interfering with the portion 8b of the lamina 6b of the releasing needle 1 and therefore without the need to produce the separation of its upper end from the shank 2 of the releasing needle 1. In this manner, the wear of the head 3 of the receiving needle 1b and of the lamina 6b of the releasing needle 1 is reduced significantly.

[0062] When, in its descent, the releasing needle 1 has moved with its latch 4 beyond the loop of knitting 9, which is in the head 3 of the receiving needle 1b and causes the closure of the head 3 of the releasing needle 1 by the latch 4, the two needles 1 and 1b can be lowered together below the knitting formation plane 21. During this lowering, the portions 8a, 8b of the laminae 6a, 6b, by engaging the strips, are moved into the inactive position.

[0063] This function of the strips is shown in Figures 15, 16 with reference to the second constructive variation of the needle 1, in which the strips have been designated by the reference numeral 27, the seats or slots delimited laterally by the strips 27 have been designated by the reference numeral 28, and the needle cylinder, or more generally the needle holder, has been designated by the reference numeral 40.

[0064] It should be noted that the presence of the resting shoulder 17a, 17b allows to transfer loops of knitting 9 even above the knitting formation plane 21, since said supporting shoulder 17a, 17b achieves by itself the correct positioning of the loop of knitting 9 to be transferred, avoiding its descent along the shank 2 of the releasing needle 1.

[0065] In this case, the passage of the portions 8a, 8b of the laminae 6a, 6b from the active position to the inactive position after the transfer of the loop of knitting 9 can be achieved following the descent of the releasing needle 1 between the adjacent needles 1a, 1b, since the first segment 13a, 13b of the portions 8a, 8b of the laminae 6a, 6b engages the sides 10a, 10b of the blending region 10, as shown in Figures 10 and 11.

[0066] The inactive needle 1a, which does not take part in the transfer of the loop of knitting 9, can be used to reduce the extent of the elastic deformation of the portion 8a of the lamina 6a of the adjacent releasing needle 1

away from the corresponding side 7a of the releasing needle 1, so as to reduce the stresses to which the loop of knitting 9 to be transferred and the other lamina 6b are subjected. This can be achieved by limiting the front extension or eliminating the upper portion of the strips 27 directly below the knitting formation plane 21, so that the portions 8a, 8b of the laminas 6a, 6b of the various needles can move, by elastic reaction, into the active position even without being extracted upward with respect to the knitting formation plane 21 and by positioning beforehand the needle 1a with its blending region 10 at the portion 8a of the lamina 6a of the adjacent releasing needle 1, so as to limit or prevent, as a consequence of the engagement of the blending region 10 of the inactive needle 1a with the portion 8a of the lamina 6a of the releasing needle 1, the flexing of the portion 8a of the lamina 6a away from the side 7a of the shank 2. Subsequently, the releasing needle 1 and the inactive needle 1a are lifted together, so that the releasing needle 1 slides within the loop of knitting 9 until it is moved against the resting shoulder 17b of the lamina 6b, whose portion 8b is in the active position, while the contact of the blending region 10 of the inactive needle 1a continues to limit the spacing of the portion 8a of the lamina 6a from the side 7a of the releasing needle 1. This possibility to use the inactive needle 1a is shown in Figure 12, which illustrates the sequence of actuation, in the direction indicated by the arrow 30, of sets of three needles 1, 1a, 1b. In said figure, for the sake of simplicity, the needles have all been shown with the corresponding latch 4 open, without altering the fact that the latch 4 is open or closed on the head of the needles 3 depending on the operating conditions of the needles.

[0067] This use of the inactive needle 1a is possible also with the various constructive variations of the needle 1 described above.

[0068] In order to contrast the elastic flexing of the portions 8a, 8b, during the widening of the loop of knitting 9, it is possible to use, in addition to the resting of the rear protrusion 18b against the head 3 of the receiving needle 1b, other elements of the machine, such as for example the sinkers 29 and/or the strips 27.

[0069] In practice, as shown in Figure 14, by means of a movement of the sinkers 29 along a radial direction of the needle cylinder 40 that can be obtained in a per se known manner, and by virtue of the lifting movement of the releasing needle 1, after the portions 8a, 8b of the laminas 6a, 6b have reached the active position, it is possible to cause the insertion of the sinkers 29, arranged laterally to the receiving needle 1b and the inactive needle 1a on the opposite side with respect to the releasing needle 1, in the space comprised between the sides 7a, 7b of the releasing needle 1 and the portions 8a, 8b of the laminas 6a, 6b.

[0070] Likewise, it is possible to shape the region of the strips 27 proximate to the sinkers 29 so that said region of the two strips 27 arranged laterally to the receiving needle 1b and to the inactive needle 1a on the

opposite side with respect to the releasing needle 1 are located, following the lifting of the releasing needle 1 after the portions 8a, 8b of the laminas 6a, 6b have moved by elastic reaction into the active position, in the space comprised between the sides 7a, 7b of the releasing needle 1 and the portions 8a, 8b of the laminas 6a, 6b.

[0071] In both of these cases, the sinkers 29 and/or the strips 27 engage the rear protrusion 18a, 18b of the second portion 14a, 14b of the portions 8a, 8b of the laminas 6a, 6b, assuredly preventing a compression of the portions 8a, 8b toward the shank 2 of the releasing needle 1 by virtue of the action of the loop of knitting 9.

[0072] In order to transfer the loop of knitting 9 not to the adjacent needle 1b arranged to the right of the needle 1 but to the adjacent needle arranged to the left in the figures, it is sufficient to actuate said needle arranged to the left as described above with reference to the receiving needle 1b.

[0073] Of course, if the needles according to the invention are used in a dial of a machine with cylinder and dial, the needles are moved radially outward instead of being raised and radially inward instead of being lowered.

[0074] The adaptation of the movements to be imparted to the needles according to the invention with reference to the machine on which they are mounted can be derived in any case straightforwardly on the basis of the explanation given above with reference to a single-bed circular machine.

[0075] The particular structure of the needle according to the invention allows to provide said needle according to the invention with a reduced thickness, such as to allow its use in machines with high fineness (higher than 18 needles per inch).

[0076] It should be noted that the needle according to the invention can be used advantageously also on double-bed machines to transfer a stitch from one bed to the other also with transfer from one needle of one bed to an adjacent needle of the same bed without requiring relative movements between the beds and therefore avoiding the problems of precision and complexity in execution that these movements entail.

[0077] Moreover, the use of needles according to the invention with the possibility to transfer the stitches from either side of the needles on machines that can be actuated with an alternating motion allows to produce items of knitting with knitted regions of any shape with increasing or decreasing stitches, increasing their quality and degree of finish.

[0078] In practice it has been found that the needle according to the invention fully achieves the intended aim, since by limiting the sliding between the elastically flexible portion of the laminas and the head of the adjacent needle onto which the stitch or loop of knitting is to be transferred it reduces the wear of these components, achieving longer durability for the needle.

[0079] Moreover, the covering of the head of the adjacent needles by the elastically flexible portion of the lamina of the releasing needle during the transfer of the stitch

or loop of knitting ensures high precision and reliability in the operation for transferring the stitch or loop of knitting.

[0080] Another advantage of the needle according to the invention is that it can prevent the compression of the elastically flexible portions of the lamina against the shank of the needle thanks to the action of the stitch or loop of knitting to be transferred and/or prevent or limit the spacing of the elastically flexible portions of the lamina from the shank of the needle that must release the stitch or loop of knitting by means of the adjacent needle or by means of other elements of the machine on which it is mounted, achieving high versatility in actuation and use.

[0081] The needle thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0082] In practice, the materials used, as well as the dimensions, may be any according to requirements and to the state of the art.

[0083] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A needle (1) for transferring stitches therefrom to adjacent needles (1a, 1b) for knitting machines for hosiery or the like, comprising a shank (2), a head (3) that is arranged at a longitudinal or upper end of said shank (2) and is contoured like a hook that is open toward the front side of said shank (2), and a latch (4), which is pivoted to said shank (2) proximate to said head (3), about a pivoting axis (4a) that is substantially perpendicular to the longitudinal axis of said shank (2), and rotatable about said pivoting axis (4a) in order to open or close said head (3), at least one lamina (6a,6b) that is connected to said shank (2) and has, on each of the two opposite sides (7a, 7b) of said shank (2), below said latch (4), a portion (8a,8b) that can flex elastically from an inactive position, in which it is closer to the corresponding side (7a, 7b) of the shank (2), to an active position, in which it is spaced from the corresponding side (7a, 7b) of the shank (2); in said active position, said elastically flexible portion (8a,8b) of the lamina (6a,6b) being suitable for producing an expansion of a loop (9) of knitting that is fitted onto said shank (2) at said elastically flexible portion (8a,8b) of the lamina (6a, 6b), the head (3) of an adjacent needle (1b) being insertable in the space comprised between said elas-

tically flexible portion (8a,8b) of the lamina (6a,6b), in said active position, and the corresponding side (7a,7b) of said shank (2), in order to pick up said loop (9) of knitting by means of said adjacent needle (1b); said elastically flexible portion (8a,8b) of the lamina (6a,6b) having a region that can be superimposed laterally, on the opposite side with respect to the corresponding side (7a,7b) of said shank (2), on the head (3) of said adjacent needle (1b) inserted in the space comprised between said elastically flexible portion (8a,8b) of the lamina (6a,6b), in said active position, and the corresponding side (7a,7b) of said shank (2); **characterized in that** said lamina (6a,6b) rests, at least with its end (12a, 12b) directed toward said head (3), against the corresponding side (7a, 7b) of said shank (2) in a region that is located in front of said head (3) so that the distance from the longitudinal axis of the shank (2) of the end (12a, 12b) of said lamina (6a,6b) directed toward said head (3) is greater than the distance of the tip free end of the hook from the longitudinal axis of the shank (2).

2. The needle (1) according to claim 1, **characterized in that** said lamina (6a,6b) has, for each side (7a, 7b) of said shank (2): a lower region (20a,20b), which lies so as to adhere to the corresponding side (7a, 7b) of said shank (2) and is fixed thereto; an intermediate region, which constitutes said elastically flexible portion (8a,8b) of the lamina (6a,6b); and an upper region (11a, 11b), which ends with the upper end (12a, 12b) of the lamina (6a, 6b) that rests against the corresponding side (7a,7b) of said shank (2).

3. The needle according to one or more of the preceding claims, **characterized in that** said elastically flexible portion (8a,8b) of the lamina (6a,6b) is constituted, starting from its lower end and in the absence of forces acting thereon: by a first segment (13a,13b), which is folded away from the corresponding side (7a,7b) of said shank (2); by a second segment (14a,14b), which is substantially parallel to the corresponding side (7a,7b) of said shank (2); and by a third segment (15a,15b), which is folded toward the corresponding side (7a,7b) of said shank (2); said third segment (15a,15b) being arranged forward with respect to said head (3).

4. The needle according to claim 3, **characterized in that** said first segment (13a,13b) of the elastically flexible portion (8a,8b) of the lamina (6a,6b), at least proximate to said second segment (14a,14b) of the elastically flexible portion (8a,8b) of the lamina (6a, 6b), is arranged forward with respect to said head (3).

5. The needle according to one of the preceding claims 3 or 4, **characterized in that** said region that can be superimposed laterally on the head (3) of said adja-

cent needle (1b) is defined by a rear protrusion (18a, 18b) of said second segment (14a, 14b) of the elastically flexible portion (8a,8b) of the lamina (6a,6b).

6. The needle according to one or more of claims 3 to 5, **characterized in that** the rear side of said first segment (13a, 13b) of the elastically flexible (8a,8b) portion of the lamina (6a,6b) defines an abutment for the latch (4) of said adjacent needle (1b), contrasting the rotation of its latch (4) about its pivoting axis (4a) with respect to the shank (2) of said adjacent needle (1b).
7. The needle according to one or more of the preceding claims, **characterized in that** said elastically flexible portion (8a,8b) of the lamina (6a,6b) has, on its front side, a supporting shoulder for the loop of knitting.
8. The needle according to claim 7 and one of claims 3 to 6, **characterized in that** said supporting shoulder is defined by the upper side of a front protrusion (16a, 16b) of said second segment (14a, 14b) of the elastically flexible portion (8a,8b) of the lamina (6a, 6b).
9. The needle according to one or more of the preceding claims, **characterized in that** said elastically flexible portion (8a,8b) of the lamina (6a,6b) can engage elements of the machine that are arranged laterally to the needle (1) in order to maintain or transfer said elastically flexible portion (8a,8b) of the lamina (6a,6b) in said inactive position and can be disengaged from said elements of the machine for the transfer of said elastically flexible portion (8a,8b) of the lamina (6a,6b) in said active position.
10. The needle according to one or more of the preceding claims, **characterized in that** said elastically flexible portion (8a,8b) of the lamina (6a,6b) can engage elements of the machine that are arranged laterally with respect to the needle (1) in order to keep said elastically flexible portion (8a,8b) of the lamina (6a,6b) in said active position.
11. The needle according to one or more of the preceding claims, **characterized in that** said elastically flexible portion (8a,8b) of the lamina (6a,6b) can engage the side (7) of an adjacent needle (1b) to transfer or keep said elastically flexible portion (8a,8b) of the lamina (6a,6b) in said inactive position.
12. The needle according to one or more of the preceding claims, **characterized in that** said elastically flexible portion (8a,8b) of the lamina (6a,6b) can engage the side of the seat formed in the needle holder (40) of the machine and designed to accommodate the needle (1) to transfer or keep said elastically flex-

ible portion (8a,8b) of the lamina (6a,6b) in said inactive position.

13. The needle according to one or more of the preceding claims, **characterized in that** said elastically flexible portion (8a,8b) of the lamina (6a,6b) can engage the portion of the needle holder (40) that defines the side of the seat that accommodates an adjacent needle in order to keep said elastically flexible portion (8a,8b) of the lamina (6a,6b) in said active position.
14. The needle according to one or more of the preceding claims, **characterized in that** said shank (2) has, between said latch (4) and the end of said elastically flexible portion (8a,8b) of the lamina (6a,6b) that is directed toward said head (3), a region (10) where said shank (2) is blended with said elastically flexible portion (8a,8b) of the lamina (6a,6b).
15. The needle according to claim 14, **characterized in that** said blending region (10) is shaped like a wedge that tapers toward said head (3) of the needle (1).

Patentansprüche

1. Eine Nadel (1) zur Maschenübertragung davon auf benachbarte Nadeln (1a, 1b) für Wirkmaschinen oder dergleichen, die Folgendes umfasst: einen Schaft (2), einen Kopf (3), der an einem Längs- oder oberen Ende des Schafts (2) angeordnet und wie ein Haken geformt ist, der zur Vorderseite des Schafts (2) hin offen ist, und eine Klinke (4), die drehgelenkig nahe dem Kopf (3) um eine Schwenkachse (4a) mit dem Schaft (2) verbunden ist, welche im Wesentlichen senkrecht zur Längsachse des Schafts (2) ist, und drehbar um die Schwenkachse (4a) zum Öffnen oder Schließen des Kopfs (3), mindestens ein Plättchen (6a, 6b), das mit dem Schaft (2) verbunden ist und auf jeder der beiden gegenüberliegenden Seiten (7a, 7b) des Schafts (2), unterhalb der Klinke (4), einen Abschnitt (8a, 8b) hat, der sich elastisch aus einer inaktiven Position, in welcher er näher an der entsprechenden Seite (7a, 7b) des Schafts (2) liegt, in eine aktive Position biegen kann, in welcher er von der entsprechenden Seite (7a, 7b) des Schafts (2) beabstandet ist; wobei in der aktiven Position der elastisch biegsame Abschnitt (8a, 8b) des Plättchens (6a, 6b) geeignet ist, eine Erweiterung einer Wirkschleufe (9) zu bilden, die an dem elastisch biegsamen Abschnitt (8a, 8b) des Plättchens (6a, 6b) auf den Schaft (2) aufgesetzt ist; wobei der Kopf (3) einer benachbarten Nadel (1b) in der aktiven Position in den Raum zwischen dem elastisch biegsamen Abschnitt (8a, 8b) des Plättchens (6a, 6b) und der entsprechenden Seite (7a, 7b) des Schafts (2) einsetzbar ist, zum Aufnehmen

- der Wirkschlaufe (9) mit Hilfe der benachbarten Nadel (1b); wobei der elastisch biegsame Abschnitt (8a, 8b) des Plättchens (6a, 6b) einen Bereich hat, der seitlich, auf der Seite, die der entsprechenden Seite (7a, 7b) des Schafts (2) gegenüberliegt, auf den Kopf (3) der benachbarten Nadel (1b) gelegt werden kann, der in der aktiven Position in den Raum zwischen dem elastisch biegsamen Abschnitt (8a, 8b) des Plättchens (6a, 6b) und der entsprechenden Seite (7a, 7b) des Schafts (2) eingesetzt ist; **dadurch gekennzeichnet, dass** das Plättchen (6a, 6b) mindestens mit dem Ende (12a, 12b), das dem Kopf (3) zugewandt ist, an der entsprechenden Seite (7a, 7b) des Schafts (2) in einem Bereich anliegt, der sich vor dem Kopf (3) befindet, so dass der Abstand zwischen der Längsachse des Schafts (2) des Endes (12a, 12b) des Plättchens (6a, 6b), das dem Kopf (3) zugewandt ist, größer ist als der Abstand zwischen der freien Spitze des Hakens und der Längsachse des Schafts (2).
2. Die Nadel (1) gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das Plättchen (6a, 6b) für jede Seite (7a, 7b) des Schafts (2) einen unteren Bereich (20a, 20b) hat, der haftend an der entsprechenden Seite (7a, 7b) des Schafts (2) anliegt und daran befestigt ist; einen intermediären Bereich, der den elastisch biegsamen Abschnitt (8a, 8b) des Plättchens (6a, 6b) bildet, und einen oberen Bereich (11a, 11b), der an dem oberen Ende (12a, 12b) des Plättchens (6a, 6b) endet, das an der entsprechenden Seite (7a, 7b) des Schafts (2) anliegt.
3. Die Nadel gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** der elastisch biegsame Abschnitt (8a, 8b) des Plättchens (6a, 6b), ausgehend von seinem unteren Ende und in Abwesenheit darauf einwirkender Kräfte, aus Folgendem besteht: einem ersten Segment (13a, 13b), das von der entsprechenden Seite (7a, 7b) des Schafts (2) fort geknickt ist; einem zweiten Segment (14a, 14b), das im Wesentlichen parallel zur entsprechenden Seite (7a, 7b) des Schafts (2) ist; und einem dritten Segment (15a, 15b), das zur entsprechenden Seite (7a, 7b) des Schafts (2) hin geknickt ist; wobei das dritte Segment (15a, 15b) weiter vorne angeordnet ist als der Kopf (3).
4. Die Nadel gemäß Anspruch 3, **dadurch gekennzeichnet, dass** das erste Segment (13a, 13b) des elastisch biegsamen Abschnitts (8a, 8b) des Plättchens (6a, 6b), mindestens nahe dem zweiten Segment (14a, 14b) des elastisch biegsamen Abschnitts (8a, 8b) des Plättchens (6a, 6b), weiter vorne angeordnet ist als der Kopf (3).
5. Die Nadel gemäß einem der obigen Ansprüche 3 oder 4, **dadurch gekennzeichnet, dass** der Bereich, der seitlich auf den Kopf (3) der benachbarten Nadel (1b) gelegt werden kann, durch einen hinteren Vorsprung (18a, 18b) des zweiten Segments (14a, 14b) des elastisch biegsamen Abschnitts (8a, 8b) des Plättchens (6a, 6b) bestimmt ist.
6. Die Nadel gemäß einem oder mehreren der Ansprüche 3 bis 5, **dadurch gekennzeichnet, dass** die Rückseite des ersten Segments (13a, 13b) des elastisch biegsamen Abschnitts (8a, 8b) des Plättchens (6a, 6b) ein Widerlager für die Klinke (4) der benachbarten Nadel (1b) bestimmt, das der Drehung seiner Klinke (4) um ihre Schwenkachse (4a) mit Bezug auf den Schaft (2) der benachbarten Nadel (1b) entgegenwirkt.
7. Die Nadel gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** der elastisch biegsame Abschnitt (8a, 8b) des Plättchens (6a, 6b) an seiner Vorderseite eine Stützschar für die Wirkschlaufe hat.
8. Die Nadel gemäß Anspruch 7 und einem der Ansprüche 3 bis 6, **dadurch gekennzeichnet, dass** die Stützschar durch die Oberseite eines vorderen Vorsprungs (16a, 16b) des zweiten Segments (14a, 14b) des elastisch biegsamen Abschnitts (8a, 8b) des Plättchens (6a, 6b) bestimmt ist.
9. Die Nadel gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** der elastisch biegsame Abschnitt (8a, 8b) des Plättchens (6a, 6b) in Elemente der Maschine eingreifen kann, die seitlich von der Nadel (1) angeordnet sind, um den elastisch biegsamen Abschnitt (8a, 8b) des Plättchens (6a, 6b) in der inaktiven Position zu halten oder dorthin zu überführen; und zur Überführung des elastisch biegsamen Abschnitts (8a, 8b) des Plättchens (6a, 6b) in die aktive Position von den Elementen der Maschine getrennt werden kann.
10. Die Nadel gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** der elastisch biegsame Abschnitt (8a, 8b) des Plättchens (6a, 6b) in Elemente der Maschine eingreifen kann, die seitlich von der Nadel (1) angeordnet sind, um den elastisch biegsamen Abschnitt (8a, 8b) des Plättchens (6a, 6b) in der aktiven Position zu halten.
11. Die Nadel gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** der elastisch biegsame Abschnitt (8a, 8b) des Plättchens (6a, 6b) in die Seite (7) einer benachbarten Nadel (1b) eingreifen kann, um den elastisch biegsamen Abschnitt (8a, 8b) des Plättchens (6a, 6b) in die inaktive Position zu überführen oder dort zu halten.

ten.

12. Die Nadel gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** der elastisch biegsame Abschnitt (8a, 8b) des Plättchens (6a, 6b) in die Seite des Sitzes eingreifen kann, der im Nadelhalter (40) der Maschine geformt ist und dazu dient, die Nadel (1) aufzunehmen, um den elastisch biegsamen Abschnitt (8a, 8b) des Plättchens (6a, 6b) in die inaktive Position zu überführen oder dort zu halten.
13. Die Nadel gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** der elastisch biegsame Abschnitt (8a, 8b) des Plättchens (6a, 6b) in den Abschnitt des Nadelhalters (40) eingreifen kann, der die Seite des Sitzes bestimmt, der eine benachbarte Nadel aufnimmt, um den elastisch biegsamen Abschnitt (8a, 8b) des Plättchens (6a, 6b) in der aktiven Position zu halten.
14. Die Nadel gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** der Schaft (2) zwischen der Klinke (4) und dem Ende des elastisch biegsamen Abschnitts (8a, 8b) des Plättchens (6a, 6b), das dem Kopf (3) zugewandt ist, einen Bereich (10) hat, in dem der Schaft (2) in den elastisch biegsamen Abschnitt (8a, 8b) des Plättchens (6a, 6b) übergeht.
15. Die Nadel gemäß Anspruch 14, **dadurch gekennzeichnet, dass** der Übergangsbereich (10) wie ein Keil geformt ist, der zu dem Kopf (3) der Nadel (1) hin spitz zuläuft.

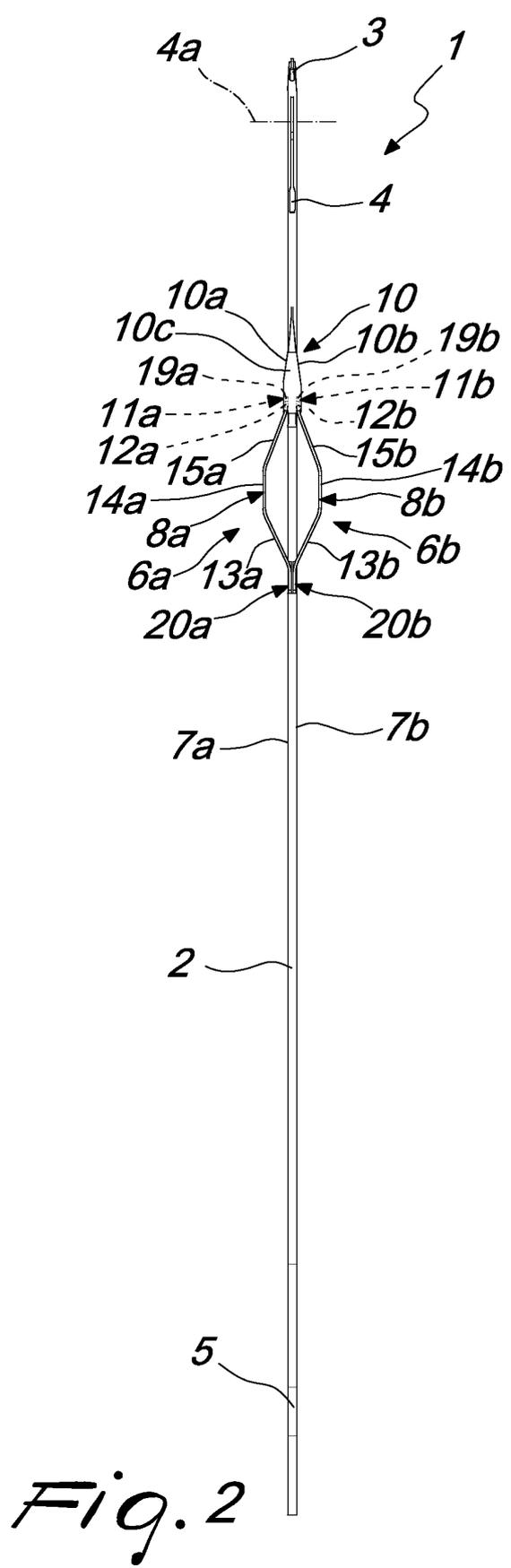
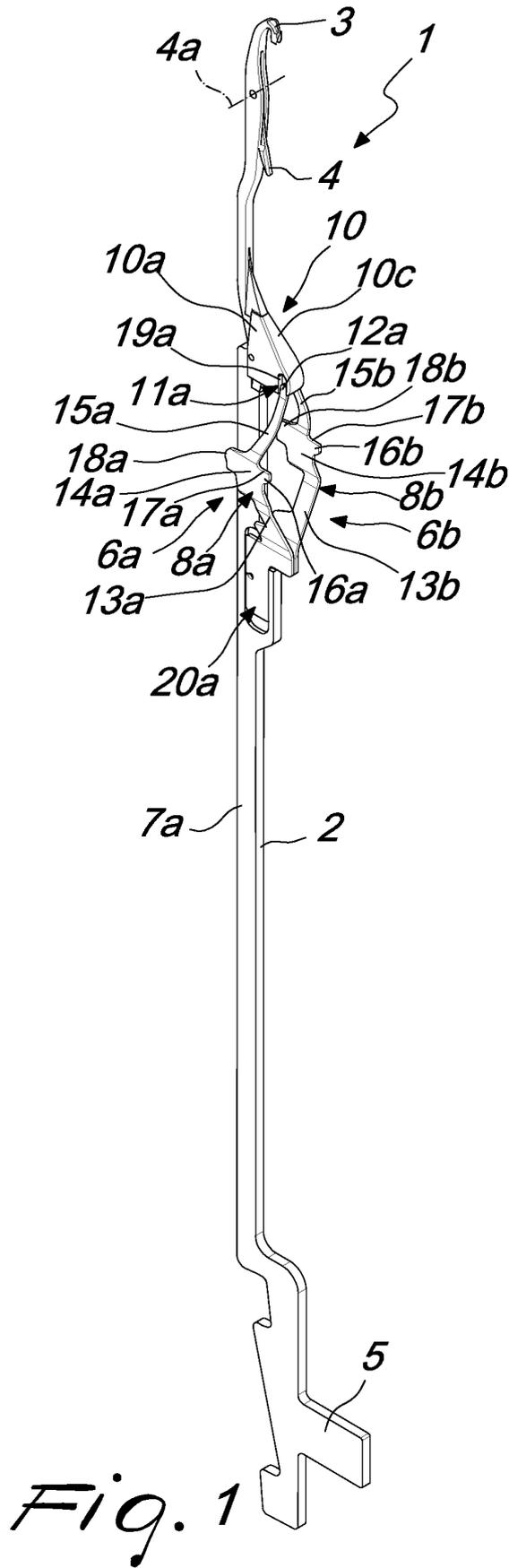
Revendications

1. Aiguille (1) destinée à transférer des mailles à partir de celle-ci vers des aiguilles (1a, 1b) adjacentes pour des machines à tricoter de la bonneterie ou analogue, comportant une tige (2), une tête (3) qui est agencée une extrémité longitudinale ou supérieure de ladite tige (2) et est profilée comme un crochet qui est ouvert vers le côté avant de ladite tige (2), et un clapet (4), qui pivote sur ladite tige (2) à proximité de ladite tête (3), autour d'un axe de pivotement (4a) qui est sensiblement perpendiculaire à l'axe longitudinal de ladite tige (2), et peut tourner autour dudit axe de pivotement (4a) afin d'ouvrir ou de fermer ladite tête (3), au moins une lamelle (6a, 6b) qui est reliée à ladite tige (2) et a, sur chacun des deux côtés opposés (7a, 7b) de ladite tige (2), sous ledit clapet (4), une partie (8a, 8b) qui peut fléchir élastiquement à partir d'une position inactive, dans laquelle elle est rapprochée du côté (7a, 7b) correspondant de la tige (2), jusqu'à une position active, dans laquelle elle est espacée du côté (7a, 7b) correspondant de la

tige (2), dans ladite position active, ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) étant adaptée pour produire une expansion d'une boucle (9) de tricot qui est ajustée sur ladite tige (2) sur ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b), la tête (3) d'une aiguille (1b) adjacente pouvant être insérée dans l'espace compris entre ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b), dans ladite position active, et le côté (7a, 7b) correspondant de ladite tige (2), afin de ramasser ladite boucle (9) de tricot au moyen de ladite aiguille (1b) adjacente, ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) ayant une zone qui peut être superposée latéralement, sur le côté opposé par rapport au côté (7a, 7b) correspondant de ladite tige (2), à la tête (3) de ladite aiguille (1b) adjacente insérée dans l'espace compris entre ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b), dans ladite position active, et les côtés (7a, 7b) correspondants de ladite tige (2), **caractérisée en ce que** ladite lamelle (6a, 6b) est en appui, au moins avec son extrémité (12a, 12b) dirigée vers ladite tête (3), contre le côté (7a, 7b) correspondant de ladite tige (2) dans une zone qui est située à l'avant de ladite tête (3) de sorte que la distance par rapport à l'axe longitudinal de la tige (2) de l'extrémité (12a, 12b) de ladite lamelle (6a, 6b) dirigée vers ladite tête (3) est supérieure à la distance de l'extrémité libre de la pointe du crochet par rapport à l'axe longitudinal de la tige (2).

2. Aiguille (1) selon la revendication 1, **caractérisée en ce que** ladite lamelle (6a, 6b) a, pour chaque côté (7a, 7b) de ladite tige (2) : une zone inférieure (20a, 20b), qui est agencée de manière à adhérer au côté (7a, 7b) correspondant de ladite tige (2) et est fixée à celui-ci, une zone intermédiaire, qui constitue ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b), et une zone supérieure (11a, 11b), qui se termine par l'extrémité supérieure (12a, 12b) de la lamelle (6a, 6b) qui est en appui contre le côté (7a, 7b) correspondant de ladite tige (2).
3. Aiguille selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) est constituée, en commençant par son extrémité inférieure et en l'absence de forces agissant sur celle-ci : d'un premier segment (13a, 13b), qui est replié en s'éloignant du côté (7a, 7b) correspondant de ladite tige (2), d'un deuxième segment (14a, 14b), qui est sensiblement parallèle au côté (7a, 7b) correspondant de ladite tige (2), et d'un troisième segment (15a, 15b), qui est plié vers le côté (7a, 7b) correspondant de ladite tige (2), ledit troisième segment (15a, 15b) étant agencé à l'avant par rapport à ladite tête (3).

4. **Aiguille selon la revendication 3, caractérisée en ce que** ledit premier segment (13a, 13b) de la partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b), au moins à proximité dudit deuxième segment (14a, 14b) de la partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b), est agencé à l'avant par rapport à ladite tête (3). 5
5. Aiguille selon l'une des revendications 3 ou 4 précédentes, **caractérisée en ce que** ladite zone qui peut être superposée latéralement à la tête (3) de ladite aiguille (1b) adjacente est définie par une saillie arrière (18a, 18b) dudit deuxième segment (14a, 14b) de la partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b). 10
6. Aiguille selon une ou plusieurs des revendications 3 à 5, **caractérisée en ce que** le côté arrière dudit premier segment (13a, 13b) de la partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) définit une butée pour le clapet (4) de ladite aiguille (1b) adjacente, en opposition à la rotation de son clapet (4) autour de son axe de pivotement (4a) par rapport à la tige (2) de ladite aiguille (1b) adjacente. 15
7. Aiguille selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) a, sur son côté avant, un épaulement de support pour la boucle de tricot. 20
8. Aiguille selon la revendication 7 et l'une des revendications 3 à 6, **caractérisée en ce que** ledit épaulement de support est défini par le côté supérieur d'une saillie avant (16a, 16b) dudit deuxième segment (14a, 14b) de la partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b). 25
9. Aiguille selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) peut venir en prise avec des éléments de la machine qui sont agencés latéralement à l'aiguille (1) afin de maintenir ou de transférer ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) dans ladite position inactive et peut être mise hors de prise desdits éléments de la machine pour le transfert de ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) dans ladite position active. 30
10. Aiguille selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) peut venir en prise avec des éléments de la machine qui sont agencés latéralement par rapport à l'aiguille (1) afin de maintenir ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) dans ladite position active. 35
11. Aiguille selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) peut venir en prise avec le côté (7) d'une aiguille (1b) adjacente pour transférer ou maintenir ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) dans ladite position inactive. 40
12. Aiguille selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) peut venir en prise avec le côté du siège formé dans le porte-aiguilles (40) de la machine et conçu pour recevoir l'aiguille (1) pour transférer ou maintenir ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) dans ladite position inactive. 45
13. Aiguille selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) peut venir en prise avec la partie du porte-aiguilles (40) qui définit le côté du siège qui reçoit une aiguille adjacente afin de maintenir ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) dans ladite position active. 50
14. Aiguille selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ladite tige (2) a, entre ledit clapet (4) et l'extrémité de ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b) qui est dirigée vers ladite tête (3), une zone (10) où ladite tige (2) est reliée à ladite partie élastiquement souple (8a, 8b) de la lamelle (6a, 6b). 55
15. Aiguille selon la revendication 14, **caractérisée en ce que** ladite zone de jonction (10) est formée comme un coin qui converge vers ladite tête (3) de l'aiguille (1).



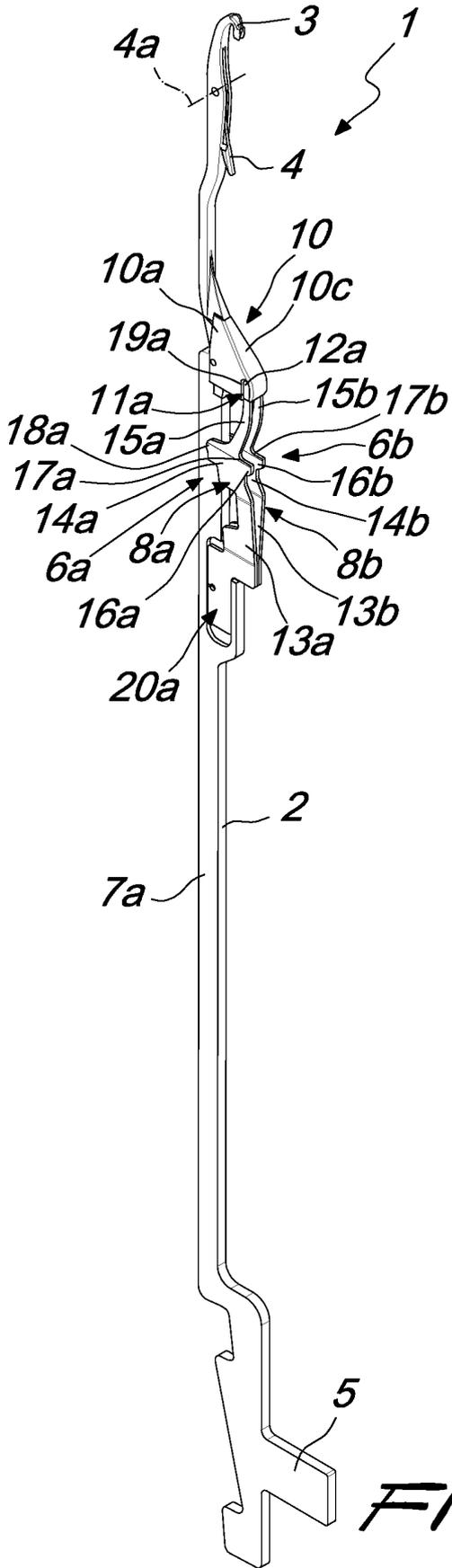


Fig. 3

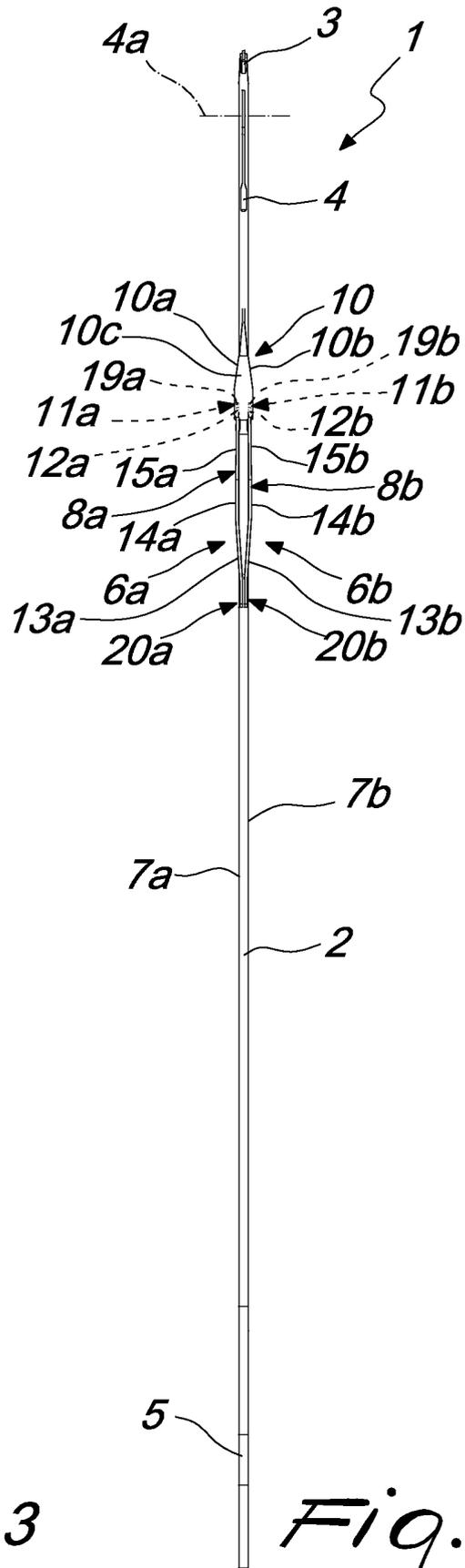


Fig. 4

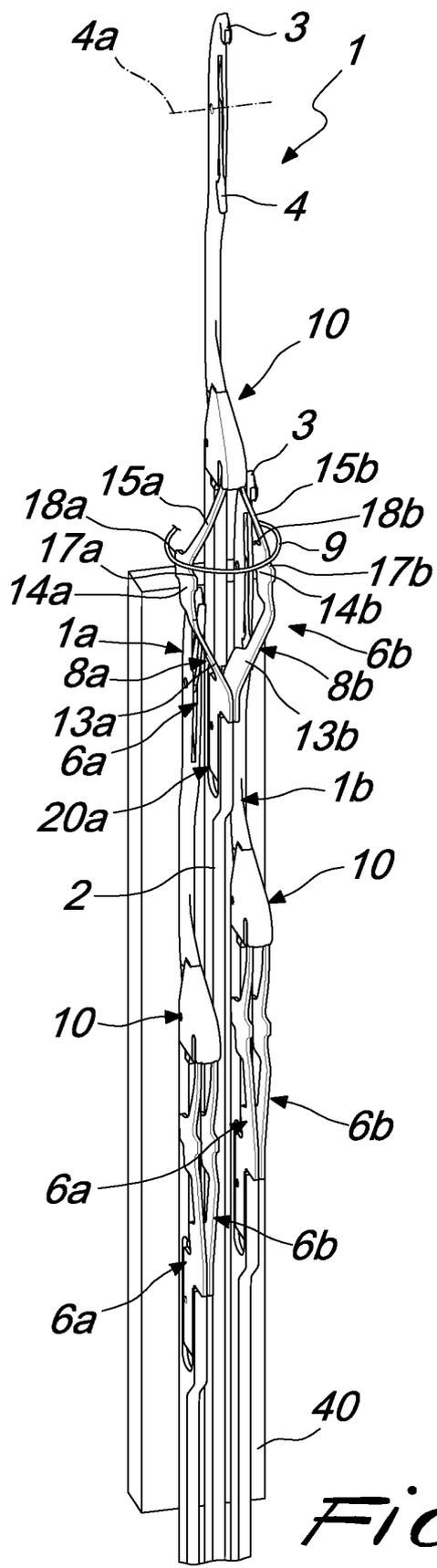


Fig. 5

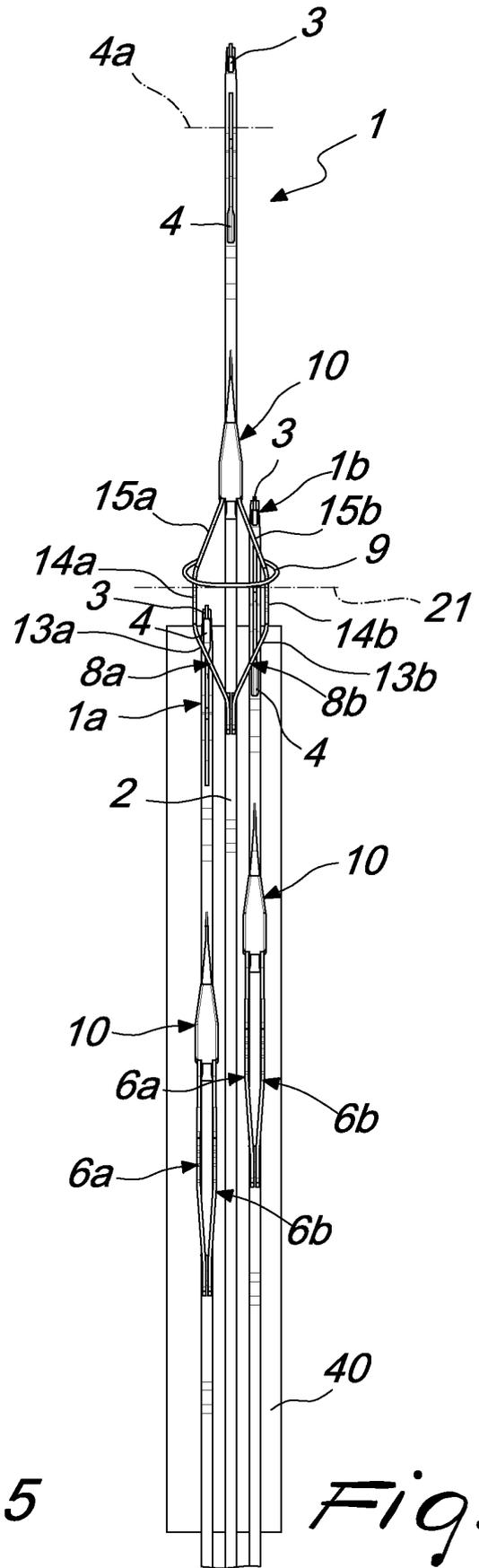


Fig. 6

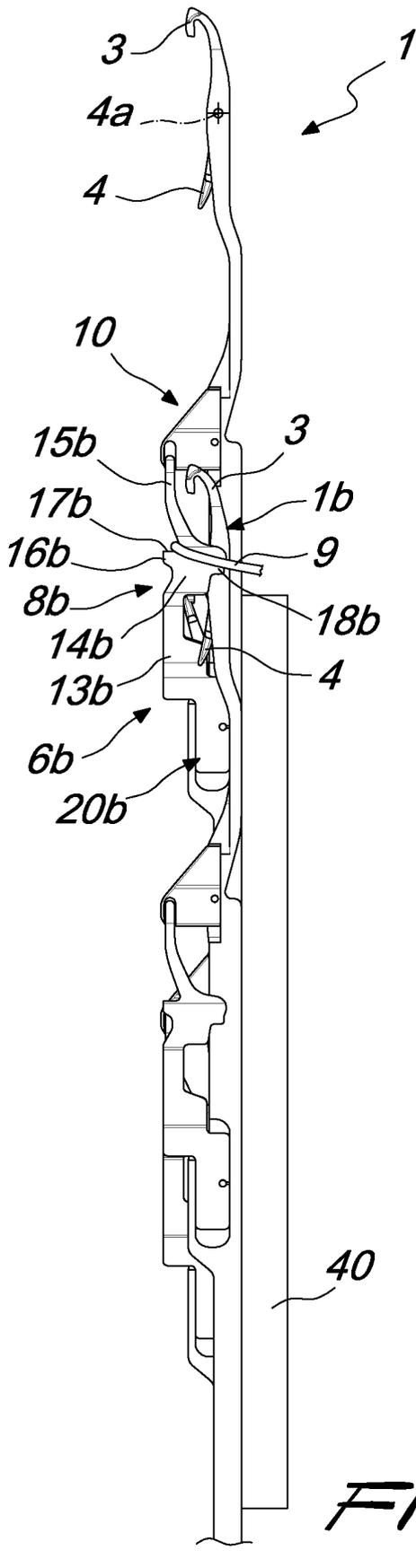


Fig. 7

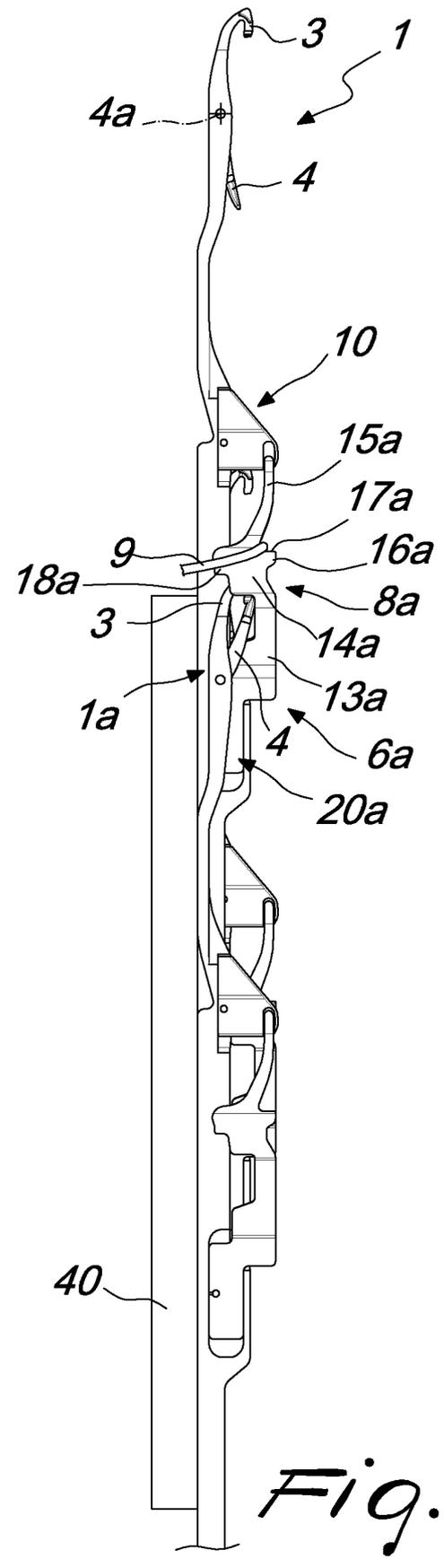


Fig. 8

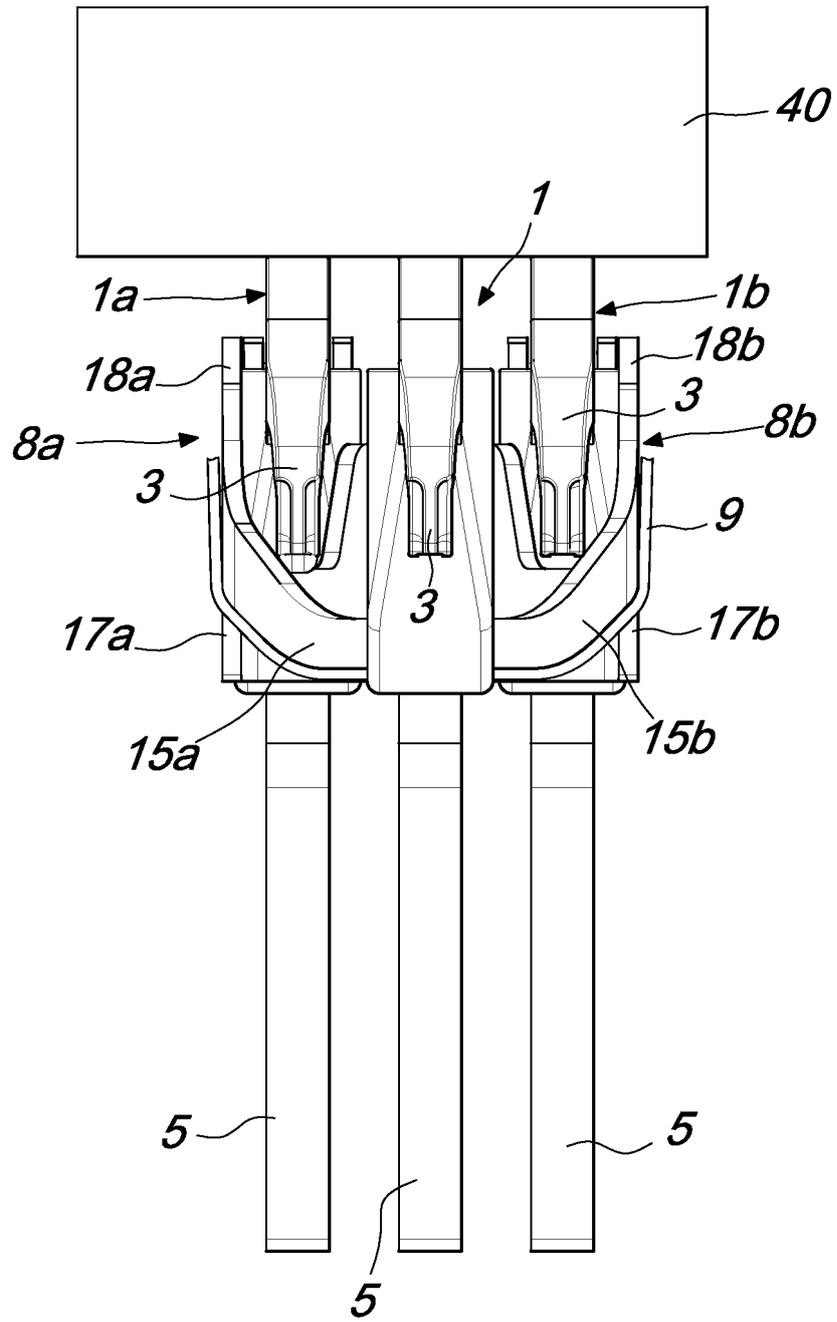
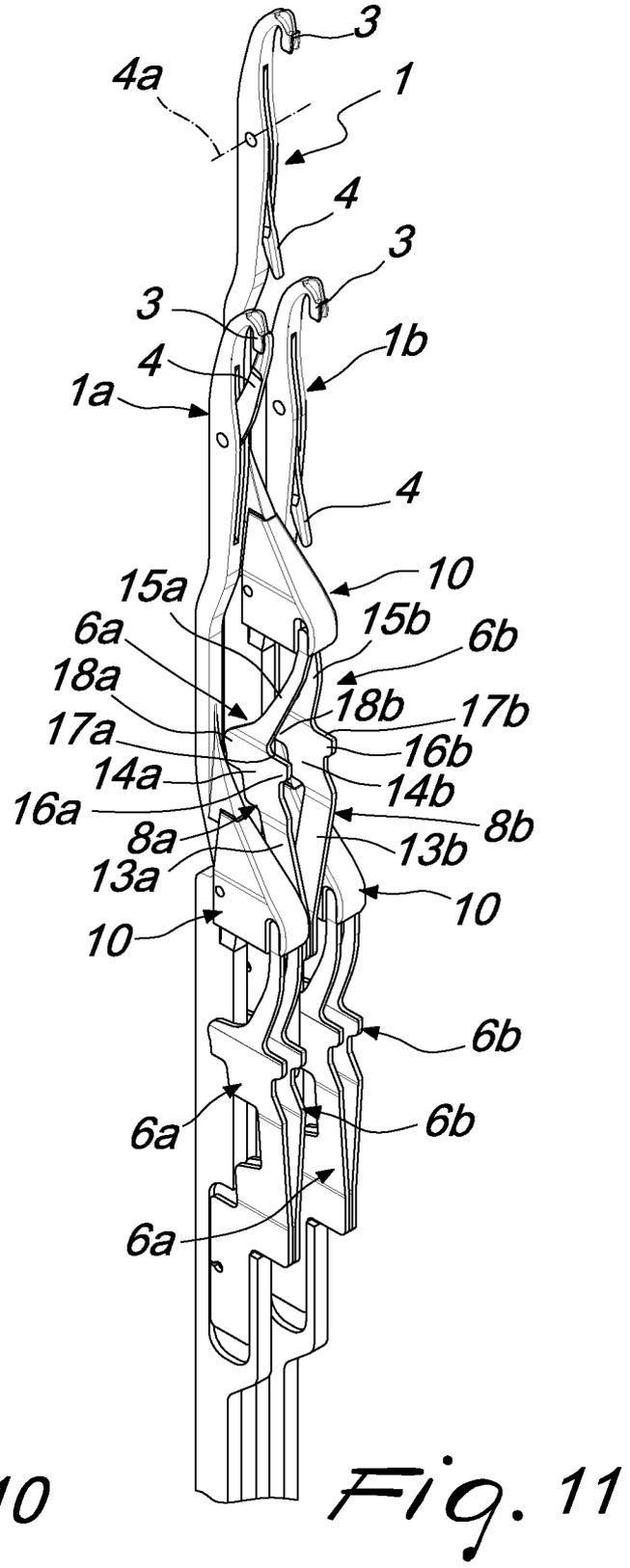
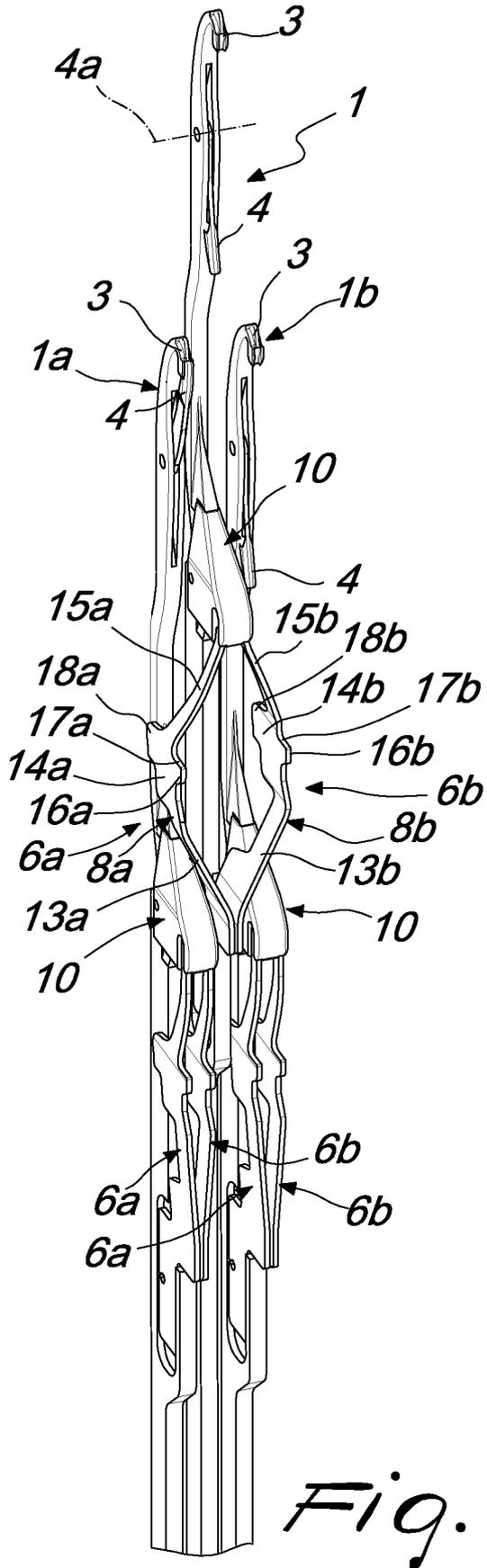


Fig. 9



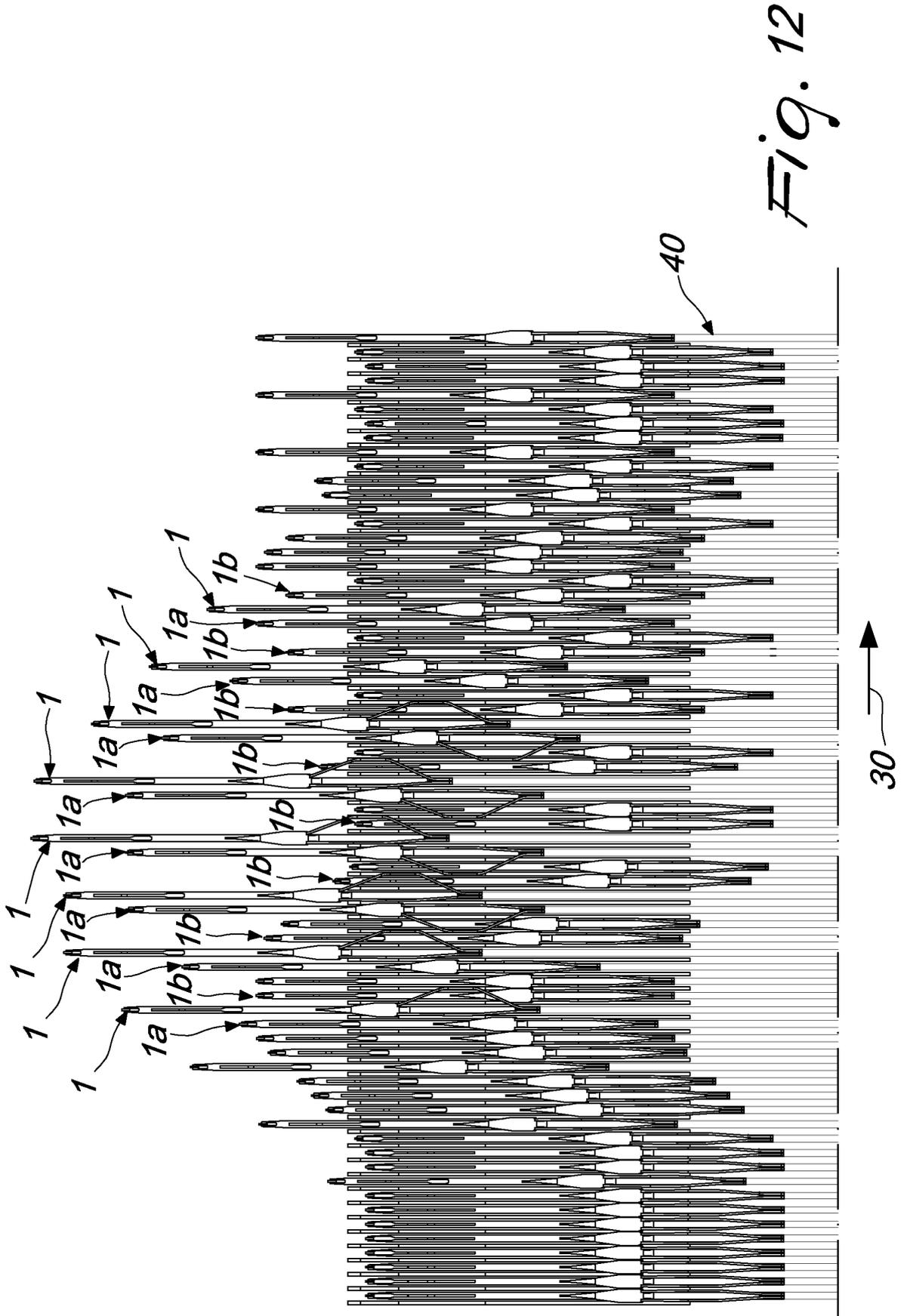


Fig. 12

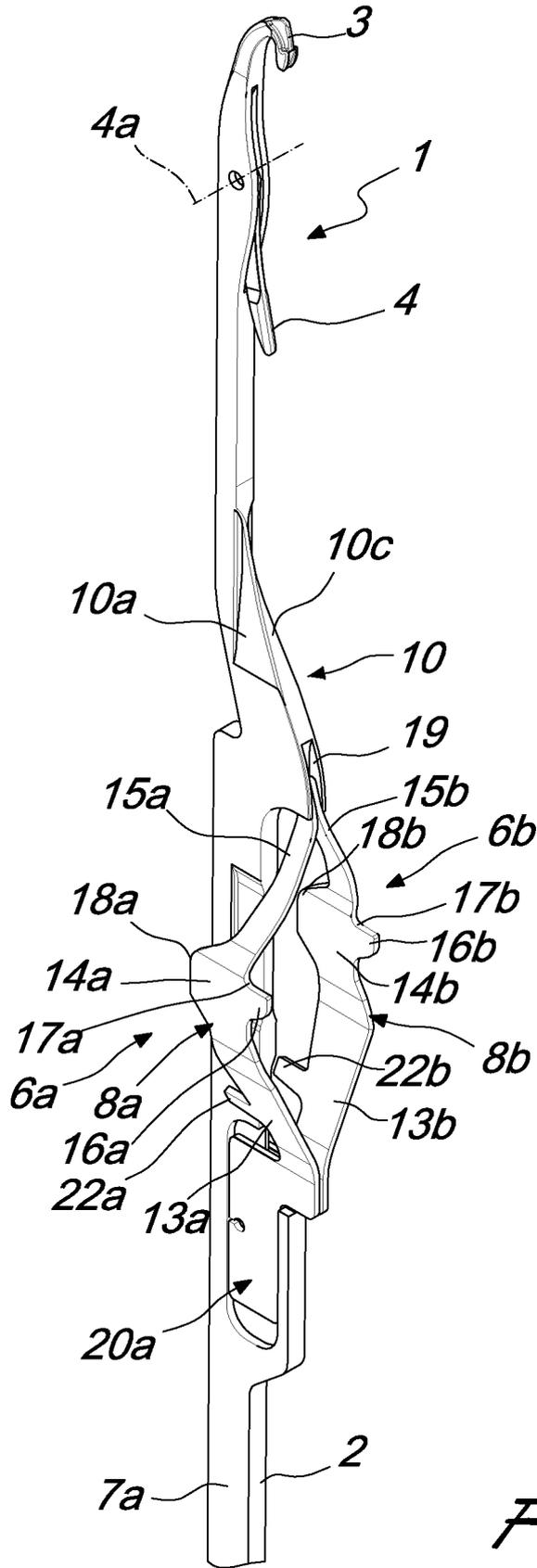


Fig. 13

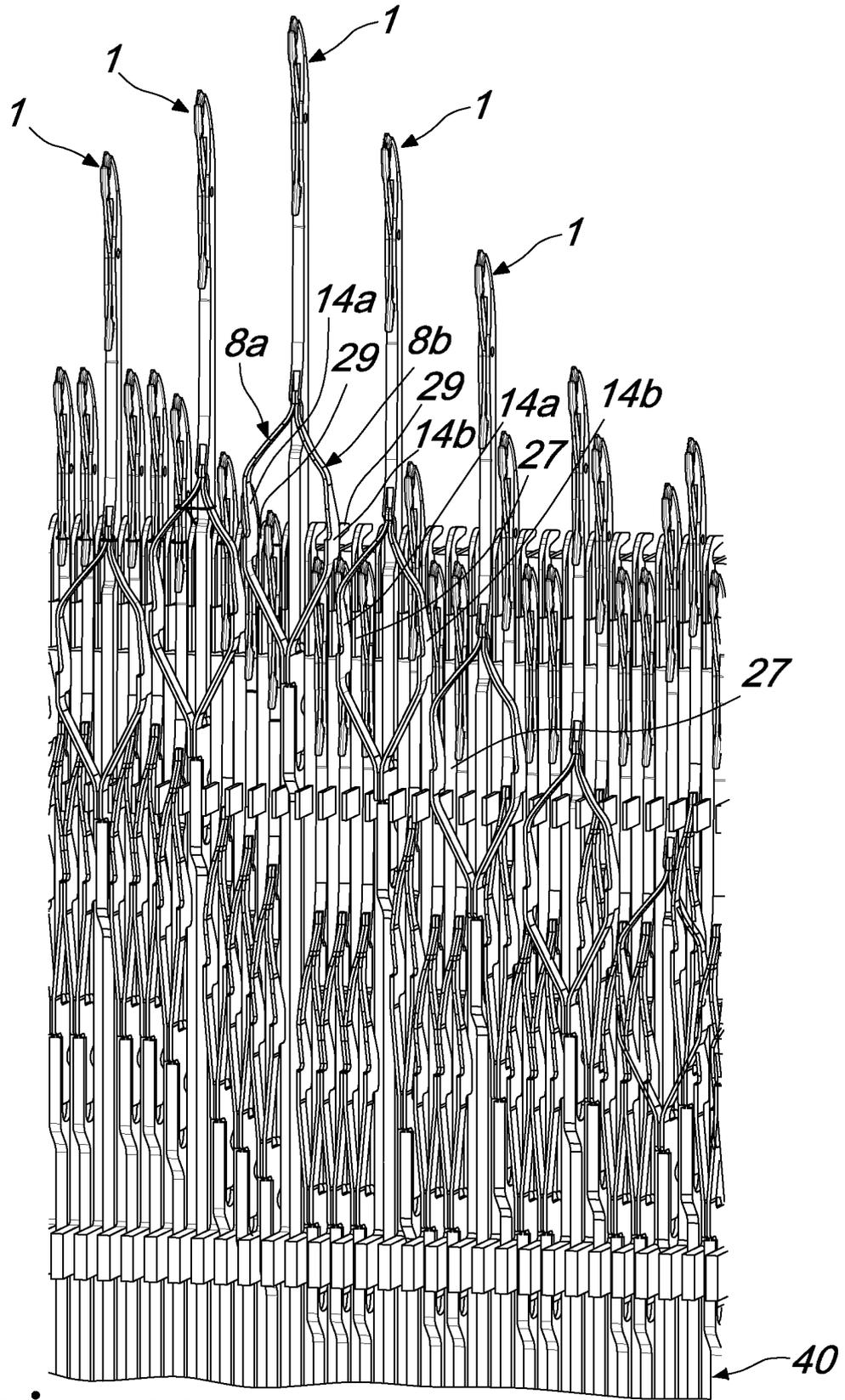


Fig. 14

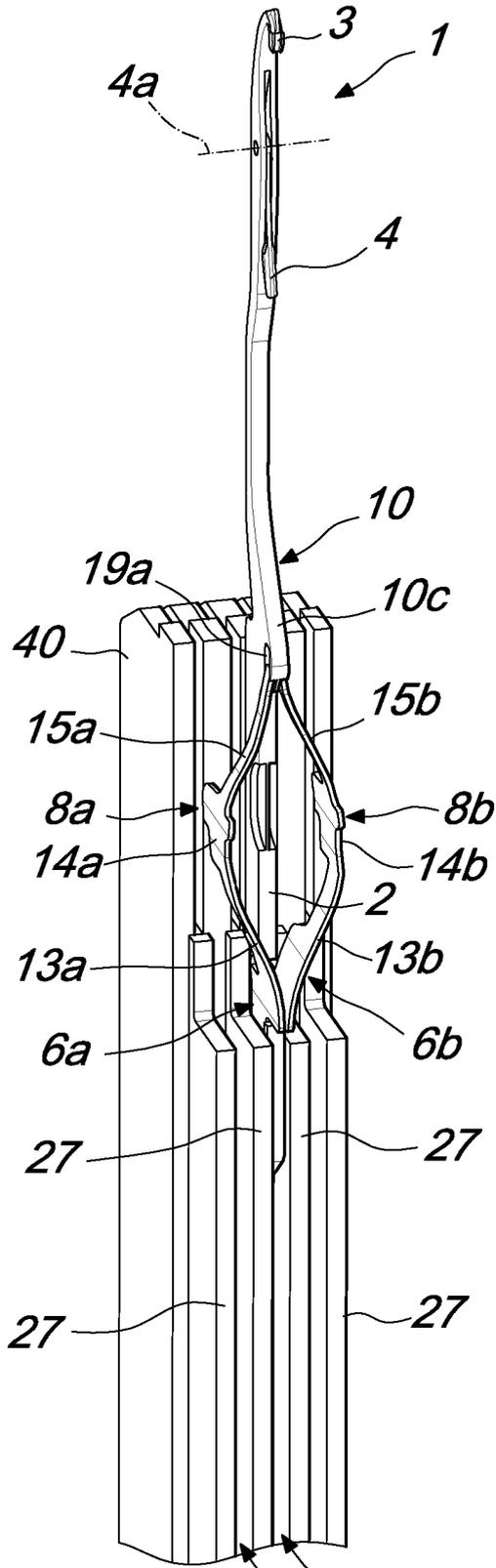


Fig. 15 28 28

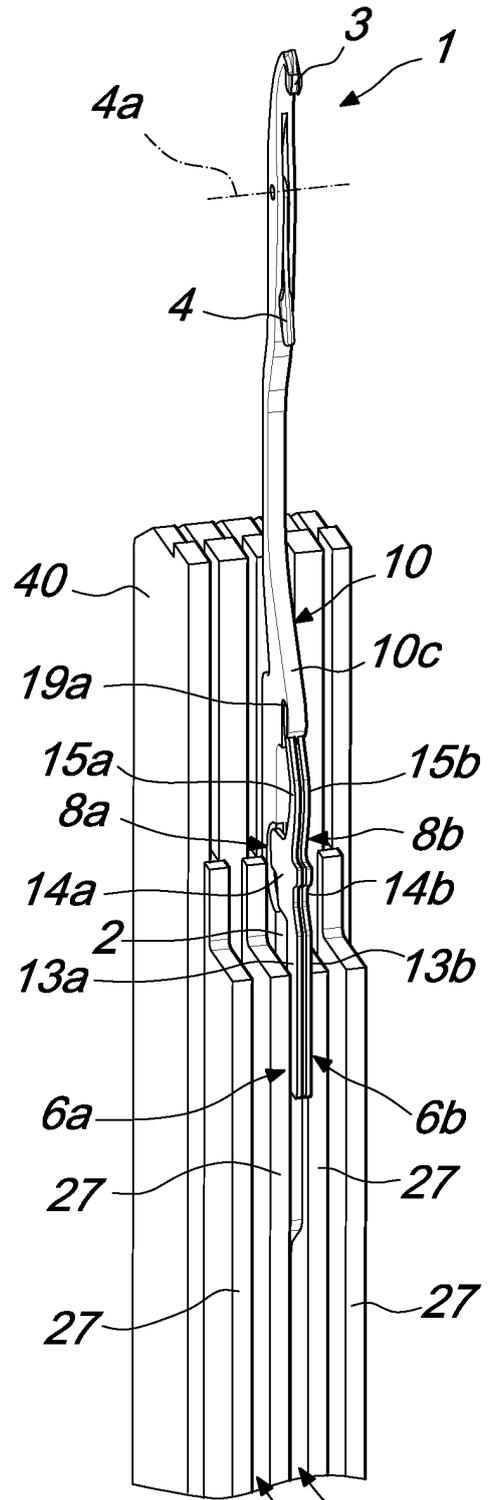


Fig. 16 28 28

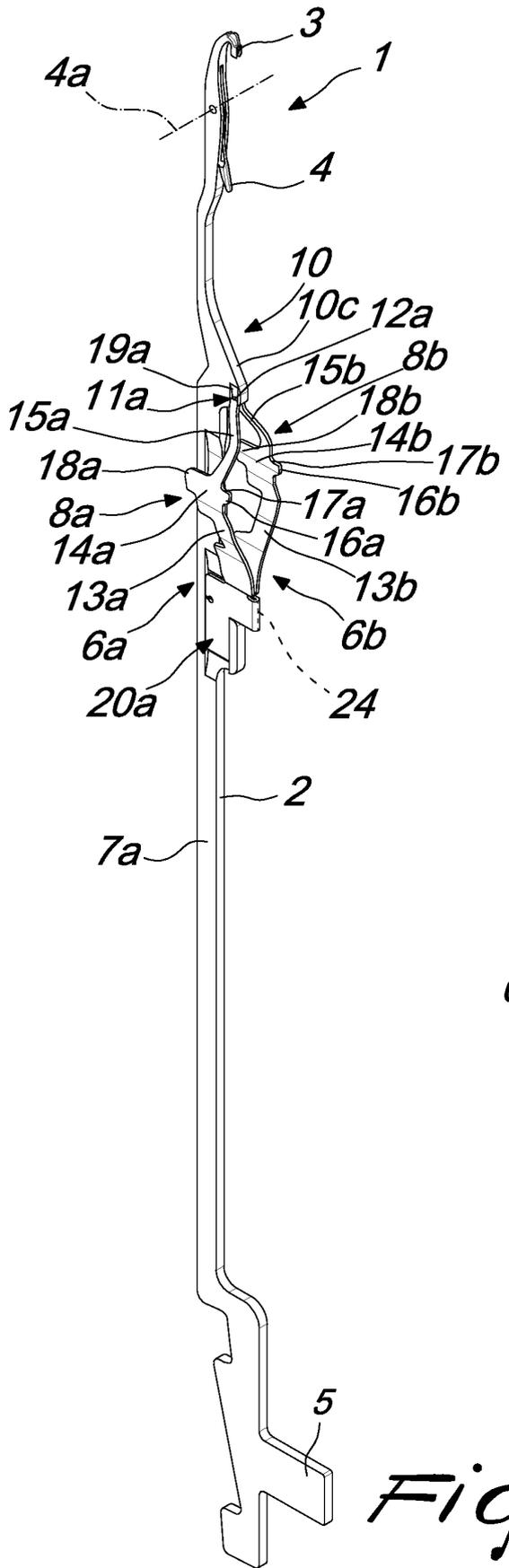


Fig. 17

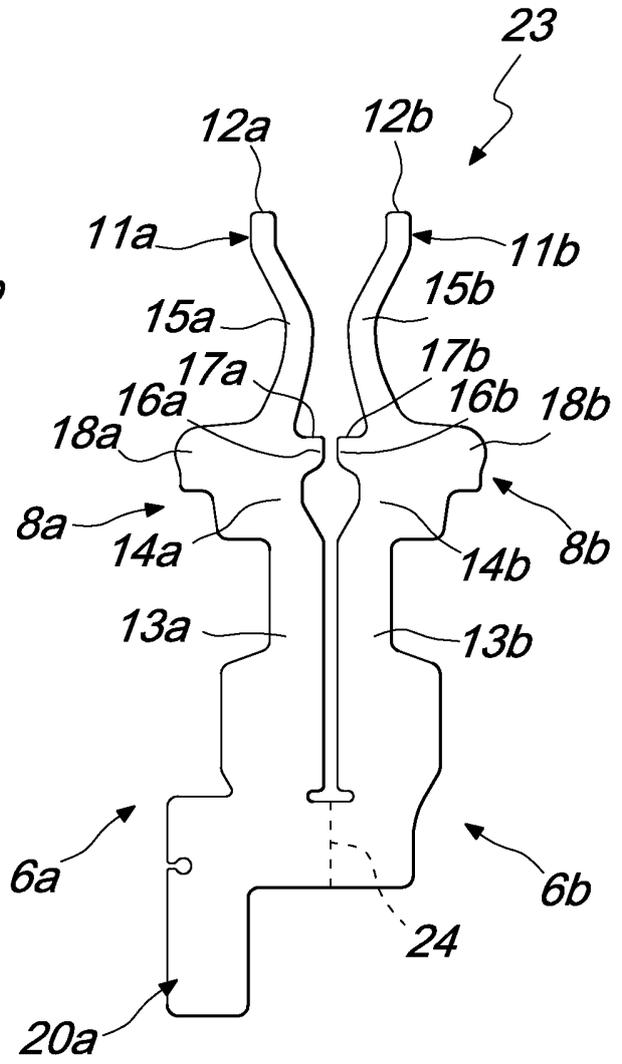


Fig. 18

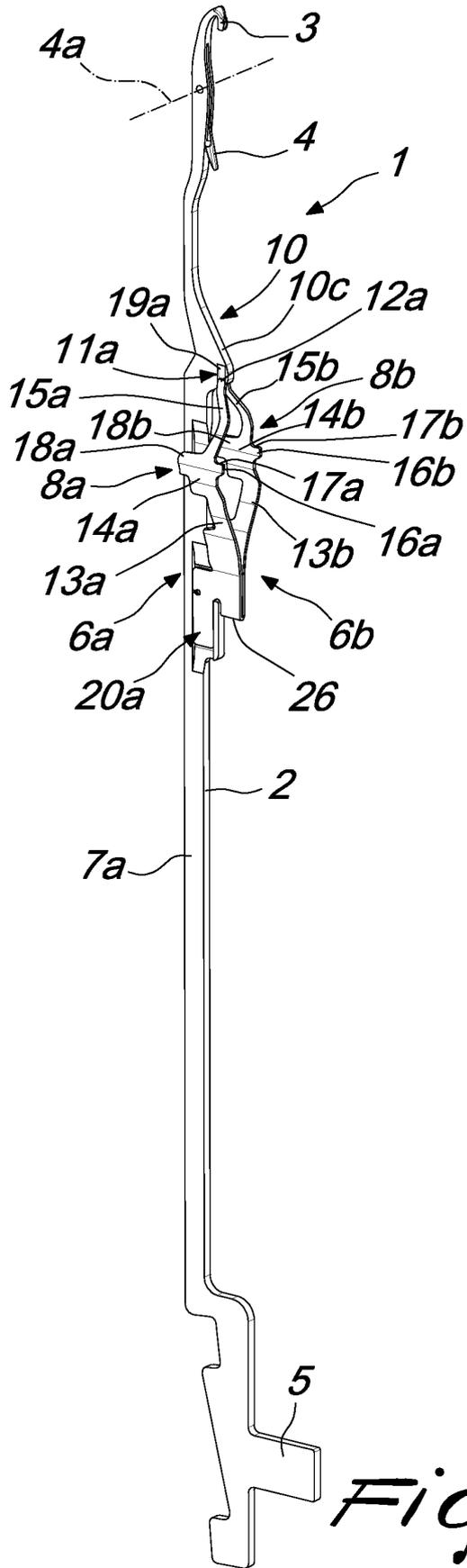


Fig. 19

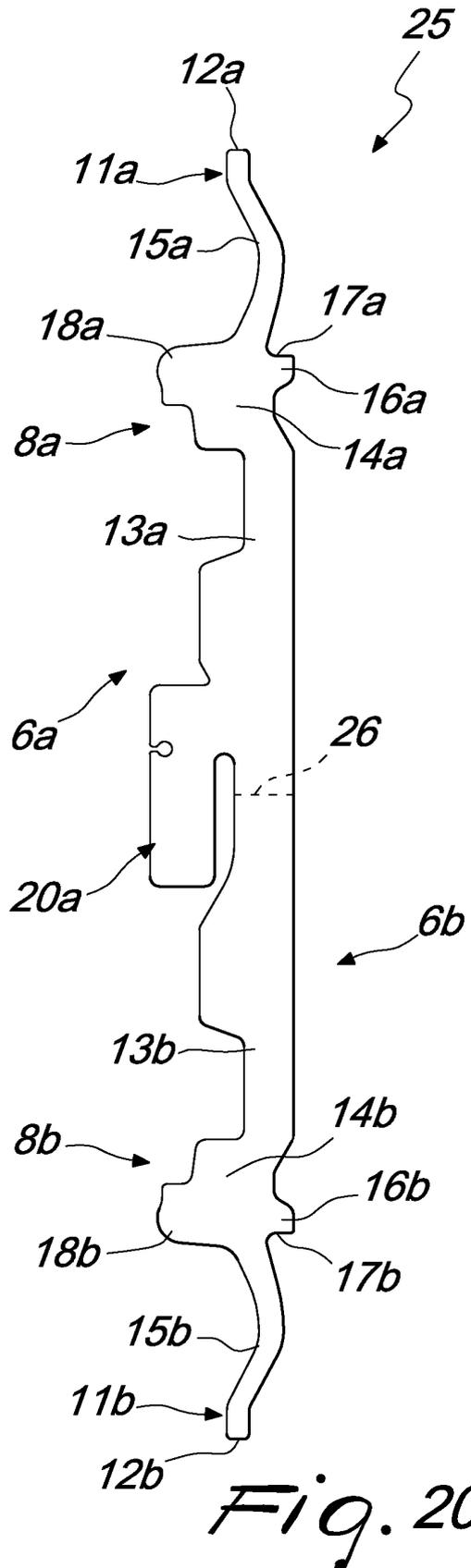


Fig. 20

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Patent documents cited in the description

- WO 02070799 A [0003]
- WO 2007057041 A [0004] [0005]