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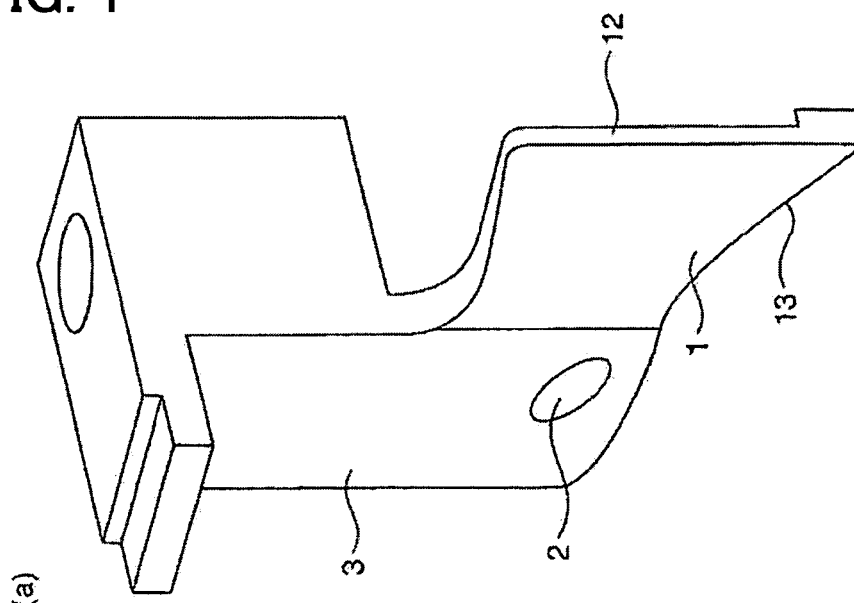
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(54) **Yarn guide apparatus for offset knitting**

(57) A yarn guide apparatus for offset knitting is provided that enables a knitting needle to reliably receive all filaments constituting a yarn at a knitting point even in offset yarn feeding, and enables a yarn to be stably fed without coming off the knitting point due to a change in the knit structure or the like. The yarn guide apparatus feeds a yarn to a knitting needle from a position offset

from the movement line of the knitting needle in a knitting machine. The apparatus includes a yarn guide apparatus main body that is provided with a yarn inlet and a yarn outlet, and a guide plate that is disposed at a lower side portion of the yarn guide apparatus main body. A yarn that has been pushed into a knitting needle is guided by the guide plate up to a position immediately before a knitting point.

FIG. 1



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a yarn guide apparatus that feeds a yarn to a knitting needle from a position offset from the movement line of the knitting needle in a knitting machine.

2. Description of Related Art

[0002] Typically, a knitting machine includes a yarn guide apparatus for feeding a yarn to a knitting needle. The knitting needle moves along a movement line along which the knitting needle is repeatedly lifted and then lowered in order to receive a yarn. The yarn guide apparatus is disposed on that movement line such that the knitting needle can reliably receive a yarn.

[0003] As another type of yarn guide apparatus, a yarn guide apparatus for offset knitting is known that guides a yarn to a knitting needle from a position offset from the movement line of the knitting needle (see JP-04-316649A and JP-60-52660A, for example).

[0004] In such offset yarn feeding, a knitting needle and a yarn guide apparatus are never brought into contact with each other, and, thus, problems such as abrasion or damage caused by the contact do not occur. In the case of ordinary knitting, if a latch is closed due to breakage of a yarn or the like, the knitting needle cannot receive a yarn in subsequent operations, and the latch is kept closed, which causes defects in the knit fabric or press-off, and, thus, a manual operation is needed to open the latch. However, in the case of offset yarn feeding, a guided yarn acts on a latch of a lifted knitting needle to open the latch, and, thus, such an operation is not necessary, and the possibility of press-off is significantly reduced. Moreover, in the case of a yarn guide apparatus for offset knitting, the contact with the knitting needle does not have to be considered, and, thus, the structure is simple, and the production cost is lower than that of a conventional yarn guide apparatus.

[0005] Offset yarn feeding is adopted, for example, in a knitting machine having a short movement line of a knitting needle, because, in such a knitting machine, a latch of a knitting needle often enters a yarn outlet of a yarn guide apparatus and causes damage and the like if the yarn guide apparatus is on the movement line of the knitting needle. Furthermore, offset yarn feeding is adopted also in the case where use of this feeding method is unavoidable due to the configuration of a knitting machine, for example, in the case where otherwise it is difficult to cause a yarn to pass through a yarn guide apparatus because the yarn guide apparatus is completely fixed.

[0006] In offset yarn feeding, the distance from a yarn outlet of a yarn guide apparatus to a knitting point where

a knitting needle receives a yarn is long, and the yarn is not particularly controlled between these points. Accordingly, for example, depending on the properties of a yarn such as a continuous filament yarn having a large number of filaments, filamentation easily occurs in which filaments constituting the yarn become loosened and broken up toward the knitting point although they are bound together when existing near the yarn outlet of the yarn guide apparatus. In this case, a knitting needle cannot receive all filaments constituting the yarn, and a defect may occur in the knit fabric.

[0007] Furthermore, when a yarn feeding route is moved or a knitting needle is inclined due to a change in the knit structure or the like, the knitting needle sometimes fails to receive a yarn, and, in this case, the yarn comes off the knitting point. The yarn that has come off the knitting point does not return to the knitting point by itself, and, thus, a large amount of defective knit fabric may be produced, and a manual operation is needed to return the yarn to the knitting point.

[0008] When these problems occur, they can be tentatively solved by switching the mode such that a yarn is fed from the ordinary position. With this mode, since the distance between the yarn outlet of the yarn guide apparatus and the knitting point is shortened, the yarn can be fed without being loosened, and can be stably fed regardless of a change in the knit structure or the like. However, as described above, the yarn guide apparatus cannot be disposed at the ordinary position in some types of knitting machines, and there is a problem that a knit fabric produced thereby is defective when the yarn comes off the knitting point.

SUMMARY OF THE INVENTION

[0009] It is a main object of the present invention to provide a yarn guide apparatus for offset knitting that enables a knitting needle to reliably receive all filaments constituting a yarn at a knitting point even in offset yarn feeding, and enables a yarn to be stably fed without coming off the knitting point due to a change in the knit structure or the like.

[0010] In order to solve the above-described problems, the present invention is directed to a yarn guide apparatus that feeds a yarn to a knitting needle from a position offset from a movement line of the knitting needle in a knitting machine, including: a yarn guide apparatus main body that is provided with a yarn inlet and a yarn outlet; and a guide plate that is disposed at a lower side portion of the yarn guide apparatus main body; wherein a yarn that has been pushed into a knitting needle is guided by the guide plate up to a position immediately before a knitting point.

[0011] It is preferable that a projected portion is formed at a lower side portion of the guide plate, and a height of projection of the projected portion in a rear face direction is gradually increased in a yarn feed direction.

[0012] It is preferable that a perpendicular portion at a

side portion of the guide plate is situated where a latch of the knitting needle is positioned when starting to close.

[0013] It is preferable that a bottom portion of the guide plate is formed as an inclined portion that is inclined downward toward a leading end thereof.

[0014] In order to avoid contact with a closed latch, the yarn guide apparatus main body may use a guide plate having a shape that does not prevent the latch of the knitting needle from being opened in a lifting portion where the knitting needle and the guide plate are positioned close to each other.

[0015] The guide plate and the yarn guide apparatus main body may be integrally formed, or may be freely detachable from each other via a fixing member.

[0016] Furthermore, an upper edge curved face of the projected portion of the guide plate is formed such that the projected portion has a width that is increased toward the yarn outlet.

[0017] According to the claims of the present invention, in offset knitting using a yarn in which filaments constituting the yarn are easily loosened, all the filaments can be received by a knitting needle without fail, and, thus, it is possible to produce a knit fabric without a defect resulting from the receiving failure. Furthermore, since the guide plate guides a yarn up to a position near the knitting point, it is possible to continue stable yarn feeding without the influence of a change in the knit structure or the like.

[0018] According to an aspect of the present invention, it is possible to position the guide plate and the knitting point very close to each other in a stable manner, and, thus, the precision in guiding the yarn up to a position near the knitting point is improved.

[0019] According to another aspect of the present invention, it is possible to configure the yarn guide apparatus so as not to prevent a latch from being opened and closed.

[0020] If the guide plate and the yarn guide apparatus main body can be freely detachable from each other, it is possible to use the apparatus as a conventional yarn guide apparatus for offset knitting when they are detached from each other.

[0021] According to another aspect of the present invention, even when the yarn route passes the upper portion of the projected portion, the yarn rarely comes off the projected portion, and, even if it comes off the projected portion, easily returns thereto by itself.

[0022] Hereinafter, embodiments of the present invention will be described, but the present invention is not limited to these embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

FIGS. 1A and 1B show a yarn guide apparatus for offset knitting according to an embodiment of the present invention, wherein FIG. 1A is a perspective view from the right front, and FIG. 1B is a perspective

view from the right rear.

FIGS. 2A to 2C show the yarn guide apparatus for offset knitting according to the embodiment of the present invention, wherein FIG. 2A is a front view, FIG. 2B is a left side view, and FIG. 2C is a rear view. FIG. 3 is a schematic view of offset knitting using the yarn guide apparatus for offset knitting according to the embodiment of the present invention.

FIG. 4 is a schematic front view of offset knitting using a conventional yarn guide apparatus.

FIG. 5 is a schematic view of the Z-Z cross-section of the embodiment in FIG. 3 viewed from above, wherein the conventional yarn route B in FIG. 4 is also shown in a superimposed manner for comparison.

FIGS. 6X and 6Y are enlarged views of the portion near the knitting point in FIG. 5, wherein FIG. 6X shows a case using the yarn guide apparatus according to the embodiment of the present invention, and FIG. 6Y shows a case using a conventional yarn guide apparatus.

FIGS. 7A to 7C show a yarn guide apparatus for offset knitting according to another embodiment of the present invention, wherein FIG. 7A is a front view, FIG. 7B is a left side view, and FIG. 7C is a rear view.

DETAILED DESCRIPTION OF THE INVENTION

[0024] FIGS. 1A to 2C show a yarn guide apparatus for offset knitting of this embodiment. A guide plate 1 is integrally formed at a lower side portion of a yarn guide apparatus main body 3 that is provided with a yarn inlet 2 and a yarn outlet 4.

[0025] A perpendicular portion 12 at a side portion of the guide plate 1 is situated at the position where a latch of the knitting needle starts to be closed.

[0026] A projected portion 15 at a lower side portion of the guide plate 1 is shaped such that the guide portion is projected in order to avoid a knitting needle and its latch. The height and the width of the thick projected portion 15 and the width of a thick projected portion front edge 16 that is projected most at the end of the yarn guide apparatus are preferably increased to the limit where the projected portion can avoid a knitting needle and its latch.

[0027] If the upper face of the projected portion 15 is formed along a straight line, in the case where the yarn route is moved upward to cause a yarn to pass the upper edge portion of the projected portion 15, the yarn may come off the projected portion 15 and not return to the projected portion 15 even when the yarn route is subsequently moved downward. Thus, it is preferable that an upper edge curved face 17 of the projected portion 15 is formed such that a yarn rarely comes off the projected portion, and, even if it comes off the projected portion, easily returns thereto.

[0028] The bottom of the side portion of the guide plate 1 is formed as an inclined portion 13 that is inclined down-

ward toward the leading end thereof so as to allow a tool for opening the latch to be easily inserted while avoiding the knitting needle, and the guide plate 1 as a whole is in the shape of a trapezoidal plate having a flat portion at its top and the inclined portion 13 at its bottom.

[0029] As shown in FIG. 3, a yarn that has entered the yarn inlet 2 passes through the yarn guide apparatus main body 3, exits from the yarn outlet 4, travels along the guide plate 1, and reaches a knitting point 5. Since the guide plate 1 guides a yarn up to a position near the knitting point 5 in this manner, the yarn is stably fed to the knitting point 5 without being affected by a change in the knit structure.

[0030] Furthermore, the yarn that has been pushed into a knitting needle 6 is regulated by the guide plate 1 up to a position immediately before the knitting point 5 as indicated by A in FIG. 5, and, thus, in a lowering portion 72 of a movement line 7 where the knitting needle 6 is lowered to receive the yarn, filaments 9 constituting the yarn are rarely loosened in the outer direction where the guide plate 1 exists as shown in FIG. 6X. Accordingly, even when the filaments 9 constituting the yarn are loosened, the knitting needle 6 can receive all the filaments 9.

[0031] On the other hand, in the case where a conventional yarn guide apparatus shown in FIG. 4 is used, the filaments 9 constituting the yarn are loosened without regulation as shown in FIG. 6Y, and are naturally loosened also in the outer direction. Thus, the knitting needle 6 cannot receive the filaments 9 that have been loosened beyond the range where the yarn can be received.

[0032] The yarn guide apparatus main body 3 of this embodiment is configured such that, in a lifting portion 71 of the movement line 7 where the knitting needle 6 and the guide plate 1 are positioned close to each other, the yarn route is set slightly away from the knitting needle 6 so as not to be brought into contact with a closed latch 8. In ordinary offset knitting, if a yarn is positioned close to the knitting needle 6 when the knitting needle 6 is being lifted, an action that opens the closed latch 8 is obtained. However, during the process that opens the latch, the guide plate 1 and the latch 8 may be brought into contact with other to cause problems such as damage of constituent components, and, thus, the yarn guide apparatus main body 3 of this embodiment is configured as described above.

[0033] As another method for obtaining an action that opens the latch 8 unique to the offset yarn feeding, it is possible to use a guide plate 1 having a shape that does not prevent the latch 8 of the knitting needle 6 from being opened in the lifting portion 71 where the knitting needle 6 and the guide plate 1 are positioned close to each other.

[0034] Furthermore, as another embodiment, the guide plate 1 and the yarn guide apparatus main body 3 can be freely detachable from each other via fixing members 18 such as screws as shown in FIG. 7. With this configuration, when using a yarn in which filamentation does not occur, it is possible to perform adjustment such that the latch 8 of the knitting needle 6 can be opened in

offset yarn feeding in a state where the guide plate 1 is detached.

[0035] The invention may be embodied in other forms without departing from the spirit or essential characteristics thereof. The embodiments disclosed in this application are to be considered in all respects as illustrative and not limiting. The scope of the invention is indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are intended to be embraced therein.

Claims

1. A yarn guide apparatus for offset knitting that feeds a yarn to a knitting needle (6) from a position offset from a movement line of the knitting needle (6) in a knitting machine, **characterized in that** the apparatus comprises:

a yarn guide apparatus main body (3) that is provided with a yarn inlet (2) and a yarn outlet (4); and

a guide plate (1) that is disposed at a lower side portion of the yarn guide apparatus main body (3);

wherein a yarn that has been pushed into a knitting needle (6) is guided by the guide plate (1) up to a position immediately before a knitting point (5).

2. The apparatus according to claim 1, wherein a projected portion (15) is formed at a lower side portion of the guide plate (1), and a height of projection of the projected portion in a rear face direction is gradually increased in a yarn feed direction.
3. The apparatus according to claim 1 or 2, wherein a perpendicular portion (12) at a side portion of the guide plate (1) is situated where a latch (8) of a knitting needle (6) is positioned when starting to close.
4. The apparatus according to any one of claims 1 to 3, wherein a bottom portion of the guide plate (1) is formed as an inclined portion (13) that is inclined downward toward a leading end thereof.
5. The apparatus according to any one of claims 1 to 4, wherein the guide plate (1) has a shape that does not prevent a latch of the knitting needle (6) from being opened in a lifting portion (71) where the knitting needle (6) and the guide plate (1) are positioned close to each other.
6. The apparatus according to any one of claims 1 to 5, wherein the guide plate (1) and the yarn guide apparatus main body (3) are integrally formed.

7. The apparatus according to any one of claims 1 to 5, wherein the guide plate (1) and the yarn guide apparatus main body (3) can be freely detachable from each other via a fixing member (18).

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8. The apparatus according to any one of claims 1 to 7, wherein an upper edge curved face (17) of the projected portion (15) of the guide plate (1) is formed such that the projected portion (15) has a width that is increased toward the yarn outlet (4).

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FIG. 1

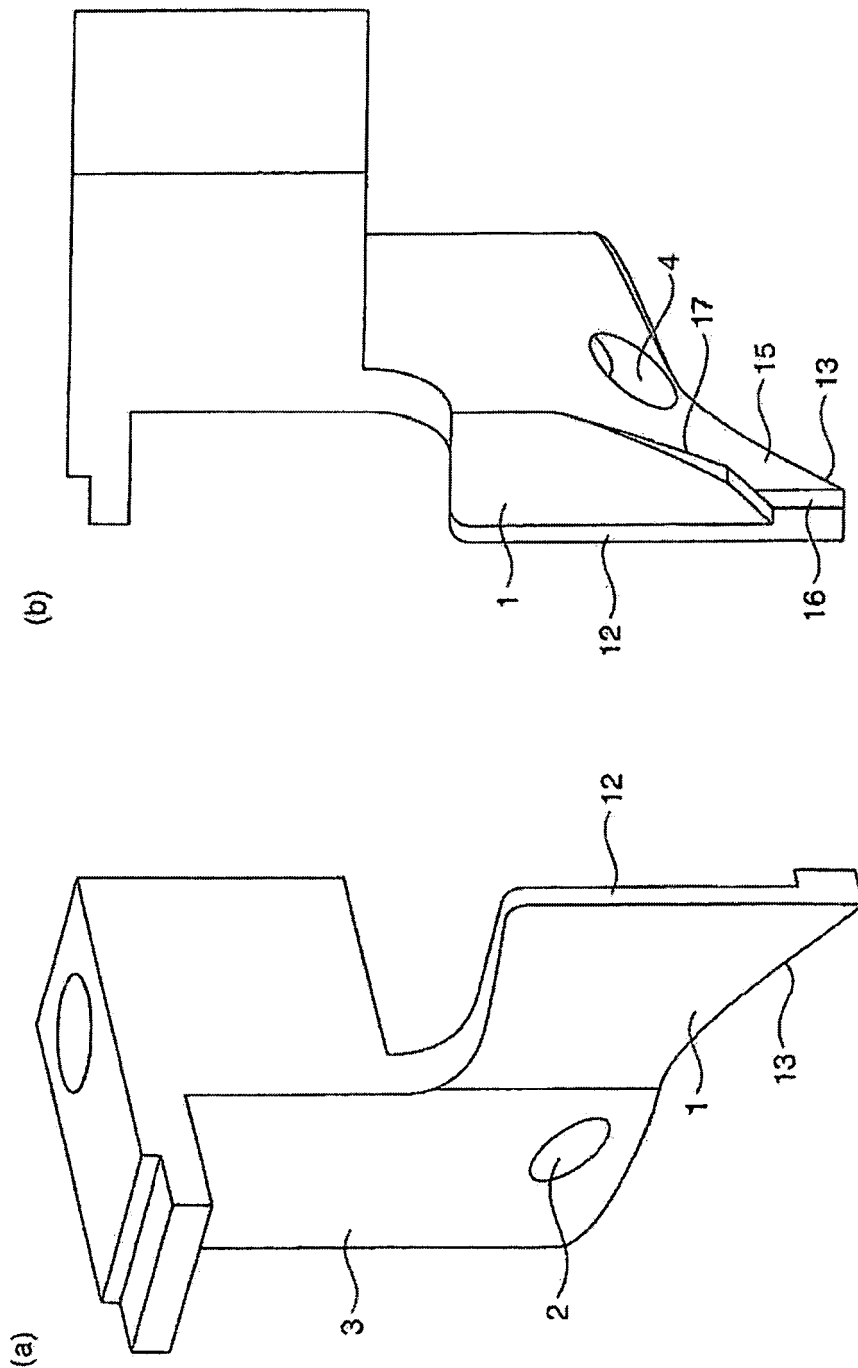


FIG. 2

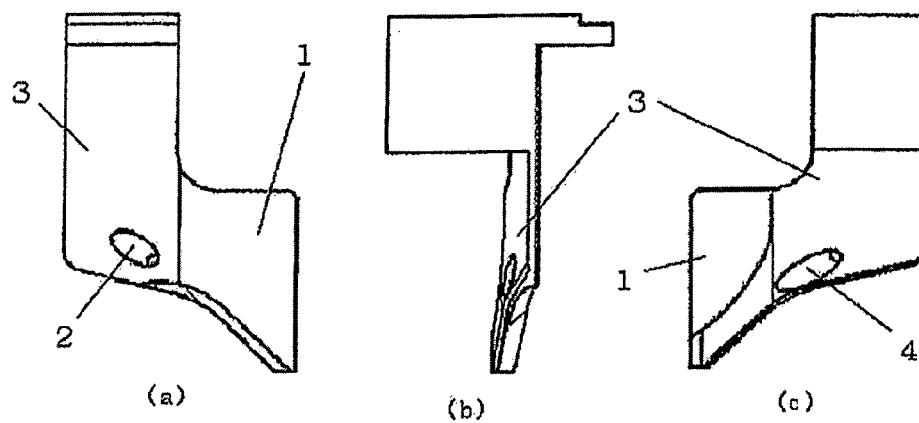


FIG. 3

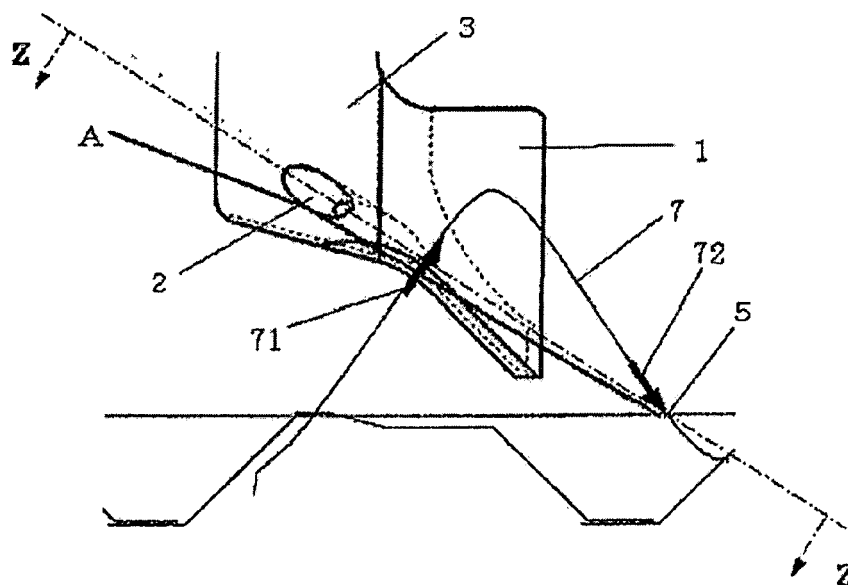


FIG. 4

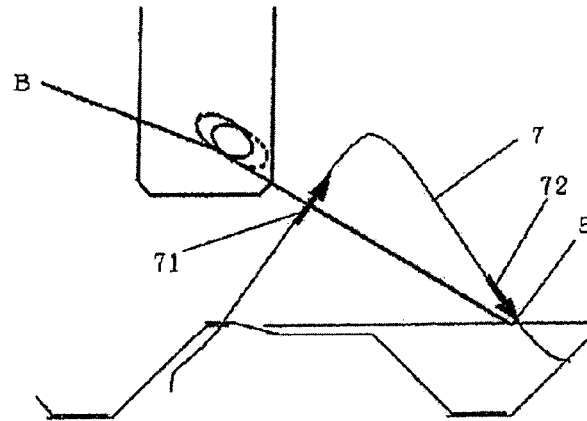


FIG. 5

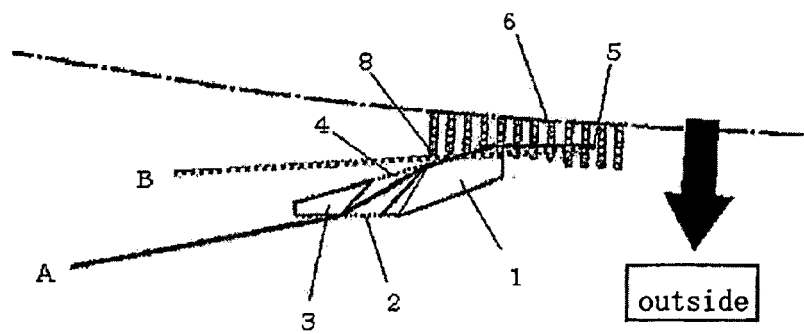


FIG. 6

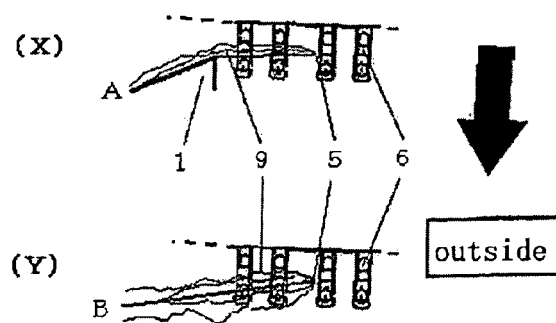
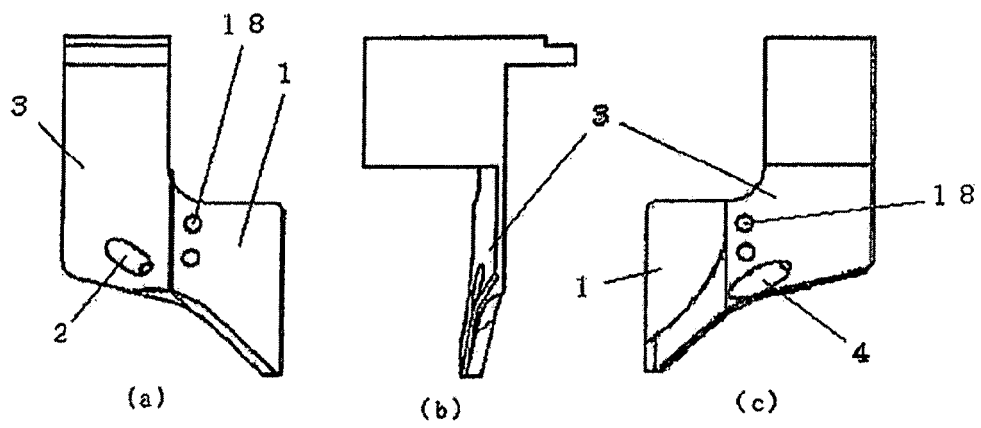


FIG. 7





EUROPEAN SEARCH REPORT

Application Number
EP 11 00 7091

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 February 2012	Examiner Zirkler, Stefanie
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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