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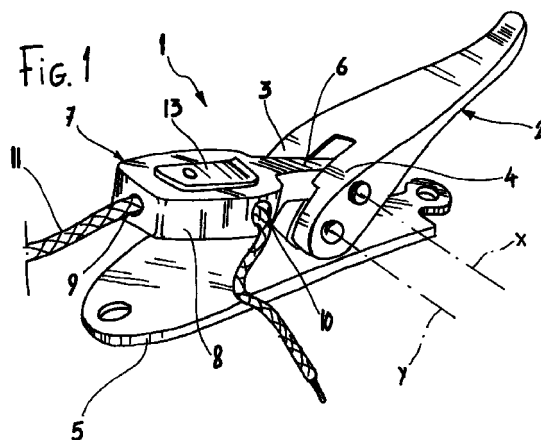
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(54) **Device for tensioning lace fastenings, in particular for a sport shoe**

(57) A tensioning device (1) for lace fastenings, particularly for sports shoes, is described, comprising a lever (2) associated with the lace fastening for tensioning the latter, and with which there is in turn associated a lace-constricting device (7). The lace-constricting device is capable of engaging at least one end of the lace (11) for retaining the latter in a first state of tension of the fastening, while the final state of tension is obtained by the action of the lever (2).



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Description

[0001] The present invention relates to a device for tensioning lace fastenings, in particular for sports shoes, according to the preamble of the main claim.

[0002] In the field of sports shoes, it is known to produce lace fastenings in which levers are used as means for tensioning the fastening.

[0003] A fastening of this type is described in US Patent No. 4,999,889 in the name of Le Couturer, in which a lever provided with a plurality of recesses regularly spaced from its fulcrum is associated with a sports shoe with lace fastening. According to the teaching proposed by the patent cited, the lace is engaged in one of the said recesses and tensioned by the action of the lever, the degree of tension obtained being greater, the further the recess engaged by the lace is distanced from the fulcrum.

[0004] The lace fastening described with reference to the prior art cited has numerous drawbacks, however, including the limited possibility of tensioning the lace without having recourse to excessively long levers.

[0005] Further drawbacks encountered are the impossibility of effecting continuous variation of the tension of the lace and the inconvenience of use connected with the insertion of the lace in the recesses of the lever.

[0006] The problem underlying the present invention is that of producing a device for tensioning lace fastenings which is structurally and functionally designed to overcome the limitations described above with reference to the prior art cited.

[0007] This problem is solved by the present invention by means of a tensioning device produced according to the claims which follow.

[0008] The characteristics and advantages of the invention will become clear from the detailed description of one of its preferred embodiments, illustrated by way of non-limiting example with reference to the appended drawings, in which:

Fig. 1 shows a perspective view of a tensioning device for lace fastenings which is produced according to the present invention,

Figs. 2 and 3 show, respectively, a view in side elevation and a plan view of the device in Fig. 1,

Fig. 4 shows a view in section along the plane IV-IV of a detail of Fig. 2,

Fig. 5 shows a view in section along the plane V-V of a detail of Fig. 3,

Fig. 6 shows a sports shoe equipped with the tensioning device in Fig. 1,

Fig. 7 shows a perspective view from above of a first alternative embodiment of the tensioning device in Fig. 1,

Fig. 8 shows a view in side elevation, partly in section, of the tensioning device in Fig. 7,

Fig. 9 shows a perspective view of a shoe equipped with the device in Fig. 7,

Fig. 10 shows a perspective view from above of a second alternative embodiment of the tensioning device in Fig. 1,

Fig. 11 shows a view in side elevation, partly in section, of the tensioning device in Fig. 10.

[0009] In the drawings, 1 indicates as a whole a device for tensioning a lace fastening, produced according to the present invention.

[0010] The tensioning device 1 comprises a lever 2 provided with two arms 3 and 4, the free ends of which are hinged on a base 5.

[0011] A tie-bar 6 is received between the arms 3 and 4 and is articulated in an intermediate position of the arms, so as to be able to pivot about an articulation axis X substantially parallel to and spaced from the hinge axis Y of the lever 2.

[0012] The tensioning device 1 further comprises a lace-constricting device 7, of conventional type *per se*, produced in one piece with the tie-bar 6. The lace-constricting device 7 in its turn includes a tubular body 8 of substantially conical shape defining an inclined surface 8a and on which, in turn, are defined a first and a second lace passage opening, respectively indicated by 9 and 10, arranged for the passage of one of the ends of a lace 11.

[0013] The lace-constricting device 7 is equipped with locking means 12 for checking the lace 11 jointly with the tubular body 8, and with release means 13 for unlocking the lace 11, allowing it to slide relatively in both directions inside the tubular body 8. The locking means 12 comprise a locking member 14 and resilient means 15 associated therewith. The resilient means 15 are mounted inside the tubular body 8 so as to extend in the direction of the lace passage opening 9 starting from a retaining recess 16 provided in the tubular body 8 on the opposite side from the opening 9. The locking member 14 is associated, for example by way of a form-fit coupling, with the free end of the resilient means 15 and is further linked to guide means 17 which define and limit its travel. The guide means 17 have a structure which is conventional *per se* and may, for example, comprise a pin 18 passing through the lace-constricting device 7 and slidably engaged in a groove 19 provided therein. The groove 19 is provided parallel to the direction Z defined by the direction of extension of the resilient means 15.

[0014] With reference to Figure 6, the tensioning device 1 is mounted on a sports shoe, indicated as a whole by 20, provided with a vamp 21 and a lace fastening 22. The lace fastening 22 comprises the lace 11, the ends of which are identified by 23 and 24, and a plurality of return means 25, for example holes or eyelets, provided on opposed edges 26 and 27 of the vamp 21.

[0015] The lace 11 is engaged in alternating succession in the return means 25, according to a lacing system which is conventional *per se*, in order to bring together the edges 26 and 27 when the lace 11 is ten-

sioned.

[0016] To the free tip of the end 23 of the lace 11 is fitted a stop 28, which prevents it from unthreading from the terminal return means 25a. The end 24, however, is threaded into the lace-constricting device 7 through the lace passage opening 9. In order to facilitate the insertion operation, the release means 13 are acted on so as to displace the locking member 14, by means of the pin 18, along the groove 19 in the direction of the recess 16, contracting the resilient means 15. As soon as the end 24 of the lace 11 has emerged from the opening 10, the lace 11 can be tensioned by grasping the end 24 and exerting a first tension on it. In the meantime, the release means 13 are released, so that the locking member 14 is forced against the lace 11 by the resilient means 15. In this position the locking means 12 do not prevent the advance of the lace 11 along the lace-constricting device 7 since a component of the tensile force acts on the resilient means 15, causing them to contract partially in the direction Z. Once a first desired degree of tension has been imparted to the lace 11, the end 24 is released while the locking means 12 prevent it from unthreading by retaining the lace 11 in the position reached. In this case, in fact, the force exerted by the lace 11 on the locking member 14 has a component concordant with the direction Z of extension of the resilient means 15, thus increasing the action of retaining the lace 11 against the inner wall of the tubular body 8.

[0017] The final clamping of the fastening 22 is obtained by pivoting the lever 2 on the base 5 in the customary manner for the closure of a lever fastening.

[0018] To loosen the fastening 22, it is sufficient to pivot the lever 2 from the base 5, obtaining a first degree of release of the tension of the lace 11. If it is desired to loosen the shoe further to slip the foot out of it, or even to unthread all or part of the lace 11, the release means 13 will be acted on so as to unlock the end 24 and allow it to slide with respect to the lace-constricting device 7.

[0019] A first alternative embodiment of the present invention is shown in Fig. 7, in which the same reference numbers correspond to similar details of the example described previously. According to this alternative, the lace-constricting device 7 is mounted on the base 5 in a position such as to be received between the arms 3 and 4 of the lever 2 when the latter is pivoted into the closure position. On the lever 2 there is further provided a plurality of recesses, all indicated by 2a, substantially parallel to the hinge axis Y, to receive the lace 11 at an intermediate portion thereof. According to this alternative, the end 24 of the lace 11, before being threaded into the lace passage opening 9, is conveniently inserted into one of the recesses 2a of the lever 2 and led in engagement in one of the return means 25 placed on the opposite edge 27 of the vamp 21 from that on which the tensioning device 1 is arranged (Figure 9). As in the example described previously, the first degree of tension is obtained by pulling the end 24 through the lace-constricting device 7, and the final

clamping by pivoting the lever 2 into the closure position, the difference consisting in the fact that the lever 2 acts in tension directly on the lace 11 without the intervention of the lace-constricting device 7. Furthermore, the plurality of recesses 2a advantageously provides a further degree of adjustment of the final tensioning of the lace 11.

[0020] A second variant of the present invention, shown in Figures 10 and 11, reassumes the characteristics of the previous example, with the difference that the lace-constricting device 7 is mounted on the base 5 in a position alongside the lever 2, so as to make the design thereof independent by freeing both from the need for the form-fit coupling. Also in this case, details analogous to the examples already described are indicated in the drawings with the same reference numbers.

[0021] The tensioning device of the present invention therefore overcomes the limitations encountered with reference to the prior art cited, at the same time offering numerous advantages, including a greater possibility of tensioning of the lace, since, besides the manual action, benefit is also obtained from the action of the lever.

[0022] A second advantage consists in the versatility of the invention which lends itself to differently configured applications on sports shoes provided with lace fastenings, for example the lace-constricting device may be intended to receive both ends of the lace, or the sports shoe may be provided with a tensioning device for each end of the lace.

[0023] A third advantage consists in that a fastening designed in this manner can be partially loosened by acting only on the lever without unlocking the lace-constricting device, thus maintaining the "memory" of the desired final fastening tension.

Claims

1. A tensioning device (1) for lace fastenings (22), particularly for sports shoes, comprising a lever (2) associated with said lace fastening for tensioning said lace (11), characterized in that it comprises a lace-constricting device (7) capable of engaging at least one end (24) of said lace (11) to retain said lace in a first state of tension, said lever (2) being associated with said lace-constricting device (7) in order to bring said lace (11) into a final state of tension.
2. A tensioning device according to claim 1, wherein said lace-constricting device (7) is articulated on said lever (2).
3. A tensioning device according to claim 2, wherein said lever (2) comprises a tie-bar (6) articulated in an intermediate position of said lever (2) and said lace-constricting device (7) is associated with said tie-bar (6).

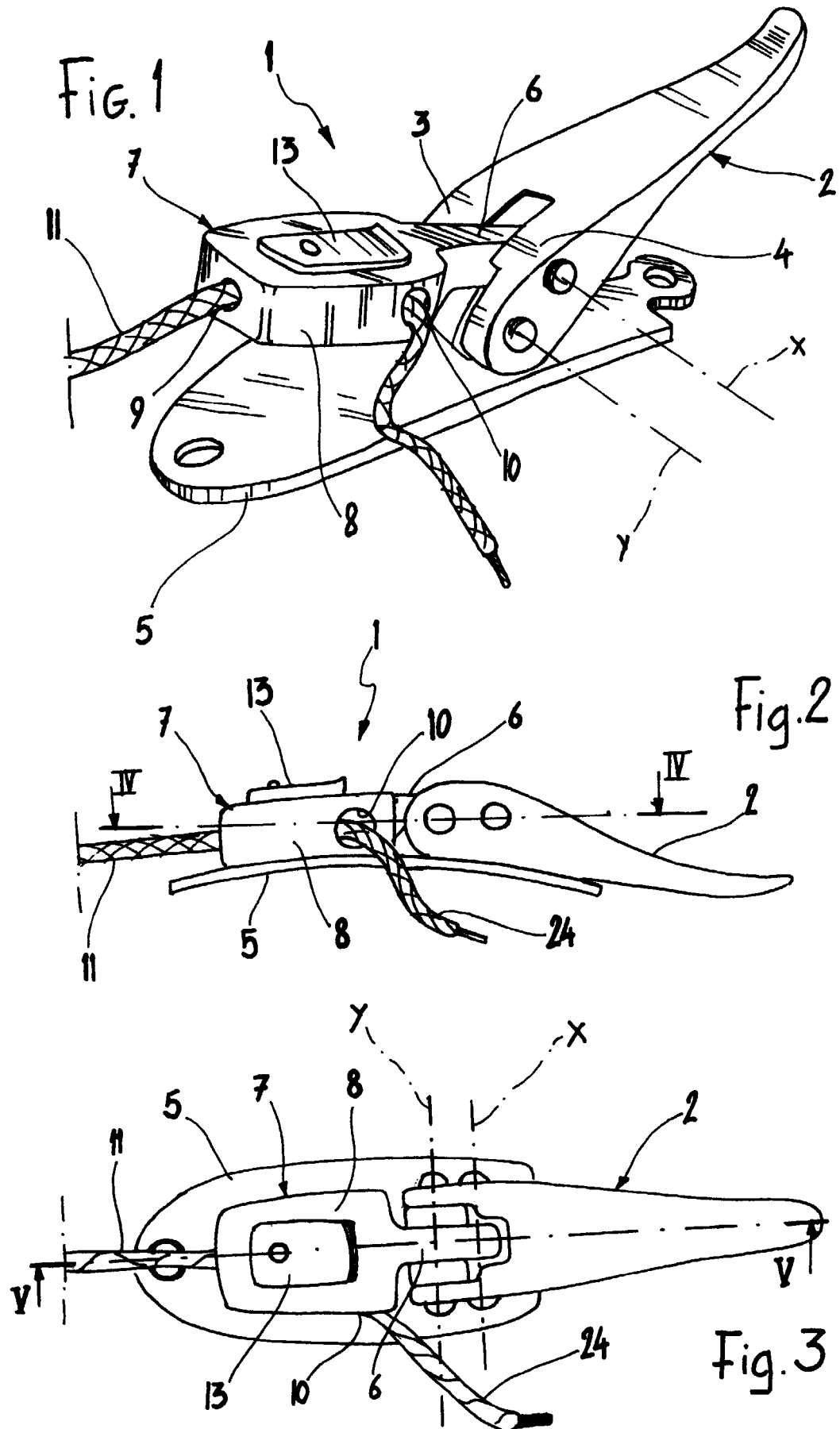
4. A tensioning device according to claim 3, wherein said lace-constricting device (7) is produced in one piece with said tie-bar (6).
5. A tensioning device according to claim 1, wherein said lever (2) is hinged to a base (5) and said lace-constricting device (7) is mounted on said base (5) to constitute an anchorage point for said at least one end (24) of said lace (11). 5
6. A tensioning device according to claim 5, wherein said lever (2) has at least one recess (2a) for receiving said lace (11) in an intermediate portion thereof. 10
7. A tensioning device according to one of the preceding claims, wherein said lace-constricting device (7) comprises a tubular body (8), constituting said tie-bar (6), provided with at least one opening (9) for receiving at least one end (24) of said lace (11) and means for locking (12) said at least one lace end in said tubular body (8) for firmly retaining said at least one end (24) within said tubular body. 15 20
8. A tensioning device according to claim 7, wherein on said tubular body (8) there is defined an inclined surface (8a) tapering towards said at least one opening (9) and said locking means (12) comprise a locking member (14) slidable within said tubular body in proximity to said inclined surface (8a) and resilient means (15) urging said locking member (14) towards said at least one opening (9) of said tubular body. 25 30
9. A sports shoe, comprising a lace fastening (22) and a device (1) for tensioning the latter according to one or more of the preceding claims. 35

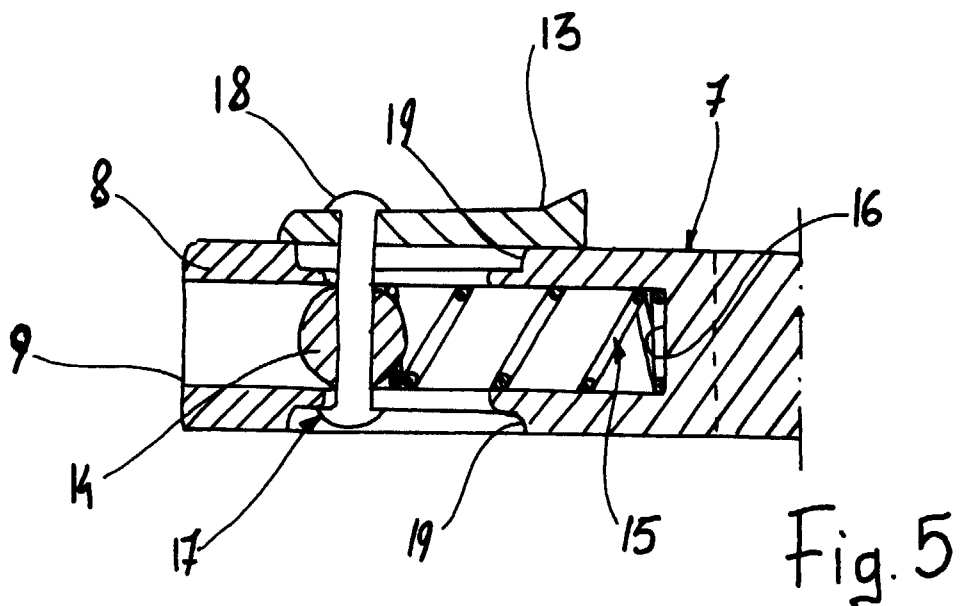
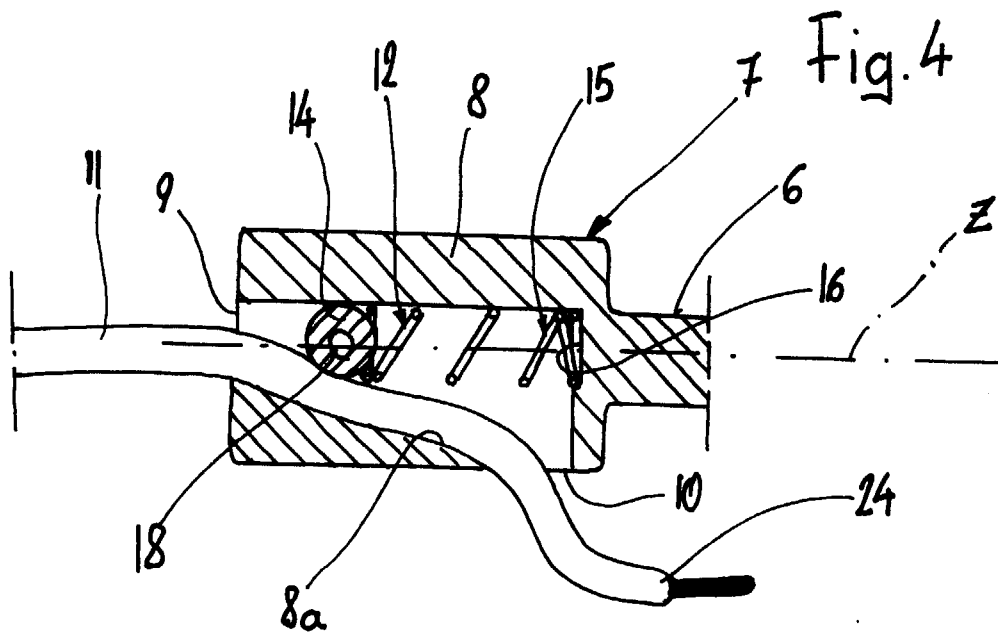
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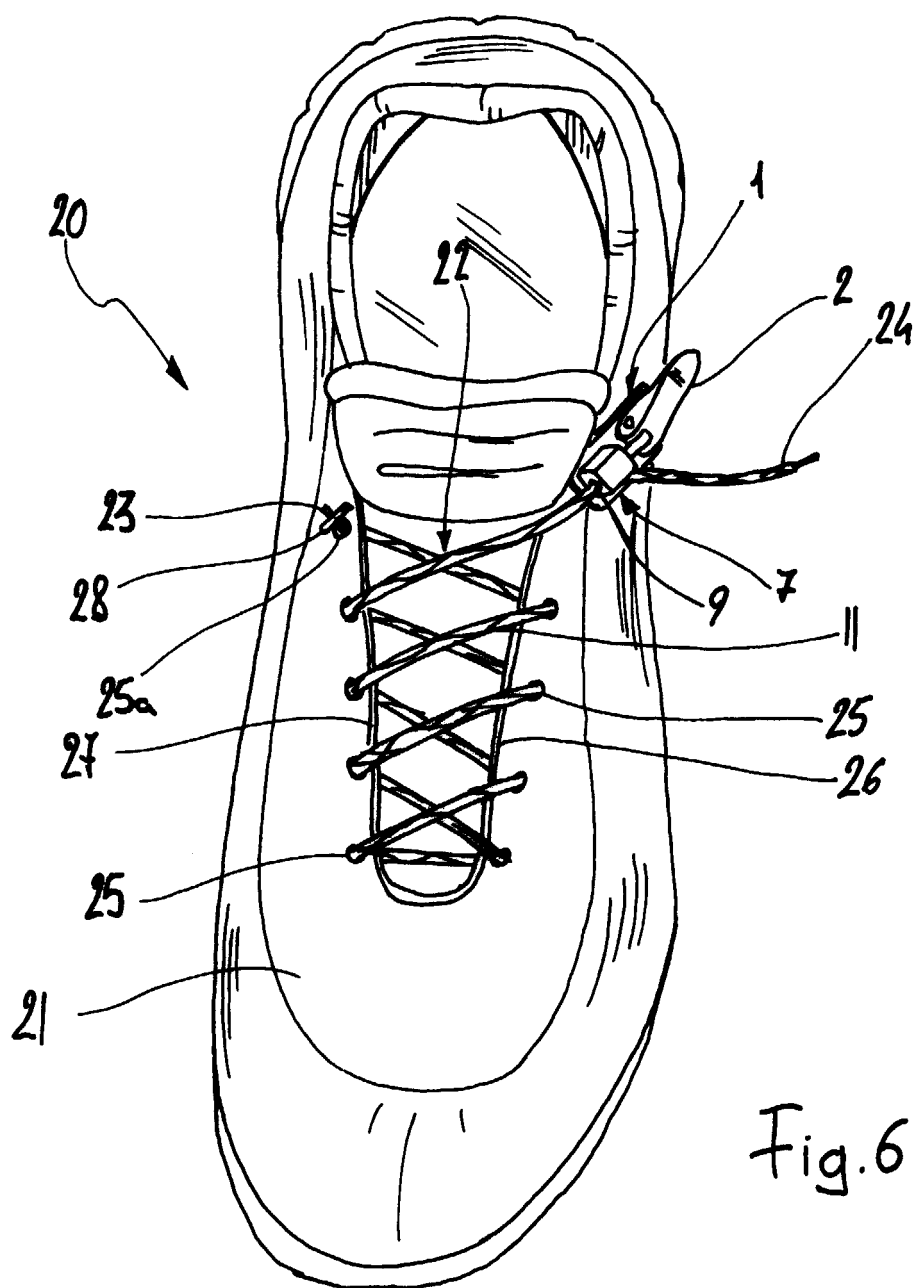
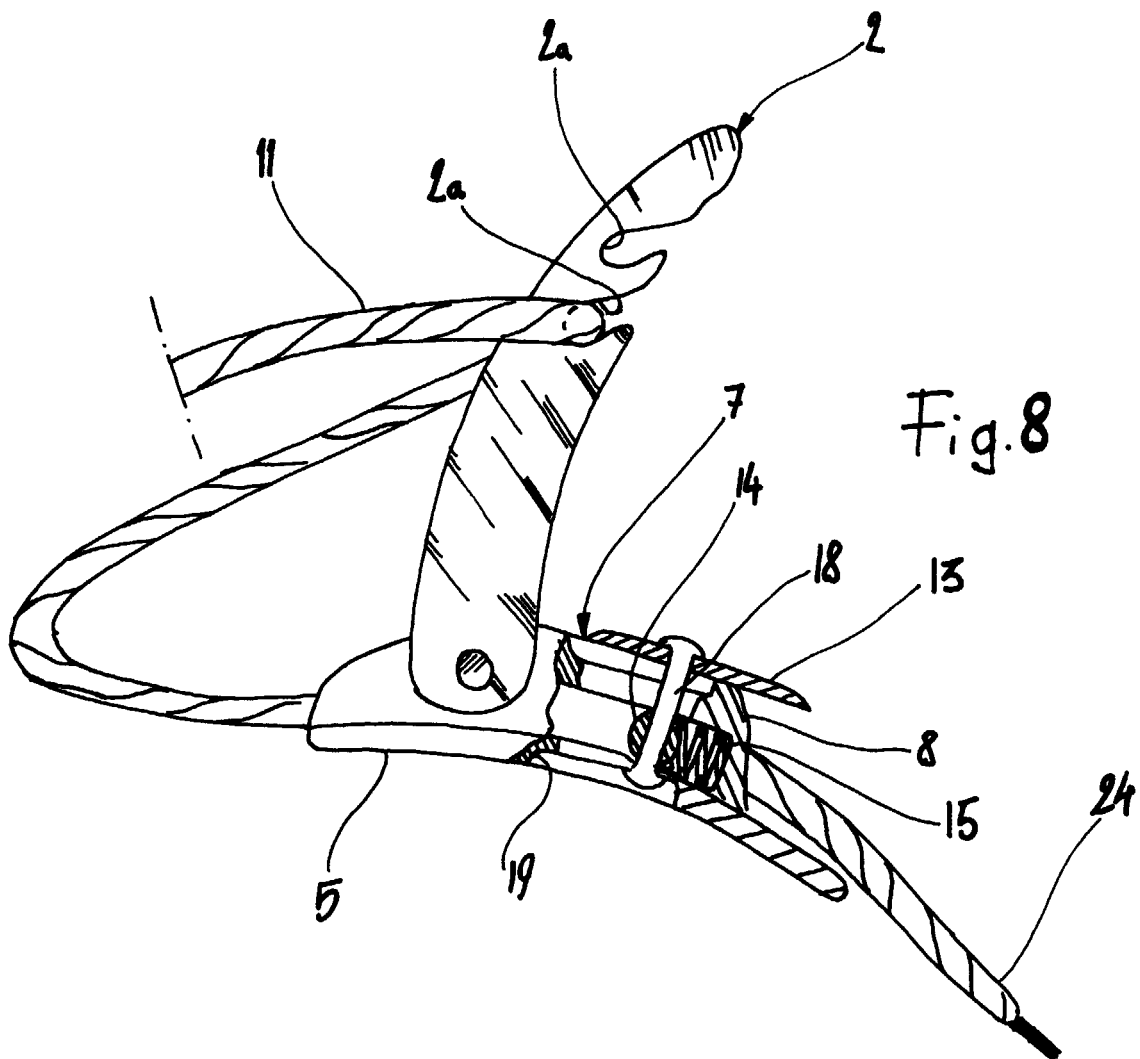
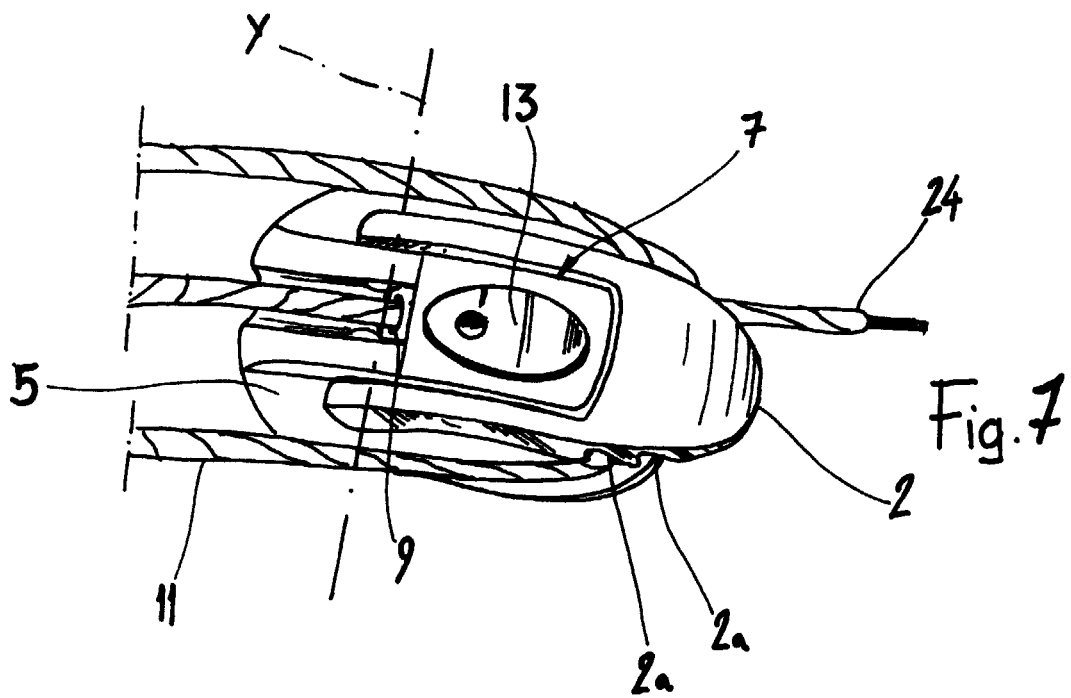


Fig. 6



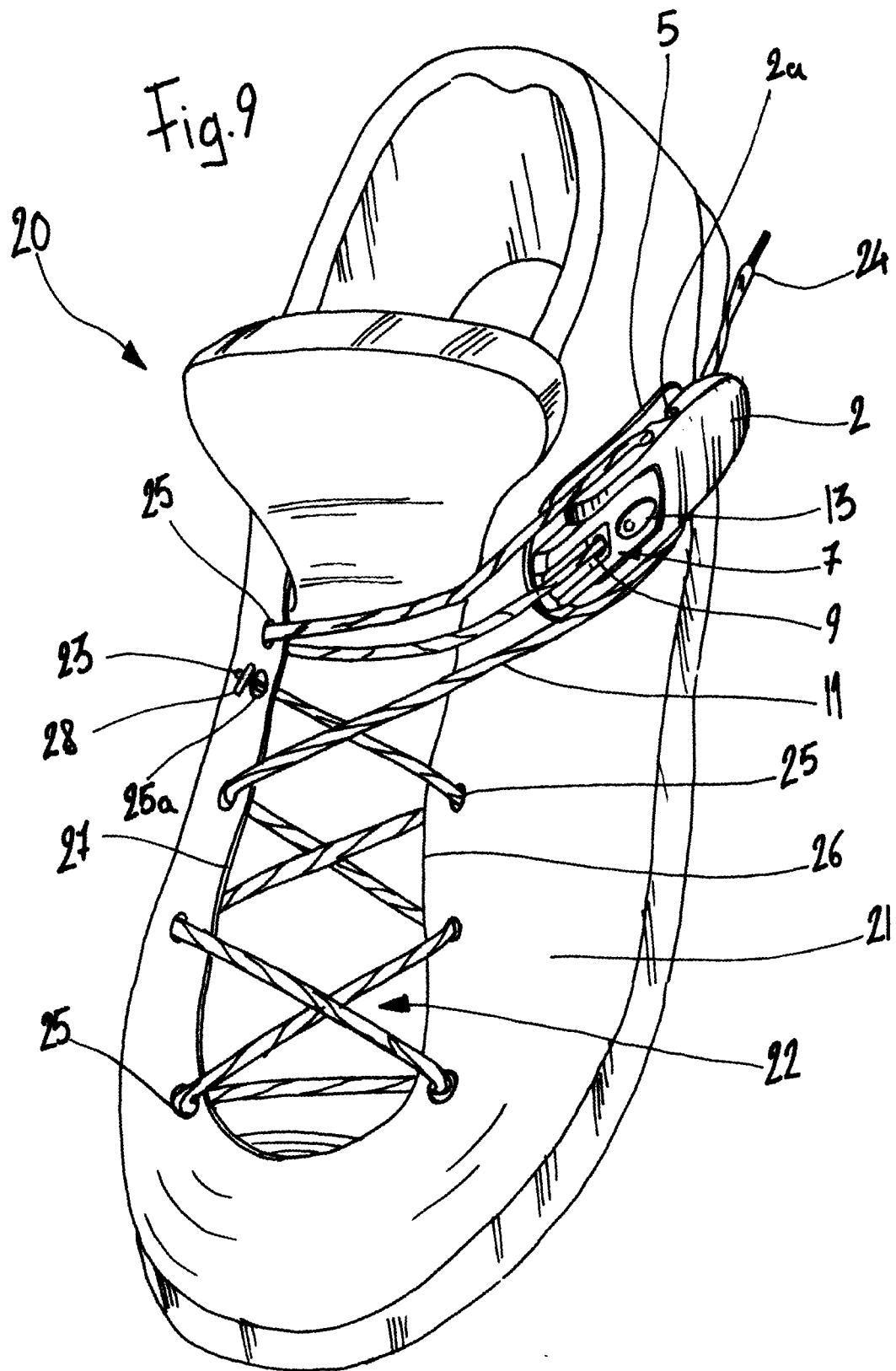


Fig.10

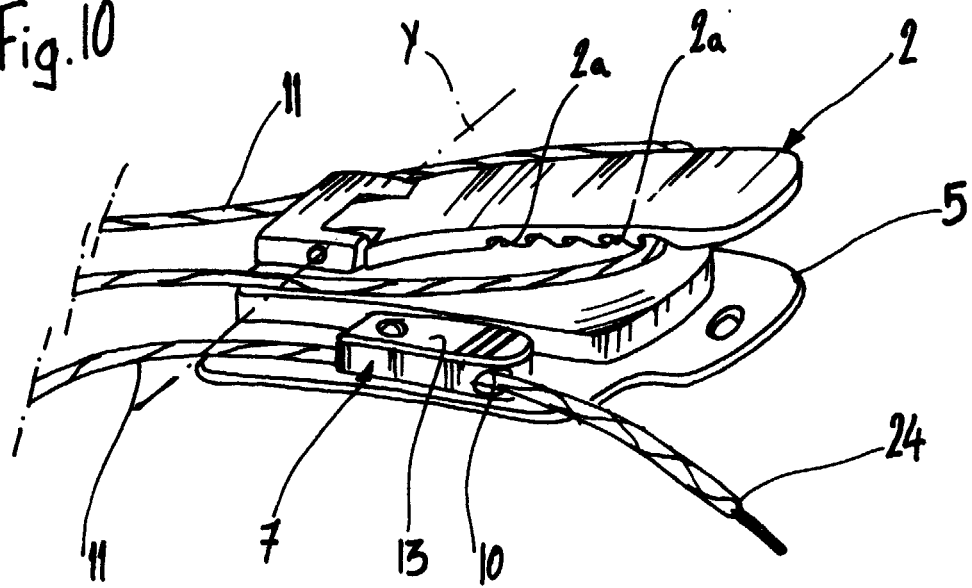
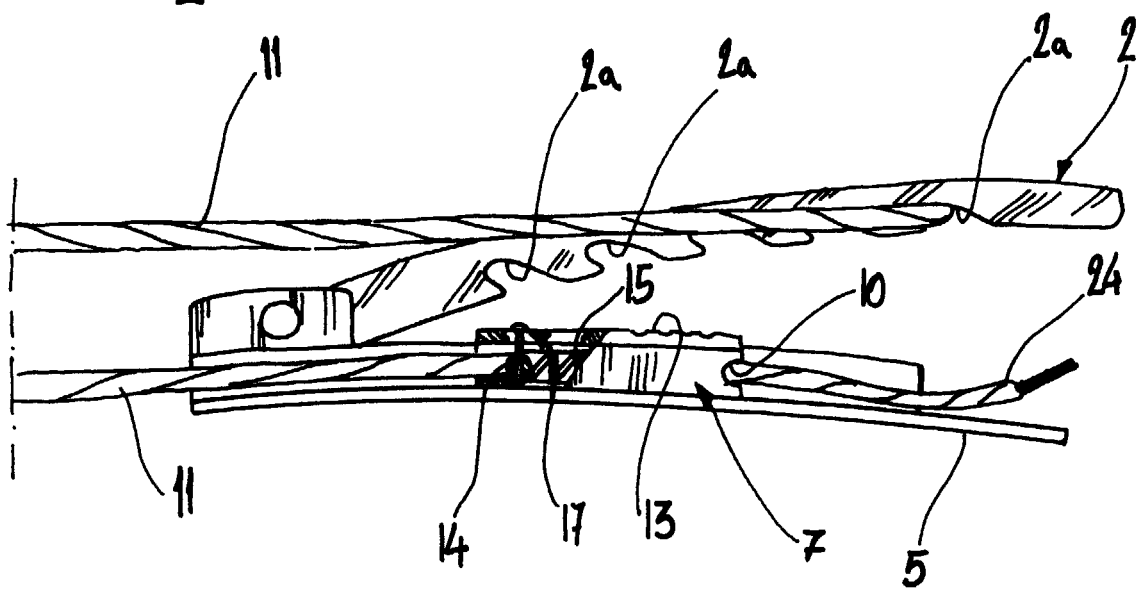


Fig.11





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EUROPEAN SEARCH REPORT

Application Number
EP 00 10 3849

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 September 2000	Examiner Claudel, B
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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