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## (54) Adjustable arch support, particularly for ski boots.

(57) An adjustable arch support for ski boots including a shell having a shim (3); the arch support includes a support member (2) associated with the shim and arranged at the plantar arch region of the foot; a screw acting on a wedge is provided for lifting the support member; the screw has a head external to the shell for being actuated by the user.

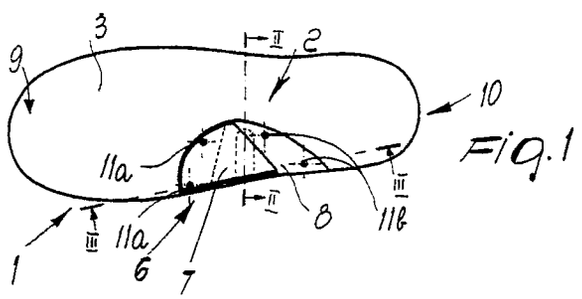


Fig. 1

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# ADJUSTABLE ARCH SUPPORT, PARTICULARLY FOR SKI BOOTS

The present application relates to an adjustable arch support, particularly usable in ski boots.

U.S. patent no. 1,694,582 discloses an adjustable support member for the plantar arch which however has a double disadvantage: first of all adjustment is possible only once the foot has been removed and secondly this adjustment is not sufficient to achieve the best support depending on the configuration of the foot of the various users.

U.S. patent, no. 1,904,789 also discloses an adjustable support for the plantar arch which also has some disadvantages: first of all the adjustment leads to the lifting of the support which, since it has a rigid configuration, cannot allow optimum control of the its placement at the plantar arch region.

Secondly, it is not possible to optimally adapt the placement of the support according to the various configurations of the foot.

U.S. patent no. 2,075,942, shows a partial solution to these disadvantages; in said patent, the plantar arch support is slidable with respect to the shim with which it is associated, providing said shim, however, has its own disadvantages, it is in fact not possible to achieve correct anatomical adaptation according to the various configurations of the feet of the users, which can have, besides a different placement of the plantar arch in the foot longitudinal direction, also a different depth thereof.

U.S. patent, no. 2,113,898 discloses an adjustable plantar arch support which also has some disadvantages: first of all it can be adjusted only once the foot has been removed, and secondly the adjustment is performed by moving the support with respect to the shim, with the disadvantages mentioned above for the other solutions.

U.S. patent, no. 4,731,940, discloses an adjustable means for the plantar arch of the foot which comprises an element (shaped complementarily to the plantar arch of a foot) which is slidable at least at three points with respect to an underlying shim.

This solution has considerable disadvantages, given by the fact that the support slides at the shim along three preset axes entailing friction during adjustment, an uncertain stability of the support, possible jammings of said support with respect to the shim during the adjustment step, and difficulty in manufacture and industrialization of the components.

Finally, U.S. patent, no. 4,166,329 relates to an adjustable support for the plantar arch of shoes which comprises a lever adjustable by acting on a screw placed between the inner sole and the sole of the shoe.

Upon a rotation of the screw in the unscrewing direction with respect to a threaded sleeve, the lever is caused to raise the plantar arch support.

Said solution, however, has considerable disadvantages, the main one being that when the lever is activated, the screw protrudes from its seat, with possible consequent risks of impact and breakages thereof or of damage to the points against which said screw makes contact.

Furthermore, an unfavourable lever requires a considerable effort for the adjustment.

The configuration of the lever is furthermore such as to be subject to very high stresses when the foot is inserted, and can lead to the breakage thereof or to twisting of the stem of the screw.

The aim of the present invention is to eliminate the disadvantages described above in known types by providing an adjustable support which allows to achieve, in a rapid and easy manner, optimum fit at the plantar arch region.

Within the scope of the above described aim, an important object is to provide a device that can be adjusted by the user even if the foot is inserted, and adapted to keep its own shape unchanged despite being subjected to the user's weight.

Another important object is to provide an adjustable support which adapts, in an anatomically correct manner, to the various configurations of the foot at the plantar arch region, limiting as much as possible any transverse movements of the foot while skiing.

Another object is to provide a structurally simple support, free from friction or jammings which complicate its activation.

Another object is to provide an invention which can be easily produced from an industrial point of view.

Not least object is to provide an adjustable support which associates with the preceding characteristics that of having low production costs.

The above mentioned aim and objects, as well as others which will become apparent hereinafter, are achieved by an adjustable arch support, particularly for ski boots, comprising a shell having a shim, characterized in that it comprises a support member associated with said shim and arranged at the plantar arch region of the foot, means being provided for lifting said support members relatively to said shim, said means being actuated by a user from outside said ski boot.

Further characteristics and advantages of the invention will become apparent from the detailed description of some particular embodiments, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a top view of the adjustable support applied to the shim or insole;

figure 2 is a sectional view according to the line II-II of figure 1;
figure 3 is a sectional side view, according to the line III-III of figure 1;
figures 4, 5, 6 and 7 are top views of respective further embodiments of the support, according to the invention;
figure 8 is a sectional view, according to the line VIII-VIII of figure 7;
figure 9 is a sectional view according to the line IX-IX of figure 6;
figure 10 is a partial sectional view, according to a transverse axis with respect to the boot, of an adjustable support according to a further aspect of the invention;
figure 11 shows, in a detail view, similar to the preceding one, a further embodiment of the support member;
figure 12 is a partial sectional view, according to a transverse axis with respect to the boot, of a still further embodiment of the invention.

With particular reference to figures 1-3, the adjustable arch support, generally indicated by the reference numeral 1, comprises at least one resilient support member 2 associated with a shim or insole 3 which is arranged at an adapted seat 4 provided in the sole 5 of a ski boot.

The resilient support member 2 is arranged at the region 6 of the plantar arch of the foot and comprises a first flap 7 and a second flap 8; the ends of said flaps, respectively directed toward the tip 9 and toward the heel 10 of the shim 3, are associated with said shim by means of adapted protrusions 11a and 11b which can be inserted snap-together in said shim; alternatively, these first and second deformable flaps can be for example riveted to the shim or fastened thereto with other known systems.

Said first and second flaps furthermore have ends which can mutually overlap at the region 6.

Means are furthermore provided adapted to lift the resilient support member with respect to the plane of arrangement of the shim 3 at the plantar arch region 6. Said means advantageously comprises a screw 12 which is freely pivoted, at its ends, to said sole and shell and is connected, at one of said ends which protrudes from said sole 5, to a lever member which can be actuated by the skier.

A complementarily threaded first wedge member 14 is associated with the threaded stem 13 of the screw 12; the vertex of said wedge member is directed toward the inner lateral surface 15 of the sole 5 which faces the resilient support member 2.

When sliding according to a plane which is approximately parallel to the resting plane of the sole 5, said first wedge member 14 interacts with a second wedge member 16 associated below the first flap 7 at the region of overlap on the second flap 8.

The screw 12 is thus arranged approximately transversely to the shim 3 at the plantar arch region 6.

The operation of the arch support is therefore as follows: upon the actuation of the screw 12, the first wedge member 14 is caused to slide, for example toward the facing inner lateral surface 15 of the sole 5, and in cooperation with the second wedge member 16, lifts the first flap 7 and the second flap 8 at the respective mutually overlapping ends.

By virtue of the elastic deformation of the support member, the anatomical adaptation to the sole of the foot, is improved, also because the point of maximum deformation coincides with the point of maximum camber of the plantar arch.

When lifting, the first and second flaps mutually slide at the partially overlapping ends, and this reduces friction during adjustment and provides greater stability.

Possible defects, such as jamming during adjustment, are also eliminated.

It has thus been observed that the adjustable support, according to the invention, has achieved the intended aim and objects, achieving, in a rapid and easy manner, an optimum adaptation of the foot at the plantar arch region, said adaptation being assuredly anatomically correct by virtue of the elastic deformation which can be obtained at the first flap 7 and at the second flap 8.

The arch support according to the invention is furthermore constructively very simple and therefore easy to produce industrially.

Adjusting the first and second flaps with respect to the foot plantar arch is very simple and can be performed directly by the skier while the foot is inserted in the boot by acting on an adapted lever member or other tool connected to the screw 12.

Figure 4 illustrates a second embodiment of the resilient support member 102 which comprises multiple flap member 107 having a plurality of depressions 117 which extend radially starting from a perimetric edge 118 of the flap member 107. The flap member 107 is associated with the shim 103.

Figure 5 illustrates a further embodiment of the resilient support member 202 which again comprises a multiple flap member 207 having a series of depressions 217 which are shaped so as to create a plurality of strips or single flaps 219 which can be elastically deformed during the adjustment of the means adapted to lift said flap with respect to the shim 203.

Figures 6, 9 illustrate another embodiment of the resilient support member 302 comprising a flap member 307 which has a T-shaped tab 320 pro-

truding directly from the shim 303 approximately at the plantar arch region 306; the wings 307a, 307b of said tab partially overlap the underlying shim 303 which has a depression 321 below the tab 320.

Figures 7, 8 illustrate still a further embodiment of the resilient support member 402 comprising a flap member which is monolithically integral with the shim 403 and extends approximately transversely thereto at the plantar arch region 406.

Said flap member 407 is arranged approximately at the same plane as the upper surface 422 of the shim 403, and a depression 421 which is smaller than the flap member 407 is provided on said shim 403 at said flap member 407.

The depression 421 thus defines two smaller flaps 421a and 421b on the shim 403; the flap member 407 being adapted to overlap, at least partially, the smaller flaps 421a, 421b.

Figures 10,11 show an adjustable arch support 501 according to a further aspect of the invention, for a ski boot having a shell 502 and a shim, or insole 503, arranged in the shell.

A rigid support member 504 is arranged at the plantar arch region 505; said element comprises a body 506 which is provided downward with a first curved end 507 and upward with a planar or curved support plane, for example for an inner shoe, at the region 505.

Said plane 508 may have a second end 509 which is directed in the opposite direction with respect to the inner surface 510 of the shell 502 and is adjacent to the facing end of the shim 503 or interacts therewith, being for example slidably associated therewith.

The first end 507 of the body 506 interacts with a complementarily shaped raised portion 511 associated with the shell 502.

The support member 504 can be moved by a screw 512 which has a head 513 which protrudes externally to the shell 502 and is rotatably associated therewith and a stem 514 which protrudes inside the shell and is adjacent to the body 306.

Said stem 514 can be internally hollow and threaded for a complementarily threaded pin 515 pivoted at one end at an adapted slot 516 provided on the body 506 according to an axis which is approximately perpendicular to the support plane of the shell 502.

Alternatively, as illustrated in figure 11, the stem 514 can be associable at a ball or cylinder 517 associated with the body 506 so that said body can rotate.

The operation of the arch support is as follows: as shown in figure 10, the skier rotates the head 513 of the screw 512, thus causing a translatory motion of the support member 504 along an axis which is transverse to the shell; said support member is simultaneously subjected to a vertical movement with respect to the support plane of said shell by virtue of the configuration of the first end 507 and of the raised portion 511.

A translatory motion of the support member 504 with respect to the shell is thus achieved which causes said support member to rise and simultaneously move toward the deeper portion of the plantar arch.

Figure 12 illustrates a further embodiment of the adjustable arch support according to the invention, generally indicated by the reference numeral 601, wherein the support member 604 is arranged transversely to the shim 603 on the opposite side with respect to the plantar arch region 605.

The support member 604 comprises a wedge member 606 which has its vertex directed opposite to the region 605 and has an inclined surface 607 which is slidable at a complementarily shaped raised portion 611 provided on the shell 602.

Advantageously, the shim 603 can have an end which partially overlaps the support member 604, and said shim and said support member may be slidably associated with one another.

The movement of the support member 604 occurs by means of a slider 618 which is arranged below the shim 603 transversely to the shell 602 and has one end which interacts with the body 606 on the opposite side with respect to the side directed toward the inner lateral surface 610 of the shell 602.

The slider 618 is moved by means of a screw 612 which is freely pivoted, at its ends, to the shell 602, has its head 613 accessible to the skier and has a threaded stem 614 which passes at an adapted and complementarily threaded seat provided longitudinally to the slider 618.

By rotating the screw 612, the slider 618 is displaced and therefore also the support member 604, which is simultaneously lifted by virtue of the configuration of the surface 607 of the raised portion 611.

The materials employed and the dimensions which constitute the individual components of the adjustable arch support according to the invention may naturally be the most pertinent according to the specific requirements.

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 scope of each element identified by way of example by such reference signs.

## Claims

1. Adjustable arch support, particularly for ski boots, comprising a shell (502,602) having a shim (3,103,203,303,403,503,603), characterized in that it comprises a support member (2,102,202,302,402,504,604) associated with said shim and arranged at the plantar arch region of the foot, means (12,512,612) being provided for lifting said support member relatively to said shim, said means being actuated by a user from outside said ski boot.

2. Arch support, according to claim 1, characterized in that said support member is a resilient support member (2,102,202,302,402) comprising at least two flaps (7,8,107,207,219,307a,307b,407,421a,421b), said flaps being adapted to overlap at least partially and to slide, one upon the other, when said means for lifting said support member is actuated.

3. Arch support according to claim 2, characterized in that said resilient support member comprises a first flap (7) and a second flap (8) which have ends which mutually overlap at said plantar arch region.

4. Arch support according to claim 1, characterized in that said means for lifting said resilient support member with respect to said shim comprises a screw (12) arranged approximately transversely to said shim (3) and freely pivoted thereto and to said shell at its ends, said screw having a threaded stem with which a complementarily threaded first wedge member (14) is associated, the vertex of said wedge member being directed toward the inner lateral surface of said sole which faces the perimetric edge of said resilient support member.

5. Arch support according to claim 4, characterized in that said first wedge member slides according to a plane which is approximately parallel to a support plane of a sole of said shell and interacts with a second wedge member (16) which is downwardly associated with said resilient support member which has its vertex directed toward the opposite side.

6. Arch support according to claim 4, characterized in that said screw (12) has an end which protrudes from said shell and can be connected to a lever which can be actuated by the skier, or has a shaped head (13) which can be engaged by the skier by means of an adapted tool.

7. Arch support according to claim 2, characterized in that said support member comprises a flap member (107) having a plurality of depressions (117) which extend radially starting from the perimetric edge (118) which is directed externally to said shim (103) at an approximately median point.

8. Arch support according to claim 2, characterized in that said support member comprises a flap member (207) having a plurality of depressions (217) shaped so as to create a plurality of strips (219) which can be elastically deformed during the adjustment of said means for lifting said resilient support member from said shim (203).

9. Arch support according to claim 2, characterized in that said support member comprises a flap member (307) having a T-shaped tab (320) which protrudes from said shim (303) at said plantar arch region, said tab having wings partially overlapping the underlying shim (303), a depression (321) being provided on said shim below said tab.

10. Arch support according to claim 2, characterized in that said support member comprises a flap member (407) which is provided approximately transversely to said shim (403) at said plantar arch region and is arranged approximately at the same plane as the upper surface of said shim, a depression (421) being provided on said shim, said depression underlying said flap member and defining two smaller flaps (421a,421b), said smaller flaps being overlapped by said flap member.

11. Arch support according to claim 1, characterized in that said support member (504) comprises a body (506) which is provided downward with a first curved end (507) and upward with a curved or planar support plane (508) for supporting an inner shoe arranged inside said shell (502).

12. Arch support according to claim 11, characterized in that said support plane has a second end (509) which is adjacent and/or interacts with a facing end of said shim.

13. Arch support according to claim 11, characterized in that said first end (507) of said body interacts with a complementarily shaped raised portion (511) associated with said shell.

14. Arch support according to claim 11, characterized in that it comprises a screw (512) which has a head (513) which protrudes outward with respect to said shell (502) and is rotatably associated therewith and a stem (514) which protrudes inside said shell and is adjacent to said body (506).

15. Arch support according to claim 14, characterized in that said stem is partially internally hollow and is internally threaded for a complementarily threaded pin (515) which is pivoted, at the free end, at an adapted slot (516) provided on said body (506) according to an axis which is approximately perpendicular to the support plane of said shell.

16. Arch support according to claim 14, characterized in that said stem (514) has an externally threaded end which interacts with a complementarily threaded seat provided on a ball (517) associated with said body (506) with the possibility, for said body, of rotating with respect to an axis which is transverse thereto.

17. Arch support according to claim 1, characterized in that said support member (604) is arranged transversely to said shim (603) on the side opposite to the plantar arch region.

18. Arch support according to claim 17, characterized in that said support member comprises a wedge member (606) which has its vertex directed opposite to said plantar arch region and is provided below with an inclined surface (607) which is slidable at a complementarily shaped raised portion (611) provided on said shell (602).

19. Arch support according to claim 17, characterized in that said shim (603) has an end which partially overlaps and is slidably associable with said support member (604).

20. Arch support according to claim 17, characterized in that it comprises a slider (618) which is arranged below said shim (603) in a transverse direction with respect to said shell (602) and has one end which interacts with said body (606).

21. Arch support according to claim 20, characterized in that said slider (618) is moved by means of a screw (612) which is freely pivoted, at its ends, to said shell (602) and has a head (613) which can be operated by the skier and a threaded stem (614) which passes at an adapted and complementarily threaded seat provided longitudinally to said slider.

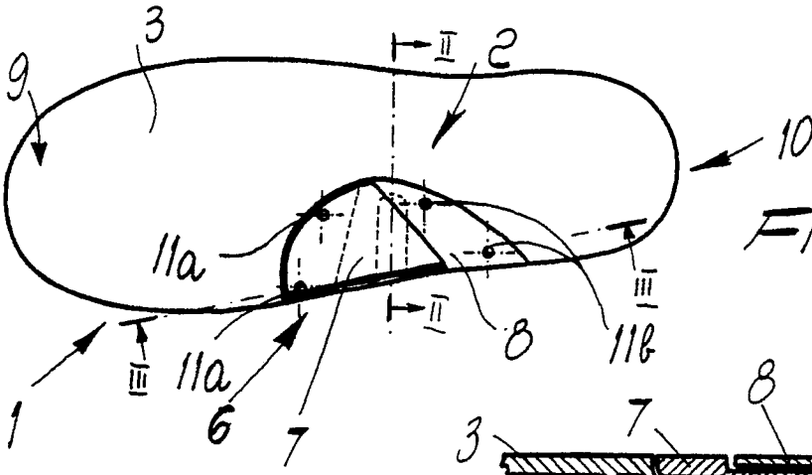


Fig.1

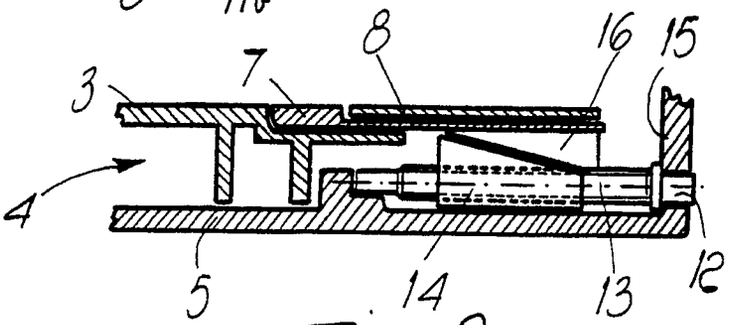


Fig.2

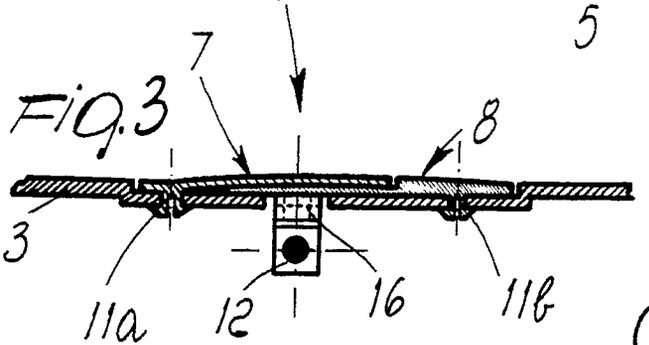


Fig.3

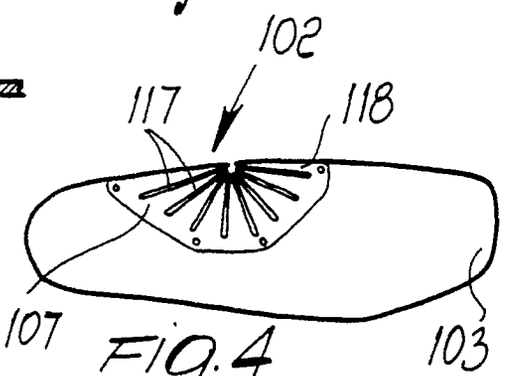


Fig.4

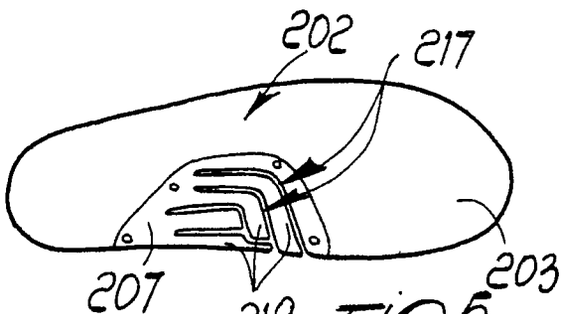


Fig.5

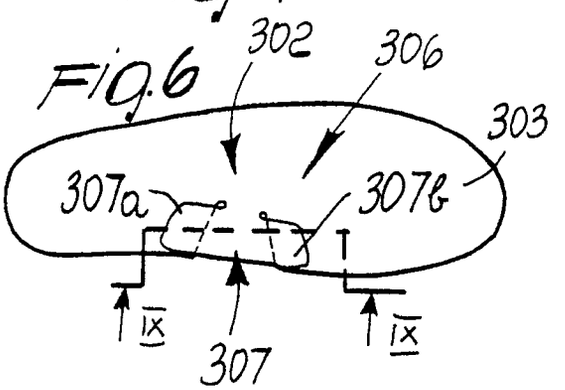


Fig.6

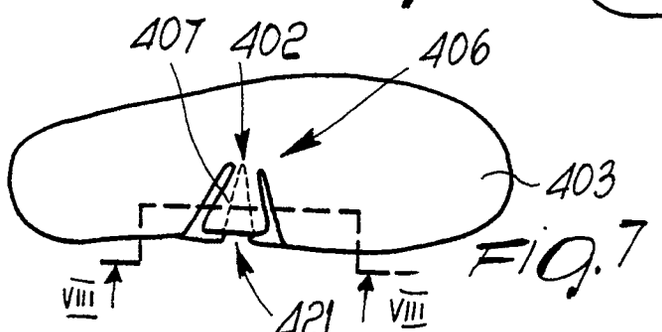


Fig.7

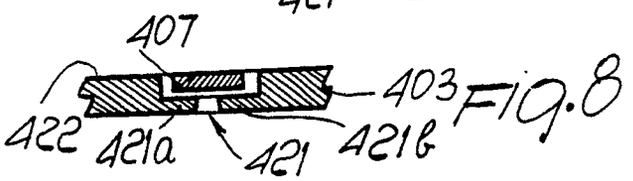


Fig.8

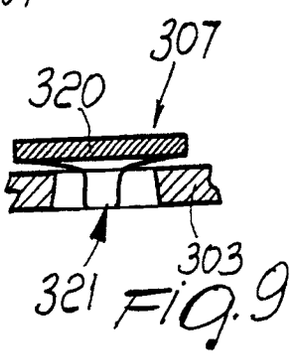


Fig.9

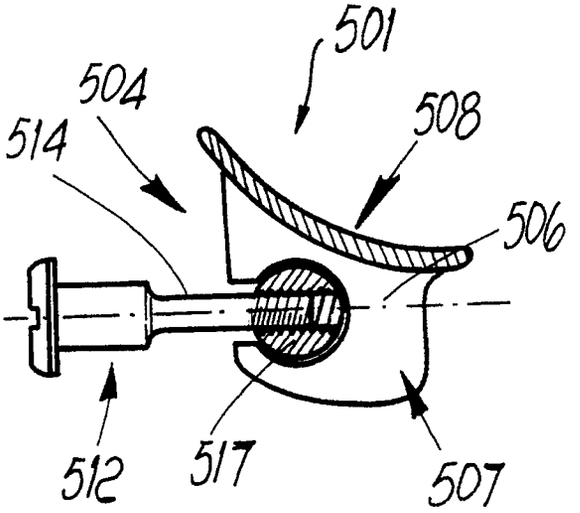


Fig. 11

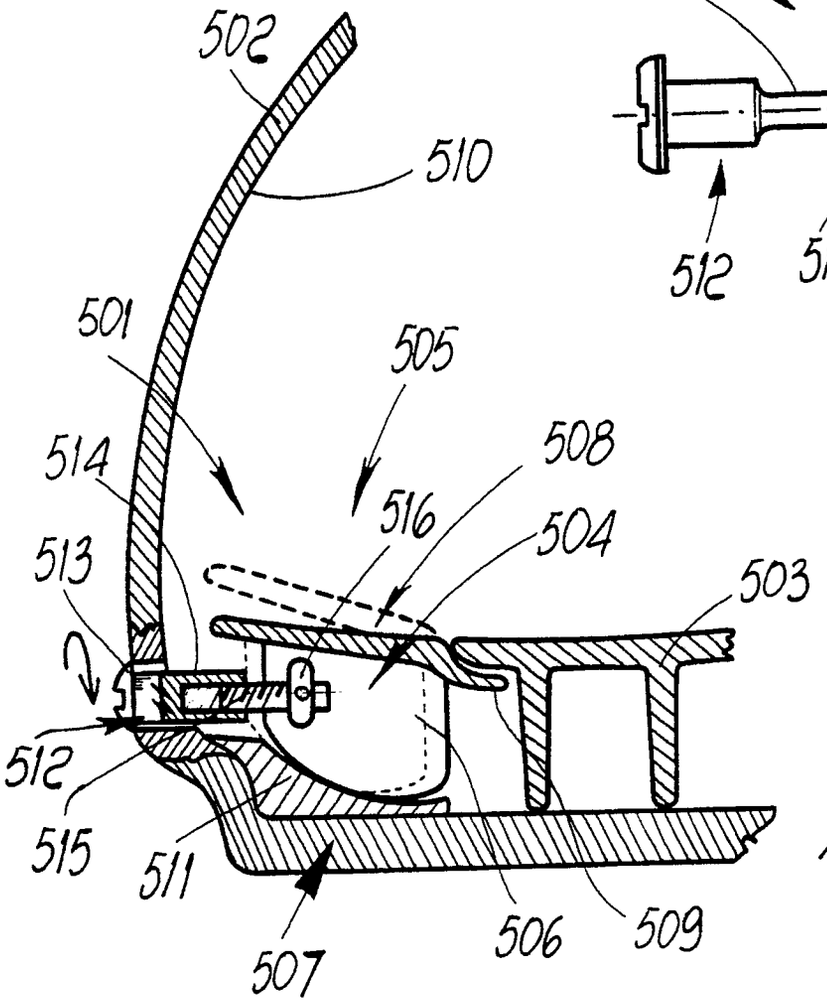


Fig. 10

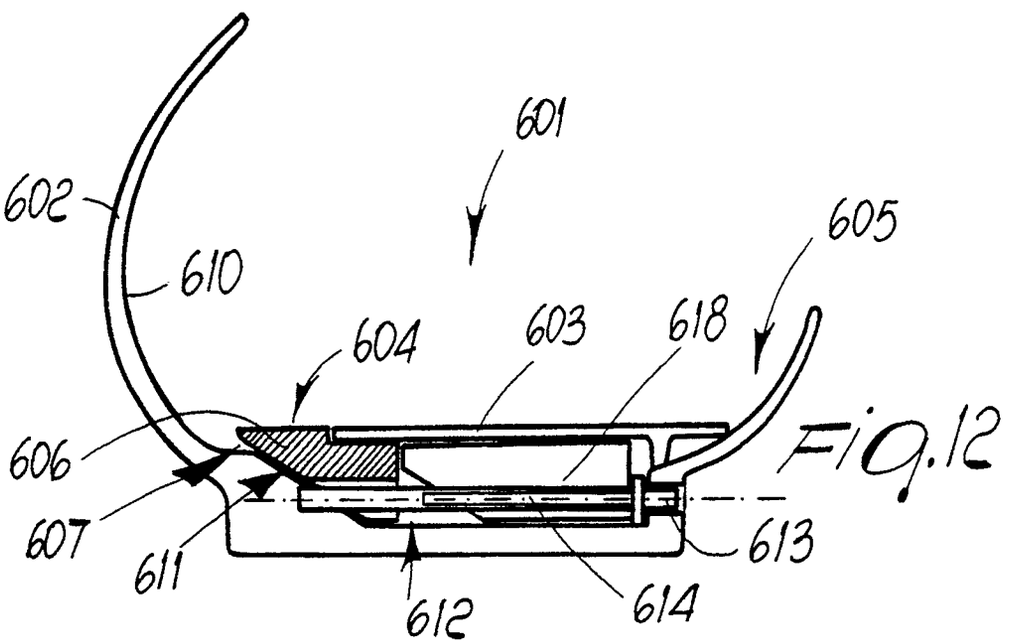


Fig. 12