

(19)



(11)

EP 3 437 702 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

26.01.2022 Bulletin 2022/04

(51) International Patent Classification (IPC):

A63C 7/06 (2006.01) **A63C 7/02** (2006.01)
A63C 5/12 (2006.01)

(21) Application number: **17184631.4**

(52) Cooperative Patent Classification (CPC):

A63C 7/06; A63C 5/126; A63C 7/02

(22) Date of filing: **03.08.2017**

(54) **A CROSS COUNTRY SKI**

LANGLAUFSKI

UN SKI DE FOND

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(43) Date of publication of application:

06.02.2019 Bulletin 2019/06

(73) Proprietor: **Mika, Vladimír**

37004 České Budejovice (CZ)

(72) Inventor: **Mika, Vladimír**

37004 České Budejovice (CZ)

(74) Representative: **Sedlák, Jirí**

Okružní 2824

370 01 České Budejovice (CZ)

(56) References cited:

**EP-A1- 0 664 142 WO-A1-2016/046115
AT-B- 381 031**

EP 3 437 702 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

Field of the Invention

[0001] The invention concerns a cross country ski allowing a quick exchange of sliding, rebounding or anti-backwards sliding technologies in the course of skiing depending on changing outdoor conditions or the skier's decision on the selection of skiing style.

Background of the Invention

[0002] A ski, in particular a cross country ski, is manufactured as a multi-layer body comprising a shell casing whose sectional view is substantially in the shape of an inverted "U" letter, whose base forms the upper side of the ski body and whose arms form the sides of the ski body. A core made of light-weight material reinforced by a firm carbon layer is mounted inside the shell casing. The body also includes a running surface and force distribution element arranged between the casing and running surface at least in the kick and grip zone of the ski, or alternatively exceeding this zone on one or both ends in the longitudinal direction of the ski.

[0003] A number of solutions whose purpose is to equip a ski with a means preventing backwards sliding when climbing or with a means allowing the ski's properties to be changed depending on snow and field conditions or the skier's requirements are known.

[0004] The US 4,165,886 patent discloses the cross country ski whose running surface is equipped with at least one groove accommodating a replacement element whose surface prevents backwards sliding. The element is self-adhesive on one side and is stuck to an interface layer between the running surface and the ski body. It is also possible to stick a replacement element with smooth surface or waxed surface for downhill skiing instead of the replacement element preventing backwards sliding. This will adapt the ski to snow conditions and sports requirements. A disadvantage of the solution according to the US 4,165,886 patent rests in the fact that the skier must keep a large number of elements with various surfaces corresponding to different snow conditions as only one side of the element can be used for sliding or bouncing whereas the other side of the element is always equipped with a self-adhesive fixing layer designed to fix the element. Under winter conditions fixing using a self-adhesive layer is not possible in the field; the exchange must be done by a specialist service provider. This solution did not work in practice and is no longer used.

[0005] The EP 0473898 patent discloses a solution for the cross country ski which is on its lower side equipped with a flat recess in the area of the kick and grip zone. The recess has side grooves into which the replacement element that must be bent beforehand is inserted. The element is held in the recess by friction force produced in the grooves. Its surface can be equipped with a means preventing backwards sliding or it can be smooth. A dis-

advantage of the solution disclosed in the EP 0473898 patent rests in the fact that it is very difficult to insert and extract the element as at lower temperatures the plastic material stiffens and gets fragile and becomes too difficult to bend. Moreover, snow or ice can get into the grooves, which makes the exchange of the element in the field even more difficult.

[0006] The US 6,659,492 patent discloses a solution for ski mountaineering that is equipped with a replacement element insertable into grooves in a recess similarly as in the EP 0473898 document with the only difference that the element does not need to be bent. The element is inserted into the recess from the front or from the back of the ski and the recess runs along the entire length of the ski. In addition, the element is equipped with side pads fitting into the grooves. One side of the element is rough for climbing up the hill whereas the other side is smooth for downhill skiing. The element must be secured against longitudinal motion by screws and stops. In addition, the element can be alternatively placed only in the kick and grip zone of the ski, not along its entire length. Then it has a key to be inserted into the recess groove on one side and on the other side the recess is open in the "V" shape and the element must be secured by screws. An advantage of the solution according to the US 6,659,492 patent rests in the fact that under cold conditions inserting the element into the grooves is difficult and requires a great force considering its length. In addition, it is necessary to work with the screws, which is disadvantageous in snow when it is freezing. The exchange of the element is time-consuming and laborious. Therefore, the solution is not suitable for cross country skis where it would be needed to exchange the element very often and quickly, namely directly on the track in the field depending on the track profile and snow conditions.

[0007] According to the WO 2004/064949 document the ski running surface is equipped with a band containing a means preventing backwards sliding of the ski. The front part of the band fits into the recess in the running surface where it is secured using a pressure plate. The pressure plate is tightened using a screw or cam from the upper side of the ski. The solution can be used for ski mountaineering skis but it is not suitable for cross country skis. The transition between the pressure plate and the band aggravates and slows down the ski movement, which is a critical disadvantage in the case of cross country skis.

[0008] The EP 2452729 B1 patent (Atomic Austria GmbH) discloses the cross country ski where the means preventing backwards sliding consists of a furry, brushy or scaled profile arranged on a supporting member stable in terms of dimensions and bending. The supporting member is deposited in the recess in the running surface with the possibility of extraction and exchange thereof. The recess is formed in at least part of the kick and grip zone of the ski and reaches as far as the force distribution element so that the base surface of the recess is formed and confined by the material of the force distribution el-

ement. The front and rear ends of the recess and supporting member are identically shaped into profile locks. The supporting member is made from hardened plastic material. The EP 2452729 B1 patent mentions the magnetic fixing of the supporting member in the recess. The fixing of the supporting member is also described by another document EP 2295120 B1 (Atomic Austria GmbH). It is always only the lower side of the supporting member that is smooth or scaled or has brushy textile preventing backwards sliding stuck onto it. Velcro fasteners or discs from ferromagnetic material are protruding on the upper side of the supporting member and fit against the matching counterparts of the Velcro fastener or permanent magnets mounted in the recess. The upper side of the supporting member is not used for skiing. The rear end of the supporting member is equipped with a small opening into which a fixture for the extraction of the supporting member is inserted. In fact it is a hook by which one end of the supporting member is caught hold from underneath, lifted and extracted from the recess. The skis according to EP 2452 729 B1 and EP 2295 120 B1 allow a quick exchange of sliding, rebounding or anti-backwards sliding technologies in the course of skiing depending on changing outdoor conditions or the skier's decision on the selection or change of skiing style. Their disadvantage rests in the fact that the supporting members can be equipped with various surfaces but always on one side only. This means that if the skier intends to exchange a smooth running surface for a smooth running surface with wax, scales or brushy textile, they must carry four supporting members. In practice a great number of waxes for different conditions are used, which means that the skier must have a great number of pre-waxed members with a smooth running surface with different waxes applied. Alternatively, the skier can have one supporting member with a smooth running surface, which needs to be re-waxed during skiing. A number of supporting members represents an undesirable load, in particular in the case of racing skiing. Additional application of wax during skiing then represents a considerable time loss, which is also a disadvantage in the case of sports or racing skiing. Additional disadvantages rest in the fact that the opening for the extraction of the supporting member is filled with snow and ice during skiing and the plastic hook cannot be inserted into it; handling therewith is also difficult when it is freezing. There is no place where to keep the plastic hook during cross country skiing and considering its small size, it can be easily lost. Another disadvantage is given by the fact that the edges of the supporting member forming part of the running surface area are made from hard plastic material, and unlike the remaining part of the running surface area they have very bad sliding properties and get frozen easily, which makes the exchange even more difficult and aggravates sliding.

[0009] Another European patent application EP 2745886 A1 (Atomic Austria GmbH) discloses the disadvantages of the solution provided in EP 2452729 B1 and EP 2295120 B1 which have been resolved by the

removal of the supporting member from plastic material. Instead of the supporting member, bendable textile bands with flexible shapes equipped on one side with a self-adhesive layer and on the other side with a means preventing backwards sliding are used. These bands are positioned in the recess where they are stuck and can be unstuck and extracted again. To keep the precise position of the bands parallel to the longitudinal axis of the ski, the bands have, at least on one end, a positioning fixture cooperating with the groove on the lower side of the ski which is used for precise inserting and extracting the band. The positioning fixture can be formed by a positioning edge, bolt, magnetic plate and other embodiment examples. The disadvantage consists again in the fact that only one side of the band can be utilized for skiing and also that the band cannot be exchanged by the skier themselves. The exchange must be implemented by a specialist service provider. Therefore, the skis according to the EP 2745886 A1 patent cannot be used for quick changes in snow conditions and cross country skiing styles during skiing.

[0010] The international patent application WO 2016/046115 A1 also discloses the climbing and downhill skiing ski which has a supporting member equipped with a means preventing backwards sliding designed in a similar manner as that disclosed in EP 2452729 B1, which means with profile locks and magnets for fixing. Unlike in EP 2452729 B1, the supporting member is smooth on the other side, which means that it can be turned by 180° and used for downhill skiing. The supporting member is fixed and released using a holding device positioned on the rear side of the ski. The holding device is tiltable, its lower part grips the rear edge of the supporting member and its upper lever part tilts onto the lower surface of the ski and grips the supporting member. The disadvantage of this method of fixing rests in the fact that it is suitable only for special climbing and downhill skiing skis and not for cross country skis where the kick and grip zone in the middle part of the ski, i.e. under the binding, cannot be used. This method of the solution of the holding and releasing device is usable only in skis with the kick and grip zone at the rear end of the ski.

[0011] The European patent EP 0 664 142 A1 describes braking device for cross-country ski, wherein in the running surface of the ski has a recess which is provided with an adjustable braking element. Braking intensity is adjusted by extending the braking element off the running surface. The extension is adjusted by the mechanism formed by the braking element and the lever arm which together form an integral body. The lever arm passes through the ski and it is adjusted by control lever. The disadvantage of this invention is that the braking element and lever arm together form integral body, which is hardly changeable in the field. It is necessary to disassemble an upper part and a lower part of adjusting mechanism.

[0012] The purpose of the invention is to manufacture the cross country ski which would eliminate the drawbacks of the solutions described above, in particular ac-

cording to EP 2452729 B1 and EP 2295120 B1, in particular which would allow the all-purpose use of one skis for alternating run, for sliding with both arms as well as for the skating style with the possibility of a quick exchange of the sliding, rebounding or anti-backwards sliding technologies directly in the field depending on external weather conditions, track and the skier's requirements. Another task of the invention is to reduce the weight and number of items of the skier's equipment necessary for such an exchange. Another task of the invention is to create an extraction means for the supporting member which would allow the supporting member to be turned and exchanged very quickly and easily even at very low temperatures without the respective components become blocked by snow or ice. Another task is the solution of the extraction means in a manner possibly allowing the skier to exchange the supporting member without having to take the ski off. Finally, the task of the invention is to provide the solution of the supporting member whose surfaces would not tend to get frozen and covered with snow during skiing.

Summary of the Invention

[0013] This task has been resolved by the manufacture of the cross country ski according to claim 1. The ski is manufactured as a multi-layer body comprising a shell casing whose sectional view is substantially in the shape of an inverted "U" letter. In addition, the ski comprises a core filling in the casing, a strength member arranged at least on the lower side of the core, a binding fixed on the upper side of the ski or at least an area for fixing the binding, a running surface on the lower side of the ski and a force distribution element arranged between the running surface and the strength member. The force distribution element defines a kick and grip zone where the ski has improved strength and elastic properties. The binding comprises a fixing head and a rebound plate, both arranged on the upper side of the ski. The running surface and force distribution element in the kick and grip zone of the ski comprise a recess running in the longitudinal direction of the ski where a replaceable supporting member in the shape of a dimensionally stable band, whose at least one side is smooth or equipped with a means preventing backwards sliding, is inserted in an extractable manner. At the bottom of the recess at least one permanent magnet attracting at least one ferromagnetic segment positioned in the supporting member is mounted. The position of the permanent magnet - ferromagnetic segment can be inverted. In addition, the ski comprises a general extraction means to put the supporting member further away from the recess bottom, and eject the lower side of the supporting member above the running surface level to make it possible to take a grip of, extract and exchange the supporting element.

[0014] The summary of the invention rests in the fact that the extraction means consists of a case which is mounted inside the ski in the area of the kick or grip zone

and open to connect the upper side of the casing with the recess and which also comprises a pressure member mounted in the case in a movable manner with the possibility of movement between the upper extreme position, where the pressure member is completely outside the recess, and the lower extreme position where the pressure member reaches as far as the recess by a minimum of the length $l \geq t$, where t refers to the total thickness of the supporting member, i.e. the thickness of the supporting member, including the means preventing backwards sliding, provided that it is used on the supporting member.

[0015] The case consists of a watertight element with a through hole where a movable pressure member consisting of a pin is mounted. The case and the pin have a circular cross section. The element and the pin can be made from metallic, composite or plastic material. The element either forms an integral part of the ski and is integrated during manufacture, or is stuck into an additionally drilled bore.

[0016] In an example that is not part of the invention the case is arranged in front of the binding, i.e. in the area between the fixing head of the binding and the front end of the kick or grip zone, or between the rear end of the rebound plate and the rear end of the kick or grip plate. If the cross country ski is manufactured without binding, the aforementioned term "binding" also refers to the equivalent term "area designed for fixing the binding". The example rests in the fact that the extraction means does not reach the binding structure and can be mounted on various types of cross country skis with various types of binding, including retrofitting.

[0017] In the invention the case is arranged in the binding area, i.e. in the area of the fixing head of the binding or in the area of the rebound plate of the binding. Although it is necessary to interfere in the binding, the advantage of this embodiment is that the extraction means is hidden under the skier's boot and is therefore better protected against snow, frost and damage.

[0018] The pin can be a very simple, one-piece pin, but in the preferred embodiment the pin is two-piece and consists of a control pin and a tubular pressure pin and the pressure pin is mounted in the case in a movable manner, the control pin is mounted in the pressure pin in a movable manner, and the pins are equipped with means allowing mutually releasable coupling of their movement towards the recess. The means for mutually releasable coupling of the pins movement preferably consist of a guiding bolt protruding from the control pin and a groove formed in the pressure pin, and the control pin is equipped with a control head allowing the control pin to be turned to make the guiding bolt fit into the groove. The control pin and groove form a simple bayonet joint of both pins. The advantage of this arrangement rests in the fact that the whole pressure member in the engaged position of the control pin is short and does not protrude much on the upper side of the ski. In the disengaged and turned position of the control pin the control pin connects the pressure pin and the connected length of the pressure

member is then sufficient to press the supporting member out of the recess.

[0019] In another preferred embodiment of the invention the pin is mounted on a spring in the case and in its upper part it is equipped with a pressing head placed in a watertight flexible cover connected to the upper side of the ski. The advantage of this embodiment is its simplicity and protection of the mechanism against bad weather conditions.

[0020] The design of the extraction means according to the invention allows the extraction of the supporting member from the upper side of the ski to be controlled, and it also allows a double supporting member to be used. This preferred embodiment rests in the fact that the upper side of the supporting member is smooth and manufactured from the same material as the running surface, or that it is equipped with a means preventing backwards sliding and the lower side of the supporting member is smooth and manufactured from the same material as the running surface, or that it is equipped with a means preventing backwards sliding where at least one ferromagnetic segment is mounted inside the supporting member between its upper side and lower side. The ferromagnetic segment can be substituted by a permanent magnet but it is always mounted in a manner that it does not protrude onto the surface of the supporting member.

[0021] This arrangement allows the double utilization of the supporting member for skiing where the upper side and the lower side can be equipped with different skiing surfaces. In one preferred embodiment of the invention the whole supporting member is manufactured from the same material as the running surface, for example polyethylene with added graphite. It is possible to apply for example wax for hard and frozen snow onto one side of the supporting member while klister for soft snow and skiing at high temperatures can be applied on the other side. Alternatively, one side of the supporting member can be equipped with brushy textile or scales for climbing. The use of individual means preventing backwards sliding and smooth sides of the supporting member can be combined at will. The skier can thus have at their disposal several supporting members whose surfaces have been premeditated with respect to the character of the track and weather forecast. During skiing, only the supporting members are exchanged. The skier can be equipped with supporting members having all-purpose surfaces for individual contacts.

[0022] When waxes or klister are used, it is preferred if the bottom of the recess is equipped with an anti-adhesive layer preventing wax or klister forming a means that prevent backwards sliding from sticking.

[0023] In another embodiment of the invention intended for the same purpose the bottom of the recess is equipped with spacer pads allowing the side of the supporting member equipped with the means preventing backwards sliding formed by brushy textile or wax or klister to sit down. The spacer pads not only prevent wax sticking but also in the case that the brushy textile is used

they eliminate its flexibility and keep the supporting member in a constant position.

[0024] The advantages of the cross country ski according to the disclosed invention rest in particular in the fact that the ski allows supporting members with various surfaces to be exchanged quickly and effectively during skiing depending on the track nature and weather. The design of the extraction means allows this exchange to be implemented very quickly and easily even at low temperatures without having to take off the ski. The supporting member does not get frozen and its double design provides a very high variability of ready-to-use surfaces while the total number of elements necessary for racing or recreational skiing is reduced to the minimum. The invention provides all skiers, no matter whether racers, amateurs or tourists, with the possibility to employ all styles (skate, with both arms, standard) with only one type, or where applicable, one pair of skis when doing cross country skiing. In addition, the ski according to the invention allows optimal skiing on all kinds of snow.

[0025] The greatest benefit of the cross country ski is that it simplifies the choice of cross country skis for beginners but also advanced skiers due to its all-purpose character. The use of the cross country ski according to the invention will popularize cross country skiing among the non-specialist public because if the beginner chooses unsuitable equipment for their first rides, they may get frustrated and lose interest in skiing completely. If the beginners use the cross country skis according to the invention, they will not be frustrated but will experience pleasant feelings and will definitely enjoy their ride.

Explanation of drawings

[0026] The invention will be explained in detail by drawings where the following is illustrated:

- Fig. 1 A side view of the cross country ski,
- Fig. 2 A sectional view of the ski of Fig. 1 through the A-A plane with the extraction means formed by a one-piece pin in the upper extreme position,
- Fig. 3 A sectional view of the ski of Fig. 1 through the A-A plane with the extraction means in the lower extreme position,
- Fig. 4 A view of the lower side of the cross country ski with the recess,
- Fig. 5 A view of the side of the supporting member with the means preventing backwards sliding formed by scales,
- Fig. 6 A view of the side of the supporting member with the means preventing backwards sliding formed by brushy textile,
- Fig. 7 A view of the side of the supporting member with a smooth running surface,
- Fig. 8 A sectional view of the supporting member with one side smooth and the other side equipped with the means preventing back-

- wards sliding formed by scales,
- Fig. 9 A sectional view of the supporting member with one side smooth and the other side equipped with the means preventing backwards sliding formed by brushy textile,
- Fig. 10 A sectional view of the supporting member with both sides smooth where one side is equipped with a layer of wax,
- Fig. 11 A sectional view of the supporting member with both sides smooth where one side is equipped with a layer of hard wax and the other side is equipped with a layer of soft klister,
- Fig. 12 A sectional view of the cross country ski with the recess with an antiadhesive layer applied on its bottom,
- Fig. 13 A sectional view of the cross country ski with the recess whose bottom is equipped with spacer pads,
- Fig. 14 The extraction means in the example of the embodiment formed by the two-piece pin in the upper extreme position,
- Fig. 15 The extraction means of Fig. 14 with the disengaged control pin,
- Fig. 16 The extraction means of Fig. 15 with the revolved control pin engaging with the pressure pin,
- Fig. 17 The extraction means of Fig. 14-16 in the lower extreme position with the disengaged pressure pin,
- Fig. 18 The extraction means of Fig. 14-17 engaged back in the upper extreme position after the supporting member has been pressed into the recess,
- Fig. 19 A view of the pressure pin with a groove,
- Fig. 20 The extraction means in the example of the embodiment formed by the spring pin in the upper extreme position,
- Fig. 21 The extraction means of Fig. 20 in the lower extreme position,

Examples of the invention embodiments

[0027] It shall be understood that the specific cases of the invention embodiments described and depicted below are provided for illustration only and do not limit the invention to the examples provided here. The invention is defined by the claims.

[0028] The cross country ski 1 according to the disclosed invention has a known composite structure consisting of the shell casing 2 which is designed as carbon or glass-reinforced armouring of the core 3. The core 3 is also composite and its supporting base is formed either by polyurethane with admixtures, or it is made from acrylate. The light-weighted core contains lots of cavities. The lower side of the ski 1 is equipped with the running surface 5 made from sintered polyethylene with added graphite with a high molecular weight and porous surface. The lower side of the core 3 is equipped with the

strength member 4 consisting of the supporting plate from carbon and also the force distribution element 6 made from plastic material arranged between the running surface 5 and the strength member 4 in the area of the kick or grip zone 7. The force distribution element 6 serves for the reinforcement of the ski 1 in the area of the binding 20 and in the area in front of the binding 20 and behind the binding 20. The binding 20 is equipped with the fixing head of the binding 33 and the rebound plate of the binding 34. The binding 20 does not need to be mounted on the ski and is not necessary for the application of the solution according to the invention.

[0029] On the lower side of the ski 1, the running surface 5 includes the recess 8 in the shape of a rectangular running parallel to the longitudinal axis of the ski 1 with rounded ends that reduce the resistance of the ski 1 when sliding. The recess 8 is executed in the area of the kick or grip zone 7 and reaches as far as the force distribution element 6, so that the bottom of the recess 8 is formed by the material of the force distribution element 6. The bottom of the recess 8 is equipped with the permanent magnets 10 that are circular as illustrated in Fig 4 but they can be manufactured substantially in any shape.

[0030] The recess 8 is equipped with the plastic supporting member 9 whose shape is identical with that of the recess 8. The supporting member 9 is equipped with the ferromagnetic segments 11 whose position corresponds to that of the permanent magnets 10. Also the ferromagnetic segments 11 can have substantially any shape or they can be formed by a compact plate from ferromagnetic material. The mutual magnetic interaction of the permanent magnets 10 and the ferromagnetic segments 11 keeps the supporting member 9 in the recess 8. The positions of the permanent magnets 10 and the ferromagnetic segments 11 can be mixed up, or the permanent magnets 10 can be present both in the recess 8 and in the supporting member 9.

[0031] The supporting member 9 is made from plastic material and the ferromagnetic segments 11 are mounted inside the plastic body so that they do not protrude either from the upper side 14 or the lower side 15 of the supporting member 9. The supporting member 9 can be manufactured from one piece, and the ferromagnetic segments 11 can be integrated in it within the framework of the mould-based manufacture. In the example of the embodiment provided in Fig. 8 through Fig. 11, the supporting member 9 is manufactured as a sandwich from two layers made from identical material as the running surface 5 where at least one of the layers includes the integrated ferromagnetic segments 11 and both layers are subsequently stuck or welded together. In another example, the supporting member 9 can have a core covered or coated with the material of the running surface 5. The upper side 14 and the lower side 15 of the supporting member 9 have a wide range of applications that can be used for different skiing techniques, track surfaces and weather conditions.

[0032] In one example of the embodiment illustrated

in Fig. 5 and Fig. 8 the upper side 14 is smooth and the lower side 15 is equipped with the means preventing backwards sliding 17, the so-called scales or multi-grip. Both sides 14 and 15 can be turned where the smooth side can be used for downhill skiing or skating and the scales for climbing.

[0033] In another example of the embodiment provided in Fig. 6 and Fig. 9 the upper side 14 is smooth and formed by the material of the running surface 5, and the lower side 15 is equipped with the means preventing backwards sliding 17 formed by brushy textile stuck on the surface of the lower side 15 of the supporting member 9. Both sides can be turned at will and the use is identical as in the previous example of the embodiment.

[0034] In another example of the embodiment provided in Fig. 7, Fig. 10 and Fig. 11 the supporting member 9 has both sides 14, 15 smooth and manufactured from the same material as the running surface 5. One side 14 or both sides 14, 15 can have wax or klister applied on. The typical use of the supporting member 9 according to this example of the embodiment is where one side is smooth or waxed for harder snow and lower temperatures, while the other side is waxed or treated by klister for softer snow and higher temperatures. With a change in conditions the only thing that must be done is to turn the supporting member 9 in the recess 8 and use the other side. To make it possible to repeatedly insert the supporting member 9 with applied wax or klister into the recess 8 and extract it out of the recess 8, the bottom of the recess according to one example of the embodiment provided in Fig. 12 is equipped with the anti-adhesive layer 18 preventing wax or klister to get stuck to the bottom of the recess 8. The anti-adhesive layer 18 is preferably formed by sprayed, coated or another surface treatment of the bottom of the recess 8. In another example of the embodiment provided in Fig. 13 the bottom of the recess 8 is shaped to include a set of the spacer pads 19 protruding from the bottom of the recess 8. The spacer pads 19 can be point-like, for example semi-circular, or they can have the shape of linear keys. The upper side 14 of the supporting member 9 is supported by the tops of the spacer pads 19 and wax or klister partly fills in the gap between the tops of the spacer pads 19 and the bottom of the recess 8. The height of the spacer pads 19 is selected to allow a number of commonly used waxes and klisters to be applied. The embodiment including the spacer pads 19 is suitable also for the supporting member 9 of Fig. 6 where the upper side 14 is equipped with the means preventing backwards sliding 17 formed by brushy textile. The brushy textile is soft and if applied directly onto the bottom of the recess 8, it would get compressed. The lower side 15 of the supporting member 9 then would not form a perfectly planar surface with the running surface 5 of the ski 1. The spacer pads 19 will eliminate this disadvantage by pressing into the brushy textile and supporting the plastic upper side 14 of the supporting member 9 at a fixed distance so that also the lower side 15 of the supporting member 9 is fixed

and aligned to make a perfect plane with the running surface 5.

[0035] The extraction means 16, i.e. the case 12, in which the pressing member 13 is mounted, can be arranged in front of the binding 20 or behind the binding 20, or, where applicable, directly in the binding 20, as provided in Fig. 1. If the ski is not equipped with the binding 20, the position of the extraction means is defined by the area designed for fixing the binding 20. The task of the case 12 is to connect the upper side of the ski 1 to the recess 8 to allow the pressure member 13 to move from the upper side of the ski 1 to the recess 8 and press the supporting member 9 out of the recess 8. The case 12 as well as the pressure member 13 can thus have a number of structural and shape variants.

[0036] In the example of the embodiment provided in Fig. 2 and Fig. 3 the plastic case 12 is cylindrical and is stuck into the composite design of the ski 1 in which an opening was made subsequently. The case 12 can also be created during the manufacture of the ski 1 as its integral part and can be manufactured from any suitable material. On its upper side the case 12 is equipped with a flange sealing the passage way of the case 12 into the ski 1. The case 12 has a through hole running as far as the recess 8. The through hole is equipped with the pressure member 13 consisting of the cylindrical pin 21 with a head. The lower end of the pin 21 sits down onto the upper side 14 of the supporting member 9 in the recess 8. By pressing onto the head of the pin 21 the supporting member 9 is pressed out of the recess 8 as provided in Fig. 3.

[0037] Another example of the design of the pressure member 13 is provided in Fig. 14 through Fig. 19. The case 12 and the pin 21 are cylindrical again but the pin 21 is two-piece this time. The advantage of this example of the embodiment rests in the reduction of the working cycle of the pin 21 and in the fixation of the pin 21 in the upper extreme position. The two-piece pin 21 consists of the solid control pin 22 with the control head 26 and the guiding bolt 24, and of the tubular pressure pin 23 with the groove 25. The tubular pressure pin 23 is mounted in the case 12 in a movable manner and the control pin 22 is mounted in the tubular pressure pin 23. The guiding bolt 24 fits into the groove 25 that is equipped with a vertical segment and a horizontal segment. When the control pin 22 is pulled upwards and turned, the guiding bolt 24 fits into the horizontal segment of the groove 25 provided in Fig. 19, locks the connection of the control pin 22 with the pressure pin 23, and this assembly is then pressed down and presses the supporting member 9 out of the recess 8. When a new or turned supporting member 9 is inserted into the recess 8, the whole assembly of the pin 21 is engaged back again and returned to its initial position by turning and lowering down the control pin 22. The person skilled in the art knows a number of means allowing a releasable coupling of the movement of the control pin 22 and the pressure pin 23 and fulfilling a similar function as the guiding bolt 24 and the groove 25.

[0038] In another example of the embodiment provided in Fig. 20 and Fig. 21, the pin **21** is one-piece again but to fix the upper extreme position it is mounted on the spring **27** that is supported by the baffle in the case **12**. The upper end of the pin **21** is equipped with the pressing head **28** screwed onto a thread and mounted in the flange of the case **12**. The whole pressing head **28** is mounted in the watertight flexible cover **29** made from plastic or rubber material surrounding the pressing head **28**, and it is connected to the surface of the ski **1**.

Industrial applicability

[0039] The ski according to the invention can be used in an all-purpose manner as a cross country ski for recreational, sports as well as racing skiing.

Overview of the positions used in the drawings

[0040]

1	ski	
2	shell casing	
3	core	
4	strength member	
5	running surface	
6	force distribution element	
7	kick or grip zone	
8	recess	
9	supporting member	
10	permanent magnet	
11	ferromagnetic segment	
12	case	
13	pressure member	
14	upper side of the supporting member	
15	lower side of the supporting member	
16	extraction means	
17	means preventing backwards sliding	
18	anti-adhesive layer	
19	spacer pad	
20	binding	
21	pin	
22	control pin	
23	pressure pin	
24	guiding bolt	
25	groove	
26	control head	
27	spring	
28	pressing head	
29	watertight flexible cover	
33	fixing head of the binding	
34	rebound plate of the binding	
35	bolt	
36	eye	

Claims

1. A cross country ski (1) manufactured as a multi-layer body and comprising a shell casing (2) whose sectional view is substantially in a shape of an inverted "U" letter, wherein the ski (1) further comprises a core (3) filled in the casing, a strength member (4) arranged at least on a lower side of a binding (20) or on a lower side of an area for fixing the binding (20) arranged on an upper side of the ski (1), a running surface (5) on the lower side of the ski (1) and a force distribution element (6) arranged between the running surface (5) and the strength member (4), wherein the running surface (5) and the force distribution element (6) include in an area of a kick and grip zone (7) of the ski (1) a recess (8) running along a longitudinal direction of the ski (1), in the recess (8) a replaceable supporting member (9) is mounted in an extractable manner, the supporting member (9) has a shape of a dimensionally stable band whose at least one side (14, 15) is either smooth or equipped with a means (17) preventing backwards sliding, wherein a bottom of the recess (8) is equipped with at least one permanent magnet (10) and the supporting member (9) is equipped with one ferromagnetic segment (11), arranged against the permanent magnet (10) and the ski (1) also comprises an extraction means (16) to separate the supporting member (9) from the bottom of the recess (8) and disengage the lower side (15) of the supporting member (9) above the level of the running surface (5), **characterized in that** the extraction means (16) consists of a case (12), which is arranged inside the ski (1) in the area of the zone (7) and at the same time in the area designed for fixing the binding (20), and is opened in a manner allowing the upper side of the casing (2) to be connected with the recess (8), the extraction means (16) also consists of a pressure member (13), which is mounted in the case (12) in a movable manner with the possibility of movement between an upper extreme position, in which the pressure member (13) does not reach the recess (8), and a lower extreme position in which the pressure member (13) reaches the recess (8) by at least the length $l \geq t$, where t is a total thickness of the supporting member (9), wherein the case (12) further consists of a watertight element with a through hole in which the movable pressure member (13) is mounted, the movable pressure member (13) is formed by a pin (21) and the case (12) as well as the pin (21) have a circular cross section.
2. A cross country ski according to claim 1, **characterized in that** the pin (21) is two-part and consists of a control pin (22) and a tubular pressure pin (23), wherein the pressure pin (23) is mounted in a movable manner in the case (12), the control pin (22) is mounted in a movable manner in the pressure pin

(23), and the pins (22, 23) are equipped with a means allowing releasable coupling of their movement.

3. A cross country ski according to claim 2, **characterized in that** the means for the releasable coupling of the movement of the pins (22, 23) consists of a guiding bolt (24) protruding from the control pin (22) and a groove (25) created in the pressure pin (23), wherein the control pin (22) is equipped with a control head (26) to turn the control pin (22) and make the guiding bolt (24) to fit into the groove (25). 5
4. A cross country ski according to claim 1, **characterized in that** the pin (21) is mounted in the case (12) on a spring (27), and in its upper part is equipped with a pressing head (28) placed in a watertight flexible cover (29) connected to the upper side of the ski (1). 10
5. A cross country ski according to any of claims 1 to 4, **characterized in that** the upper side (14) of the supporting member (9) is either smooth and is manufactured from the same material as the running surface (5), or is equipped with the means (17) preventing backwards sliding, and the lower side (15) of the supporting member (9) is either smooth and manufactured from the same material as the running surface (5), or is equipped with the means (17) preventing backwards sliding, and at least one ferromagnetic segment (11) is mounted inside the supporting member (9) between its upper side (14) and the lower side (15). 15
6. A cross country ski according to claim 5, **characterized in that** the supporting member (9) consists of two layers of the same material as that of the running surface (5) preferably made from polyethylene with added carbon. 20
7. A cross country ski according to any of claims 1 to 6, **characterized in that** the bottom of the recess (8) is equipped with an anti-adhesive layer (18) preventing the sticking of wax or klister forming the means (17) preventing backwards sliding onto the supporting member (9). 25
8. A cross country ski according to any of claims 1 to 6, **characterized in that** the bottom of the recess (8) is equipped with a spacer pads (19) to receive the side (14, 15) of the supporting member equipped with the means (17) preventing backwards sliding wherein the means (17) consists of brushy textile or wax or klister sit down. 30
9. A cross country ski according to any of claims 1 to 8, **characterized in that** the recess (8) and the supporting member (9) are rounded on front as well as rear ends. 35

Patentansprüche

1. Langlaufski (1), der als Mehrschichtkörper hergestellt ist und eine Schalenhülle (2) aufweist, die im Schnitt im wesentlichen die Form eines umgekehrten "U" hat, wobei der Langlaufski (1) ferner einen in die Hülle eingefüllten Kern (3) aufweist, eine Aussteifung (4), die zumindest an einer Unterseite einer Bindung (20) oder an einer Unterseite eines an einer Oberseite des Skis (1) angeordneten Bereichs zur Befestigung der Bindung (20) angeordnet ist, eine Lauffläche (5) an der Unterseite des Skis (1) und ein zwischen der Lauffläche (5) und der Aussteifung (4) angeordnetes Kraftverteilungselement (6), wobei die Lauffläche (5) und das Kraftverteilungselement (6) in einem Bereich einer Abstoß- und Griffzone (7) des Skis (1) eine in Längsrichtung des Skis (1) verlaufende Ausnehmung (8) aufweisen, in der ein auswechselbares Stützelement (9) ausziehbar gelagert ist, das Stützelement (9) die Form eines formstabilen Bandes aufweist, dessen mindestens eine Seite (14, 15) entweder glatt oder mit einem Mittel (17) versehen ist, das ein Zurückgleiten verhindert, wobei ein Boden der Ausnehmung (8) mit mindestens einem Permanentmagneten (10) und das Stützelement (9) mit einem ferromagnetischen Segment (11) versehen ist, das gegen den Permanentmagneten (10) angeordnet ist, und der Ski (1) auch ein Ausziehmittel (16) aufweist, um das Stützelement (9) vom Boden der Ausnehmung (8) zu trennen und die Unterseite (15) des Tragelements (9) über dem Niveau der Lauffläche (5) freizugeben, **dadurch gekennzeichnet, dass** das Ausziehmittel (16) aus einem Gehäuse (12) besteht, das im Inneren des Skis (1) im Bereich der Zone (7) und gleichzeitig in dem für die Befestigung der Bindung (20) vorgesehenen Bereich angeordnet und derart geöffnet ist, daß die Oberseite der Schalenhülle (2) mit der Ausnehmung (8) verbunden werden kann, wobei das Ausziehmittel (16) ferner aus einem Druckelement (13) besteht, das in dem Gehäuse (12) beweglich angebracht ist, mit der Möglichkeit der Bewegung zwischen einer oberen Endposition, in der das Druckelement (13) die Ausnehmung (8) nicht erreicht, und einer unteren Endposition, in der das Druckelement (13) die Ausnehmung (8) um mindestens die Länge $l \geq t$ erreicht, wobei t eine Gesamtdicke des Stützelements (9) ist, wobei das Gehäuse (12) ferner aus einem wasserdichten Element mit einem Durchgangsloch besteht, in dem das bewegliche Druckelement (13) angebracht ist, das bewegliche Druckelement (13) durch einen Stift (21) gebildet ist und das Gehäuse (12) sowie der Stift (21) einen kreisförmigen Querschnitt aufweisen. 40
2. Langlaufski nach Anspruch 1, **dadurch gekennzeichnet, dass** der Stift (21) zweiteilig ist und aus einem Steuerbolzen (22) und einem rohrförmigen 45

Druckbolzen (23) besteht, wobei der Druckbolzen (23) beweglich im Gehäuse (12) gelagert ist, der Steuerbolzen (22) beweglich im Druckbolzen (23) gelagert ist und die Bolzen (22, 23) mit einer Einrichtung ausgestattet sind, die eine lösbare Kopplung ihrer Bewegung ermöglicht.

3. Langlaufski nach Anspruch 2, **dadurch gekennzeichnet, dass** das Mittel zur lösbaren Kopplung der Bewegung der Bolzen (22, 23) aus einem Führungsbolzen (24), der aus dem Steuerbolzen (22) herausragt, und einer in dem Druckbolzen (23) gebildeten Nut (25) besteht, wobei der Steuerbolzen (22) mit einem Steuerkopf (26) ausgestattet ist, um den Steuerbolzen (22) zu drehen und den Führungsbolzen (24) in die Nut (25) einzupassen. 10
4. Langlaufski nach Anspruch 1, **dadurch gekennzeichnet, dass** der Stift (21) im Gehäuse (12) auf einer Feder (27) montiert ist und in seinem oberen Teil mit einem Druckkopf (28) versehen ist, der in einer wasserdichten, flexiblen Hülle (29) angeordnet ist, die mit der Oberseite des Skis (1) verbunden ist. 20
5. Langlaufski nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, daß** die Oberseite (14) des Stützelements (9) entweder glatt ist und aus dem gleichen Material wie die Lauffläche (5) hergestellt ist, oder mit einem Mittel (17) versehen ist, das ein Rückwärtsgleiten verhindert, und die untere Seite (15) des Stützelement (9) entweder glatt ist und aus dem gleichen Material wie die Lauffläche (5) hergestellt ist oder mit den Mitteln (17) ausgestattet ist, die ein Rückwärtsgleiten verhindern, und mindestens ein ferromagnetisches Segment (11) im Inneren des Stützelements (9) zwischen seiner oberen Seite (14) und der unteren Seite (15) angebracht ist. 25 30 35
6. Langlaufski nach Anspruch 5, **dadurch gekennzeichnet, dass** das Stützelement (9) aus zwei Schichten des gleichen Materials wie das der Lauffläche (5) besteht, vorzugsweise aus Polyethylen mit Kohlenstoffzusatz. 40
7. Langlaufski nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** der Boden der Ausnehmung (8) mit einer Antihafschicht (18) versehen ist, die das Anhaften von Wachs oder Klistern verhindert, das die Mittel (17) bildet, die das Rückwärtsgleiten auf das Stützelement (9) verhindern. 45 50
8. Langlaufski nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** der Boden der Ausnehmung (8) mit einem Abstandshalter (19) versehen ist, um die Seite (14, 15) des Stützkörpers aufzunehmen, die mit dem Mittel (17) versehen ist, das ein Rückwärtsgleiten verhindert, wobei das Mittel (17) aus einem büstigen Textil oder Wachs oder 55

Klistern besteht.

9. Langlaufski nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** die Ausnehmung (8) und das Stützelement (9) sowohl am vorderen als auch am hinteren Ende abgerundet sind.

Revendications

1. Ski de fond (1) fabriqué sous la forme d'un corps multicouche et comprenant une enveloppe (2) dont la vue en coupe a en principe la forme d'une lettre "U" inversé, le ski (1) comprenant en outre un noyau (3) rempli dans l'enveloppe (2), un renfort (4) de résistance disposé au moins sur un côté inférieur d'une fixation (20) ou disposé sur un côté inférieur d'une zone de placement de la fixation (20) disposée sur un côté supérieur du ski (1), une semelle (5) sur le côté inférieur du ski (1) et un élément (6) de répartition de force disposé entre la semelle (5) et le renfort (4) de résistance, où la semelle (5) et l'élément (6) de répartition de force comprennent dans une zone de pousse de pied et de montée (7) du ski (1) un évidement (8) s'étendant le long de la direction longitudinale du ski (1), dans l'évidement (8) un élément de support remplaçable (9) est monté de manière extractible, l'élément de support (9) à la forme d'une bande indéformable dont au moins un côté (14, 15) est soit lisse soit équipé d'un moyen (17) empêchant le glissement vers l'arrière, dans lequel un fond de l'évidement (8) est équipé d'au moins un aimant permanent (10) et l'élément de support (9) est équipé d'un segment ferromagnétique (11), disposé contre l'aimant permanent (10) et le ski (1) comprend également un moyen d'extraction (16) pour séparer l'élément de support (9) du fond de l'évidement (8) et dégager le côté inférieur (15) de l'élément de support (9) au-dessus du niveau de la semelle (5), **caractérisé en ce que** le moyen d'extraction (16) consiste en un boîtier (12), qui est disposé à l'intérieur du ski (1) dans la région de la zone (7) et en même temps dans la zone destinée à l'emplacement de la fixation (20), et est ouvert d'une manière permettant à la face supérieure du boîtier (2) d'être reliée à l'évidement (8), le moyen d'extraction (16) se compose également d'un élément de pression (13), qui est monté dans le boîtier (12) de manière mobile avec la possibilité de se déplacer entre une position extrême supérieure, dans laquelle l'élément de pression (13) n'atteint pas l'évidement (8), et une position extrême inférieure dans laquelle l'élément de pression (13) atteint l'évidement (8) d'au moins la longueur $l \geq t$, où t est une épaisseur totale de l'élément de support (9), et le boîtier (12) consiste en outre en un élément étanche à l'eau avec un trou traversant dans lequel l'élément de pression mobile (13) est monté, l'élément de pression mobile (13) est formé par une bro-

che (21) et le boîtier (12) ainsi que la broche (21) ont une section transversale circulaire.

2. Ski de fond selon la revendication 1, **caractérisé en ce que** la broche (21) est en deux parties et est constituée d'un tenon de commande (22) et d'un tenon de pression tubulaire (23), le tenon de pression (23) étant monté d'une manière mobile dans le boîtier (12), le tenon de commande (22) étant monté d'une manière mobile dans le tenon de pression (23), et les tenons (22, 23) étant équipés des moyens permettant un couplage libérable de leur mouvement. 5

3. Ski de fond selon la revendication 2, **caractérisé en ce que** les moyens pour le couplage libérable du mouvement des tenons (22, 23) consiste en un boulon de guidage (24) faisant saillie du tenon de commande (22) et une rainure (25) créée dans le tenon de pression (23), dans lequel le tenon de commande (22) est équipé d'une tête de commande (26) pour faire tourner le tenon de commande (22) et faire en sorte que le boulon de guidage (24) s'adapte dans la rainure (25). 10 15 20

4. Ski de fond selon la revendication 1, **caractérisé en ce que** la broche (21) est montée dans le boîtier (12) sur un ressort (27), et est équipée dans sa partie supérieure d'une tête de pression (28) placée dans un couvercle souple étanche (29) relié à la face supérieure du ski (1). 25 30

5. Ski de fond selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** le côté supérieur (14) de l'élément de support (9) est soit lisse et fabriqué dans le même matériau que la semelle (5), soit équipé du moyen (17) empêchant le glissement vers l'arrière, et le côté inférieur (15) de l'élément de support (9) est soit lisse et fabriqué dans le même matériau que la semelle (5), soit équipé du moyen (17) empêchant le glissement vers l'arrière, et au moins un segment ferromagnétique (11) est monté à l'intérieur de l'élément de support (9) entre son côté supérieur (14) et le côté inférieur (15). 35 40

6. Ski de fond selon la revendication 5, **caractérisé en ce que** l'élément de support (9) est constitué de deux couches du même matériau que celui de la surface de roulement (5), de préférence en polyéthylène avec du carbone ajouté. 45 50

7. Ski de fond selon l'une quelconque des revendications 1 à 6, **caractérisé en ce que** le fond de l'évidement (8) est équipé d'une couche anti-adhésive (18) empêchant le collage de fart ou de klister formant les moyens (17) empêchant le glissement vers l'arrière sur l'élément de support (9). 55

8. Ski de fond selon l'une quelconque des revendica-

tions 1 à 6, **caractérisé en ce que** le fond de l'évidement (8) est équipé d'un tampon d'écartement (19) pour recevoir le côté (14, 15) de l'élément de support équipé du moyen (17) empêchant le glissement vers l'arrière, dans lequel le moyen (17) consiste en un textile brossé ou un fart ou un klister assis.

9. Ski de fond selon l'une quelconque des revendications 1 à 8, **caractérisé en ce que** l'évidement (8) et l'élément de support (9) sont arrondis à l'avant comme à l'arrière.

Fig. 1

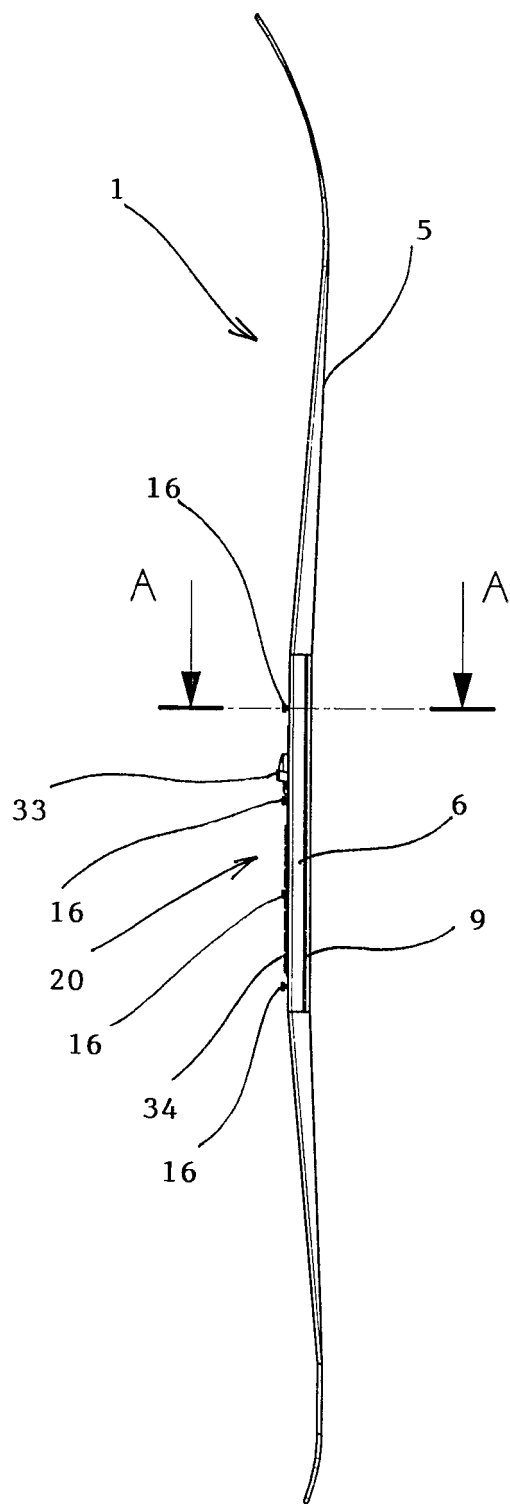


Fig. 2

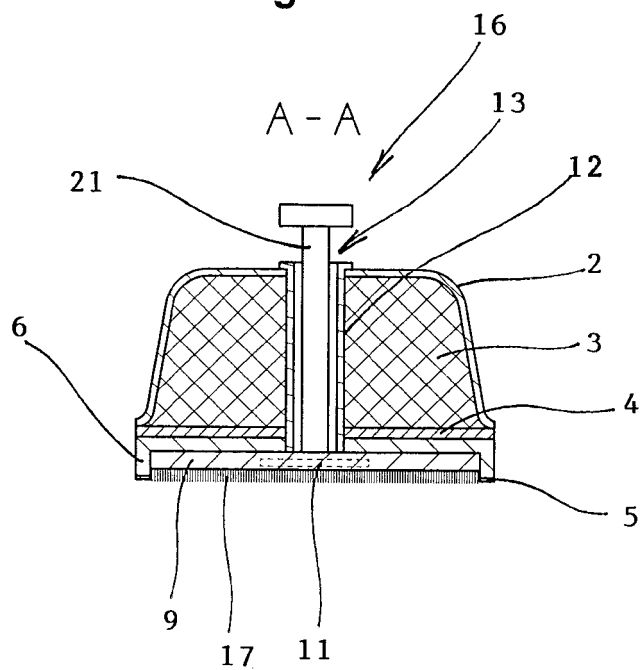


Fig. 3

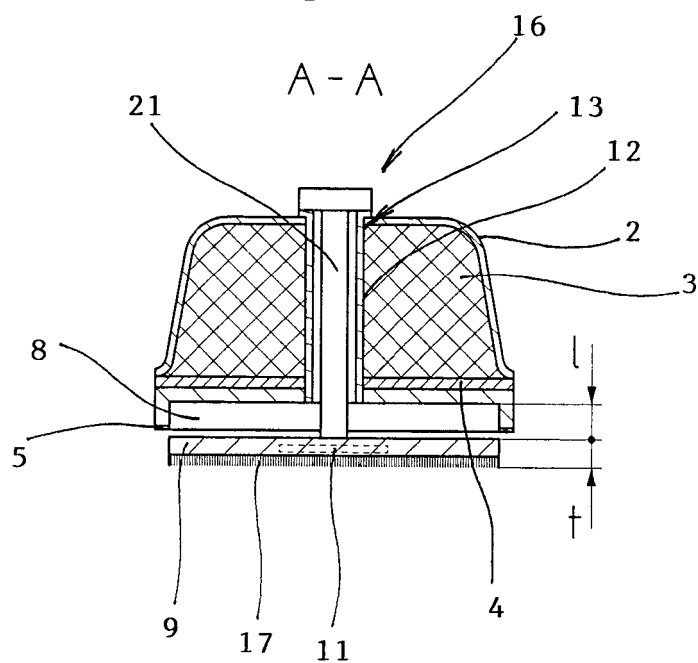


Fig. 4

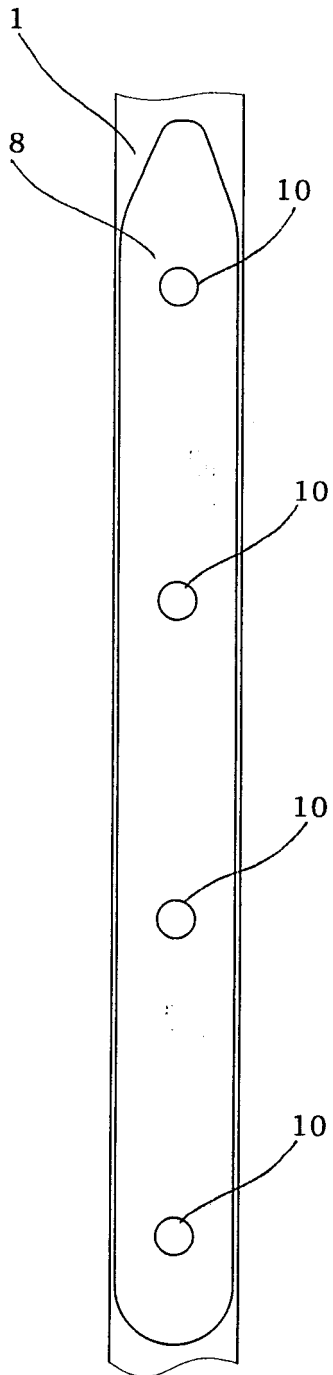


Fig. 5

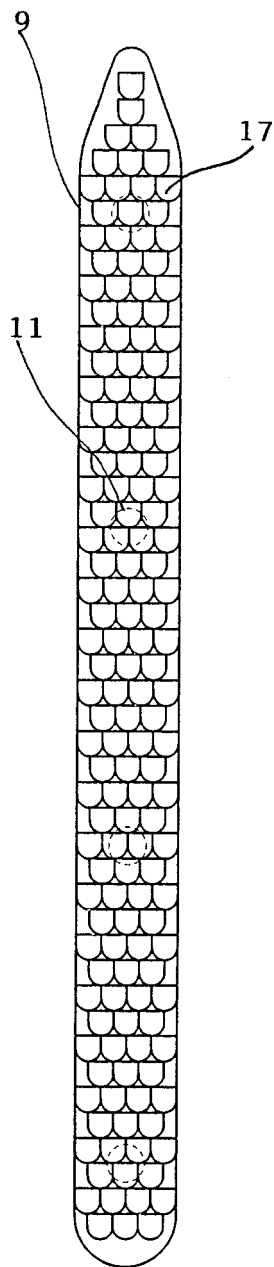


Fig. 6

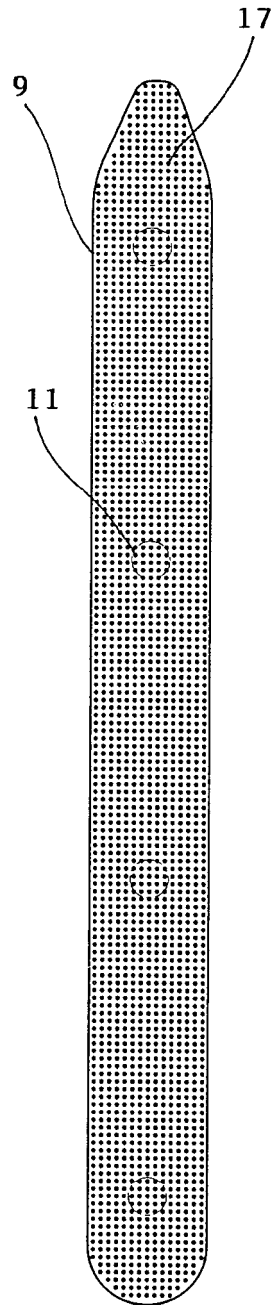


Fig. 7

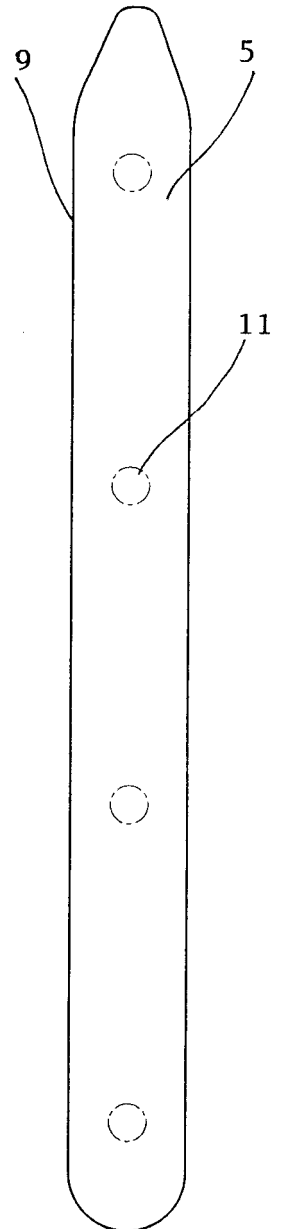


Fig. 8

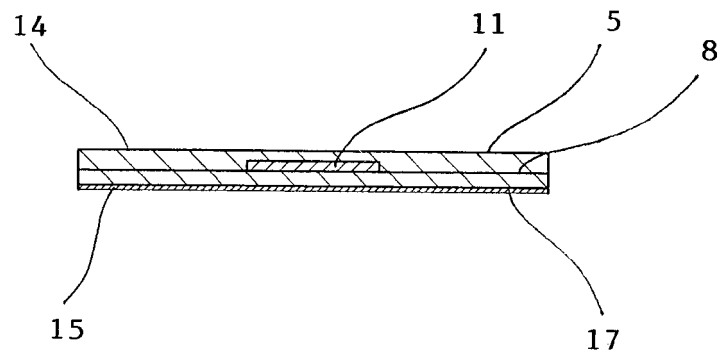


Fig. 9

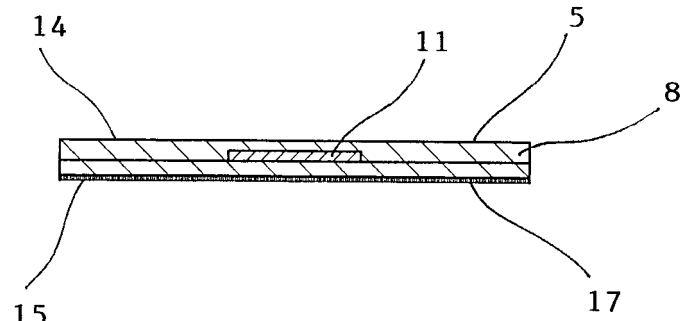


Fig. 10

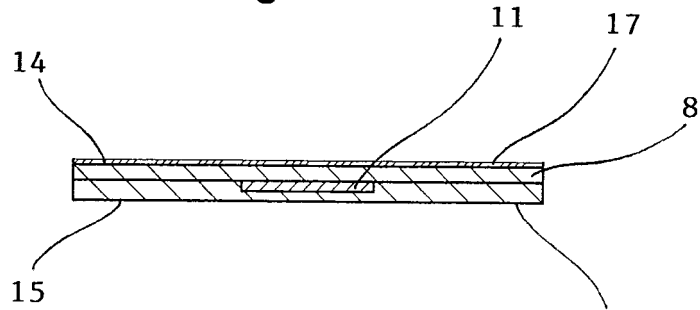


Fig. 11

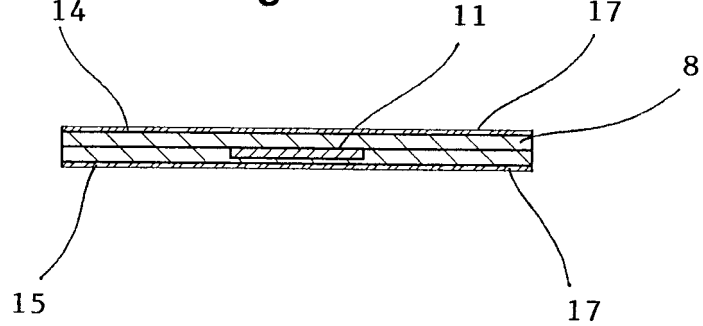


Fig. 12

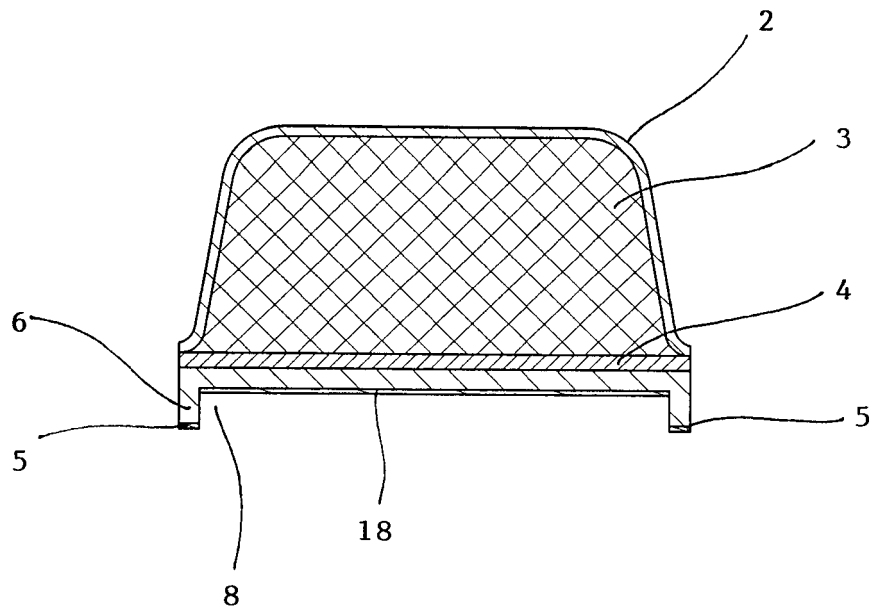
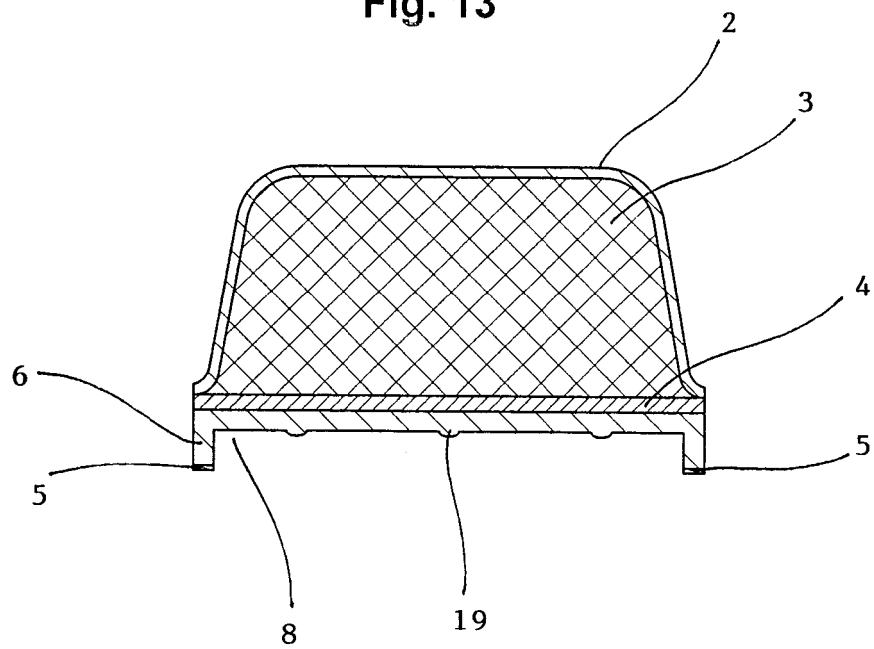


Fig. 13



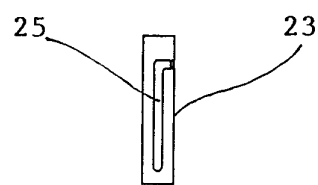
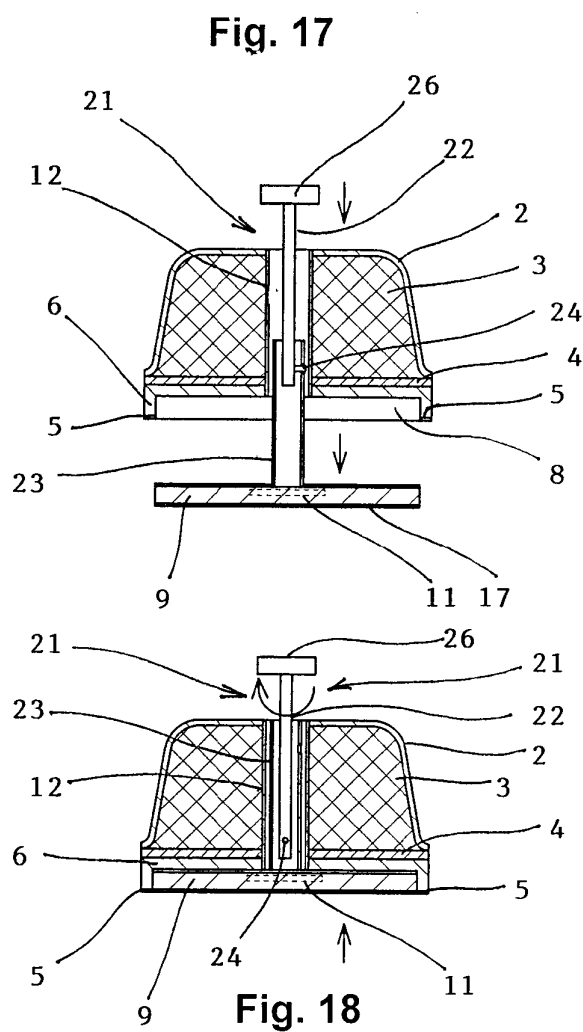
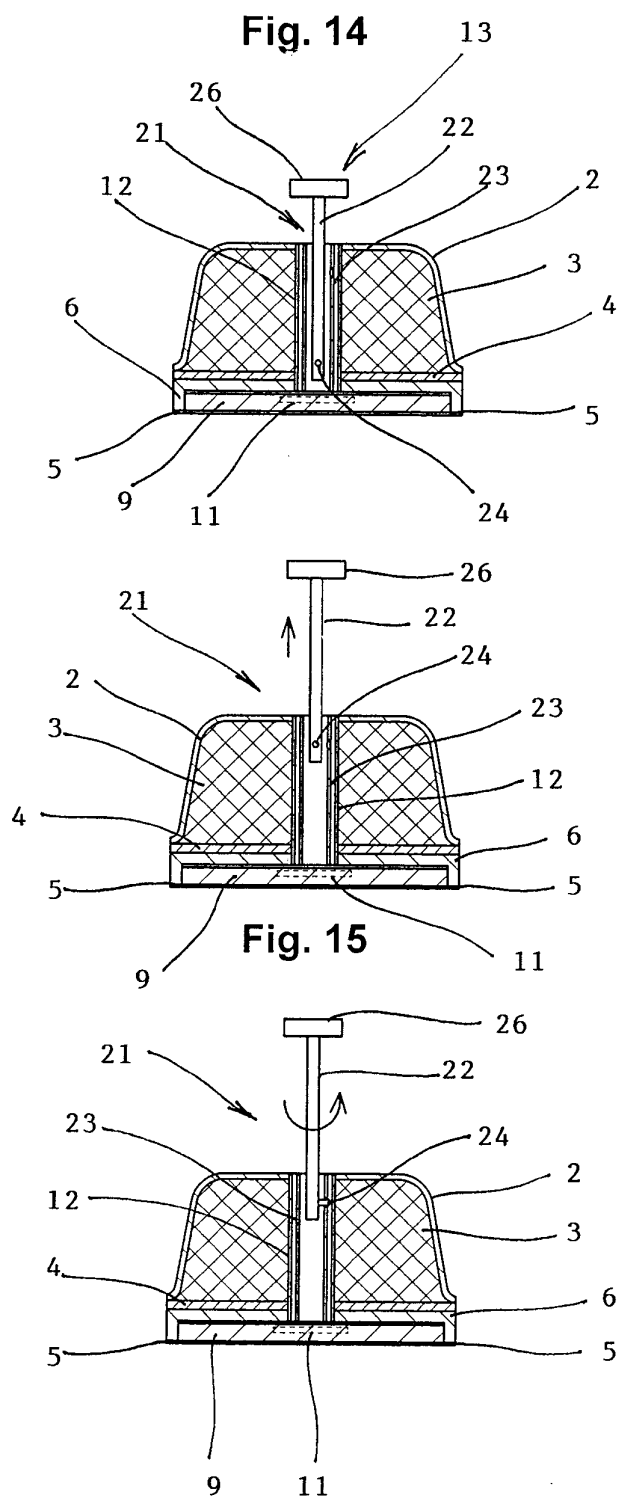


Fig. 19

Fig. 20

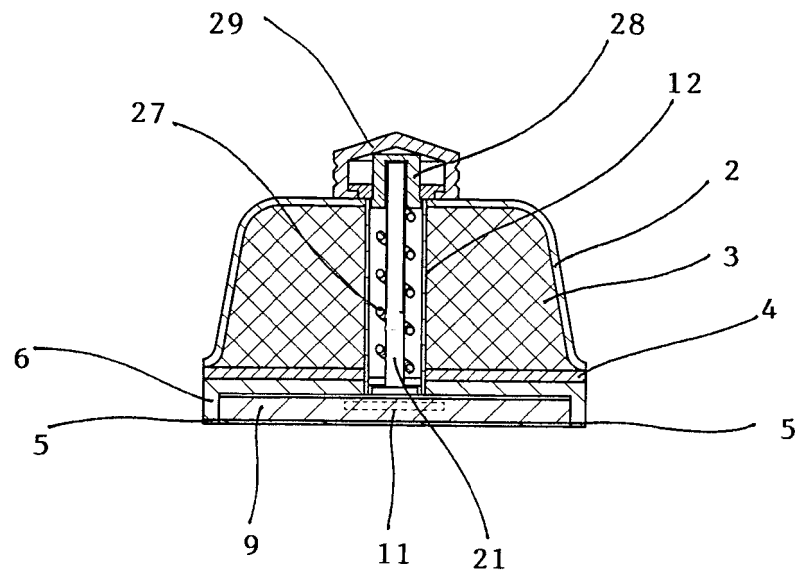
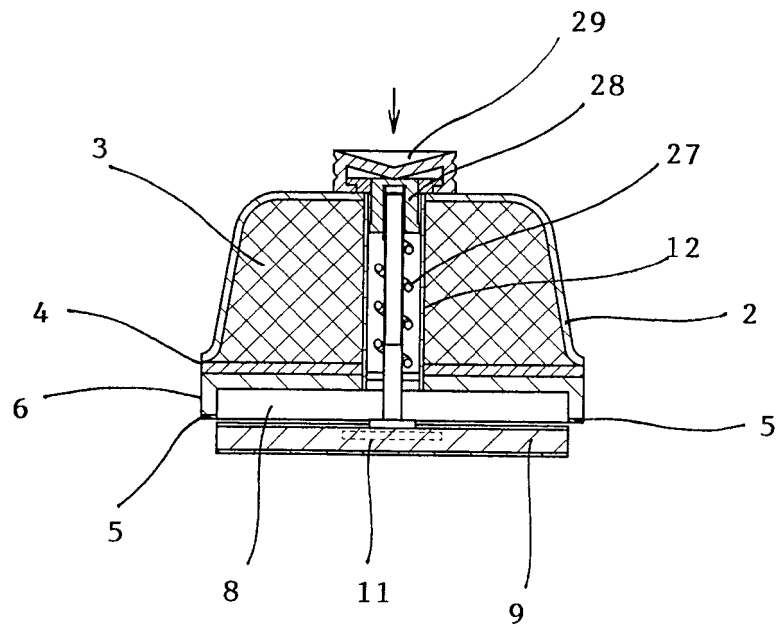


Fig. 21



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 4165886 A [0004]
- EP 0473898 A [0005] [0006]
- US 6659492 B [0006]
- WO 2004064949 A [0007]
- EP 2452729 B1 [0008] [0009] [0010] [0012]
- EP 2295120 B1 [0008] [0009] [0012]
- EP 2745886 A1 [0009]
- WO 2016046115 A1 [0010]
- EP 0664142 A1 [0011]