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(54) HYBRID DEVICE COMBINING SNOWSHOE AND SKI FUNCTIONS

(76) Inventors: **Lane Anthony Ekberg**, Salt Lake City, UT (US); **Troy Adam Ekberg**, Salt Lake City, UT (US); **David Jacob Wilson**, Pasco, WA (US); **Michael William Bryner**, Cedar Park, TX (US); **Phillip Neal Sharp**, Sll, UT (US)

Correspondence Address:
TROY ADAM EKBERG
7135 PONDEROSA DR.
SALT LAKE CITY, UT 84121 (US)

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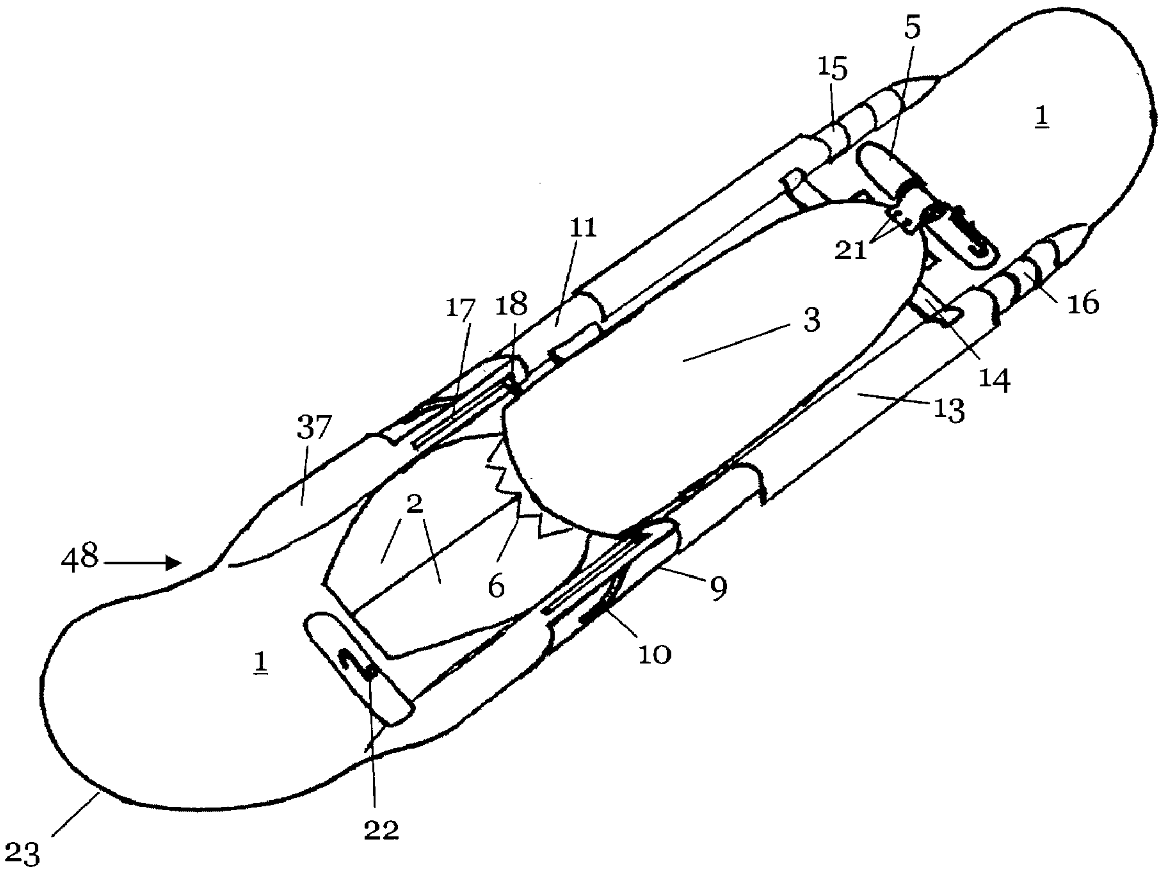
(57) ABSTRACT

A molded snowshoe of a high impact plastic material able to efficiently ascend inclines and yet incorporating the ability to change configuration such that the user can ski downhill. The device includes the ability for the position of the user's foot relative to the present invention to change during transformation from snowshoe mode to ski mode, thus actuating the rotation of wings ending in a position under the device to form a continuous ski-able surface. Snowshoeing is performed when the wings are rotated in an outward position, thus enabling the user's foot to have the freedom to rotate through the plane of the bottom surface of the present invention.



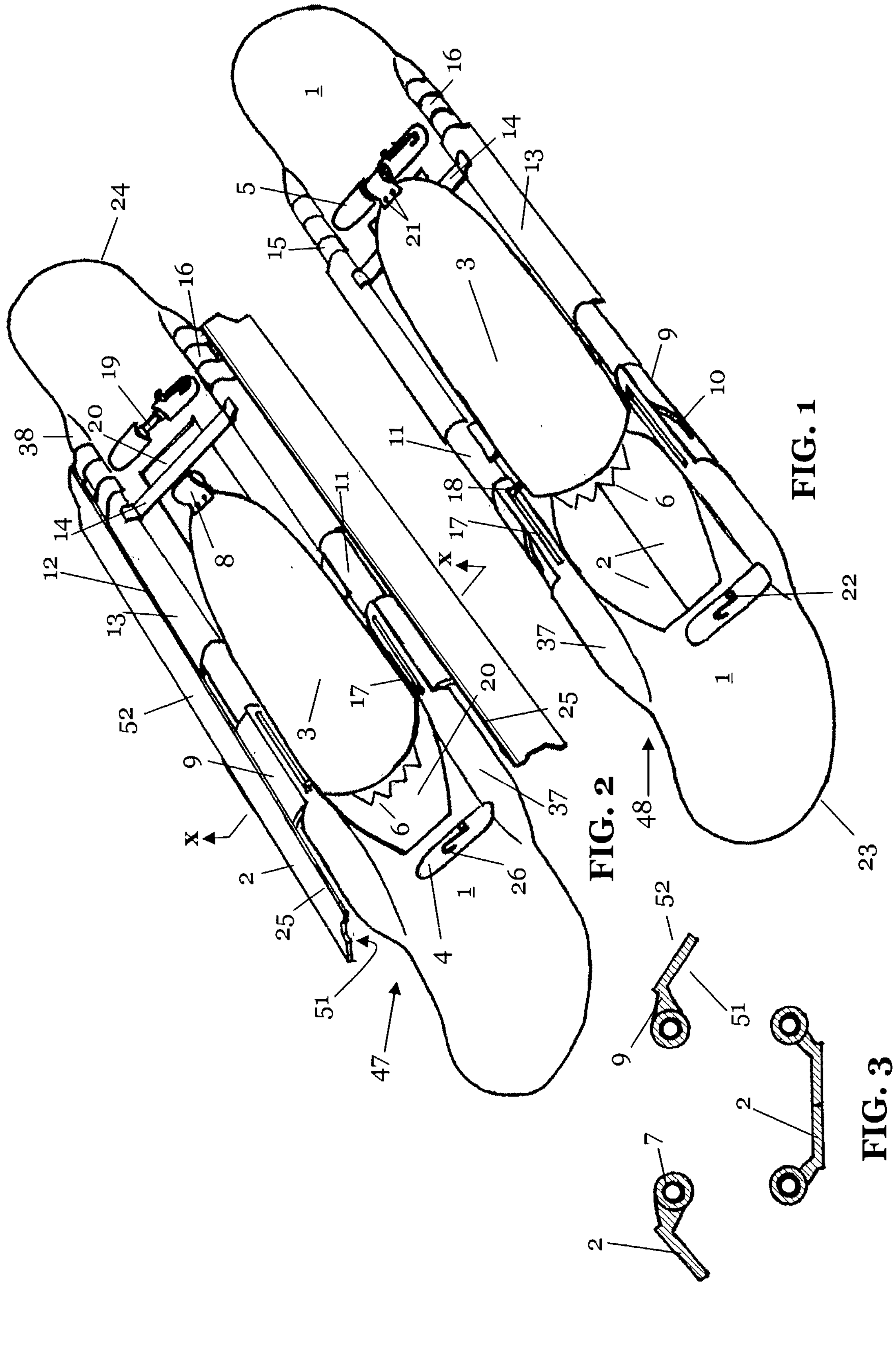


FIG. 1

FIG. 2

FIG. 3

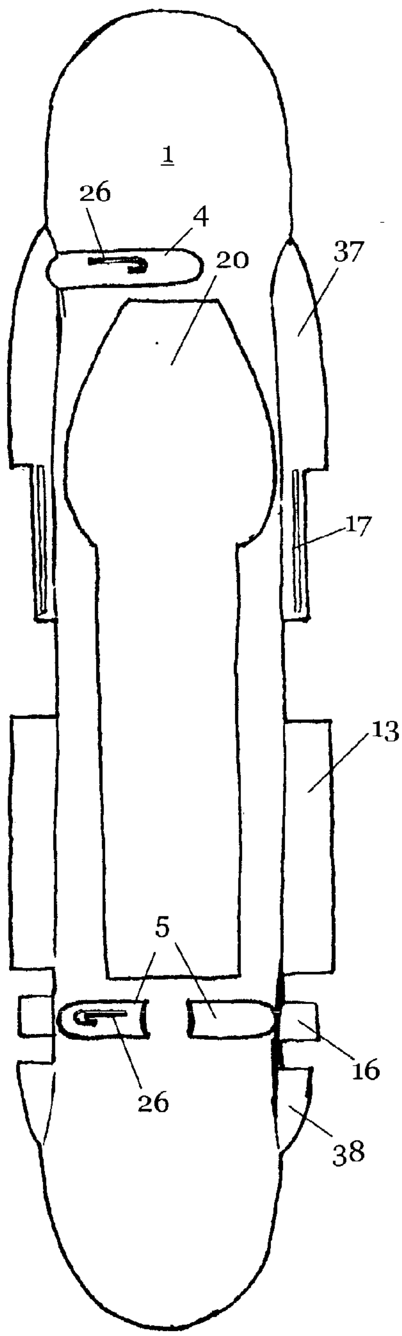


FIG. 4

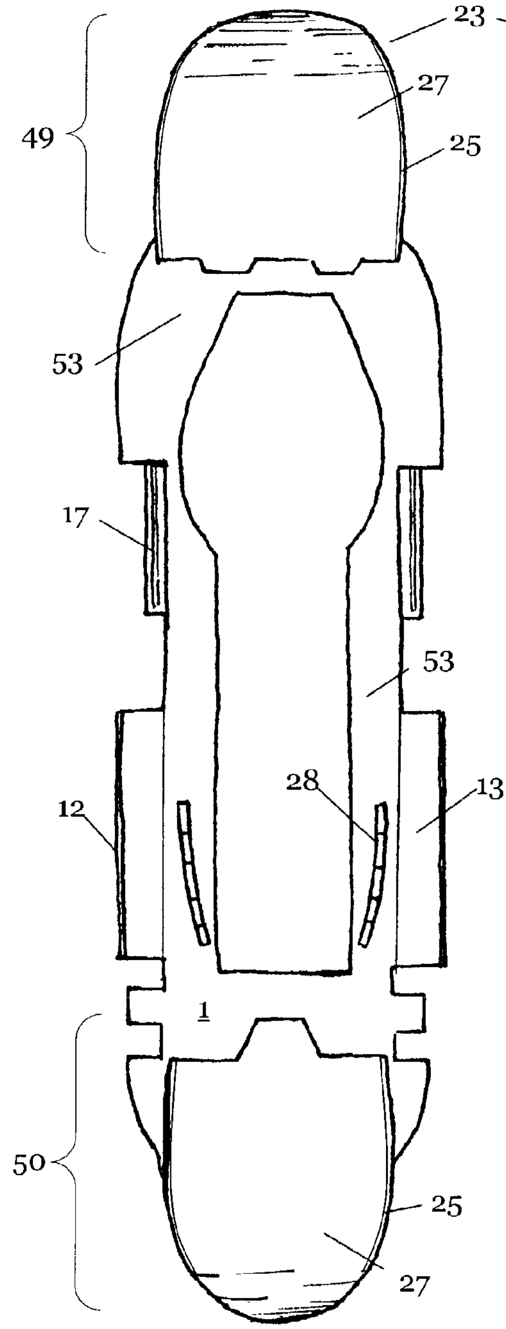


FIG. 5

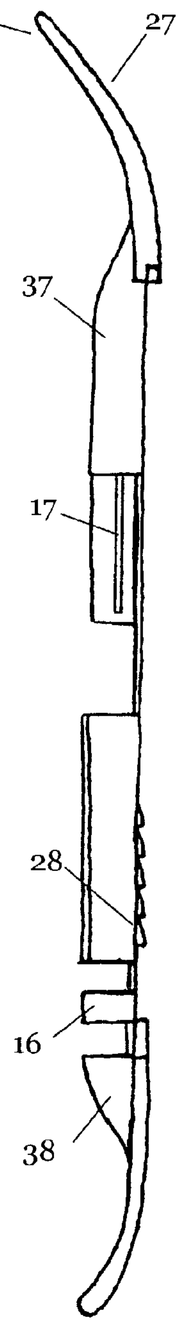
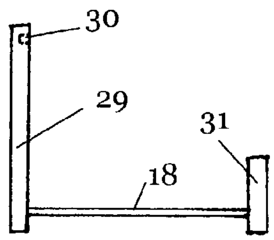


FIG. 6



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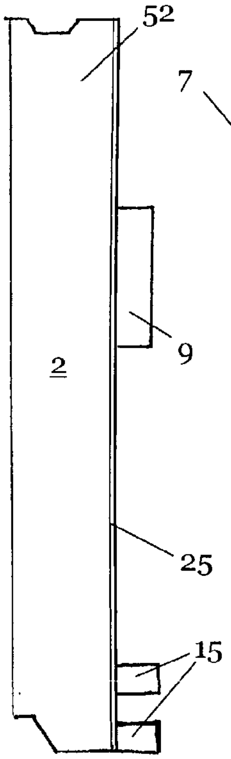
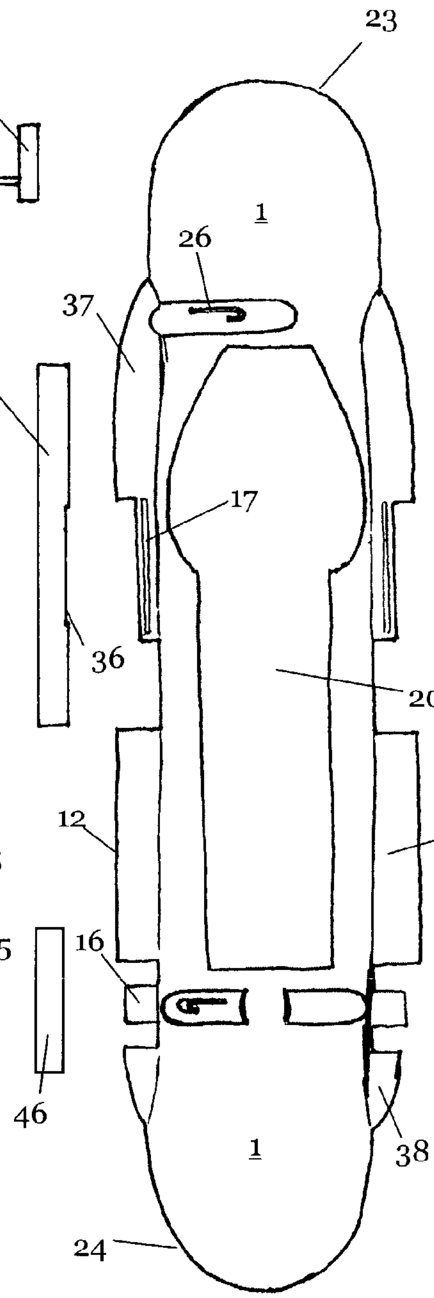


FIG. 8



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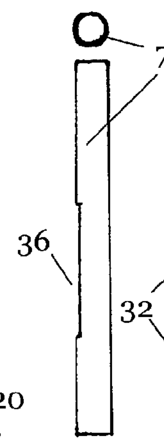


FIG. 9

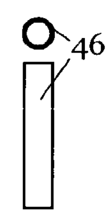


FIG. 10

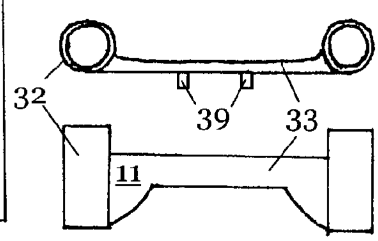
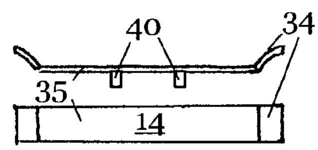


FIG. 11



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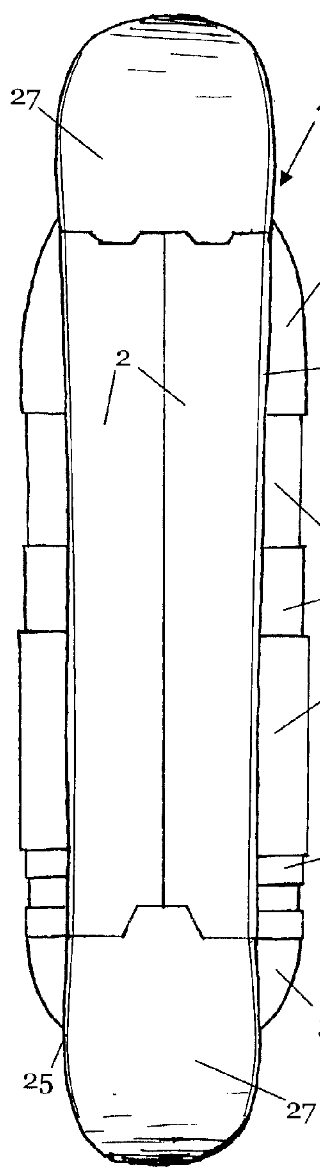

FIG. 13

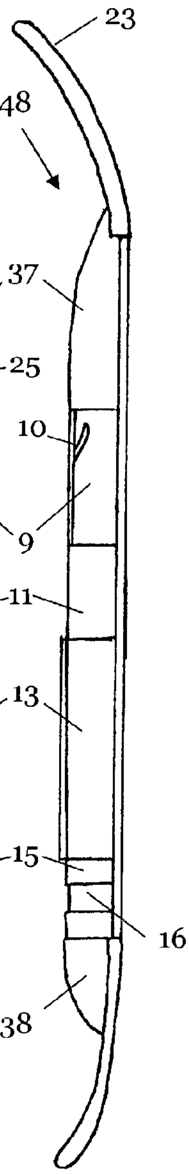

FIG. 14

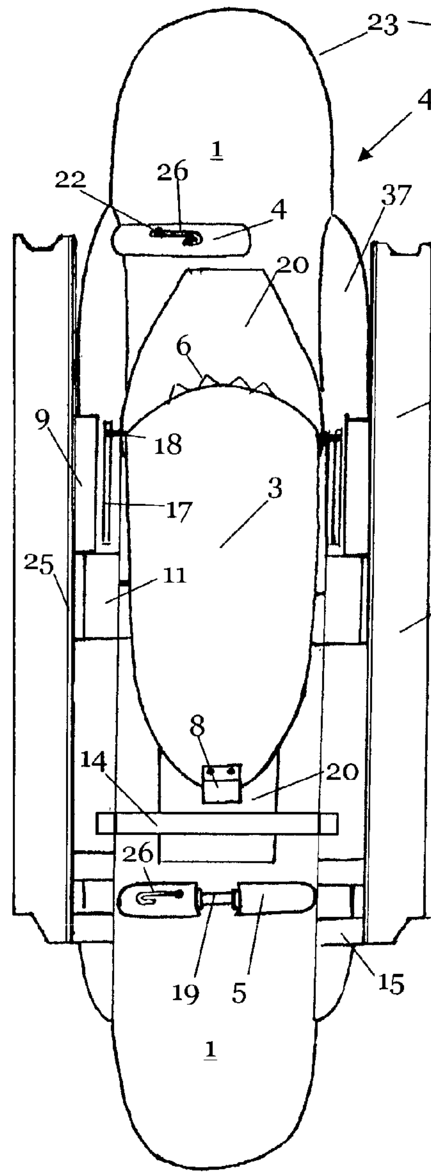

FIG. 15

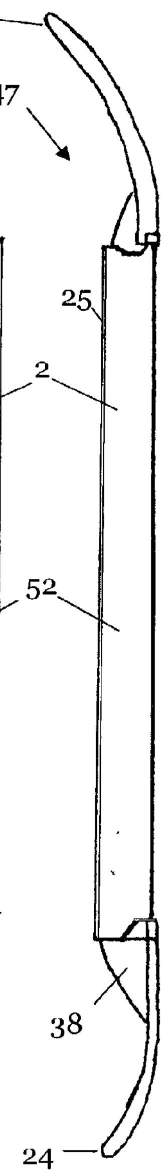

FIG. 16

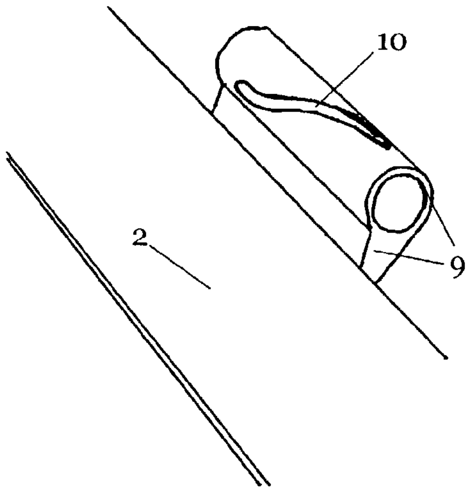

FIG. 17

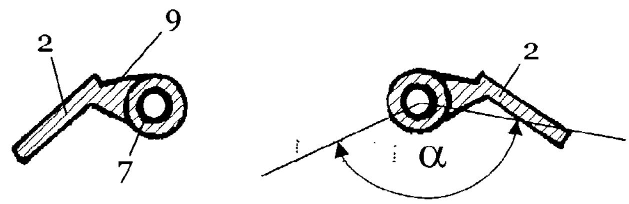

FIG. 18

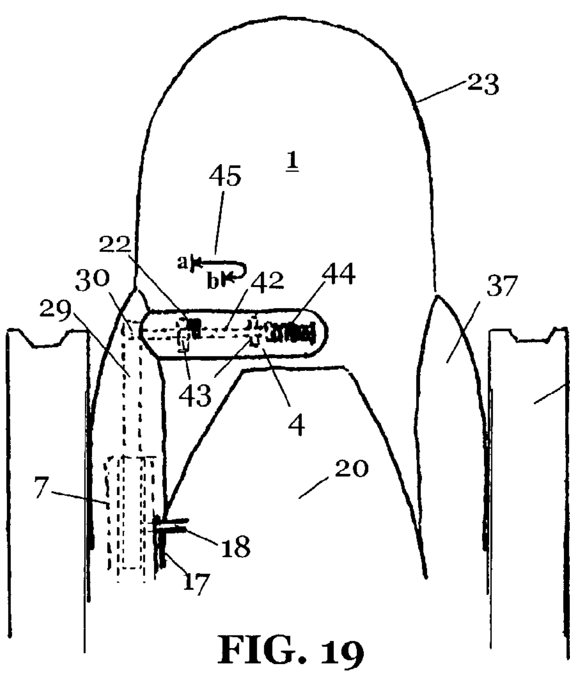

FIG. 19

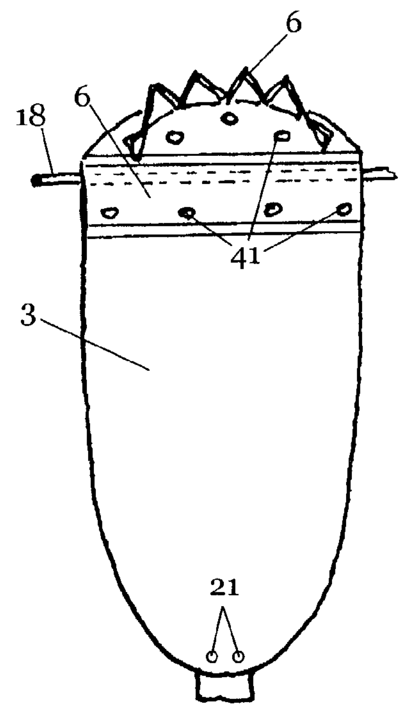

FIG. 20

HYBRID DEVICE COMBINING SNOWSHOE AND SKI FUNCTIONS

FIELD OF THE INVENTION

[0001] The present invention relates to the field of winter sports equipment, and more precisely to a device which allows a user to traverse snow-covered areas by hiking up inclines in a similar fashion as one may do with snowshoes and yet have the ability to quickly transform the device to slide down the incline much as one would do with skis.

BACKGROUND OF INVENTION

[0002] Snowshoeing is a popular winter sport that enables backcountry exploring, provides exercise, and is fun. Likewise, downhill skiing and snowboarding are winter sports that are enjoyed for many of the same reasons. Many have tried to combine these two sports by strapping their equipment to their backs, snowshoeing up a mountain, and skiing or snowboarding back down. The added weight and hassle of packing up the necessary gear is an obvious disadvantage of this activity.

[0003] Some bother doing this to avoid the lift tickets and crowds of ski resorts, and to find untracked snow. They snowshoe as a means to an end, so that they can primarily enjoy the activity of skiing or snowboarding. There are others, though, who are primarily interested in the activity of snowshoeing. They use their skiing equipment because they dislike the idea of hiking up a mountain only to hike back down later on. They also use it to increase their range and speed on snowshoes; they can travel farther and faster into the backcountry if they can ski down any hill they happen to summit.

[0004] It is primarily this latter group of users that the present invention would serve. The main objective of the invention is to function as a snowshoe. The advantage over traditional snowshoes is the ability to be quickly transformed into a ski.

[0005] Currently, there is a large range and variety of snowshoes of different composition, size, and shape. Each have a bearing surface significantly larger than the area contained on the sole of the users boot, thus allowing the user to better distribute the pressure corresponding to the user's weight. Likewise, many different ski configurations exist touting better maneuverability or quicker speed and possess a surface area much larger than the sole of the ski boot, again, to better distribute the user's weight. The invention will function similarly to snowshoes of similar size and configuration, and no attempt will be made to construct a ski with added utility. In fact, the invention will function as a ski considerably shorter than most existing skis.

[0006] U.S. Pat. No. 2,410,702, by Joseph A. Arsenault, discloses a device that equips a ski with the utility of a snowshoe. This transformation occurs as the folding side wings of the device are parallel to the skiing surface forming a snowshoe-like device. The device operates as a ski when the wings are at an angle with respect to the skiing surface. Each wing pivots about a pair of hinges. There are many limitations to the design of Arsenault. First, the wings of the device rotate as to come nearly in contact with the leg of the user, a less than ideal ergonomic design. Not only does this encumber the user, but it aids in the accumulation of snow on the device. Secondly, snowshoeing is most effective when the pivot point of the ball of the user's foot is able to rotate through the plane of the snowshoe's top surface, thus allowing the toe of the foot to grip or dig into the surface of the snow. This design by Arsenault does not contain this feature. Finally, it is more advantageous for the pivot point of the foot to be located about one-third of the length of the snowshoe away from the front of snowshoe. Most traditional snowshoes have this incorporated in their design as it requires less energy to walk or ascend hills; the shorter protruding front section is less of an encumbrance by both acquiring less snow and enabling better mobility. The present invention proposes to resolve these issues.

[0007] U.S. Pat. No. 3,861,698, by James W. Grieg, discloses a device which is a hollow lightweight plastic ski with an underside equipped with a series of transversely extending corrugations which are of wedge-shape to help resist rearward movement. Similar shortcomings are presented in this device by Grieg as with the device by Arsenault. Namely, the foot is unable to rotate through the plane of the skiing surface to allow for better traction and maneuverability. Also, the position of the foot relative to the snowshoe ski structure is fixed. Though it is beneficial to have the foot at or behind the midpoint of the ski, it is, as previously mentioned, inconvenient to have the foot located in this same location during walking or climbing movement. The present invention proposes to incorporate the translation of the foot position to accommodate for this need and allow for the rotation of the foot through the deck of the device when functioning as a snowshoe.

[0008] U.S. Pat. No. 5,944,334, by Zhen Zhao, discloses a device which contains a short gliding surface functioning as a ski adjacent to a bearing surface which when placed parallel to the surface of the snow serves as the snowshoe. More specifically, Zhao's device consists of giving the snowshoe a particular shape which allows it to fulfill both the function of support for walking over the surface of the snow on both flat surfaces and uphill, and yet contain the ability of sliding downhill. The transformation occurs when the device is rotated 90° onto its edge, which is tactically the skiing surface. Similar to U.S. Pat. No. 2,410,702, this device also proves to be ergonomically inconvenient as the edges of the device ride high on the legs of the user when in ski mode. In addition, the device by Zhao, as with the aforementioned disclosures, does not allow the user's foot to rotate through the plane of the snowshoe which aids in the traction or grip of the snow surface as seen in traditional snowshoes. Lastly, no attempt was made to place the user's foot in the position that is common to most traditional snowshoes. More specifically, the binding is placed approximately in the center of the length of the device thus impeding maneuverability. The present invention proposes to eliminate these inconveniences.

SUMMARY AND OBJECTIVES OF THE INVENTION

[0009] Disclosed herein is an invention which allows a user to traverse snow-covered areas by hiking up inclines in a similar fashion as one may do with snowshoes and yet have the ability to quickly transform the device to slide down the incline much as one would do with skis.

[0010] Hence, it is an objective of the present invention that the surface area is adequately large to distribute the pressure corresponding to the user's weight in a fashion facilitating effective movement over the surface or slightly below the surface of the snow.

[0011] Another objective of the present invention is the ability for the binding to rotate through the plane of the bottom surface of the device to allow for better maneuverability and traction when functioning as a snowshoe. The traction is obtained by the toe of the binding foot plate assembly, equipped with a steel crampon, digging into the surface of the snow or ice.

[0012] Another objective of the present invention, when functioning as a snowshoe, is to position the ball of the user's foot about one-third of the length of the snowshoe away from the front of the snowshoe to increase the ability of the user to manage snow-covered terrain. This feature creates a shorter protruding front section that tends to accumulate snow and encumber the user. It is more advantageous to have the majority of the length and weight behind the user's foot as the front of the device will tend to slope upwards with each step creating a more effective climb.

[0013] Yet another objective of the present invention is to provide the means to snowshoe effectively and efficiently across snow-covered terrain on horizontal or level surfaces, upwardly sloping terrain, and on downhill surfaces.

[0014] A further objective of the present invention is to be primarily molded from a lightweight, tough and somewhat rigid material, preferably a high impact plastic such as, but not limited to, thermosetting, polyurethane elastomer.

[0015] A yet further objective of the present invention is to change configuration from a snowshoe to a ski-able device without the removal or addition of separate parts.

[0016] An additional objective of the present invention is the ability of the binding foot plate assembly to change position relative to the main body of the present invention when undergoing transformation from snowshoe to ski. This translation also facilitates the movement of the wings from an outward, open position to a closed position folded under the device for skiing. As the metal axle, the pivot point of the binding foot plate assembly, moves through a helical groove, the wings are forced to rotate. This further aids in the ease and efficiency of transformation.

[0017] Another objective of the present invention is to possess the means to attach the user's boot to the device. There are several methods of attaching or binding a user's boot to a ski or snowshoe. It is not the purpose of this disclosure to delineate any preferential method.

[0018] Yet another objective of the present invention when functioning as a ski is to possess sufficient stability to allow the user to effectively maintain proper balance. This is facilitated by means of narrowing the width of the ski-able surface such that it is less than the overall width of the device and by placing the ski-able surface directly under the user's foot.

[0019] A further objective of the present invention, when functioning as a ski, is to position the ball of the foot closer to the midpoint of the device than when in snowshoe mode. Stability is more easily attained by such a placement.

[0020] A yet further objective of the present invention is to possess surfaces with a low coefficient of friction when in contact with snow. Such surfaces will be contained on the surface of the wings fashioned to act as skiing surfaces and on the front and rear sections of the device.

[0021] An additional objective of the present invention is to possess edging on the surfaces used for skiing. Such ridges or edges will be contained on the surface of the wings, fashioned to act as skiing surfaces, and on the front and rear sections of the device. Preferably, the edging material will be a type of strong, rigid metal.

[0022] Another objective of the present invention is to provide an upturned, curved front section that would enable the device to better maneuver through snow both when skiing and when snowshoeing.

[0023] A fuller understanding of the embodiment of the present invention with its objectives, and the advantages which result there from, will emerge more clearly from the following detailed description, and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] **FIG. 1** is a top perspective view of the present invention with the wings rotated under to allow the invention to function as a ski;

[0025] **FIG. 2** is a top perspective view of the present invention with the wings rotated in an outward position allowing the invention to function as a snowshoe;

[0026] **FIG. 3** is a cross sectional view taken on line x-x of **FIG. 2** with the body of the invention and the binding assembly omitted, which discloses the position of the wings when snowshoeing and when skiing;

[0027] **FIG. 4** is a top plan view of the main body of the invention to be molded from a high impact plastic material;

[0028] **FIG. 5** is a bottom plan view of the main body of the invention to be molded from a high impact plastic material;

[0029] **FIG. 6** is a right side plan view of the main body of the invention to be molded from a high impact plastic material;

[0030] **FIG. 7** is a top plan view of a sliding mechanism used for the translation of the binding foot plate assembly;

[0031] **FIG. 8** is a top plan view of a wing of the invention;

[0032] **FIG. 9** is a top plan view and front elevation view of a tube with slot;

[0033] **FIG. 10** is a top plan view and front elevation view of a tube for a rear hinge;

[0034] **FIG. 11** is a top plan view and front elevation view of the front support member;

[0035] **FIG. 12** is a top plan view and front elevation view of the rear support member;

[0036] **FIG. 13** is a bottom plan view of the present invention with the wings in a position to allow the device function as a ski;

[0037] **FIG. 14** is a right side plan view of the present invention with the wings in a position to allow the device to function as a ski;

[0038] **FIG. 15** is a top plan view of the present invention with the wings rotated in an outward position to allow the device to function as a snowshoe;

[0039] **FIG. 16** is a right side plan view of the present invention with the wings rotated in an outward position to allow the device to function as a snowshoe;

[0040] **FIG. 17** is a top perspective view of the wing and helical groove appendage;

[0041] **FIG. 18** is a cross sectional view taken on line x-x of **FIG. 2** with the body and the binding assembly omitted to show the possible angle of rotation of the wings;

[0042] **FIG. 19** is a top plan view of the present invention to disclose a possible locking mechanism to prohibit translation of the binding foot plate assembly;

[0043] **FIG. 20** is a bottom plan view of the binding foot plate assembly

DETAILED DESCRIPTION OF THE INVENTION

[0044] The hybrid snowshoe-ski device embodying the present invention is generally indicated by **47** and **48**, which disclose the device functioning as a snowshoe and ski, respectively. Clearly, there are many different permutations in architecture which make it possible to maintain the spirit of the present invention, and this invention is not limited to **47** and **48** or the illustrations which follow.

[0045] Thus, the hybrid snowshoe-ski device consists of a body **1** of a generally elongated shape with half-elliptical ends **23**, **24** molded preferably from a tough rigid material, preferably a high impact plastic such as, but not limited to, thermosetting, polyurethane elastomer. Both ends **23**, **24** curve upwards, the curve made by the front side **23** being more pronounced.

[0046] As can be seen in **FIGS. 4, 5** and **6**, the body **1** consists generally of a deck and side members **37, 13, 16, 38** which aid in structural rigidity and assist in other functions as will be described below. An opening **20** has a defined shape limited by the ability of the binding foot plate assembly **3** with boot attached to rotate through the plane of the deck, the wings **2** to fold under the device with collected snow and yet optimize the amount of plastic material used in the body **1**. In other words, the opening **20** also aids in allowing the wings **2** to form the ski configuration as accumulated snow is less likely to get trapped between the wings **2** and the body **1**.

[0047] As illustrated in **FIG. 5**, the bottom bearing surface **27** of the front section **49** and the rear section **50** possess a low coefficient of friction surface to better enable the device to glide over the surface of the snow in the act of skiing. It may, for example, be a sole made of a material used to make skis, but is not required as the plastic material may already possess a surface with the required coefficient of friction. **FIG. 8** reveals the bearing surface **52** of one of the wings **2** which is to be constructed from the same material as the bottom bearing surface **27** of sections **49** and **50**, thus possessing the same coefficient of friction (see also **FIG. 13**).

[0048] In addition, surfaces **27** may contain metal ridges **25** to aid in turning on hard packed snow or ice, and helping to protect the bearing surface from wear. Likewise, metal edging **25** may be present on the wings **2**.

[0049] Besides providing greater structural support, side members **37** are necessary to hold tubes **7**, possibly of aluminum, in place. Thus, side members **37** are virtually hollow cylindrical tubes with an inner diameter large enough to accommodate tubing **7**. The grooves **36** cut into tubes **7** create boundaries for the metal axle **18** to slide across. The large rod **29** and small rod **31** connected by the metal axle **18** (**FIG. 7**) slide within tubing **7**, which is contained within the side members **37**. The metal axle **18** slides also through additional grooves **17** made in side members **37**. The other end of tubes **7** are attached to the front support member **11**.

[0050] As best seen in **FIGS. 2 and 15**, side members **13** come in contact with the wings **2** along surface **12** restricting further rotation and helping to better distribute forces induced on the wings **2** while snowshoeing. The side members **13** are convex in shape.

[0051] Similar to side members **37**, side members **16** and **38** are virtually hollow cylinders with the purpose of accommodating smaller diameter tubing. Tubes **46** (**FIG. 10**) fit into side members **16** and **38**.

[0052] Locking mechanisms are contained in the curved shaped protrusions **4** and **5**, though the locking mechanism is omitted in **FIG. 4**. It is anticipated, but not required, that the curved shaped protrusions **4,5** are molded separately and later cemented into their respective positions as shown, after the locking mechanisms (**FIG. 19**) are installed. Groove **26** is provided to allow the engagement and disengagement of the locking mechanism by means of a sliding lever **22** attached to a pin **42** (**FIG. 19**).

[0053] The hybrid device according to the present invention is used as a snowshoe as follows.

[0054] When the user desires to walk or hike through snow-covered terrain whether uphill or on a horizontal, flat surface, the user places the hybrid device flat, that is to say with the bearing surfaces **27, 51, 53** in contact with the snow as illustrated in **FIG. 2** or **15**.

[0055] The user then fastens his boots to the binding foot plate **3** on the hybrid device and walks or hikes as he would with traditional snowshoes.

[0056] The binding foot plate **3** in **FIG. 20** rotates about the metal axle **18** allowing crampon **6** to dig or grip into the snow or ice and enables a more natural walk. The crampon **6** may be fastened to the binding foot plate by means of rivets **41**. In addition, optional teeth **28** can be part of the design to help gain more traction on snow or ice. And surface **50** on wings **2** may contain ribbing or corrugations to further increase resistance to rearward movement.

[0057] While walking or momentarily standing, the force generated by the user can be distributed through the metal axle **18** or through the front support member **11** when the heel of the binding foot plate is in contact with the front support member **11** (**FIG. 11**).

[0058] The hybrid device is locked in snowshoe mode when pin **42** is inserted into the hole **30** on rod **29** as shown in **FIG. 19** (see also **FIG. 7**). The pin **42** is forced into the hole **30** by means of a spring **44**. To disengage the front locking mechanism the lever **22** is translated from position a to position b as shown in **45** which is the path formed by following groove **26**. The pin rests on bushings **43** which are fixed between the body of the hybrid device and the curved shaped protrusion **4**.

[**0059**] The user can transform the hybrid device to use as a ski as follows.

[**0060**] Once the front locking mechanism is disengaged, the binding assembly is free to move towards the rear of the hybrid device. Rods **29** and **31** slide through tubes **7**, as also the metal axle **18** slides along grooves **36** and **17**. In addition, the attached binding plate **3** translates until the heel piece **8** is locked into place by the rear locking mechanism as shown in **FIG. 1**. This process of moving the foot binding plate **3** towards the rear of the hybrid device constrains the wings **2** to rotate by means of the helical groove **10** located on the helical groove appendage **9** (**FIG. 17**).

[**0061**] Typically, the angle α of rotation, as seen in **FIG. 18**, is between 120° and 180°, and preferably in the region of 150°. This angle α is defined by the angle covered by the helical groove **10**.

[**0062**] The position of the wings from snowshoe to ski is illustrated from the cross-sections in **FIG. 3**, the top and bottom illustrations revealing snowshoe and ski configurations respectively.

[**0063**] To assist in the rotation of the wings **2** are the rear hinges that consist of side members **16** and **38**. The rear collar appendages **15** are aligned with the side members **16** and **38** and the tubes **46** are inserted through the cylindrical holes contained in each of the members and collar appendages. The assembled hinge can be seen in **FIGS. 1, 2, 13, 14** and **15**.

[**0064**] The rear locking mechanism contained in **5** (not shown) performs in a similar manner to the front locking mechanism as outlined above with a notable exception being the pin **19** is of a larger diameter than pin **42**.

[**0065**] The foot binding plate when in ski mode rests on the rear support member **14** (**FIG. 12**) to better distribute the user's weight. In addition, tabs **39** and **40**, which come in contact with the wings when in ski mode, help to better distribute the forces exerted on the bearing surfaces **52** of the wings **2**.

[**0066**] Once the transformation of the configuration of the hybrid device is complete, the user progresses over the gliding slope. As seen in **FIG. 13**, the bearing surfaces **27** and **52** form a smooth skiing surface complete with gradually arcing sides and metal edges **25**.

[**0067**] The above description shows that the hybrid snowshoe-ski device makes it possible to traverse snow-covered areas by hiking up inclines in a similar fashion as one may do with snowshoes and yet have the ability to quickly transform the device to slide down the incline much as one would do with skis, thus enabling the user to experience snowshoeing and skiing in a manner previously unknown.

We claim:

1. A hybrid device for a user to traverse snow-covered inclines and, after a change in configuration, to ski stably downhill, said device comprising:

a body member of a generally elongated shape with half-elliptical ends both upwardly curved, longitudinally extending side members, and an upper surface and lower, bearing surfaces;

a pair of front tubes, to be placed within said side members, with a portion removed along the side of said tubes parallel to said tubes' axes, thus forming a groove;

a pair of short rear tubes to be placed within said side members;

a pair of wings of essentially rectangular shape with a bearing surface and means to connect to said front tubes and said short rear tubes by collar appendages and helical groove appendages;

an internal sliding assembly, consisting essentially of a long cylindrical rod and a short cylindrical rod connected by a smaller diameter metal axle, which is to slide within said front tubes;

a binding foot plate assembly, consisting essentially of a foot binding plate, a crampon, and a heal piece to assist in locking said binding foot plate assembly into a ski configuration, wherein said crampon attaches said binding foot plate assembly to said metal axle;

a means for fastening a user's boot to said binding foot plate assembly;

a front locking mechanism, consisting essentially of a spring, a pin, bushings, and a lever, to lock said hybrid device into a snowshoe configuration;

a rear locking mechanism, consisting essentially of a spring, a pin, bushings, and a lever, to lock said hybrid device into a ski configuration;

a front support member, with tabs to come in contact with said wings, which bears forces applied by said binding foot plate assembly's heal when in snowshoe configuration;

a rear support member, with tabs to come in contact with said wings, which bears forces applied by said binding foot plate assembly's heal when in ski configuration.

2. A hybrid device according to claim 1, wherein said body member is molded from a tough rigid material, preferably a high impact plastic such as, but not limited to, thermosetting, polyurethane elastomer.

3. A hybrid device according to claim 1, wherein said lower bearing surfaces consists of two types of surfaces, a first bearing surface of a sufficiently low coefficient of friction to enable a user to glide over the surface of the snow and a second bearing surface, with a higher value for the coefficient of friction, which is exposed only when said hybrid device is in snowshoe configuration.

4. A hybrid device according to claim 3, wherein said first bearing surface is located in the front and rear sections of said hybrid device.

5. A hybrid device according to claim 3, wherein said first bearing surface is slightly recessed from said second bearing surface to allow said wings to fold under said body member in a manner creating a continuous smooth bearing surface.

6. A hybrid device according to claim 3, wherein said first bearing surface has an edge, possibly ridges constructed from a metal material.

7. A hybrid device according to claim 1, wherein said side members contain grooves longitudinally formed for translation of said metal axle of said internal sliding assembly.

8. A hybrid device according to claim 1, wherein said side members contain a section extending out at a sufficient distance to come in contact with said wings when said hybrid device is in snowshoe configuration.

9. A hybrid device according to claim 1, wherein said side members are formed to allow said tubes to be contained within said side members.

10. A hybrid device according to claim 1, wherein said wings are molded from a tough rigid material, preferably a high impact plastic such as, but not limited to, thermosetting, polyurethane elastomer.

11. A hybrid device according to claim 1, wherein said wings posses two bearing surfaces, one smooth surface with a low coefficient of friction for said hybrid device in ski configuration and a more rough surface, with possible ribbing or other means to add traction, for said hybrid device in snowshoe configuration.

12. A hybrid device according to claim 11, wherein said smooth surface has an edge, possibly a ridge constructed from a metal material.

13. A hybrid device according to claim 1, wherein said wings rotate about said front tubes and said rear short tubes.

14. A hybrid device according to claim 13, wherein the angle of rotation, measured between the positions of said wings when in ski configuration and when said wings are in snowshoe configuration, is between 120°and 180°.

15. A hybrid device according to claim 14, wherein the angle of rotation, measured between the positions of said wings when in ski configuration and when said wings are in snowshoe configuration, is about 150°.

16. A hybrid device according to claim 13, wherein said wings are folded under said hybrid device, parallel to said second bearing surface when functioning as a ski.

17. A hybrid device according to claim 1, wherein the position of said metal axle is about one-third of the total length of said hybrid device away from the front of said hybrid device when functioning as a snowshoe.

18. A hybrid device according to claim 1, wherein the position of said metal axle is shifted away from the front of said hybrid device to a new position closer to the midpoint of said hybrid device when functioning as a ski.

19. A hybrid device according to claim 1, wherein said binding foot plate assembly is free to rotate about said metal axle when in snowshoe mode allowing said crampon to dig into the snow surface.

20. A hybrid device according to claim 1, wherein said binding foot plate assembly is restricted from rotation by means of said rear locking mechanism when in ski mode.

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