US 20170296905A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2017/0296905 A1**

(43) **Pub. Date: Oct. 19, 2017**

ELPHICK

(54) **RIDABLE BOARD ASSEMBLIES AND COMPONENTS THEREOF**

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(21) Appl. No.: **15/636,179**

(22) Filed: **Jun. 28, 2017**

Related U.S. Application Data

(63) Continuation of application No. 14/909,229, filed on Feb. 1, 2016, now Pat. No. 9,717,976, filed as application No. PCT/AU2014/000769 on Aug. 1, 2014.

(30) **Foreign Application Priority Data**

Aug. 1, 2013 (AU) 2013902864

Publication Classification

(51) **Int. Cl.**
A63C 5/03 (2006.01)

(52) **U.S. Cl.**
CPC *A63C 5/031* (2013.01)

(57) **ABSTRACT**

A snowboard assembly is disclosed that includes a deck supported above a pair of longitudinally spaced apart blades. The deck has an upper surface for supporting a rider thereon and each blade has a lower surface for contacting ice or snow upon which the snowboard assembly is ridden. The deck is supported above the blades by mounts that are interposed between each blade and the deck. The deck is torsionally rigid between the mounts such that, in use, rider induced weight transfer forces are able to be transferred from the deck through one or both mounts and into one or both blades in order to steer the assembly. The mounts may be truck assemblies which enable the blades to move independently with respect to the deck.

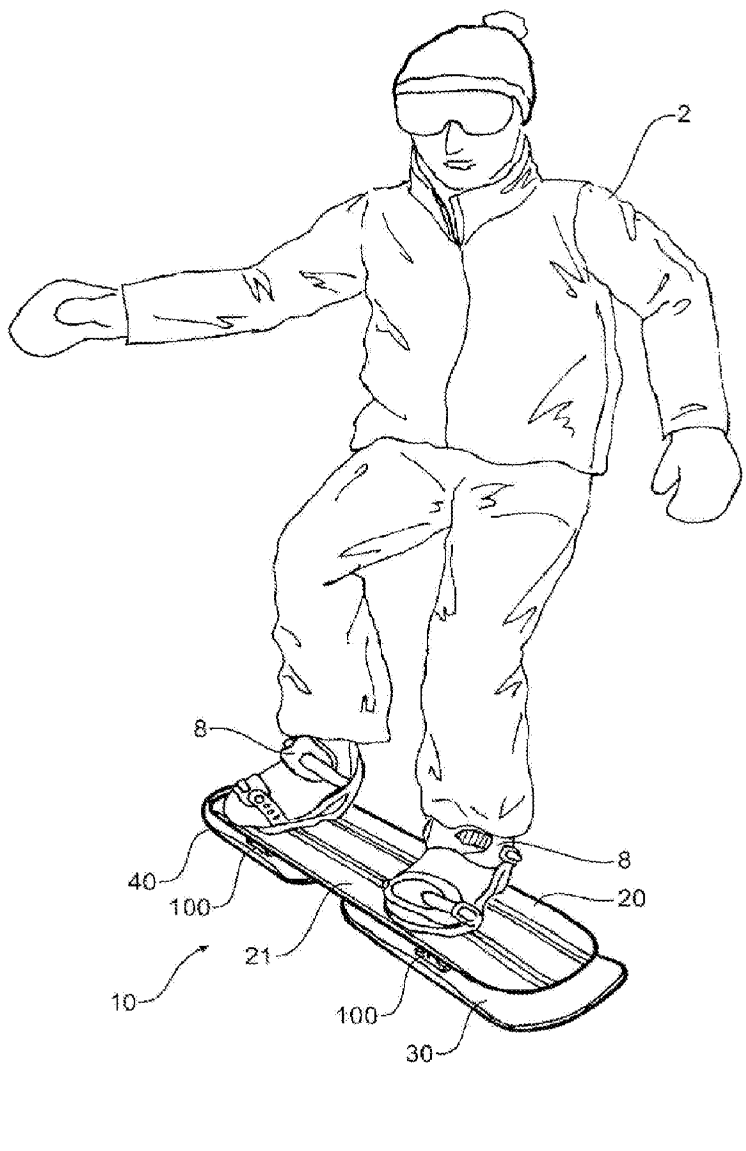
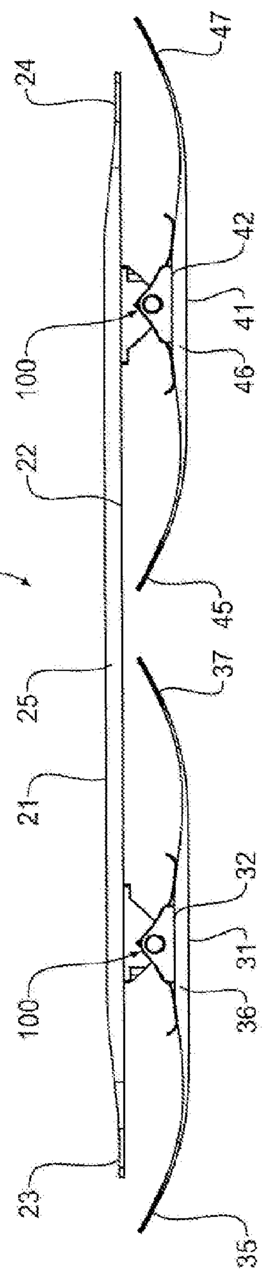


Figure 1



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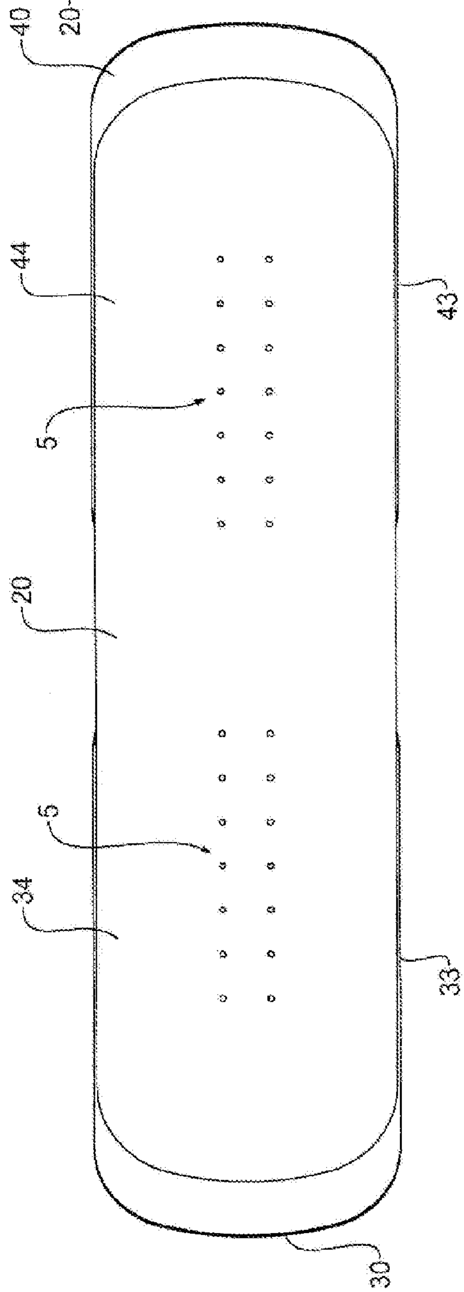

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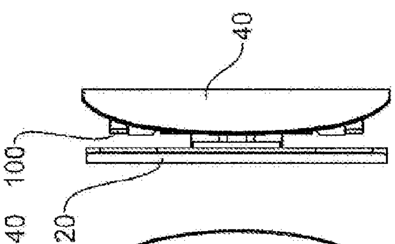

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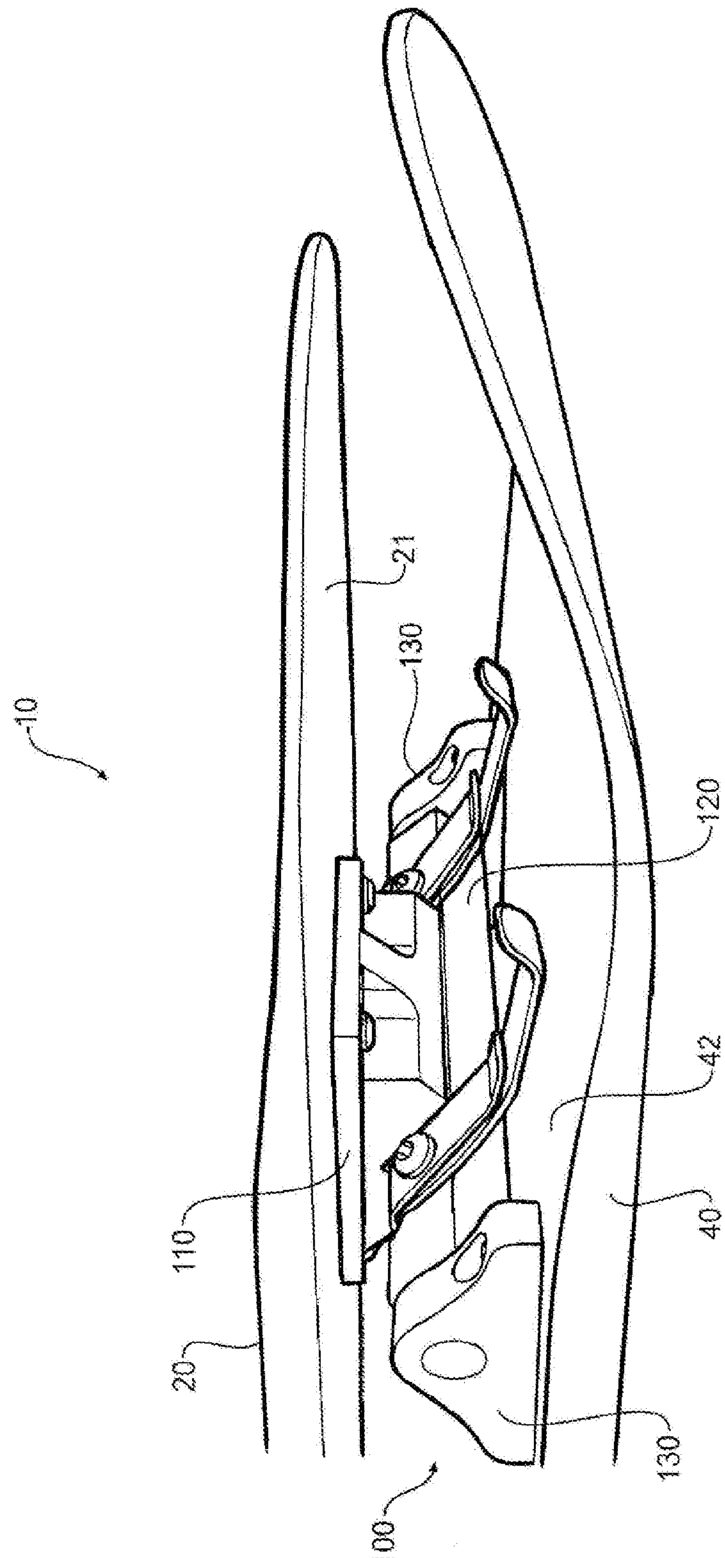

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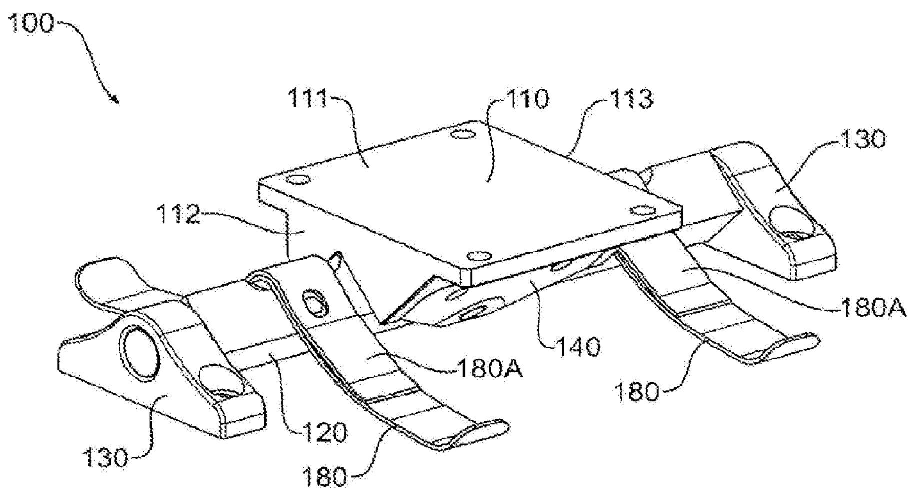


Figure 6A

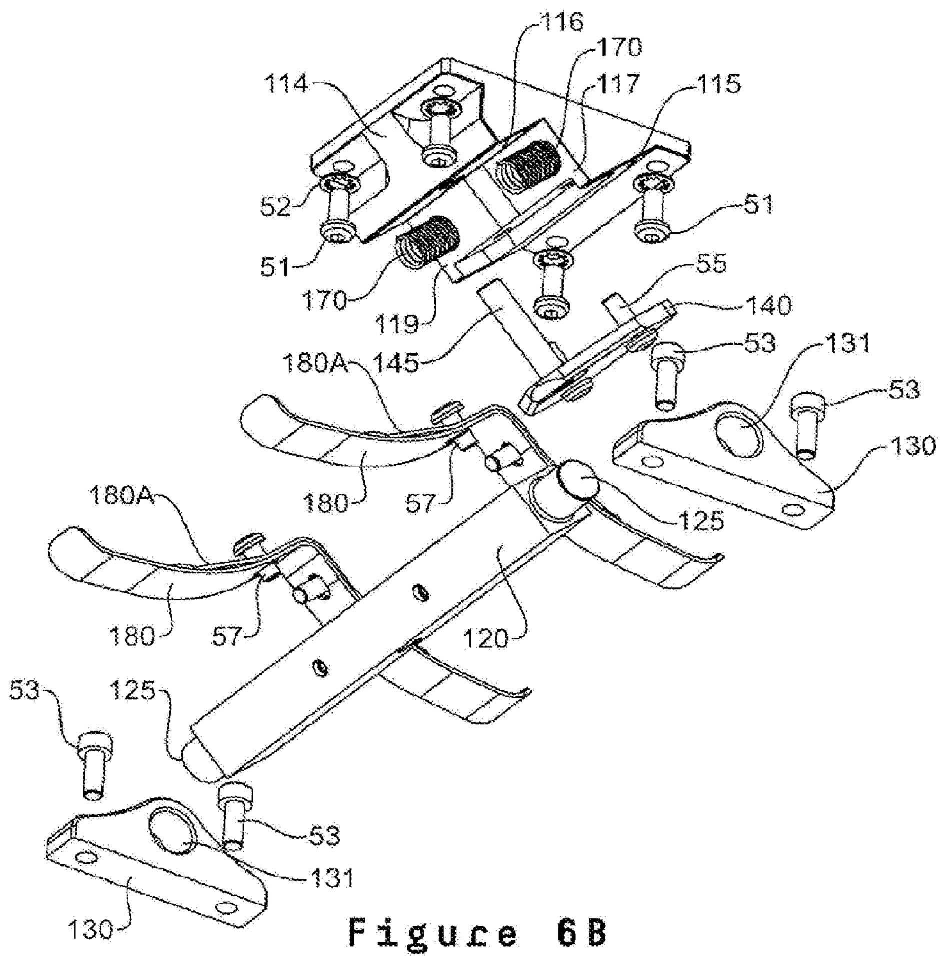
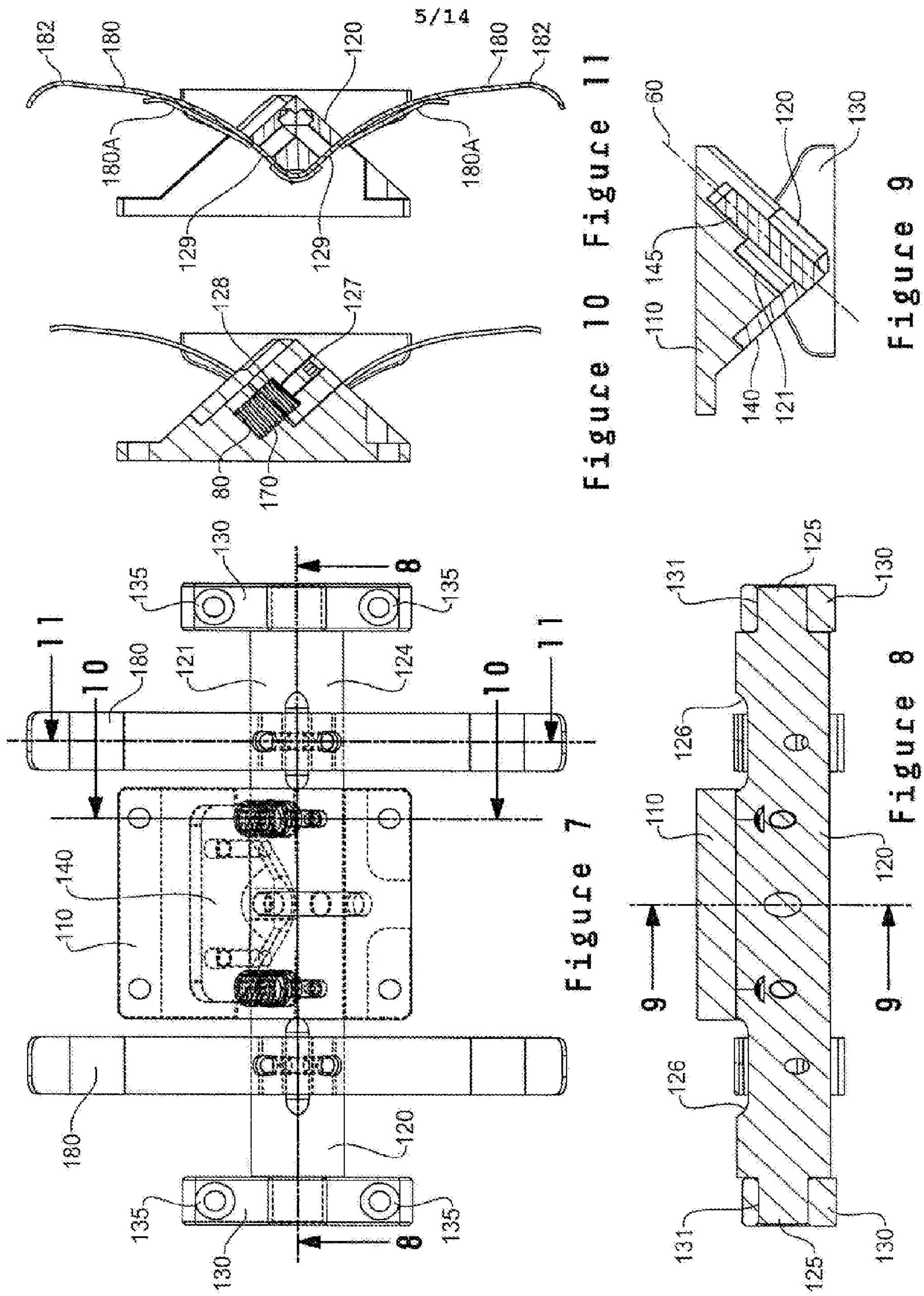


Figure 6B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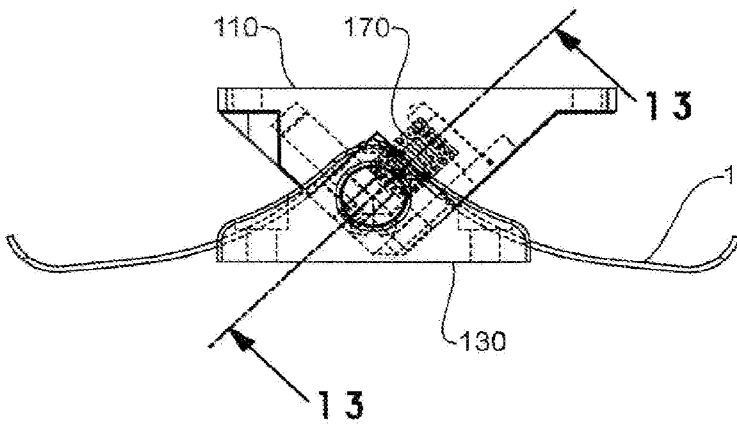

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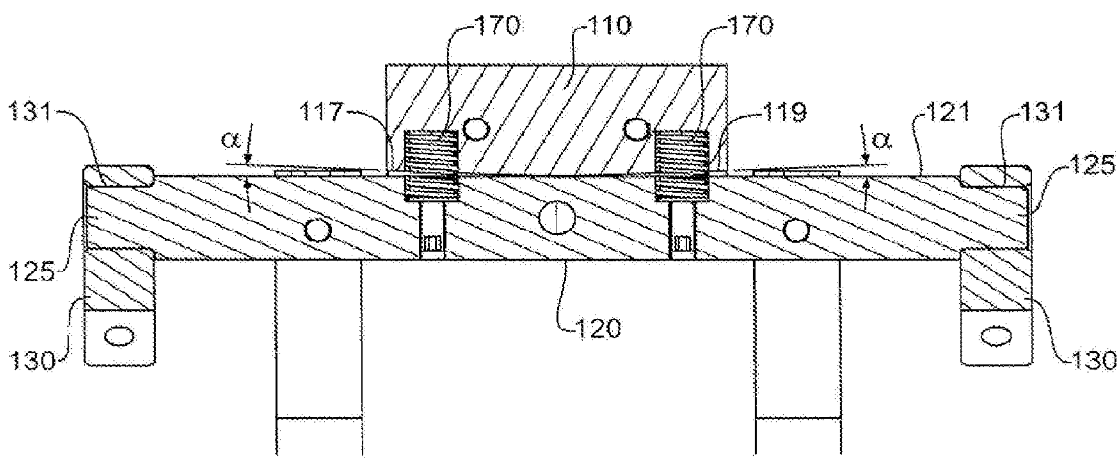

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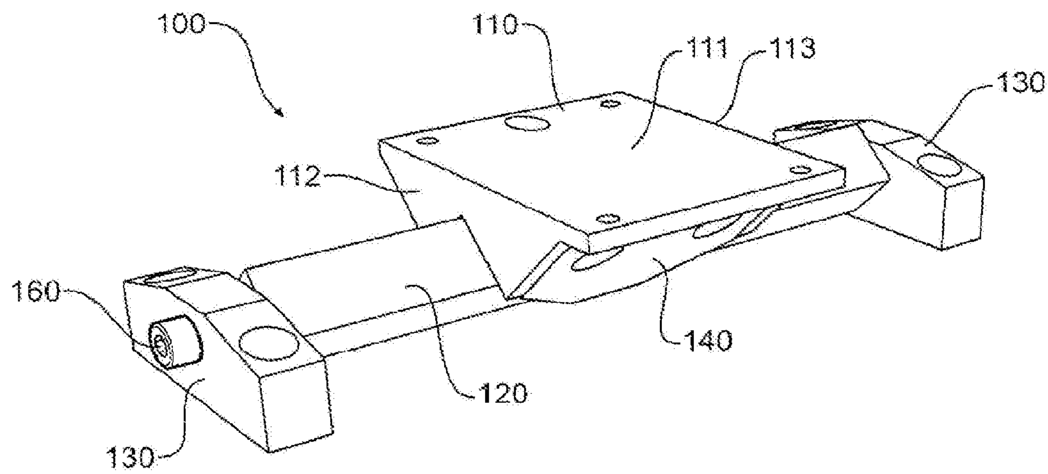

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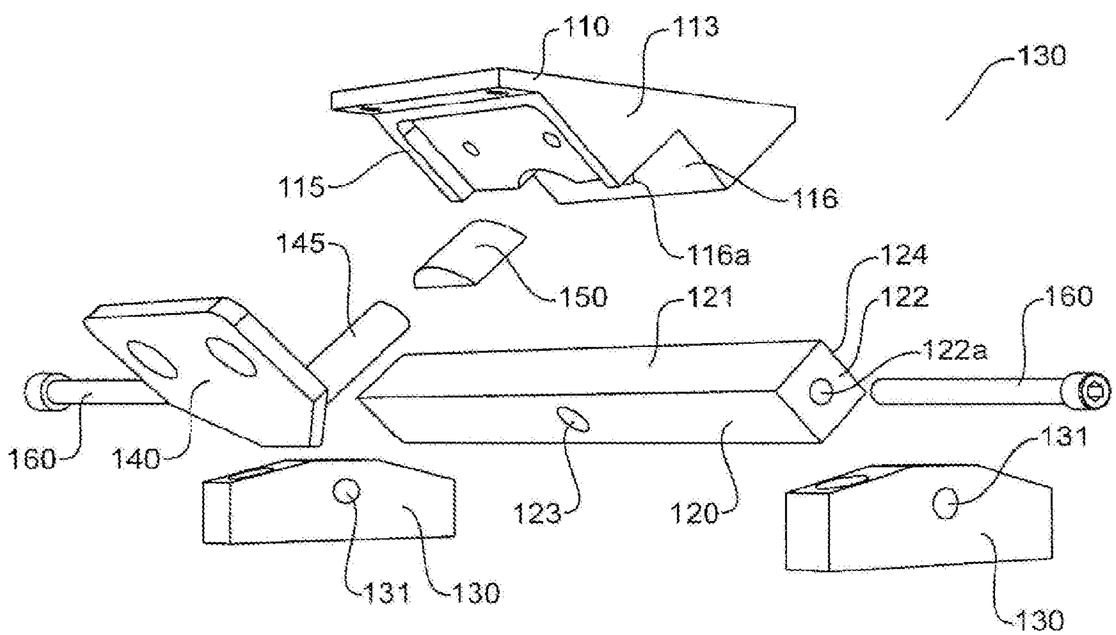

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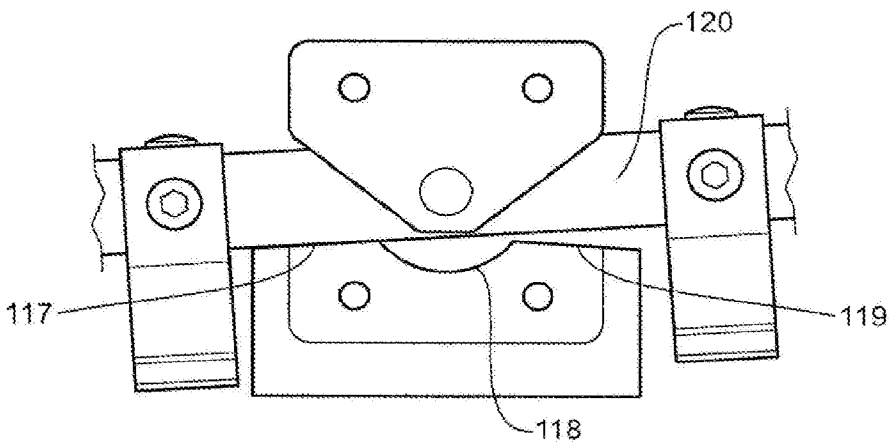

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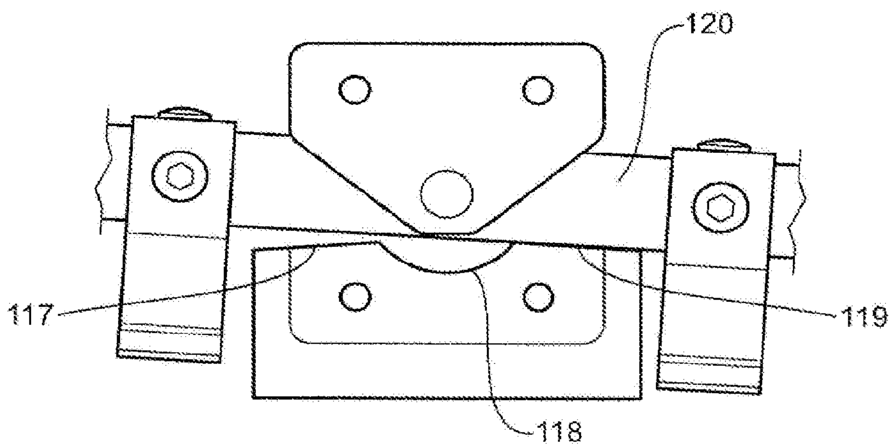

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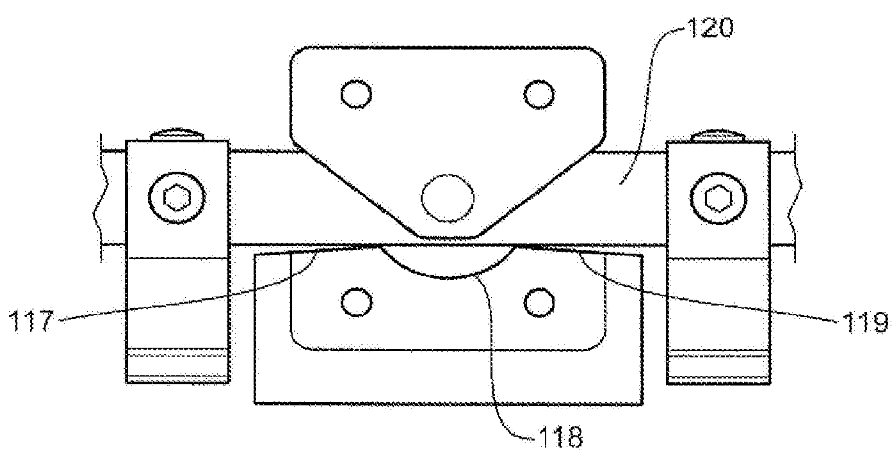

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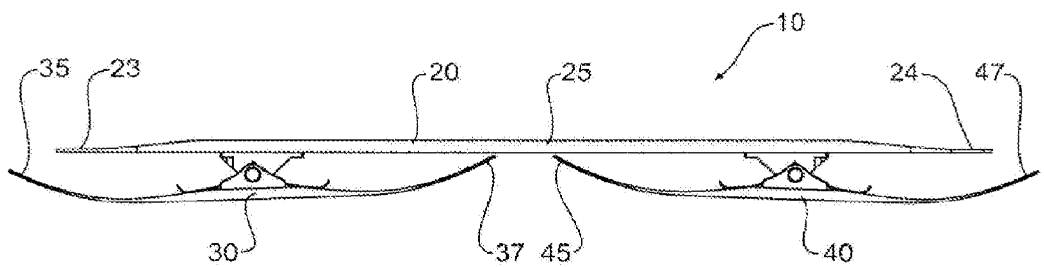

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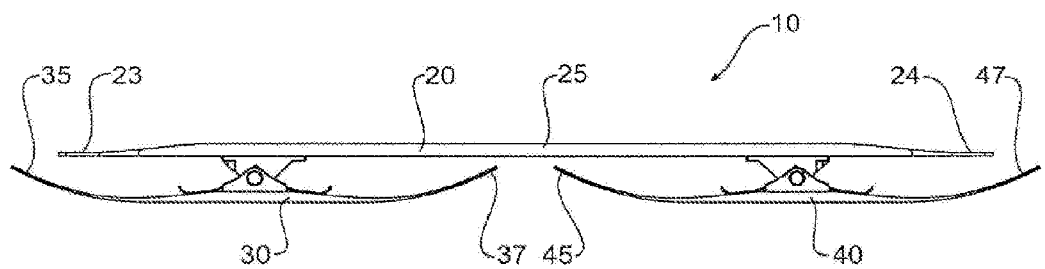

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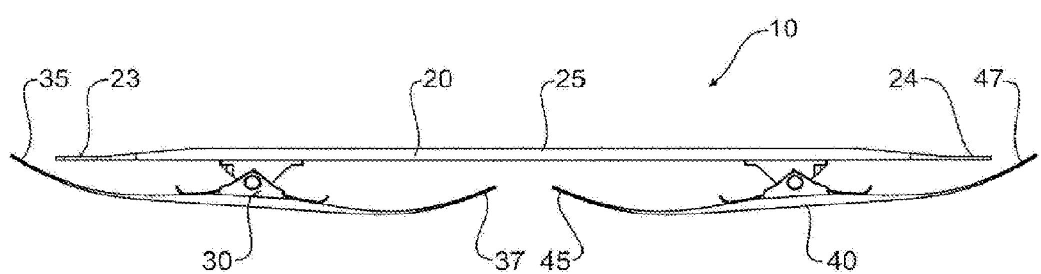

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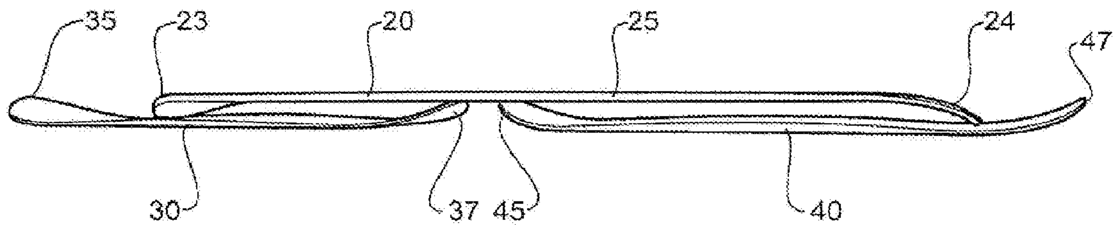

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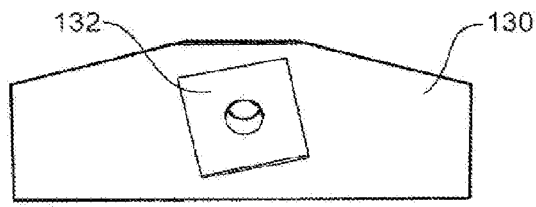

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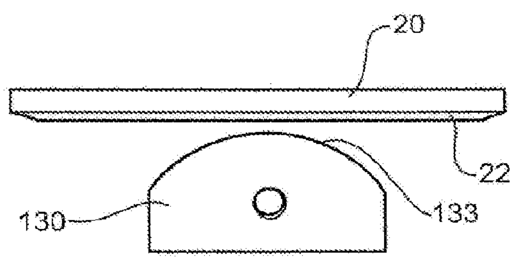

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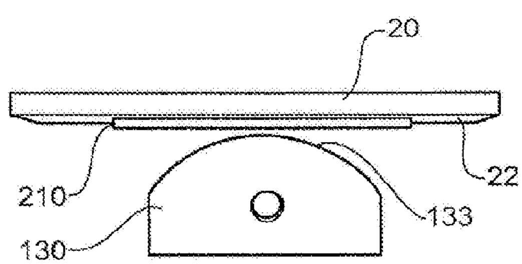

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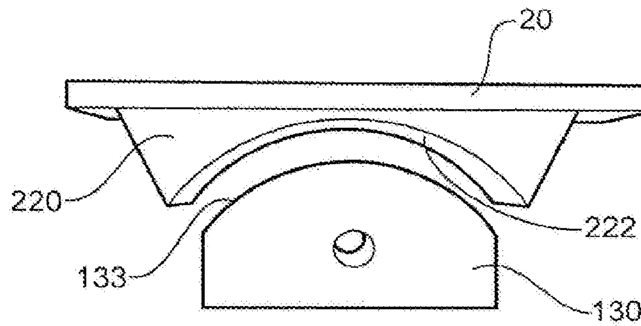

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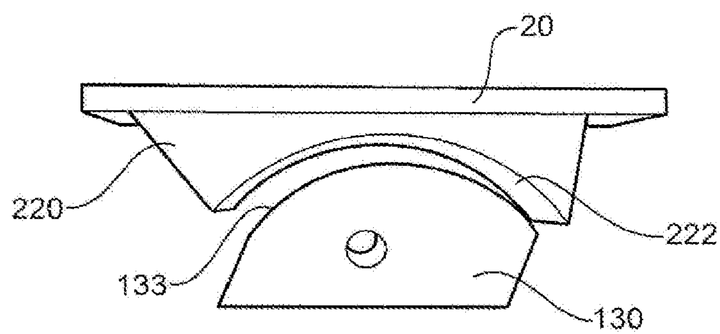

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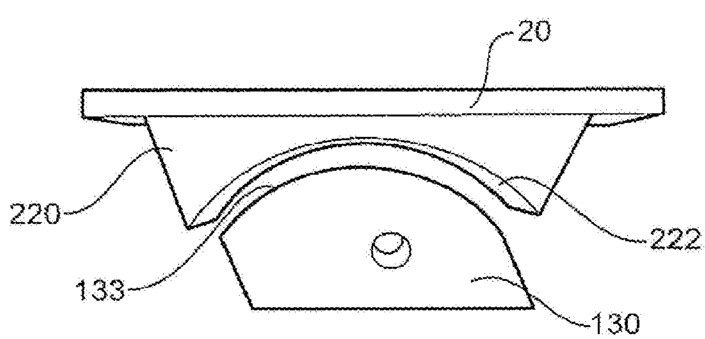

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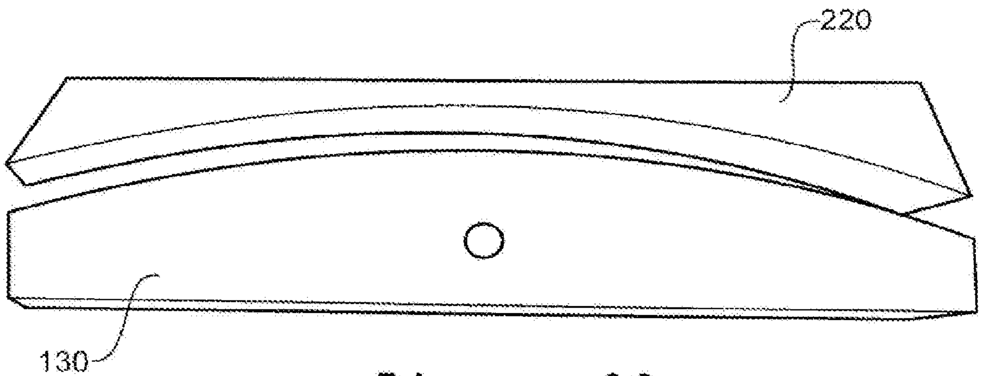

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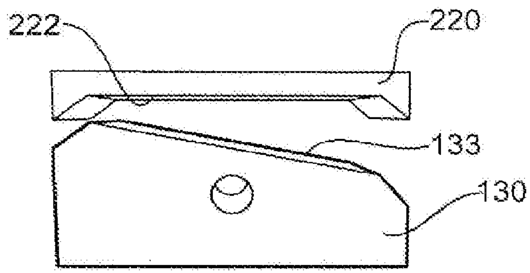

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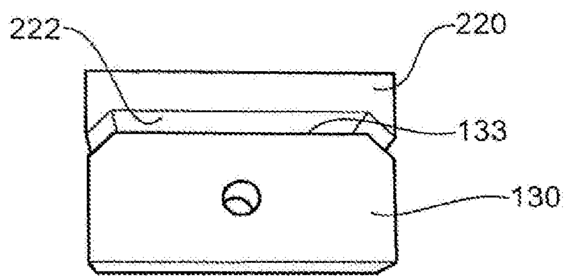

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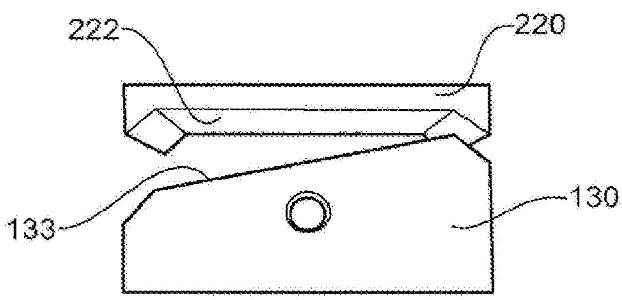

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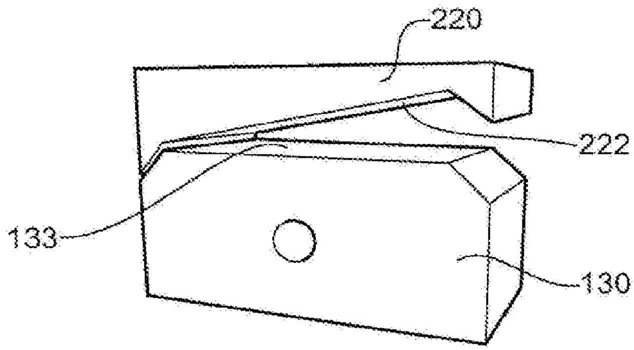

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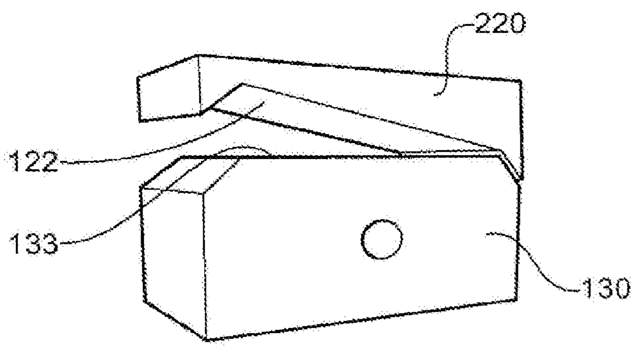

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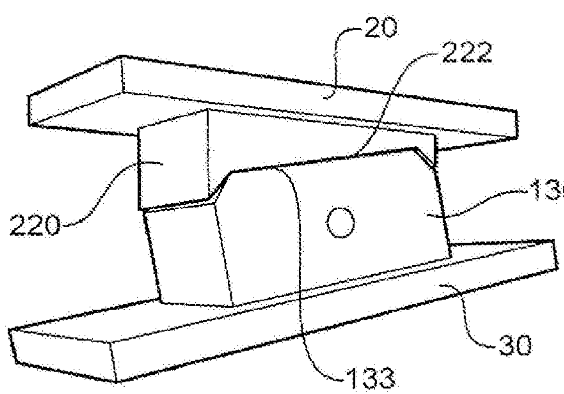

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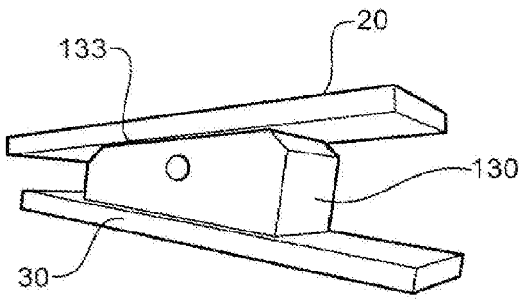

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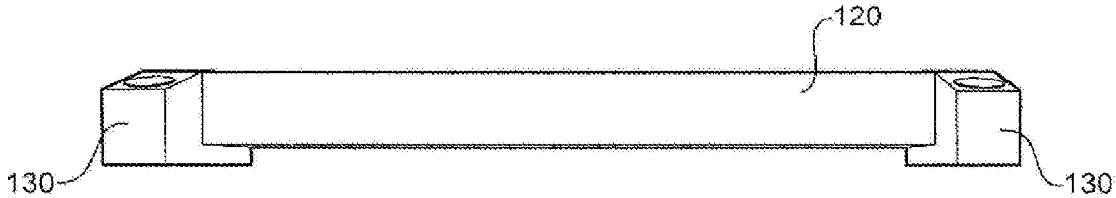

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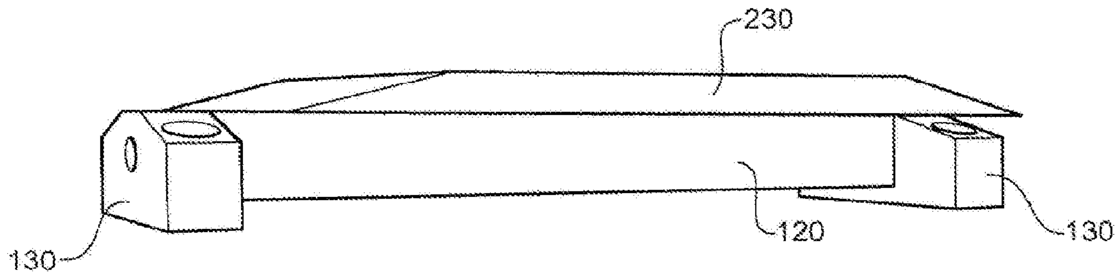

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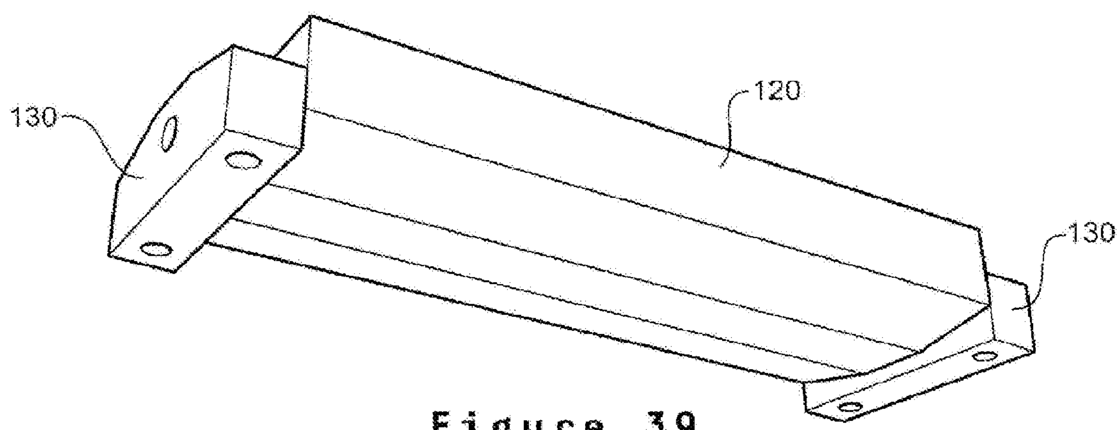

Figure 39

RIDABLE BOARD ASSEMBLIES AND COMPONENTS THEREOF

PRIORITY DOCUMENTS

[0001] The present application is a continuation application of U.S. patent application Ser. No. 14/909,229, filed on Feb. 1, 2016, which is a national stage entry of PCT/AU2014/000769 filed on Aug. 1, 2014, which claims priority from Australian Provisional Patent Application No. 2013902864 titled "RIDABLE BOARD ASSEMBLIES AND COMPONENTS THEREOF" filed on 1 Aug. 2013. The content of each of the above applications is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present invention relates generally to ridable board assemblies and components thereof. In a particular form, the invention relates to a snowboard assembly having variable tuning capabilities.

BACKGROUND

[0003] A snowboard has a multi-layered construction including at least a P-tex base for gliding over snow, an inner core and a top sheet. A snowboard also has metal edges inserted along the sides of the board for cutting into snow or ice to enable the board to turn. The metal edges are curved and have a radius known in the art as a sidecut. The sidecut of a snowboard determines the turning characteristics of the board. A board having a deeper sidecut (i.e. larger radius) will turn more sharply than a board having a shallower sidecut (i.e. smaller radius). A snowboard's construction also determines its flex and stiffness characteristics. All of these parameters, including the length and width of the board, are fixed for any given board. If a user requires different settings, for example to handle different snow conditions, then a new board is required.

[0004] A snowboard is controlled by the leading edge of the board only, which means that a user can only initiate a turn off of the front foot. A problem with this, particularly for beginners is that the automatic fear response is to lean back. Leaning back nullifies the turning action and can result in the board catching edges which may cause accident and injury. Furthermore, other board sports including surfing, skateboarding, wakeboarding and kiteboarding all enable a user to drive a turn off of the back foot which is a more natural ride style.

[0005] There is thus a need to provide an improved snowboard assembly that better replicates the riding style of these other board sports while also providing the ability to vary and tune parameters such as sidecut, length, and flex response to alter the board's performance and handling characteristics.

[0006] It is against this background and the problems and difficulties associated therewith that the present invention has been developed.

[0007] Certain objects and advantages of the present invention will become apparent from the following description, taken in connection with the accompanying drawings, wherein, by way of illustration and example, several embodiments of the present invention are disclosed.

SUMMARY

[0008] According to a first aspect, there is provided a snowboard assembly, including:

[0009] a pair of longitudinally spaced apart blades, each blade having a bottom surface for contacting ice or snow upon which the snowboard assembly is ridden; and

[0010] a deck supported above the blades by mounts that are interposed between each blade and the deck, the deck having a top surface for supporting a rider thereon,

[0011] wherein, the deck is torsionally rigid between the mounts such that, in use, rider induced weight transfer forces are able to be transferred from the deck through one or both mounts and into one or both blades in order to steer the assembly.

[0012] In one form, the mounts interposed between each blade and the deck are truck assemblies which enable each blade to move independently with respect to the deck.

[0013] In one form, for each blade, the truck assembly includes a baseplate securable to a bottom surface of the deck and an elongate member coupled to the blade and pivotally retained with respect to the baseplate.

[0014] In one form, the elongate member is retained in a recess or channel formed in the baseplate.

[0015] In one form, the elongate member is retained in the recess or channel by a retaining plate, the retaining plate including a pivot pin that extends through the elongate member and into the baseplate and wherein the pivot pin defines a pivot axis about which the elongate member is able to pivot with respect to the baseplate and deck.

[0016] In one form, the recess or channel formed in the baseplate restricts an amount that the elongate member is able to pivot about the pivot axis.

[0017] In one form, the recess or channel provides tapered surfaces that are contactable with the elongate member and which provide hard stops to restrict the amount that the elongate member is able to pivot about the pivot axis.

[0018] In one form, the pivot axis is angled at substantially 45° with respect to the bottom surface of the deck.

[0019] In one form, the elongate member is coupled to the blade through a pair of spaced apart blade mounts upstanding from a top surface of the blade adjacent opposing lateral edges thereof

[0020] In one form, the blade mounts are pivotally coupled to the elongate member.

[0021] In one form, the elongate member is a bar having a rectangular or square cross-section.

[0022] In one form, the elongate member has cylindrical end portions and the blade mounts are pivotally coupled to the cylindrical end portions.

[0023] In one form, the truck assembly further includes biasing means which act to return the elongate member to a home position with respect to the baseplate.

[0024] In one form, the biasing means comprises a pair of laterally spaced apart springs coupled between the baseplate and elongate member that provide resistance against pivotal movement of the elongate member about the pivot axis.

[0025] In one form, the truck assembly further includes biasing means which act to return the blade mounts and blade to a home position with respect to the deck.

[0026] In one form, the biasing means which act to return the blade mounts and blade to a home position with respect to the deck comprises a pair of leaf springs mounted to the elongate member about opposing sides of the baseplate, the leaf springs contactable with the top surface of the blade and operable to provide resistance against pivotal movement of the blade mounts and blade with respect to the elongate member.

[0027] In one form, the deck has flexible forward and aft tips contactable with the blades.

[0028] In one form, the deck terminates in downwardly sloped sections.

[0029] In one form, the blades have flexible upswept tips that are contactable with the deck.

[0030] In one form, the flexible upswept tips of each blade are able to flex up under snow pressure, thereby reducing edge contact between the blades and snow to assist turning in soft or powder snow.

[0031] In one form, the blades have straight metal edges for cutting into snow or ice to perform a turn.

[0032] In one form, the deck is contactable with the blade mounts when the elongate member pivots thereby providing means to vary the effective sidecut of the snowboard assembly.

[0033] In one form, for each blade, the mounts comprise a pair of spaced apart blade mounts upstanding from a top surface of the blade adjacent opposing lateral edges thereof, said blade mounts secured to both the blade and the bottom surface of the deck.

[0034] According to a second aspect, there is provided a snowboard assembly, including:

[0035] a pair of longitudinally spaced apart blades having upswept flexible tips, each blade having a bottom surface for contacting ice or snow upon which the snowboard assembly is ridden; and

[0036] a deck having a top surface for supporting a rider thereon and having flexible tips, the deck supported above each blade by a truck assembly that is interposed between each blade and the deck,

[0037] wherein, the deck is torsionally rigid between each truck assembly such that, in use, rider induced weight transfer forces are able to be transferred from the deck through one or both truck assemblies and into one or both blades in order to steer the assembly and wherein the flexible tips of the deck are contactable with the blades and the flexible tips of the blades are contactable with the deck.

[0038] According to a third aspect, there is provided a truck assembly mountable between a blade contactable with ice or snow to a deck spaced above the blade for supporting a rider thereon, the truck assembly including:

[0039] a baseplate securable to a bottom surface of the deck;

[0040] a pair of laterally spaced apart blade mounts securable to a top surface of the blade adjacent opposing edges thereof;

[0041] an elongate member coupled to each blade mount and retained in a recess or channel formed in the baseplate; and

[0042] a retaining plate for retaining the elongate member in the recess or channel formed in the baseplate, the retaining plate having a pivot pin that extends through the elongate member and into the baseplate,

[0043] wherein, the pivot pin defines a pivot axis about which the elongate member is able to pivot with respect to the baseplate and deck.

BRIEF DESCRIPTION OF DRAWINGS

[0044] Embodiments of the present invention will be discussed with reference to the accompanying drawings wherein:

[0045] FIG. **1** is a schematic representation of a snowboarder riding a snowboard assembly according to an embodiment;

[0046] FIG. **2** is a side view of the snowboard assembly of FIG. **1**;

[0047] FIG. **3** is a top view of the snowboard assembly of FIG. **2**;

[0048] FIG. **4** is an end view of the snowboard assembly of FIG. **2**;

[0049] FIG. **5** is a detailed perspective view of a truck assembly mounted between a deck and a blade of the snowboard assembly;

[0050] FIG. **6**A is a top perspective view of the truck assembly shown in FIG. **5**;

[0051] FIG. **6**B is an exploded view of the truck assembly of FIG. **6**A;

[0052] FIG. **7** is a top view of the truck assembly of FIG. **6**A showing hidden features in dashed lines;

[0053] FIG. **8** is a sectional view of the truck assembly taken through section **8-8** of FIG. **7**;

[0054] FIG. **9** is a sectional view of the truck assembly taken through section **9-9** of FIG. **8**;

[0055] FIG. **10** is a sectional view of the truck assembly taken through section **10-10** of FIG. **7**;

[0056] FIG. **11** is a sectional view of the truck assembly taken through section **11-11** of FIG. **7**;

[0057] FIG. **12** is an end view of the truck assembly of FIG. **6**A showing hidden features in dashed lines;

[0058] FIG. **13** is a sectional view of the truck assembly taken through section **13-13** of FIG. **12**;

[0059] FIG. **14** is a top perspective view of a truck assembly according to a further embodiment;

[0060] FIG. **15** is an exploded view of the truck assembly of FIG. **14**;

[0061] FIG. **16** is a rear perspective view of the truck assembly of FIG. **14** showing the limited port turning action of the hanger of the truck assembly;

[0062] FIG. **17** is a rear perspective view of the truck assembly of FIG. **14** showing the limited starboard turning action of the hanger of the truck assembly;

[0063] FIG. **18** is a rear perspective view of the truck assembly of FIG. **14** showing the straight lining position of the hanger of the truck assembly;

[0064] FIG. **19** is a side view of the snowboard assembly having a camber profile;

[0065] FIG. **20** is a side view of the snowboard assembly having a neutral profile;

[0066] FIG. **21** is a side view of the snowboard assembly having a rocker profile;

[0067] FIG. **22** is a side view of a snowboard assembly according to an embodiment showing flexible interaction between the deck and forward and aft blades;

[0068] FIG. **23** is a side view of a blade mount having a keyed recess;

[0069] FIG. **24** is a side view of a blade mount and deck arrangement;

[0070] FIG. **25** is a side view of an alternative blade mount and deck arrangement having a wear plate;

[0071] FIG. **26** is a side view of an alternative blade mount and deck arrangement having a cradle;

[0072] FIG. **27** is a side view of an alternative blade mount and deck arrangement having a cradle and off-centred blade mount;

[0073] FIG. **28** is a side view of an alternative blade mount and deck arrangement having a cradle and off-centred blade mount;

[0074] FIG. **29** is a side view of an enlarged blade mount and cradle arrangement;

[0075] FIG. **30** is a side view of a straight cut cradle and blade mount;

[0076] FIG. **31** is a side view of an alternative straight cut cradle and blade mount;

[0077] FIG. **32** is a side view of an alternative straight cut cradle and blade mount;

[0078] FIG. **33** is a side view of an alternative straight cut cradle and blade mount;

[0079] FIG. **34** is a side view of an alternative straight cut cradle and blade mount;

[0080] FIG. **35** is perspective view of the blade mount directly mounted between the deck and forward blade;

[0081] FIG. **36** is perspective view of the blade mount directly mounted between the deck and forward blade;

[0082] FIG. **37** is a front view of a truck assembly having the hanger directly mounted to the deck;

[0083] FIG. **38** is a front perspective view of a truck assembly having a load spreading plate mounted between the hanger and deck; and

[0084] FIG. **39** is a lower perspective view of a truck assembly having an enlarged hanger to spread loads.

[0085] In the following description, like reference characters designate like or corresponding parts throughout the figures.

DESCRIPTION OF EMBODIMENTS

[0086] Referring now to FIG. **1**, there is shown a schematic representation of a rider **2** (e.g. a snowboarder) riding a snowboard assembly **10** according to an embodiment of the invention. The snowboard assembly **10** includes a pair of longitudinally spaced apart blades **30**, **40**, each blade having a lower or bottom surface for contacting ice or snow upon which the snowboard assembly **10** is ridden. The snowboard assembly **10** further includes an elongate deck or board **20** supported above the blades **30**, **40** by mounts **100** that are interposed between each blade **30**, **40** and the deck **20**. The deck has a top or upper surface **21** for supporting a rider **2** thereon that stands on the deck **20** as shown. The rider **2** is secured to the deck **20** by conventional bindings **8** that receive snowboard boots. The bindings **8** are mounted to the top surface **21** of the deck **20**. There may be multiple mounting positions **5** for the bindings (see FIG. **3**) to enable the rider to adjust their stance width. With respect to the back foot of the rider **2**, a suitable position for the rear binding may be slightly rearward of the mount **100**.

[0087] Referring now to FIGS. **2-4**, side, top and end views of the snowboard assembly **10** are shown. The deck **20** further includes a bottom surface **22**, midsection **25** and forward and aft tips (**23**, **24**) which may be downwardly sloped sections. Unlike a conventional snowboard, the deck **20** is elevated or raised off of a ground surface (i.e. snow or ice).

[0088] The pair of longitudinally spaced apart (in-line) blades (also known as skids or runners) **30**, **40** are contactable with snow or ice upon which the snowboard assembly **10** is ridden. The forward blade **30** has a bottom surface **31** which presents a surface area to glide over snow, a top surface **32**, forward tip **35**, aft tip **37** and midsection **36**. Forward blade **30** further includes metal edges **33**, **34** that may be toe side or heel side edges depending upon the orientation of the rider on the snowboard assembly. In the embodiment shown in FIGS. **1-4**, the metal edges **33**, **34** are straight. Similarly, aft blade **40** has a bottom surface **41** which presents a surface area to glide over snow, a top surface **42**, forward tip **45**, aft tip **47** and midsection **46**. Aft blade **40** further includes metal edges **43**, **44** that may be toe side or heel side edges depending upon the orientation of the rider on the snowboard assembly. In the embodiment shown in FIGS. **1-4**, the metal edges **43**, **44** are also straight. The midsections **36**, **46** of each blade **30**, **40** are torsionally rigid while the forward and aft tips of each blade **30**, **40** are upswept flexible tips that are able to flex under load. Multiple blade lengths may be used ranging for example between 500-800 mm.

[0089] Each blade **30**, **40** is independently mounted to the deck **20** by mounts **100** associated with each blade **30**, **40**. The blades **30**, **40** are mounted so that they are longitudinally aligned with a longitudinal axis of the deck **20**. The deck **20** is torsionally rigid between the mounts **100** associated with each blade **30**, **40** to enable forces to be transferred from the deck **20** through the mounts **100** and into each blade **30**, **40**. In particular, the deck **20** is torsionally rigid between the mounts **100** such that, in use, rider induced weight transfer forces are able to be transferred from the deck **20** through one or both mounts **100** and into one or both blades **30**, **30** in order to steer the assembly **10**.

[0090] The deck **20** and blades **30**, **40** may be manufactured from standard composite materials that are well known and widely used in the ski and snowboard industry. For example, a Ptex base may be used in combination with a wood, foam or aluminium honeycomb core and fibreglass layers that sandwich the core. The torsionally rigidity of the deck between the mounts may be increased by increasing the thickness of the deck for a given material construction or by using an alternative composite construction.

[0091] The mounts interposed between each blade **30**, **40** and the deck **20** shown in FIGS. **1-4** are truck assemblies **100** which enable each blade **30**, **40** to move independently with respect to the deck **20**. Each truck assembly **100** enables the rider **2** to steer the snowboard assembly **10** and execute turning manoeuvres in a similar way that a skateboard truck enables a skateboard to turn.

[0092] Unlike a conventional skateboard truck assembly, truck assembly **100** has been engineered specifically for the snowboarding environment. Truck assembly **100** has a lower profile (i.e. height) than a conventional skateboard truck as well as limited articulation and greater ability to withstand higher loads than a conventional skateboard truck.

[0093] A rider may initiate a turn off of their front or back foot. A turn initiated by displacing weight over the front foot will cut an edge of the forward blade **30** into the snow. Similarly, a turn initiated by displacing weight over the rear foot will cut an edge of the aft blade **40** into the snow. A conventional ski or snowboard is controlled by the leading edge of the board only, which means that a user can only initiate a turn off of the front foot. A problem with this, particularly for beginners is that the automatic fear response is to lean back. Leaning back nullifies the turning action and can result in the board catching edges which may cause accident and injury. The snowboard assembly **10** of the present invention overcomes this deficiency by allowing a user to initiate a turn off of the back foot (i.e. with weight displaced backwards).

[0094] The ability to drive a turn from the back foot mirrors the riding style of other board sports including surfing, skateboarding, wakeboarding and kiteboarding. The snowboard assembly **10** therefore makes a user's transition from these other board sports to snowboarding easier.

[0095] In hard packed snow or icy conditions, the snowboard assembly **10** turns by cutting the edges **33**, **34**, **43**, **44** of the blades **30**, **40** into the snow. In soft or powder snow, the forward and aft tips of the blades **30**, **40** flex up under snow pressure, thereby reducing edge contact between the blades **30**, **40** and snow to assist in initiating a turn.

[0096] Referring now to FIGS. **5-13**, truck assembly **100** is described in further detail. For each blade **30**, **40** the truck assembly **100** includes a baseplate **110** having a top surface **111** that is mounted to the bottom surface **22** of the deck **20** as shown in FIG. **5**. The baseplate **110** may be mounted to the bottom surface **22** of the deck **20** by screws, bolts or other suitable fastening means **51** and lock washers **52** as shown in the exploded view of the truck assembly **100** in FIG. **6**B. The baseplate **110** further includes side portions **112**, **113**, and tapered end portions **114**, **115**. The baseplate **110** is adapted to receive and retain a hanger **120**. The hanger **120** is an elongate member as shown.

[0097] In a preferred form, the hanger **120** is an elongate bar having a rectangular or square cross-section. The hanger **120** extends laterally (or transversely) with respect to the deck **20**, through the baseplate **110** and slots into an open recess or channel machined or formed into the baseplate **110**. The channel is defined by inner surfaces **116**, **117** and **119** of the baseplate **110** as shown in FIG. **6**B. In the embodiment shown, the inner surfaces **117**, **119** are angled at substantially 45° to the bottom surface **22** of the deck **20**. The hanger **120** has surfaces **121**, **124** that nest within the channel of the baseplate **110** as shown in FIG. **7**. Surface **124** is aligned with inner surface **116** of the baseplate **110**.

[0098] The hanger **120** is held or retained with respect to the baseplate **110** by a retaining plate or faceplate **140**. The faceplate **140** has a pivot pin **145** depending therefrom which is inserted through an aperture in the hanger **120** and into an aperture of the baseplate **110**. The pivot pin **145** defines a pivot axis **60** about which the hanger **120** is able to pivot with respect to the baseplate **110** and deck **20** as shown in FIG. **9**. The faceplate **140** is seated in a recess formed in tapered end portion **115** of the baseplate **110** and mounted thereto by screws **55** or other suitable fasteners.

[0099] The truck assembly **100** further includes a pair of spaced apart blade mounts **130** that are upstanding from each blade **30**, **40** and in one form securable to each blade by fasteners **53** (e.g. bolts) through holes **135**. The blade mounts **130** are located in the midsections **36**, **46** of the blades **30**, **40** adjacent opposing lateral edges thereof. As shown in FIGS. **5-13**, the hanger **120** has cylindrical end portions **125** that are coupled to the blade mounts **130** through apertures **131**. The blade mounts **130** are pivotally coupled to the hanger **120** thereby permitting the blade mounts **130** and blades **30**, **40** to pivot fore and aft with respect to the deck **20**.

[0100] In an alternative form shown in FIGS. **14-15** the hanger **120** does not have cylindrical end portions. The hanger **120** is a bar having a square cross section and ends **122** that abut opposing blade mounts **130**. The blade mounts **130** have apertures **131** that are axially aligned with apertures **122***a* located in the ends **122** of the hanger **120**. An axle bolt **160** is inserted through each blade mount **130** and through the ends **122** of the hanger **120** to thereby pivotally couple each blade mount **130** to the hanger **120**. The hanger **120** is again retained with respect to the baseplate **110** by faceplate **140** having a pivot pin **145** extending therefrom that is inserted through aperture **123** in the hanger **110** and into aperture **116***a* of the baseplate **110**. The truck assembly **100** may further include a wear plate **150** that is seated in recess **118** of the baseplate **110**.

[0101] The truck assembly **100** is required to be lightweight having high strength and impact resistance. Suitable materials would include lightweight metals such as aluminium and titanium. The blade mounts may be metal or alternatively can be a high strength plastic material.

[0102] With reference to FIGS. **6**A-**13**, the truck assembly **100** further includes biasing means **170** which act to return the hanger **120** to a home position with respect to the baseplate **110**. The home position is a balanced or neutral straight lining position as shown in FIG. **13**. In one form, the biasing means are a pair of laterally spaced apart springs **170** coupled between the baseplate **110** and hanger **120** that provide resistance against pivotal movement of the hanger **120** about the pivot axis **60**. The springs **170** are internal springs that are located in bores **80** set into surfaces **117**, **119** respectively of the baseplate **110** as shown in FIG. **10**. The springs **170** are also received in bores **128** in the hanger **120**. The spring stiffness will determine the feel of the snowboard assembly **10** when turning. As the spring stiffness increases, a more progressive turn can be enacted which provides the rider with more control when turning. As a rider leans further into a turn, the higher spring force is slowly overcome and the hanger **120** will pivot further towards its maximum articulation. The internal springs **170** allow a rider to control the effective sidecut of the snowboard assembly **10** when executing a turn. The internal springs **170** may be replaced by nylon bushings or accurate micro gas filled shock absorbers in other embodiments.

[0103] The truck assembly **100** may further include biasing means which act to return the blade mounts **130** and blades **30**, **40** to a home position with respect to the deck **20**. In one form, the biasing means comprise a pair of leaf springs **180** mounted to the hanger **120** about opposing sides **112**, **113** of the baseplate **110**. A portion **182** of the leaf springs **180** is contactable with the top surfaces **32**, **42** of the blades **30**, **40**. The leaf springs **180** are therefore operable to provide resistance against pivotal movement of the blade mounts **130** and blades **30**, **40** with respect to the hanger **120**.

[0104] The leaf springs **180** as shown in FIGS. **5-13** control the undulation response of the snowboard assembly **10** as it traverses across the ice or snow in order to provide a smoother ride and support the assembly over bumps etc. Referring to FIG. **6**A and FIG. **11**, a secondary leaf spring **180**A may overlay the primary leaf spring **180** as a means to vary the flex response. The leaf springs **180** are located over recessed portions **126** of the hanger **120** and fastened thereto by locking grub screws **57** or other suitable fasteners. The leaf springs **180**, **180**A may be mounted over the top of the hanger **120** (as shown in FIG. **6**A) or alternatively may be mounted below the hanger or in yet further embodiments may be adapted to encapsulate the hanger such that the hanger is slidably engaged within the leaf spring. The leaf springs **180** are set along the lengthwise direction of each blade **30**, **40** and are adapted to provide resistance to the pivotal movement of the blade mounts **130** and blade **30**, **40** with respect to the hanger **120**. The tension of the leaf springs **180** is set so that blades **30**, **40** are returned to a safe neutral position (home position) when not under load. Without the undulation spring resistance provided by leaf springs **180**, the blade **30**, **40** may drop and dig into the snow when landing aerial manoeuvres which may lead to damage and injury. A 0.9 mm thick leaf spring provides sufficient tension to return the blades **30**, **40** to a horizontal neutral position. In some embodiments, undulation may be eliminated altogether by using a thicker leaf spring (e.g. 2.4 mm thick) which locks the blades **30**, **40** into a pre-determined position. If the blades **30**, **40** cannot pivot about the hanger **120**, the loading (e.g. from bumps in terrain etc.) will be transferred into the forward and aft tips of the blades resulting in a flex response similar to a conventional ski or snowboard.

[0105] The leaf springs **180** for the forward and aft blades **30**, **40** may be designed to achieve various settings such as camber, neutral and rocker as illustrated in FIGS. **19-21**. FIG. **19** depicts the snowboard assembly **10** set in camber whereby the aft tip **37** of the forward blade **30** and the forward tip **45** of the aft blade **40** are raised off of the snow. A camber profile offers improved handling and power on groomed terrain and harder snow, but requires precise turn initiation. The tips **37**, **45** of the blades **30**, **40** may interact with the midsection **25** of the deck to vary the flex response of the board. FIG. **20** illustrates the blades **30**, **40** set in a neutral position whereby the bottom surfaces of the blades **30**, **40** are parallel to deck **20**. FIG. **21** depicts the snowboard assembly **10** set in rocker whereby the forward tip **35** of the forward blade **30** and the aft tip **47** of the aft blade **40** are raised off of the snow. This configuration provides float in soft snow conditions and increases ease of turn initiation.

[0106] An alternative way to eliminate the undulation of the blades **30**, **40** is to key the hanger **120** (of the type shown in FIGS. **14-15**) into the end of the blade mounts **130** as illustrated in FIG. **23**. The end **122** of hanger **120** is locked into keyway (recess) **132** which prevents relative rotation between the blade mount **130** and hanger **120**. When the hanger **120** is keyed to the blade mount **130**, the loading (e.g. from bumps in terrain etc.) will be transferred into the forward and aft tips of the blades **30**, **40** resulting in a flex response. By rotating the keyway **132** in the blade mount **130**, the blades **30**, **40** can be set into camber, neutral or rocker.

[0107] The truck assembly **100** shown in FIGS. **5-13** has limited articulation to ensure that the truck assembly is functional in the snowboarding environment. FIG. **13** illustrates how pivotal movement of the hanger **120** with respect to the baseplate **110** is limited by limiting surfaces **117**, **119**. The hanger **20** pivots about pivot axis **60** however limiting surfaces **117**, **119** provide a hard stop to limit or restrict the amount of pivotal movement that the truck assembly **100** has. In operation, the hanger **120** can only pivot $\alpha°$ about its pivot point. In a preferred form, α is in the range of 2-3°.

[0108] With respect to the truck assembly **100** shown in FIGS. **14** and **15**, the limited articulation is schematically represented in FIGS. **16-18**, which show port turning, starboard turning and straight lining respectively. FIG. **16** shows the hanger **120** at maximum angular displacement when port turning. Further rotation or pivoting of the hanger **120** is prevented by limiting surface **117** of the baseplate **110**. Likewise, FIG. **17** shows the hanger **120** at maximum angular displacement when starboard turning. Further rotation or pivoting of the hanger **120** is prevented by limiting surface **119** of the baseplate **110**. The pitch of limiting surfaces **117**, **119** may be increased or decreased to change the allowable pivoting action of the truck assembly **100**. In the embodiment shown, the end **122** of the hanger **120** is displaced 9 mm from the pivot axis at the centre of the hanger **120** when at maximum articulation. FIG. **18** shows the position of the hanger **120** when the snowboard assembly **10** is straight lining. In this position, surface **121** of the hanger **120** is not in contact with either limiting surface **117**, **119**. The hanger **120** is orthogonal to the lengthwise axis of the deck **20** when straight lining

[0109] The ability to vary the pivoting action of the hanger **120** allows the effective side cut of the snowboard assembly **10** to vary. A conventional snowboard has curved edges which form an arc of a pre-determined radius. The deeper the sidecut (i.e. smaller radius), the sharper the board will turn. Similarly, for a shallow sidecut (i.e. larger radius), the board will turn a wider arc which provides more stability at speed. The snowboard assembly **10** has blades **30**, **40** with straight toe side and heel side edges (i.e. no curve or arc). The side cut is achieved therefore by the pivoting action of the hanger **120**. The more the truck assembly **10** is allowed to pivot, the greater the effective sidecut that can be achieved. However, the pivoting action of the truck assembly **100** must be limited, otherwise the blades **30**, **40** cannot pick up on their edges effectively in order to turn.

[0110] The effective sidecut of the snowboard assembly **10** may also be varied by changing the angle of the pivot axis of the hanger **120** with respect to the deck **20**. In the embodiments shown, the pivot axis **60** is set at substantially 45° with respect to the bottom surface **22** of the deck **20**. This parameter may be increased or decreased as appropriate in order to vary the effective sidecut.

[0111] Referring now to FIG. **22**, there is shown an embodiment of the snowboard assembly **10** which illustrates how the flex characteristics and effective sidecut of the snowboard assembly **10** may be influenced by flexible interaction between the deck **20** and blades **30**, **40** (the truck assemblies **100** are not shown). The forward tip **23** and aft tip **24** of the deck **20** may contact the blades **30**, **40** respectively as shown or alternatively there may be a gap between them such that the tips are contactable with the blades in use. The flexible interaction between the deck **20** and blades **30**, **40** allows a user to perform tricks such as manual, alter the flex response of the snowboard assembly **10** as well as the effective sidecut of the blades **30**, **40**. A user can alter the effective length of an edge of a blade by applying pressure through the tips **23**, **24** of the deck **20** into the blades **30**, **40**. The aft edge **37** of the forward blade **30** and forward edge **45** of the aft blade **40** may also be in permanent contact with the midsection **25** of the deck **20**. This flexible interaction between the deck **20** and blades **30**, **40** provides a leaf spring effect that is highly tunable to control the flex memory of the snowboard assembly **10**. The forward tip **23** and aft tip **24** of the deck **20** need not be integral with the deck **20**. In one embodiment, the forward and aft tips may be designed as removable and interchangeable flexing tips which are able to interact with the blades **30**, **40**.

[0112] The blade mounts **130** may be used to precisely tune the sidecut of each blade **30**, **40**. FIG. **24** provides a schematic view of a blade mount **130** which has an increased height to thereby reduce the gap between the upper surface **133** of the blade mount **130** and the bottom surface **22** of the deck **20**. As a rider initiates a turn and the truck assembly **100** starts to pivot, the bottom surface **22** of the deck **20** will come into contact with the upper surface **133** of the blade mount **130** to thereby limit the articulation of the truck assembly **100**. Alternatively the profile of the blade mount **130** may stay the same, while a wear pad **210** (of desired thickness) is mounted to the bottom surface **22** of the deck **20** as depicted in FIG. **25**. In another embodiment as shown in FIG. **26**, a cradle **220** may be mounted to the bottom surface **22** of the deck **20** instead of the wear pad **210**. The cradle **220** has an engaging surface **222** that is contactable with the upper surface **133** of the blade mount **130** when executing a turn. The blade mounts **130** may be off-centred as shown in FIGS. **27-28**. In FIGS. **27-28**, the curvature of the upper surface **133** of the blade mount is not aligned with the curvature of the engaging surface **222** of the cradle **220**. Therefore as upper surface **133** engages with engaging surface **222** of the cradle **220**, the blade **30**, **40** is forced into a position of camber or rocker. This provides the ability for the snowboard assembly **10** to vary between camber, neutral and rocker during a turn. For example, the leaf springs **180** may be set so that the blades **30**, **40** are configured into camber when not under load. As a turn is executed, as the blade mount **130** engages with cradle **220**, the off-centred blade mounts **130** can function to override the camber setting and force the blade into a rocker configuration.

[0113] The cradle **220** and blade mount **130** may be lengthened as shown in FIG. **29** as the length of the snowboard assembly **10** is increased from a nominal 1100 mm up to 1700 mm. Lengthening these components allows them to withstand the increased loads generated by the longer snowboard assembly **10**.

[0114] In the embodiments illustrated in FIGS. **26-29** the cradle **220** has a curved engaging surface **222** and the blade mounts **130** have a curved upper surface **133**. A higher performance alternative which is designed to minimise the potential for undulation during a turn while setting a precise pitch and angle of the blade is shown in FIGS. **30-34**. These figures illustrate a straight cut cradle **220** having a straight engaging surface **222** which is contactable with the upper surface **133** of the blade mount **130** when executing a turn. The upper surface **133** of the blade mount **130** is also straight but may be horizontal or tapered as shown in FIGS. **30-32**. In this way, the straight cut cradles **220** and blade mounts **130** of FIGS. **30-32** are able to independently influence camber, neutral or rocker settings into a blade and override the normal setting of a blade set by the leaf springs. Alternatively as shown in FIGS. **33-34**, the engaging surface **222** of the cradle **220** may be set at a pitch (i.e. tapered from horizontal) while the upper surface **133** of the blade mount **130** remains horizontal.

[0115] Referring now to FIGS. **37-39**, there are shown alternative embodiments of the truck assembly **100** with the baseplate removed. In FIG. **37**, the hanger **120** is mounted directly to the bottom surface **22** of the deck **20**. In this form, the hanger **120** cannot pivot and accordingly the truck assembly **100** is no longer used to execute a turn. For a snowboard assembly **10** in this form, sidecut is introduced by moving from straight edged blades to blades having a sidecut radius. The blades can still undulate through rotation of the blade mounts **130** relative to the hanger **120**. FIG. **38** shows a similar modified truck assembly **100** to that shown in FIG. **37** but having an additional load spreading plate **230** to react higher loads. FIG. **39** shows another way that this could be implemented by expanding the dimensions of the hanger **120** to spread load, thus negating the need for any additional load spreading plate.

[0116] In some embodiments of the present invention, the truck assembly **100** may be removed entirely. The blades **30**, **40** can be coupled to the deck **20** by mounting the blade mounts **130** directly to the bottom surface **22** of the deck **20** as illustrated in FIGS. **35** and **36**. This eliminates the undulation and articulation ability of the blades and is a high performance variation of the snowboard assembly **10**. The blade mounts **130** may be mounted directly to the bottom surface **22** of the deck **20** (FIG. **35**) or alternatively may nest within a cradle **220** as shown in FIG. **36**. The pitch of the blades can be set by adjusting the pitch of either the upper surface **133** of the blade mount **130** or alternatively the pitch of the engaging surface **222** of the cradle **220**. In this system, the blades **30**, **40** must have a sidecut radius to enable the snowboard assembly **10** to turn as the rider shifts their weight appropriately.

[0117] Throughout the specification and the claims that follow, unless the context requires otherwise, the words "comprise" and "include" and variations such as "comprising" and "including" will be understood to imply the inclusion of a stated integer or group of integers, but not the exclusion of any other integer or group of integers.

[0118] The reference to any prior art in this specification is not, and should not be taken as, an acknowledgement of any form of suggestion that such prior art forms part of the common general knowledge.

[0119] It will be appreciated by those skilled in the art that the invention is not restricted in its use to the particular application described. Neither is the present invention restricted in its preferred embodiment with regard to the particular elements and/or features described or depicted herein. It will be appreciated that the invention is not limited to the embodiment or embodiments disclosed, but is capable of numerous rearrangements, modifications and substitutions without departing from the scope of the invention as set forth and defined by the following claims.

1. A snowboard assembly, including:

a pair of longitudinally spaced apart blades, each blade having a bottom surface for contacting ice or snow upon which the snowboard assembly is ridden; and

a deck supported above the blades by mounts that are interposed between each blade and the deck, the deck having a top surface for supporting a rider thereon,

wherein, the deck is torsionally rigid between the mounts such that, in use, rider induced weight transfer forces are able to be transferred from the deck through one or both mounts and into one or both blades in order to steer the assembly.

2. The snowboard assembly of claim **1** wherein the mounts interposed between each blade and the deck are truck assemblies which enable each blade to move independently with respect to the deck.

3. The snowboard assembly of claim **2** wherein, for each blade, the truck assembly includes a baseplate securable to a bottom surface of the deck and an elongate member coupled to the blade and pivotally retained with respect to the baseplate.

4. The snowboard assembly of claim **3** wherein the elongate member is retained in a recess or channel formed in the baseplate.

5. The snowboard assembly of claim **4** wherein the elongate member is retained in the recess or channel by a retaining plate, the retaining plate including a pivot pin that extends through the elongate member and into the baseplate and wherein the pivot pin defines a pivot axis about which the elongate member is able to pivot with respect to the baseplate and deck.

6. The snowboard assembly of claim **5** wherein the recess or channel formed in the baseplate restricts an amount that the elongate member is able to pivot about the pivot axis.

7. The snowboard assembly of claim **6** wherein the recess or channel provides tapered surfaces that are contactable with the elongate member and which provide hard stops to restrict the amount that the elongate member is able to pivot about the pivot axis.

8. The snowboard assembly of claim **5**, wherein the pivot axis is angled at substantially 45° with respect to the bottom surface of the deck.

9. The snowboard assembly of claim **3** wherein the elongate member is coupled to the blade through a pair of spaced apart blade mounts upstanding from a top surface of the blade adjacent opposing lateral edges thereof.

10. The snowboard assembly of claim **9** wherein the blade mounts are pivotally coupled to the elongate member.

11. The snowboard assembly of claim **3**, wherein the elongate member is a bar having a rectangular cross-section.

12. The snowboard assembly of claim **11** wherein the elongate member has cylindrical end portions and the blade mounts are pivotally coupled to the cylindrical end portions.

13. The snowboard assembly of claim **3** wherein the truck assembly further includes biasing means which act to return the elongate member to a home position with respect to the baseplate.

14. The snowboard assembly of claim **13** wherein the biasing means comprise a pair of laterally spaced apart springs coupled between the baseplate and elongate member that provide resistance against pivotal movement of the elongate member about the pivot axis.

15. The snowboard assembly of claim **12** wherein the truck assembly further includes biasing means which act to return the blade mounts and blade to a home position with respect to the deck.

16. The snowboard assembly of claim **15** wherein the biasing means which act to return the blade mounts and blade to a home position with respect to the deck comprise a pair of leaf springs mounted to the elongate member about opposing sides of the baseplate, the leaf springs contactable with the top surface of the blade and operable to provide resistance against pivotal movement of the blade mounts and blade with respect to the elongate member.

17. The snowboard assembly of claim **1** wherein the deck has flexible forward and aft tips contactable with the blades.

18. The snowboard assembly of claim **1** wherein the deck terminates in downwardly sloped sections.

19. The snowboard assembly of claim **1** wherein the blades have flexible upswept tips that are contactable with the deck.

20. The snowboard assembly of claim **19** wherein the flexible upswept tips of each blade are able to flex up under snow pressure, thereby reducing edge contact between the blades and snow to assist turning in soft or powder snow.

21. The snowboard assembly of claim **1** wherein the blades have straight metal edges for cutting into snow or ice to perform a turn.

22. The snowboard assembly of claim **9**, wherein the deck is contactable with the blade mounts when the elongate member pivots thereby providing means to vary the effective sidecut of the snowboard assembly.

23. The snowboard assembly of claim **1** wherein, for each blade, the mounts comprise a pair of spaced apart blade mounts upstanding from a top surface of the blade adjacent opposing lateral edges thereof, said blade mounts secured to both the blade and a bottom surface of the deck.

24. A snowboard assembly, including:

a pair of longitudinally spaced apart blades having upswept flexible tips, each blade having a bottom surface for contacting ice or snow upon which the snowboard assembly is ridden; and

a deck having a top surface for supporting a rider thereon and flexible tips, the deck supported above each blade by a truck assembly that is interposed between each blade and the deck,

wherein, the deck is torsionally rigid between each truck assembly such that, in use, rider induced weight transfer forces are able to be transferred from the deck through one or both truck assemblies and into one or both blades in order to steer the assembly and wherein the flexible tips of the deck are contactable with the blades and the flexible tips of the blades are contactable with the deck.

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