Dec. 26, 1961 T. A. DWORAK 3,014,731

SKI VEHICLE

Filed Feb. 15, 1960 2 Sheets-Sheet 1

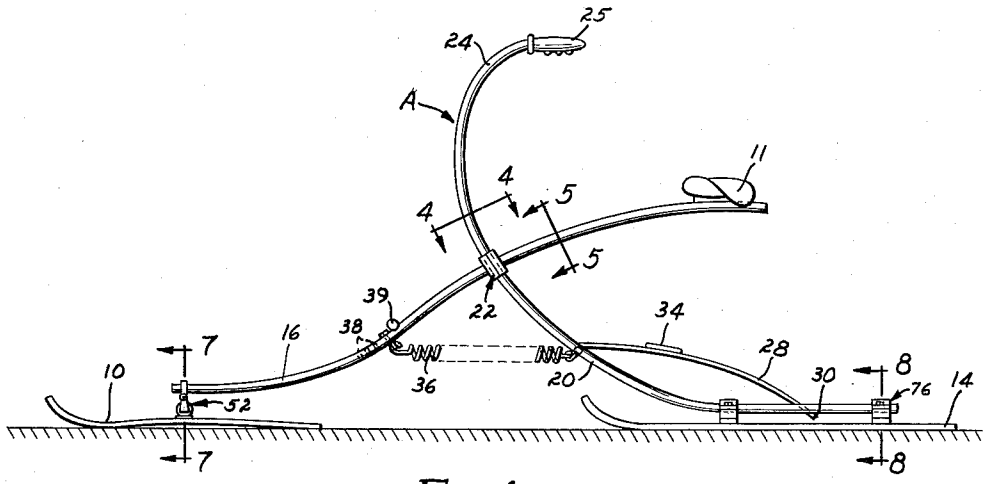


FIG. 1

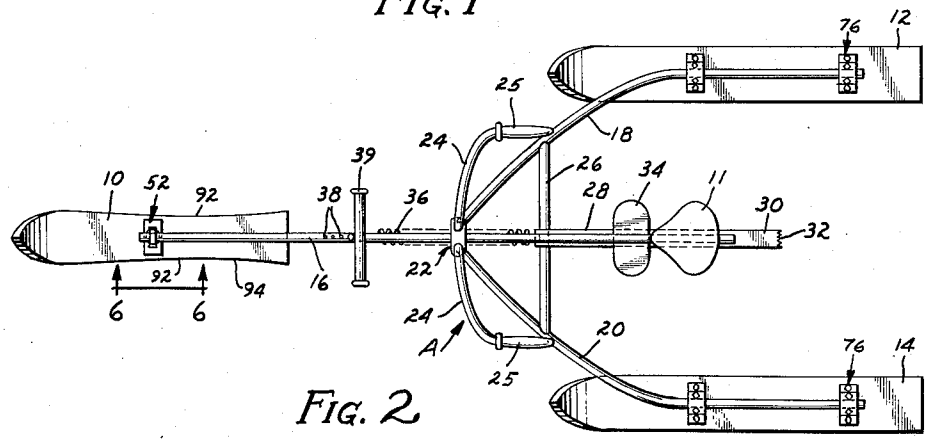


FIG. 2

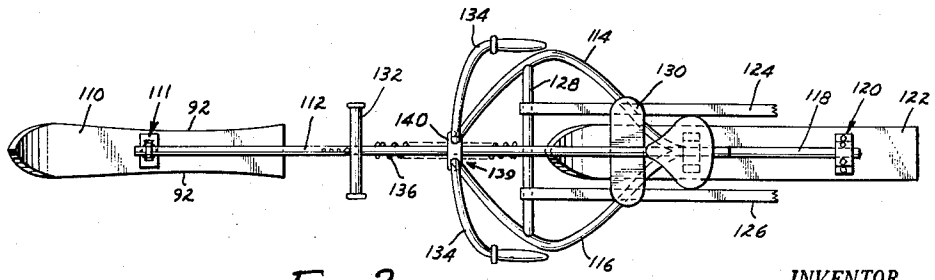


FIG. 3

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SKI VEHICLE

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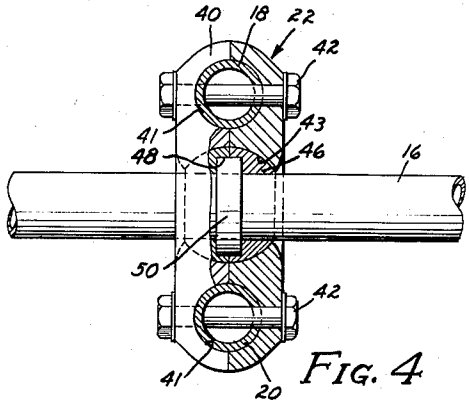


FIG. 4

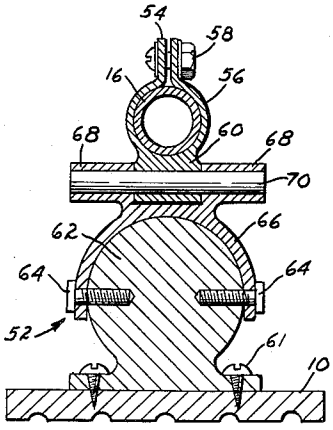


FIG. 7

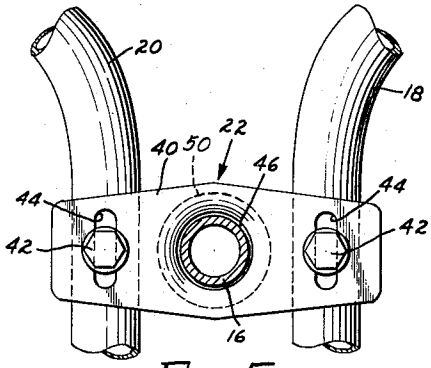


FIG. 5

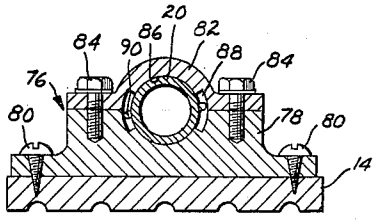


FIG. 8

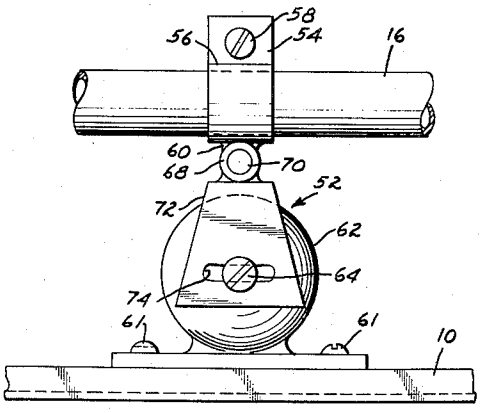


FIG. 6

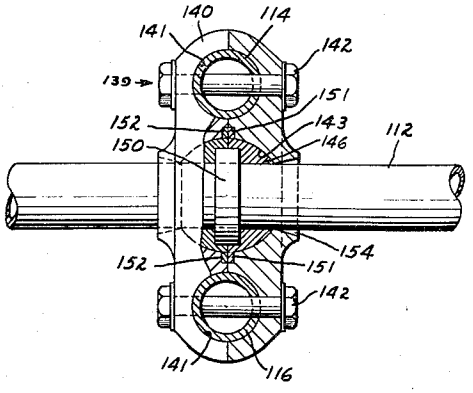


FIG. 9

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SKI VEHICLE

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Filed Feb. 15, 1960, Ser. No. 8,799
10 Claims. (Cl. 280—16)

This invention pertains to a new and improved means for traveling down snow covered hills or similar terrain; in particular it concerns a ski vehicle adapted for descending a ski slope under constant control and with a high degree of safety.

Skiing as a sport has become very popular since the days of World War II and the number of ski areas and resorts have multiplied rapidly to keep pace with the quickened demand for ski slopes and facilities. Because of the nature of the sport many people are attracted to the ski areas and slopes who do not intend to ski but who nevertheless have a sufficient interest to watch the skiers and become absorbed in the activities. Many of those who care little for the hazards of actual skiing would be interested in the enjoyment of a relatively safe downhill run on skis if suitable means for doing so were provided.

And, the need for a device adapted to simulate rather closely the technique of skiing without actually requiring a person to don ski boots and other necessary equipment is apparent. Such a vehicle could be used to provide entertainment to those hundreds of spectators that gather each weekend at the ski slopes throughout the country and who do not wish to purchase or rent the required ski equipment. Moreover, as an introduction to the art of skiing the vehicle could be used to demonstrate the proper technique for turning, traversing a slope and for straight downhill running.

Accordingly, it is a broad object of this invention to provide an improved ski vehicle.

Another object of this invention is to provide an improved gravity-propelled ski vehicle that may be readily controlled and stopped by a novice.

A further object of this invention is to provide an improved ski vehicle that may be easily managed on a traversing run as well as on a run close to the fall line of the hill.

A still further object of this invention is to provide an improved ski vehicle that is light in weight, low in cost and easy to manufacture.

Yet another object of this invention is to provide a gravity propelled ski vehicle having a novel and positive braking system.

Another object of this invention is to provide an improved ski vehicle having novel means for holding the structural members together so as to permit relative movement therebetween during the operation of the device.

A further object of this invention is to provide in a ski vehicle novel means for joining the ski members to the frame members to provide a close simulation to actual skiing techniques.

Still another object of this invention is to provide in a ski vehicle a novel combination of ground engaging members adapted to facilitate the easy control of the vehicle during its operation.

A further object of this invention is to provide in a ski vehicle having longitudinal frame members novel means for connecting said members whereby to allow for limited movement of the load carrying member with respect to the other members.

Another object of this invention is to provide in a one-man ski vehicle adapted for gravity propulsion down a slope novel ground engaging steering and braking means adapted for the easy and safe control of the vehicle.

A further object of this invention is to provide in a one-man ski vehicle novel means for maintaining certain

predetermined structural relationships during the turning and braking maneuvers thereof.

These and other objects and advantages of the invention will become apparent from a consideration of the following detailed specification and accompanying drawings wherein two embodiments of the invention are shown by way of illustration only.

In the drawings:

FIGURE 1 is a side elevation view of one form of the invention;

FIGURE 2 is a top plan view of the embodiment of the invention shown in FIGURE 1;

FIGURE 3 is a top plan view of another form of the invention;

FIGURE 4 is an enlarged fragmentary view, partially in section, taken on the line 4—4 of FIGURE 1;

FIGURE 5 is an enlarged fragmentary view taken on the line 5—5 of FIGURE 1;

FIGURE 6 is an enlarged fragmentary view taken on the line 6—6 of FIGURE 2;

FIGURE 7 is an enlarged fragmentary sectional view taken on the line 7—7 of FIGURE 1;

FIGURE 8 is an enlarged fragmentary sectional view taken on the line 8—8 of FIGURE 1; and

FIGURE 9 is an enlarged fragmentary sectional view showing a modification of the structure illustrated in FIGURE 4.

Referring now to FIGURES 1 and 2 of the drawings, the first form of the invention is designated in its entirety by the reference character A. Device A is provided with a forward ski **10** and a pair of spaced rear skis **12** and **14**, each of which is positioned equally from the longitudinal axis of the device. A central generally S-shaped (see FIGURE 1) tubular elongated seat and forward ski frame member **16** is attached at the forward lower end thereof to forward ski **10** and carries a seat **11** at the rearward upper end thereof. A pair of tubular elongated rear ski frame and handle bar members, **18** and **20**, are attached to rear skis **12** and **14** respectively. Rear frame members **18** and **20** curve upwardly and forwardly from rear skis **12** and **14** until they converge with forward frame member **16** at **22**, from which point they separate and extend upwardly and rearwardly to form spaced handle bars **24** having hand grips **25**. As seen in FIGURE 2, frame members **18** and **20** in plan view are mirror images of each other about the longitudinal axis of device A.

A lower horizontal cross bar **26** provides for structural rigidity between rear frame members **18** and **20** and also provides for the cantilever mounting thereon of an elongated depending brake member **28**. Brake member **28**, preferably fabricated of good quality spring steel, is formed in a concave downward arcuate shape and is mounted on cross bar **26** so that the free end **30** thereof is biased in a normally above ground position. Serrations **32** along the ground engaging end of brake member **28** provide increased braking ability while a foot engageable treadle plate **34** positioned intermediate the ends thereof and slightly forward of seat **11** allows for an easily handled and positive braking system. Also fastened to cross bar **26** is one end of coil spring **36**, the other end of which is fastened to forward frame member **16**. Adjusting holes **38** (see FIGURE 2) allow for the movement of the forward end of spring **36** downwardly along the frame member **16** for the purpose of compensating for differences in weight of persons using the device. A foot bar **39** is transversely mounted on forward frame member **16** an appropriate distance from seat **11** to allow for the convenient positioning of a person. If necessary, foot bar **39** and seat **11** may be adjustably mounted on frame member **16** to take care of individual differences in weight and size of the riders.

FIGURES 4 and 5 show in detail the structural features of the means **22** employed to fasten rear frame members **18, 20** to forward frame member **16**. A two piece housing **40** having spaced circular apertures **41** on each side of a hollow substantially spherical internal surface **43** is clamped by means of bolts **42** to rear frame members **18** and **20**. Slots **44** in housing **40** through which bolts **42** extend allow for the displacement of one rear frame member with respect to the other whereby to evenly distribute the weight on both rear skis during a traversing run along a slope. Forward frame member **16** is centrally positioned within housing **40** by means of a split hollow spherical bearing member **46** which slidably engages, by means of an internal recess **48** therein, an annular collar **50** that is staked or otherwise secured to forward frame member **16**.

From this construction it is apparent that the upper seat supporting section of frame member **16** is allowed a limited rotating and pivoting movement about housing **40**. The movement of the upper section of frame **16** permits the shifting of weight from one edge of forward ski **10** to the other edge without disturbing the longitudinal alignment of the skis. That is to say, the effect of a weight shift is transmitted through frame member **16** mainly to the forward ski **10** whereby to turn the vehicle in one direction or another, as will be explained.

Turning now to the manner in which frame members **16, 18** and **20** are secured to skis **10, 12** and **14**, respectively, FIGURES 6 to 8, inclusive, of the drawings illustrate the structural details of this aspect of the invention. As set forth in FIGURES 6 and 7 the forward ski mounting, designated in its entirety by reference character **52**, includes an upper clamping member **54** having a pair of inwardly facing circular legs **56** adapted to engage the lower forward end of frame member **16**. Bolt means **58** provide for the securing of clamping member **54** to frame member **16**. A lower body **60** having a hollow circular cross section which is formed integral with legs **56** and perpendicular to the longitudinal axis of frame member **16** is also provided.

On the ski itself is mounted by means of screws **61** a substantially ball type support **62**. Diametrically positioned on each side of ball **62** are a pair of support pins **64** which are threaded into ball **62**. A substantially spherical skirt member **66** having an integral upper two piece elongated hollow body **68** provides in accompaniment with locking pin **70** the necessary connection between upper clamping member **54** and ball **62**. The upper body **68**, disposed perpendicular to the longitudinal axis of the ski **10**, has a pair of spaced axially aligned members **68** which cooperate with lower body **60** of clamping member **54** to receive therethrough locking pin **70**. The sides of skirt member **66** are tapered as at **72** to distribute the weight over ball **62** without inhibiting the movement therebetween. A slot **74** is provided in each side of skirt member **66** through which support pins **64** extend. It will be noted that each slot **74** is slightly arcuate to prevent binding during the execution of a turn, as will be explained. Pin **70** may be locked in place by any of a number of well known means such as cotter pins, snap rings, etc.

The rear skis **12** and **14** are secured to frame members **18** and **20** by the mounting member **76** shown in FIGURE 8 of the drawings. Mounting member **76** includes a lower base member **78** attached to the ski by screws **80**. A removable upper member **82** is provided which is fastened to base member **78** by bolts **84**. A longitudinal bore **86** extends centrally through mounting member **76** and is adapted to receive therein frame members **18** and **20** as shown in FIGURES 1 and 2. A pair of segmental recesses **88** are provided on the internal wall of bore **86** at diametrically opposed positions to receive therein radially extending stop members **90** which are attached to frame members **18** and **20**. This construction permits a limited rolling movement of the rear skis about their longitudinal axis thereby facilitating movement over rough ground.

In the alternative, upper member **82** may be provided with a slot transverse to the longitudinal axis of the ski which cooperates with a radially extending stop member secured to the frame member.

As shown in FIGURES 2 and 3, the forward ski used in the invention is wider at the tip and tail than in the middle. The curved longitudinal edges **92** permit turning of the vehicle by edging and weighting of the ski in the snow. For example, by edging and weighting the left edge **94** of ski **10** (FIGURE 2) a turn to the left is accomplished while a turn in the opposite direction is provided by an opposite maneuver. Of course, the forward ski may be of the conventional type having straight longitudinal edges in which case turning is accomplished by the shift of weight from one edge to the other as in the conventional Arlberg or similar ski techniques. The forward ski is also provided with camber, i.e., the ski rests on its two ends so that when the weight of the body is put on the ski the resulting curve will flatten out thereby distributing the weight over the entire ski. This refinement need not necessarily be incorporated in the rear skis as no turning movements are imparted to them as in the forward ski.

FIGURE 3 discloses a second form of the invention wherein a single rear ski member is used in place of the dual rear skis of FIGURES 1 and 2. In this embodiment a front ski **110** is provided which is connected by means **111** similar to mounting means **52** employed in the structure of FIGURES 1 and 2 to a forward frame member **112**. The rear frame members **114** and **116** converge at their rear extremities to form a single elongated frame **118** which is connected by the means **120** similar to mounting means **76** to a single rear ski **122**. A pair of rearward extending brake arms **124** and **126**, which are attached to horizontal support bar **128**, are manipulated by foot treadle member **130** similar to the manner in which treadle member **34** of the first embodiment of the invention operates. Similarly a foot bar **132**, handle bars **134** and coil spring **136** are provided to facilitate operation of this embodiment of the invention.

As illustrated in FIGURE 9, the mounting means **139** employed in connecting frame members **112, 114** and **116** together differs slightly from the structure shown in FIGURE 4. A two piece housing **140** having spaced circular apertures **141** on each side of a hollow substantially spherical internal surface **143** is clamped by means of bolts **142** to rear frame members **114** and **116**. Forward frame member **112** is centrally positioned within housing **140** by means of a split hollow bearing member **146** having an inner generally circular recess which is complementary to and engageable with annular collar **150** secured to forward frame member **112**. The distinction between the structure of FIGURE 9 as compared with that of FIGURE 4 lies in the radial opposed bores **151** extending from the inner surface of housing **140** coaxial with the diametral axis of collar **150** and perpendicular to the longitudinal axis of frame members **112, 114** and **116**. Short cylindrical bearing supports **152** which rotatably engage opposed bores **151** on opposite sides of spherical member **146** allow the rotational movement of member **146** about the axis defined thereby; movement of collar **150** within the mating circular recess of member **146** also results in the rotation of frame member **112** about its longitudinal axis. In addition, shoulders **154** on housing **140** restrict the yawing movement of frame member **112** within housing **140**. The result is a somewhat more limited movement of frame member **112** in two planes as contrasted with the conical displacement allowed by the structure of FIGURE 4. It is apparent that in the single ski embodiment more exact control is necessary; however, the structure of FIGURE 9 may be incorporated in the three ski form of the invention to impart a more rigid control thereto.

Thus there has been shown and described a new and improved type of ski vehicle—one that may be operated by novices as well as experts. The forward ski mount-

ings **52** (FIGURES 1 and 2) and **111** (FIGURE 3) allow the forward ski to rotate in a limited manner about a horizontal axis positioned slightly above the ski. A slight yawing movement is also permitted by the ball type mounting on the forward ski, the tendency of a skirt **66** to bind on ball **62** being minimized by the provision of arcuate slot **74** therein which engages pin **64** of ball **62**. These combined limited movements simulate closely the actual movement imparted to a ski by a skier through conventional bindings and boots. The result is a forward ski that is readily controlled through the application of the proper weight distribution thereon. The pivoting flexibility afforded by connecting means **22** allows forward frame member **16** to be manipulated readily by a person sitting in seat **11** with his feet on foot bar **39** and hands engaging handle bar grips **25**.

Coil spring **36** serves to bias the three frame members **16**, **18** and **20** into a proper relationship with each other and also functions as a load supporting member. Suitable shock absorbers may be incorporated into coil springs **36** and **136** to lessen the tendency of seat **11** to oscillate when rough terrain is encountered. Slots **44** in housing **40** allow for the vertical displacement of one rear ski with respect to the other to account for the differences in ground level while traversing a slope. Of course, in the single ski embodiment of the invention this feature is unnecessary. The rear skis are allowed only a slight rolling movement through the action of rear supports **76** (FIGURES 1 and 2) and **120** (FIGURE 3) to minimize any tendency they may have to wander or skid out of a tracking position with respect to the forward ski. Thus the primary function of the rear skis is to carry the load, while the forward ski acts as the medium through which control is exercised. It is also within the purview of this invention to provide tandem mounting means for a plurality of riders. The device may also be equipped with suitable means for releasably attaching it to a ski tow or lift so that the effort required to get up the hill is minimized.

Although two forms of the invention have been disclosed it should be understood that the invention is not to be limited thereby, the specification and drawings being for the purpose of illustration only and the scope of the invention being limited only by appended claims.

I claim:

1. A device for use on surfaces having a relatively low coefficient of friction comprising a first elongated frame member, a second elongated frame member positioned on one side of said frame member, a third elongated frame member substantially identical with the second member and symmetrically positioned on the opposite side of said first member from said second member, means for rigidly connecting said second and third frame members intermediate the ends thereof and for pivotally connecting said first frame member intermediate the ends thereof to said second and third frame members whereby to form a three-point supporting framework symmetrical about the longitudinal axis thereof and having spaced hand engaging control means on the upper ends of said second and third frame members and body supporting means on the upper end of said first frame member, runner means affixed to the lower ends of said frame members, and means between said first member and said second and third members for biasing said first frame member with respect to said second and third frame members into a normally retracted position adapted to support a human body in a sitting position, said device being adapted for steering by the application of downward and forward swinging motions upon said framework by the rider of said device.

2. An improved ski vehicle comprising, in combination, a first frame member of tubular material, a pair of identical second frame members of tubular material, each of said pair of second frame members being mirror images of each other about a longitudinal axis coincident with the axis of said first frame member, means mounting said first frame member to said second frame members intermediate the ends thereof whereby to provide for pivoting and swinging movements of said first frame member and for a rigid connection between said second frame members, spring means between said first frame member and said second frame members for urging said first frame member against longitudinal forward movement relative to said second frame members, ski means on the forward end of said first frame member, ski means on each of said second frame members, each of said last mentioned ski means being in spaced parallel relation to each other and being equally spaced from the longitudinal axis of said vehicle, means on said first frame member for sitting thereon, hand engageable control means on each of said second frame members, transverse support means connecting said second frame members, and foot engageable means mounted on said support means for braking said vehicle, said vehicle being adapted for turning maneuvers by the application of weighted movements imparted to said first frame member by the rider of said vehicle.

3. The device of claim 2 wherein said ski means on said first frame member comprises an elongated ski type body of greater width at the tip and heel thereof than at the middle portion thereof whereby to facilitate turning of said vehicle by the shifting of weight from one longitudinal edge to the other.

4. A ski vehicle adapted to be steered by the application of weighted movements imparted by the rider thereof consisting of a skeletonized supporting framework including a pair of identical spaced curved elongated rear supports forming at their lower extremities spaced parallel substantially horizontal ski engaging legs and at their upper extremities spaced parallel substantially horizontal handle bars and converging intermediate the ends thereof, a vertically curved elongated forward support having a ski engaging leg at the lower extremity thereof and seat means at the upper extremity thereof, means for rigidly connecting said rear supports at the point of convergence thereof, said rigid connecting means including means for pivotally connecting said forward support between said rear supports at the point of convergence thereof whereby to permit swinging movement of said forward support relative to said rear supports, means between said forward and said rear supports for yieldably restraining the movement of said forward support, a foot operated brake member attached to said rear supports, a foot rest affixed to said forward support, a ski member attached to said forward support, and a ski member attached to each of said rear supports, said ski members attached to said rear supports being adapted to pivot about their longitudinal axes whereby to facilitate easy riding without loss of control, said forward ski member being adapted to pivot about a horizontal and vertical axis.

5. A ski vehicle including a tubular elongated generally S-shaped central frame member, a ski mounted on the forward end of said central frame member, a seat mounted on the rear of said central frame member, a pair of curved elongated identical symmetrically opposed side frame members joined to each other and to said central frame member at a location intermediate the ends thereof, said side frame members having parallel spaced lower horizontal legs and parallel spaced upper handle bars, said central frame member being connected to and pivotally movable with respect to said side frame members, a ski movably mounted on each of said side frame members, means between said central frame member and said side frame members for biasing said frame members so that said skis are in a normal horizontal ground engaging position, and means between said opposed side frame members for braking said vehicle during a run.

6. A ski vehicle consisting of a central longitudinal support member having a lower forward end and an upper rearward end, a ski carried at the lower forward end of said central support member, a seat carried at the upper rearward end of said support member, transversely spaced elongated symmetrical rear frame members having upper portions thereof forming handle bars and lower portions thereof forming spaced horizontal legs, said rear frame members extending upwardly and forwardly from the leg portions thereof and converging intermediate the ends thereof, a ski carried on each of the horizontal legs of said rear frame members, means attached to said central support member and said rear frame members intermediate the end of said support member and at the point of convergence of said rear frame members for connecting said support member and said rear frame members, said connecting means being adapted to permit swinging pivotal movements of said central support relative to said rear frame members and limited substantially vertical displacements of said rear frame members relative to said central support and to each other whereby to provide steering control of said vehicle and longitudinal stability over varying terrain, means between said central support member and said rear frame members for longitudinally biasing said rear frame members with respect to said central support member, foot engageable means on said central support member, and foot operated brake means carried between said rear frame members.

7. The device of claim 6 wherein said forward ski is adapted for limited rotation about a transverse horizontal axis and a central vertical axis and wherein said rear skis are adapted to rotate slightly about a longitudinal axis whereby to increase the maneuverability of said vehicle.

8. A ski vehicle consisting of a curved forward central elongated member having vertically spaced substantially horizontal end portions, means for mounting a ski on the lower forward end of said central member, seat means carried on the upper rearward end of said central member, a pair of transversely spaced symmetrical curved rear elongated members, each of said rear members being mirror images of each other about said central member, means for connecting said central member to said

rear members intermediate the ends of said central member and said rear members whereby to provide pivotal movement of said central member and relative vertical movement between said rear members, said rear members forming at one end thereof spaced rear lower horizontal legs and at the opposite upper end thereof spaced handle bars cooperable with said seat means, means for mounting a ski on each of the lower legs of said rear frame members, means between said rear frame members and said central member for longitudinally biasing said rear frame members with respect to said central member, and means attached to said rear frame members for braking said vehicle.

9. The device of claim 8 wherein said forward ski mounting means includes a clamp member adapted to engage said central member and having a hollow integral sleeve therebelow transverse thereto, a spherical support attached to the ski, a skirt engageable with said ball having an upper hollow two piece hollow sleeve cooperable with the sleeve of said clamp member to form a continuous coaxial hollow cylindrical sleeve, and a locking pin receivable within said continuous sleeve whereby to permit rotation of said ski about a transverse horizontal axis, said skirt being adapted for limited movement with respect to said spherical support.

10. The device of claim 9 wherein said rear ski mountings permit each of said rear skis to move in a limited rotational direction about a longitudinal axis.

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