United States Patent

Martinmaas

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[54] SELF-PROPELLED VEHICLE

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[52] **U.S. Cl.** **115/70**

[51] **Int. Cl.** **B63b 35/00**

[58] **Field of Search** 115/70

[56] **References Cited**

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[57] **ABSTRACT**

A pair of skis adapted to support an operator for operation in a manner simulating conventional skiing are mounted on a frame in a laterally spaced generally parallel relationship for pivotal movements relative to the frame on axes extending longitudinally of the skis. An outboard motor is mounted on the frame for steering movements on a vertical axis so as to depend between the skis forwardly of the rear end thereof. A lever, pivotally mounted on the frame for movements transversely of the skis, is connected to impart simultaneous pivotal movements to the skis on their pivotal axes in a common direction for high-speed turning maneuvers and a shaft rotatably carried by the lever is operatively connected to impart steering movements to the outboard motor in unison with or independently of pivotal movement of the skis on their pivotal axes.

12 Claims, 8 Drawing Figures

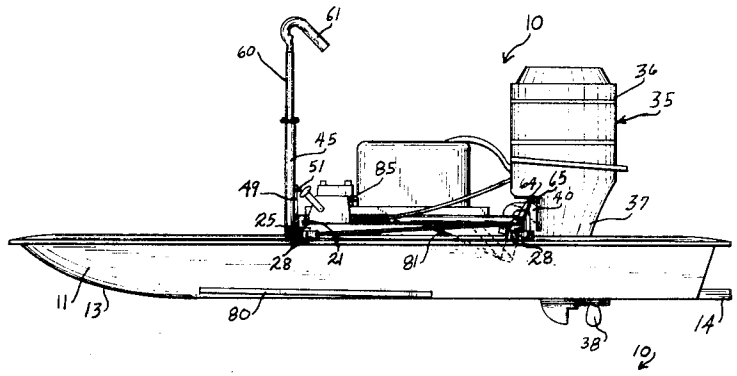


FIG_1

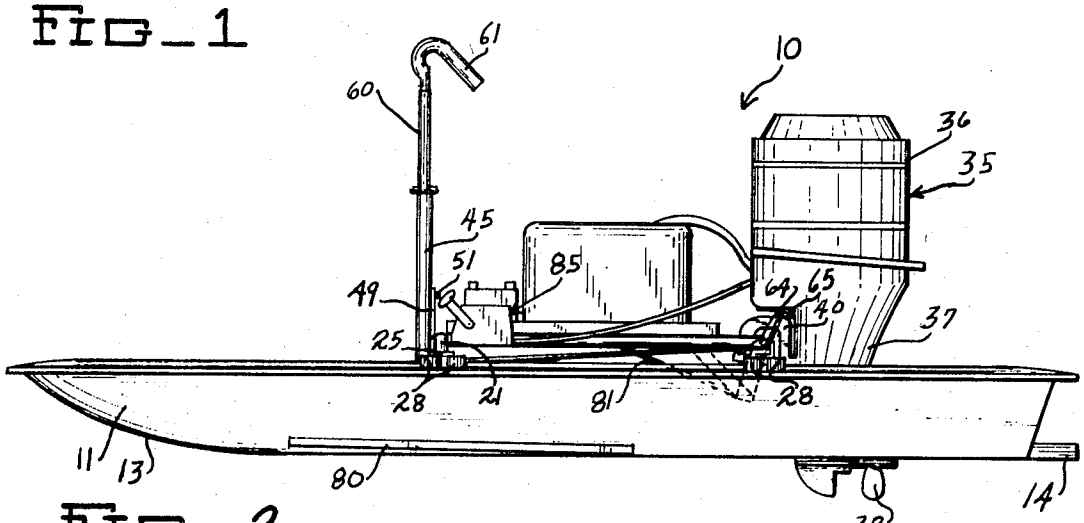


FIG_2

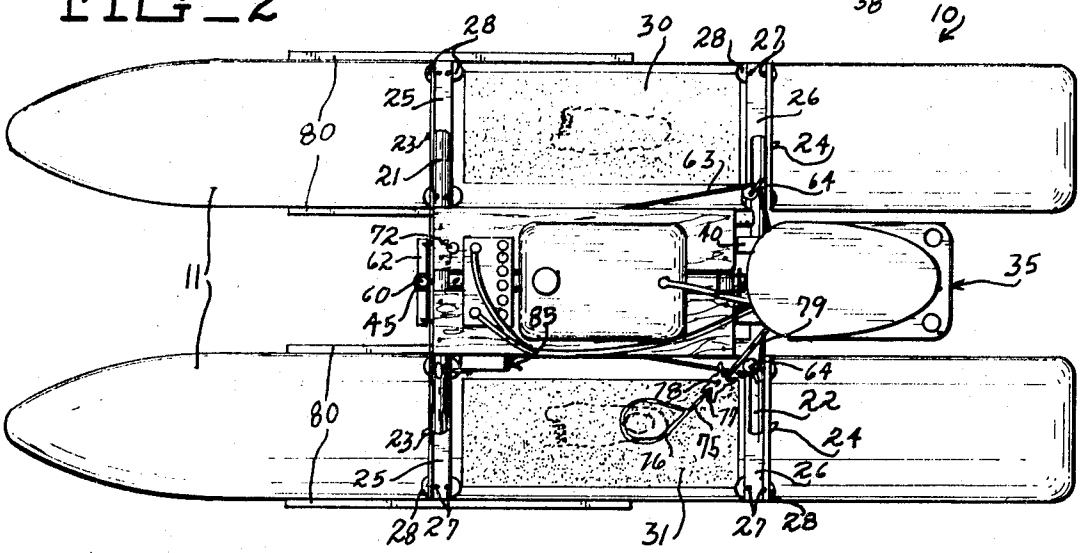
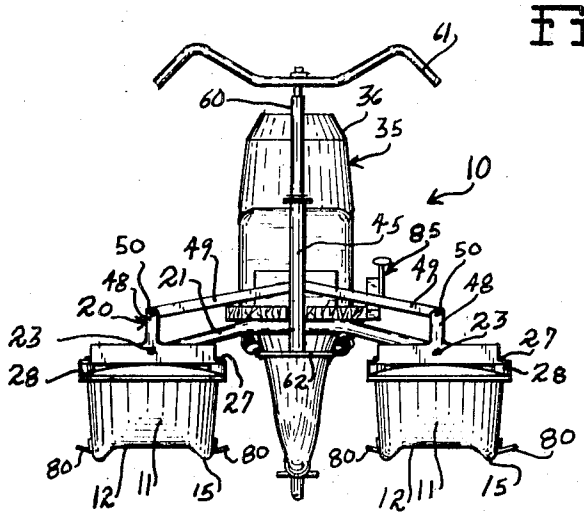


FIG_3



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FIG_4

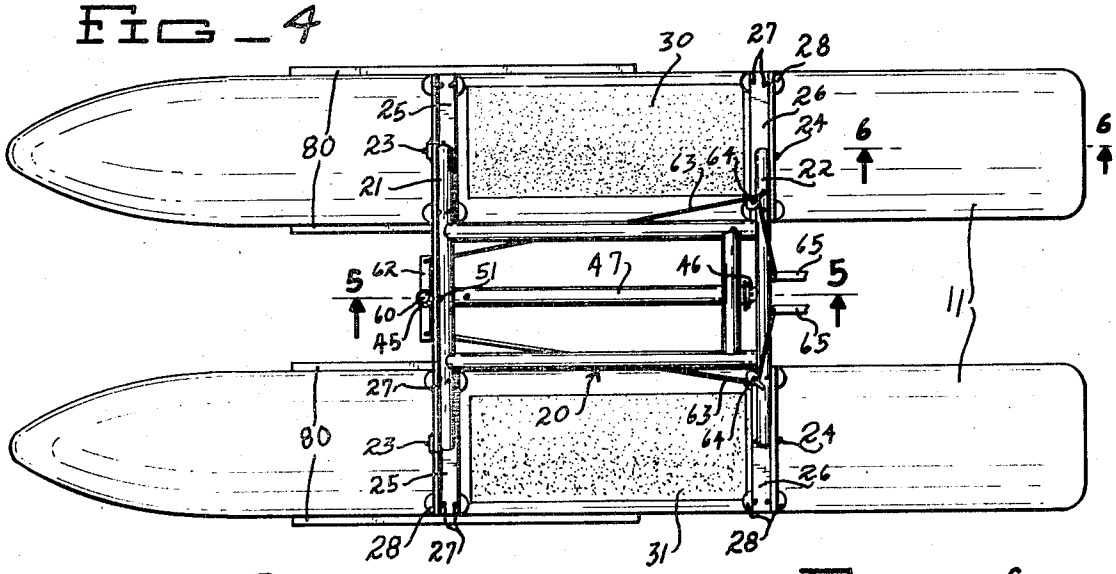


FIG_5

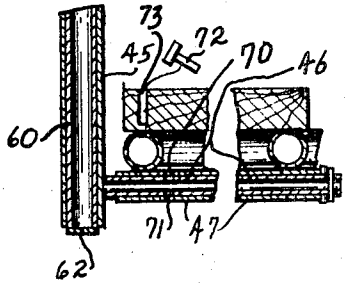


FIG_6

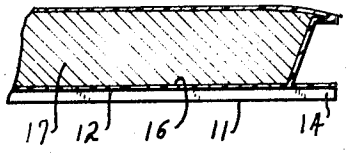


FIG_7

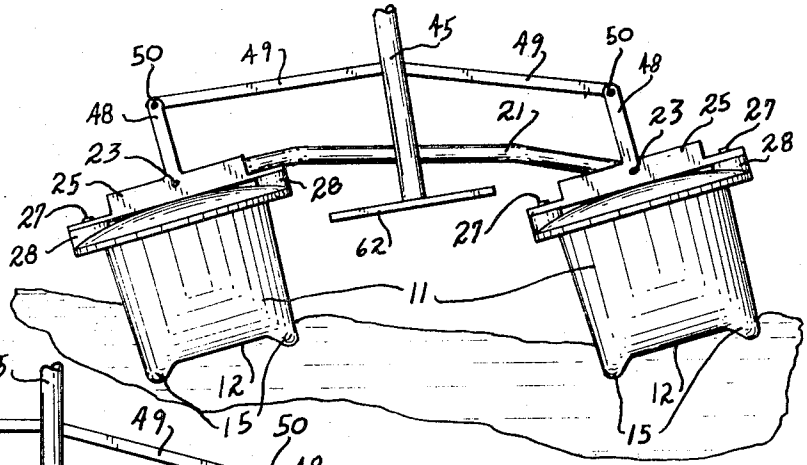
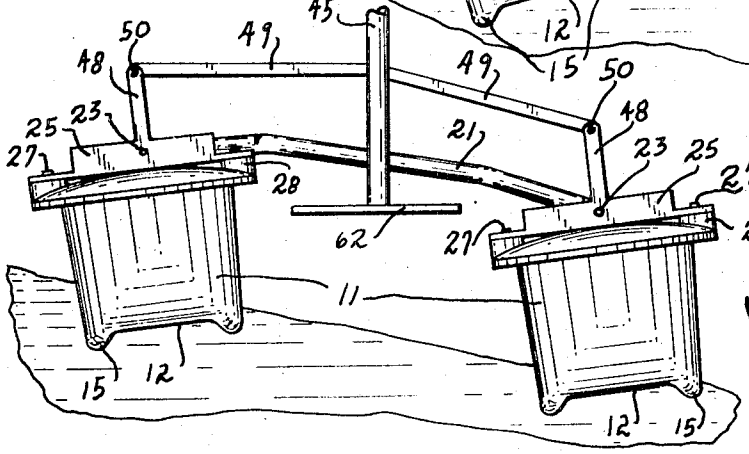


FIG_8



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SELF-PROPELLED VEHICLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to self-propelled vehicles and more specifically to types of self-propelled vehicles which utilize skis for movement of an operator over a body of water or a snow-covered surface.

2. Description of the Prior Art

Heretofore it has been a particular object to provide devices employing skis which would closely resemble or simulate the act of skiing either on water or snow by an individual positioned thereon in either a standing or sitting position. Such devices should be capable of achieving relatively high speed while at the same time permitting turning maneuvers which in the manner of a skier positioned on conventional skis. These maneuvers should also be permitted without undue or excessive shifting of weight either forwardly, rearwardly or laterally. Many devices have been devised which utilize skis, or skilike floats to support same on the surface over which they are to travel. Such vehicles utilize both self-contained power units and remotely positioned power units, such as power boats, to impart movement thereto over snow or water in an attempt to simulate the natural act of skiing. None of the prior art devices have achieved such a natural feel since they have failed to provide a device wherein the skis are mounted for natural turning maneuvers, through the manipulation of simple control linkage, and for limited vertical movement relative to each other. Additionally, such devices when using self-contained power units have failed to provide proper positioning of such units to obtain a correct weight distribution. This is particularly true in the case of water-born vehicles wherein such weight distribution is particularly critical to prevent damage to the power unit, vehicle, or injury to an operator thereof during use.

SUMMARY OF THE INVENTION

With the above in mind a pair of skis each defining a planing surface having a curved front end portion and a rear end are mounted on a frame means in a laterally spaced generally parallel relationship and for pivotal movement relative to the frame means on axes extending longitudinally of the skis. Power means is mounted on the frame means for propelling the skis over an underlying surface in a manner to position same between the skis and forwardly of the rear end thereof and control means, including a lever pivotally secured to the frame means, is connected to impart simultaneous pivotal movements to the skis in common directions on their pivotal axes whereby to dispose the planing surface of the skis in a parallel relationship with respect to each other and an underlying supporting surface.

It is a primary object of the present invention to provide a self-propelled vehicle which will closely simulate natural skiing action over an underlying surface.

It is a further object of the present invention to provide a device of the class above described which is adaptable to relatively high-speed operation while retaining a high degree of maneuverability.

It is a further object of the present invention to provide a device of the class above described which may be adapted for use on either snow covered surfaces or alternately bodies of water.

It is a still further object of the present invention to provide a device of the class above described which is simple in construction, relatively inexpensive to produce and relatively safe in use.

These and other highly important objects will become apparent upon consideration of the following specification, appended claims and attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring more particularly to the drawings wherein like characters indicate like parts throughout the several views:

FIG. 1 is a view in side elevation of a self-propelled vehicle constructed in accordance with the present invention;

FIG. 2 is a view in top plan, portions thereof removed, shown in section;

FIG. 3 is a view in front elevation thereof;

FIG. 4 is a view similar to FIG. 2, portions thereof removed to better illustrate the construction;

FIG. 5 is a view in vertical section as seen generally from the line 5—5 of FIG. 4, portions thereof broken away;

FIG. 6 is a fragmentary view in vertical section as seen generally from the line 6—6 of FIG. 5;

FIG. 7 is a diagrammatic view in front elevation illustrating a position of the various components of the present device during a turning maneuver; and

FIG. 8 is a view similar to FIG. 7 showing the position of the various components of the present device as same traverses an inclined surface.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings, FIG. 1 shows a self-propelled vehicle indicated generally by the numeral 10 of a type normally utilized for travel over a body of water. Vehicle 10 includes a pair of skis 11 each having a planing surface 12 including an upwardly curving front end portion 13 and a rear end 14. As shown, particularly in FIG. 3, the planing surfaces 12 of each of the skis 11 are defined by longitudinally extended ribs 15 which cooperate therewith to form a generally cross-sectionally arcuate planing surface 12 for reasons which will be hereinafter described. As seen particularly in FIG. 6 of the drawings, skis 11 are each constructed to define a cavity 16 which forms means providing a buoyancy sufficient to support the vehicle 10 on a body of water. To provide additional strength and for added safety purposes, should the skis be damaged during use thereof, cavity 16 is filled with a foamed-in-place plastic 17 such as polyurethane or the like.

Mounting the skis 11 in a laterally spaced generally parallel relationship for pivotal movement on axes extending longitudinally of the skis 11 is frame means indicated generally by the numeral 20. Frame means 20 includes forwardly and rearwardly disposed laterally projecting arm portions 21, 22 having opposite ends of each thereof pivotally secured as at 23, 24 to forwardly and rearwardly disposed bracket elements 25, 26 carried by each of the skis 11. Bracket elements 25, 26 are secured to the upper surface of their respective skis 11 by means of anchor bolts 27 and have rubberlike shock absorbers 28 interposed between the upper surfaces of the skis 11 and their respective bracket elements 25, 26. Shock absorbers 28 provide a cushioning effect between the skis 11 and frame 20 from impact imparted to the skis 11 and torsional forces between the skis 11 and frame means 20 during use of the vehicle 10.

As seen particularly in FIGS. 1, 2 and 4, frame means 20 is positioned generally midway between the front end portion 13 and rear end 14 for purposes of weight distribution and the forwardly and rearwardly disposed laterally projecting arms 21, 22 cooperate to define means in the nature of roughened pads 30, 31 on the upper surfaces of each of the skis 11 for engagement by the feet of an operator positioned on the skis 11 (see dotted lines in FIG. 2). Positioning of the pads 30, 31 centrally of the skis 11 between the arms 21, 22 provides for correct distribution of the weight of an operator on the vehicle 10 and the roughened surface thereof discourages accidental displacement of the feet of an operator during maneuvering of the vehicle 10 and/or travel thereof over surfaces presenting rough or uneven conditions.

Power means for propelling the skis 11 of vehicle 10 over an underlying surface, such as the upper surface of a body of water, not shown, is indicated generally by the numeral 35. Power means 35, in the embodiment illustrated, is in the nature of an internal combustion engine such as an outboard motor including a power head 36 and a power transmission 37 depending therefrom so as to position a propeller 38 mounted thereon in driving engagement with the body of water on which the vehicle is to be operated. As shown particularly in FIGS. 1–3, outboard motor 35 is mounted on the frame means

20 centrally between the skis 11 by means of the thumbscrew-equipped brackets 40 normally associated with such motors for pivotal steering movements on a vertical axis. Such mounting positions the outboard motor 35 generally centrally between the skis 11 and forwardly of the rear end 14 and prevents undue settling of the rear end 14 into the body of water during rapid slowdown of the vehicle 10. Undue or excessive lateral weight forces during high-speed maneuvers of the vehicle 10 are also prevented by such mounting.

Control means for maintaining the planing surfaces 12 in a generally parallel relationship and for imparting simultaneous pivotal movements in common directions to the skis 11 on the pivotal axes thereof includes a generally vertically disposed control lever 45. Control lever 45 is mounted on the frame 20 for pivotal movements in a plane which extends transversely of the skis 11 by means of a laterally projecting arm 46 journaled for rotation in a sleeve 47 affixed to the frame means 20 to extend in a direction generally parallel with the pivotal axis of the skis 11. A vertically extending arm 48 is rigidly affixed to each of the forwardly disposed brackets 25 so as to extend upwardly from the pivotal connections 23 of the arms 21 to their respective brackets 25 and a pair of connecting links 49 have one end of each thereof pivotally connected as at 50 to the upper free end of a respective arm 48. Each of the connecting links 49 extend laterally inwardly toward the vertical lever 45 and is pivotally connected as at 51 to the vertically disposed control lever 45 in vertically upwardly spaced relationship to the pivotal connection of the lever 45 to the frame means 20. In this manner, pivotal movement of the lever 45 by an operator positioned on the vehicle 10 in a direction transversely of the skis 11 causes pivotal movement of the skis 11 about their pivot connections 23, 24 in common directions for high-speed maneuvers as will be described hereinafter in the description of operation.

Means for imparting steering movements to the power means about the vertical pivotal axis thereof is associated with the control lever 45 and includes a rotary shaft 60 journaled for rotation relative to the control lever 45. As shown, control lever 45 is tubular in nature and telescopically receives the rotary shaft 60 for rotation therein. A steering member such as a pair of handlebars 61 is rigidly affixed to the upper end of the rotary shaft 60 for imparting rotation thereto by an operator positioned on the vehicle 10. Shaft 60 projects downwardly from the pivotal connection of the vertical lever 45 below the level of the frame means 20 and has a T-bar 62 rigidly affixed thereto so as to extend transversely with respect to the longitudinal axes of the skis 11. Flexible cables 63 have one end of each thereof secured to opposite ends of the T-bar 62. Each of the cables 63 extend rearwardly from their connection to the T-bar 62 in a manner to be entrained over pulleys 64 carried by the frame means 20 laterally of the motor 35 and have their other ends connected to opposite sides of the motor 35, as at 65, forwardly of the pivotal axis of such motor 35. With this arrangement pivotal steering movements are imparted to the motor 35 by rotary movement of the shaft 60 either in unison or independently of pivotal movements of the skis 11 on their pivotal connections 23–24 for reasons which will become apparent immediately hereinafter.

During slow-speed operation of the vehicle 10, such as during docking maneuvers or the like, it is desirable to provide means for locking the planing surfaces 12 of the skis 11 in a generally coplanar relationship while still permitting steering movements of the power means 35 independently of pivotal movement of the skis 11. To this end, as shown particularly in FIG. 5, tubular sleeve 46 together with arm 45 are apertured as at 70, 71 respectively in a manner that movement of the skis 11 to the position of FIG. 3 of the drawings by the control lever 45 aligns the apertures 70, 71 for the reception of a locking pin 72 normally positioned in an opening 73 formed in the frame means 20. Reception of the locking pin 72 within the aligned apertures 70, 71 immobilizes the lever 45 from further pivotal movement in a direction transversely of the skis 11 and consequently pivotal movement of the skis 11 about their pivotal connections 23, 24. With the control lever 45 thus immobilized it will be seen that independent steering movements of the power means 35 is still permitted during slow-speed maneuvers or docking operations since only the control means for imparting pivotal movements to skis 11 has been immobilized.

Under certain conditions of high-speed operation such as extremely rough surfaces, striking of objects, loss of control, etc., wherein one or both of an operator's feet, shown by dotted lines in FIG. 2, may be displaced from engagement with the roughened pads 30, 31 it is desirable to provide some means for disabling the power means 35 to prevent injury to the operator. FIG. 2 of the drawings illustrates means commonly known as a "deadman control" which includes a lanyard or cord 75 formed from an electrically nonconductive material. Cord 75 has a portion 76 which encircles the ankle of an operator and a portion 77 extending therefrom which is positioned between the contacts of an electrical switch 78. The contact portions of the switch 78 are normally connected into the electrical system of the motor 35 through the medium of electrical conductors, not shown, but contained within the protective covering 79 so as to ground the electrical system of the motor 35 upon engagement of the electrical contacts of the switch 78. Thus, should an operator's feet become displaced from the roughened pads 30, 31, due to the above conditions, it will be seen that the portion 77 will be withdrawn from between the electrical contacts of the switch 78 to permit contact thereof and the electrical system of motor 35 grounded to discontinue further operation of the motor 35.

To prevent water spray caused by the skis 11 from striking an operator of the vehicle 10 or otherwise inundating the power means 35 and parts associated therewith there is provided a pair of splash rails 80. Splash rails 80 are positioned on opposite sides of each of the skis 11 to extend rearwardly from the outwardly curved portion 13 thereof to a point generally midway between the portion 13 and rear end 14 of the skis 11. Splash rails 80 are each positioned adjacent one of the longitudinally extended ribs 15 with the forward end thereof at a slightly higher elevation than the rear end. In addition to the splash rails 80 a splash pan 81 is affixed to the underside of the frame means 20 so as to deflect any spray emanating from the skis 11 or spray rails 80.

It will be appreciated by those skilled in the art that while the present device has been illustrated as a vehicle adapted for use over bodies of water that with slight modifications it may be adapted for use over snow-covered surfaces. That is, skis 11 may be constructed to eliminate the cavity 16 and foamed-in-place plastic 17 and roughened pads 30, 31 replaced by conventional ski harnesses. Also, power means 35 may be replaced by a power means such as a power head pivotally mounted on the frame 20 and operatively connected to track structure which will be positioned between the skis 11 in contact with the underlying surface of snow. The above-described modifications have not been shown in the interest of brevity but only mentioned to bring out the versatility of the present invention wherein same may be used virtually throughout the year in areas which include both summer and winter conditions.

Use of the above-described structure either in its illustrated form or described modified form is accomplished by an operator positioning himself with his feet in engagement with the pads 30, 31 or ski harnesses, not shown, in a generally upstanding position similar to that of a person in the natural act of skiing. The particular power means 35 associated with the vehicle is then started and control mechanism, illustrated generally at 85, actuated to cause the power means 35 to impart forward movement to the vehicle 10. During slow-speed maneuvering locking pin 72 may be left in position within the apertures 70, 71 and steering movements imparted to the power means 35 independently to cause the vehicle 10 to travel a desired route. When it is desired to travel at a relatively high speed on the vehicle 10 locking pin 72 is removed from the apertures 70, 71 and positioned within the aperture 73.

Thereafter the control mechanism **85** is advanced to increase the speed of the vehicle **10** and directional control of the vehicle **10** is accomplished by movement of the control lever **45** on its pivot axis in a direction generally transversely of the skis **11**. Movement of the lever **45** to the right with respect to an operator positioned on the pads **30, 31** causes the skis **11** to move to the position illustrated in FIG. **7** with the result that the skis will direct the vehicle in a turn to the right much in the manner of a skier positioned on a conventional pair of skis. Thus it will be seen that in order to decrease the radius of the turn an operator merely leans a little further to the right and moves the control lever **45** likewise to tilt the surfaces of the skis **11** at a greater angle relative to the surface of the body of water or snow. In this manner, the center of gravity of the vehicle and an operator thereon is positioned identically to that of a skier attempting to make a sharper turn on a pair of conventional skis. During such high-speed turns it will be noted that the longitudinally extending rib **15** positioned on the side of the skis **11** in which direction the turn is being made operates to limit side slip of the vehicle **10** radially outwardly with respect to the radius of the turn thus adding to the maneuverability and stability of the vehicle **10**.

FIG. **8** of the drawings illustrates the vehicle **10** in position to traverse an inclined surface such as the side of a large wave or swell or alternatively on a snow-covered slope. In either case, by virtue of the above-described arrangement of parts one of the skis **11** may be positioned at a higher elevation than the other ski **11** while maintaining the planing surfaces **12** in a generally parallel relationship much in the manner of a conventional skier attempting to traverse an inclined surface. Also, with the above structure it will be noted by reference to FIGS. **3, 7** and **8** that frame means **20** is disposed in a generally parallel relationship with the underlying surface disposed between the skis **11**, whether it be a generally horizontal surface such as in FIG. **7** or an inclined surface such as in FIG. **8**. As with the case of power means **35** in the nature of an outboard motor it will be seen that the vertical axis thereof is always maintained perpendicular to the underlying surface with the propeller **38** in full driving engagement with the underlying water. In the event the vehicle **10** is to be used for travel over a snow-covered surface, wherein power means **35** including a track having driving engagement with the snow is utilized, it will be apparent that the driving portion of the driving track is maintained in full engagement with the underlying snow since the frame means **20** is maintained in a generally parallel relationship to the upper surface of the snow.

What is claimed is:

1. A self-propelled vehicle comprising:

a. a pair of skis each defining a planing surface having an upwardly curving front end portion and a rear end;

b. frame means mounting said skis in a laterally spaced generally parallel relationship and for pivotal movement relative to said frame means on axes extending longitudinally of said skis;

c. power means mounted on said frame means for propelling said skis over an underlying surface;

d. control means carried by said frame means and connected to impart simultaneous pivotal movements to said skis on said axes in common directions; and

e. means associated with said control means for imparting steering movements to said power means in unison with pivotal movements of said skis and independently of pivotal movement of said skis.

2. The structure of claim **1** in which said planing surface is cross-sectionally generally concave relative to an underlying surface and is generally parallely disposed with respect to the underlying surface.

3. The structure of claim **1** in which said power means is an internal combustion engine including a power head and a power transmission having means operable to impart forward movements to said vehicle depending from said power head to a position between said skis, said power means being mounted on said frame for pivotal movement on a generally vertical axis.

4. The structure of claim **1** in which said power means is disposed to depend between said skis forwardly of said rear end.

5. The structure of claim **3** in which said control means includes:

a. a control lever mounted on said frame for pivotal movement in a plane transversely of said ski;

b. a vertically extended arm carried by each of said skis; and

c. a pair of connecting links one end of each pivotally connected to the free end of one of said arms and the other end of each pivotally connected to said lever in spaced relationship to the pivotal connection of said lever to said frame.

6. The structure of claim **5** in further combination with means for immobilizing the pivotal movement of said lever.

7. The structure of claim **5** wherein said means associated with said control means for imparting steering movements to said power means about said vertical pivotal axis thereof comprises:

a. a rotary shaft rotatably mounted with respect to said lever;

b. a steering member fastened on the upper end of said shaft;

c. a T-bar fastened on the lower end of said shaft disposed to extend in a direction transversely of said skis; and

d. flexible control cables connected to and extending between the opposite ends of said T-bar and said outboard motor whereby rotary movement imparted to said shaft is transmitted to like rotary movements of said outboard motor on said vertical pivotal axis thereof.

8. A self-propelled vehicle comprising:

a. a pair of skis each defining a planing surface having an upwardly curving front end portion, a rear end and means generally positioned midway between said front end portion and rear end for engagement by the feet of an operator positioned on said skis;

b. frame means mounting said skis in a laterally spaced generally parallel relationship and for pivotal movement relative to said frame means on axes extending longitudinally of said skis;

c. power means mounted on said frame means for propelling said skis over an underlying surface;

d. control means connected to said skis for maintaining said planing surfaces in a generally parallel relationship and operable by an operator positioned on said skis for imparting simultaneous pivotal movements in common directions to said skis on said pivotal axes thereof;

e. means associated with said control means for imparting steering movements to said power means in unison with pivotal movements of said skis and independently of pivotal movement of said skis; and

f. means for locking said planing surfaces of said skis in a generally coplanar relationship while still permitting said steering movements to said power means independently of pivotal movements of said skis.

9. The structure of claim **8** in further combination with means providing a buoyancy sufficient to support said vehicle on a body of water.

10. The structure of claim **9** in which said skis each define a cavity.

11. The structure of claim **10** in which said cavity is filled with a buoyant material formed of foamed-in-place plastic.

12. The structure of claim **8** in further combination with means for disabling said power means responsive to displacement of one of an operator's feet from said skis.

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