PORTABLE SNOW VEHICLE
11 Claims, 16 Drawing Figs.

ABSTRACT: A self-powered snow vehicle for propelling a skier over snow-covered terrain, particularly for gaining elevation, and which is adapted to be back-packed by the skier during his descent.
PORTABLE SNOW VEHICLE

BACKGROUND OF THE INVENTION

Skiing is pursued, for the most part, as an expedient and/or sporting method of descending snow-covered terrain. Man's extremely limited ability to climb under his own power while on skis is well known to all who have so endeavored. As a result of this innate physical limitation, skiing has been practiced, almost solely, only where lifting means are provided for the skier to allow him to reacquire lost elevation with a minimum of effort and time. Fixed-base ski lifts have supplied a substantial part of the skier's "lift" needs; however, the fixed-base nature of conventional ski lift facilities greatly limits the variability and choice of location. Helicopters used as ski lifts offer considerable flexibility in choice of location; however, very limited availability and cost rule out this method of obtaining lift for the average skier.

OBJECTS OF THE INVENTION

It is an object of this invention to satisfy the need for a means for enabling a skier to obtain elevation on snow-covered terrain of his choice; more particularly, it is an object to provide a self-contained and self-powered snow vehicle which is capable of propelling a skier to higher elevations and which is compact and lightweight as to be portable when not in use. Further objects and advantages of this invention will be obvious and will in part become apparent as the following description proceeds. The features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the invention, reference may be had to the following detailed description taken in connection with accompanying drawings wherein:

FIG. 1 is a view of a snow vehicle constructed according to the teachings of this invention, showing the vehicle in its operative mode being back-packed by a skier descending snow-covered terrain;

FIG. 2 is a view of the FIG. 1 snow vehicle in its operative mode propelling a skier up a snow-covered incline;

FIG. 3 is a fragmentary side elevational view of the snow vehicle with one side support plate removed to expose internal components thereof;

FIG. 4 is a fragmentary side elevational view of the opposite side of the vehicle;

FIG. 5 is a fragmentary front elevation view of the vehicle with a portion of endless track means for the vehicle broken away to show internal components of the vehicle;

FIG. 6 is a fragmentary rear elevational view of the vehicle with a portion of the endless track means broken away;

FIG. 7 is an enlarged fragmentary side elevational view, partly in section, of an end assembly of a drive roller for the vehicle;

FIG. 8 is an enlarged fragmentary side elevational view, partly in section, of a drive shaft and centrifugal clutch assembly for the vehicle;

FIG. 9 is an enlarged fragmentary side elevational view, partly in section, of an end assembly of one of the idler rollers supporting and guiding an endless track means for the vehicle;

FIG. 10 is an enlarged view of the vehicle throttle assembly;

FIG. 11 is a side elevational view of the vehicle in its operative mode, showing retractable seat means collapsed to a position wherein the vehicle is adapted to be back-packed by the skier;

FIG. 12 is a side elevational view of the vehicle in its operative mode, showing the seat means erected to a position wherein it is capable of supporting a skier on the vehicle;

FIG. 13 is a perspective view of the idler roller mechanism of the operative mode, illustrating in detail the retractable seat means;

FIGS. 14 and 15 are enlarged fragmentary side elevational views detailing the center pivot and locking structure of a pair of collapsible linkages supporting seat means for the vehicle; and

FIG. 16 is a sectional view taken on lines 16—16 in FIG. 15.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

This invention in its broadest sense concerns the concept of a compact, lightweight, portable snow vehicle which is capable of propelling a skier over snow-covered terrain, especially for gaining elevation, and which is adapted to be back-packed by the skier when not in use. The invention is directed to a portable snow vehicle representing a preferred structural implementation of the invention.

By way of a brief introduction to the general construction and manner of use of the snow vehicle, FIG. 1, shows the vehicle 10 in its inoperative mode being back-packed by a skier descending a slope. FIG. 2 illustrates the vehicle 10 in its operative mode propelling a skier up a snow-covered incline. An important aspect of this invention is the provision of a dual-function seat means. In FIG. 1 the seat means is withdrawn to a position wherein a body-contoured seat structure constituting a part of the seat means serves as a back cushion for the vehicle while being carried; FIG. 2 shows the seat means erected to an alternate position wherein the seat structure is adapted to support a skier upon the vehicle.

FIGS. 3-10 portray the vehicle chassis, drive train, and controls. The vehicle has an exoskeleton comprising a pair of rigid sideplates 12, 14 which serve directly or indirectly to support all components of the vehicle.

Propulsive means for the vehicle is illustrated as comprising a gasoline engine 16 supported on the sideplates 12, 14. The power generated by the engine 16 is supplied to a corrugated endless track 18, preferably formed from a synthetic elastomeric material, to a drive roller 19 having external corrugations mating with the corrugations on the track 18 (see particularly FIGS. 3 and 5). The drive roller 19 is supported for rotation on the sideplates 12, 14, as shown in detail in FIG. 7.

The drive roller 19 is in the form of a hollow cylinder supported concentrically on a central axle 119 by a pair of end caps, one of which is shown in FIG. 7 at 120. Each end cap 120 is keyed to the axle 119 by a pin 121. A ball bearing 122 supports each end of the axle 119 in an aperture in the respective end plate.

Power is delivered from the engine 16 to the drive roller 19 through a transmission comprising a pair of sprockets 20, 22 interlocked by a endless chain 24. As shown in FIG. 7, the sprocket 22 may be locked to the axle 119 of the drive roller 19 by a pin 124.

A centrifugal clutch 26, shown in detail in FIG. 8, is preferably provided between the engine 16 and the sprocket 20 to prevent creeping of the vehicle when the engine is running at idle speeds.

As seen in FIG. 8, a clutch housing 126 is journaled to rotate freely on the engine drive shaft 127 and has affixed thereto the sprocket 20 that drives chain 24. The clutch 26 includes a hub 128 solidly affixed on the drive shaft 127 by a taper and keyway arrangement. Springs 130 hold weights 132 radially inwardly until the engine speed is such that centrifugal force causes the weights 132 to engage the (preferably hardened steel) housing 126 with sufficient force to drive it. The housing 126 carries the sprocket 20; thus, rotation of the housing drives the chain 24 and consequently the drive roller 19 and track 18.

The track 18 is guided and carried by four like tubular idler rollers 28, 30, 32 and 34, each of which is rotatably supported on a central shaft 35. A detail of the end arrangement of the idler roller 32 is shown in section in FIG. 9. The shaft 35 is anchored to the sideplates 12, 14 by locknuts. The idler roller 32 turns on porous bronze bearings 26 press fit into end caps 37 in each end thereof. The end caps 37 are in turn press fit onto the shaft 35. The idler shafts cooperate with the sideplates to form a rigid chassis for the vehicle.
The trapezoidal configuration of the sideplates 12, 14 and the arrangement of the idlers 28, 30, 32 and 34 is such as to offer a substantial frictional resistance to the track 18 for engagement with the snow and to provide an upward sloping forward track surface which causes the vehicle to stay on top of the snow cover.

A battery 38 and starter 39 are preferably provided for enabling the engine 16 to be started at any time with a minimum of inconvenience. A cover 40 is preferably provided to shield the transmission and centrifugal clutch 26 to prevent clogging of the transmission and to minimize the possibility that the skier might become entangled in the transmission.

A throttle assembly 42 for controlling the speed of the vehicle is provided. See especially FIG. 10. The throttle assembly 42 comprises a control lever 142 rotationally mounted with a frictional load for position stability. A circular peripheral portion of the control lever 142 and a mating concentric guideway 143 embrace a sheathed flexible cable 144 attached to the lever 142. The cable 144 is connected at its operating end 146 to the throttle lever 148 on the engine carburator 150. A spring 152 on the throttle lever 148 maintains tension on the cable 144 to ensure smooth control of the engine speed.

As stated above, it is an important aspect of this invention to provide a retractable seat means 50 which may be set in a retracted position, as shown in FIGS. 1, 11 and 13, wherein it serves to provide a back cradle for the vehicle while being carried by a skier. The seat means 50 may, alternatively, be set in an erected position, as shown in FIGS. 2 and 12, wherein it provides support for a skier on the vehicle when the vehicle is in its operative mode.

In more detail, the seat means 50 is illustrative as comprising a tubular strut 52 which is pivotally mounted on the sideplates 12, 14 near the forward end thereof and connected near the rear of the vehicle by a pair of struts in the form of articulated linkages 54 and 56. The linkages 54, 56 are pivoted at their respective centers and are pinned at their extreme ends to the tubular strut 52 and the sideplates 14, 16 respectively. The linkages 54, 56 are designed to be collapsible when it is desired to adapt the vehicle for portage and yet rigid when fully extended to offer support for the skier. The structure enabling the linkages 54, 56 to be locked in an extended position or collapsed to a retracted position can be best seen in FIG. 14. Linkage 56 is illustrated as comprising an upper bar 58 and a lower bar 60 pivotally joined with a pin 62. When the linkage is fully extended with the upper and lower bars 58, 60 aligned, a transversely extending finger 64 on lower bar 60 abuts against the back wall 66 of a recess 68 in the upper bar 58, preventing further rotation of the lower bar 60.

A leaf spring 70 anchored at one end on the upper bar 58 cooperates, as follows, with an aperture 72 in the lower bar 60 to lock the upper and lower bars 58, 60 together. As the lower bar 60 approaches its locked position, the leading edge 74 of the lower bar 60 engages a sloping leading edge 76 on a bent end portion 78 of the spring 70. See FIG. 16. The spring end portion 78 is cammed backwardly against the restorative force of the spring 70. As the lower bar 60 reaches its position of alignment with the upper bar 58, the spring end portion 78 snaps into aperture 72, rigidly interconnecting the upper and lower bars 58, 60. The linkages 54, 56 may be broken merely by manually grasping a tab 80 on spring 70 and withdrawing the spring end portion 78 from the aperture 72.

The seat means 50 includes a body-contoured seat structure 84 which serves as a seat for the skier when the vehicle is in its operative mode, and which serves as a back cradle when the vehicle is being back-packed. It is essential that the seat structure 84 conform very closely to body contours so that full guidance control of the vehicle is achieved. To this end, the seat structure 84 preferably comprises a wide flexible web, such as might be fabricated from canvas, nylon, or the like, supported between U-sections of the tubular strut 52.

Shoulder straps 90 are provided to minimize the effort required in carrying the vehicle.

The invention is not limited to the overall vehicle configuration depicted which is merely illustrative. Nor is it limited to the particular details of construction of the vehicle depicted; it is contemplated that various and other modifications and applications will occur to those skilled in the art. For example, numerous other seat and cradle structures are within the purview of this invention. As an alternative to the illustrated drive arrangement, the drive to the endless track 18 could be provided from a roller inside the track, positive coupling to the outside of the track being through holes of the like in the track means. As a further variation, the track may be provided with corrugations on both sides, the tracks being driven by an internal drive roller having corrugations mating with the internal corrugations on the track. Other changes may be made in the above-described apparatus without departing from the true spirit and scope of the invention herein involved, and it is intended that the subject matter of the above depiction shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. Apparatus for propelling a skier over snow and of a size capable of being supported on the back of a skier, comprising: chassis means including a pair of spaced side frames; self-contained motive means supported on said chassis means for supplying propulsive energy for said apparatus; endless track means supported on said chassis means and surrounding said motive means; transmission means for transmitting power from said motive means to said track means; struts means including a drive roller coupled to said motive means and positioned outside the compass of said endless track means, said drive roller and the external surface of said track means having mating corrugations for efficiently transmitting power from said drive roller to said track means; smooth idler roller means supporting said track means so as to have a substantial fraction of its length adapted for engagement with the snow; seat means on said chassis means for supporting a skier in straddling position such that the weight of the skier is distributed between the apparatus and the skis, the apparatus acting, in effect, to push the skier over the snow.

2. The apparatus defined by claim 1 wherein said apparatus includes back mounting means and back cradling means for adapting said apparatus to be back-packed when not in use.

3. The apparatus defined by claim 1 wherein said seat means includes a first strut means mounting a wraparound seat structure at the end thereof, said seat structure conforming closely to body contours to allow guidance control of the apparatus by bodily movements.

4. The apparatus defined by claim 3 wherein said first strut means is pivoted on said chassis means and wherein said seat means includes articulated second strut means interconnecting said chassis means and said first strut means, said second strut means being collapsible to enable said seat structure to be retracted when the apparatus is not in use.

5. The apparatus defined by claim 3 wherein said apparatus includes back mounting means and back cradling means for adapting said apparatus to be back-packed when not in use.

6. The apparatus defined by claim 5 wherein said seat structure comprising part of said seat means serves also as said back cradling means when said apparatus is being back-packed.

7. The apparatus defined by claim 6 wherein said first strut means is pivoted on said chassis means and wherein said seat means includes articulated second strut means interconnecting said chassis means and said first strut means, said second strut means being collapsible to enable said seat structure to be retracted when said apparatus is not in use to a position wherein it is operative to serve as said back cradling means.

8. Apparatus for propelling a skier over snow and of a size capable of being supported on the back of a skier, comprising: chassis means; self-contained motive means supported on said chassis means for supplying propulsive energy for said apparatus;
endless track means supported on said chassis means and surrounding said motive means; transmission means for transmitting power from said motive means to said track means; idler means supporting said track means so as to have a substantial fraction of its length adapted for engagement with the snow; seat means mounted on said chassis means so as to erect to a position substantially away from said chassis means or to collapse to a position closely adjacent said chassis means for supporting a skier such that the weight of the skier is distributed between the apparatus and the skis, whereby the apparatus acts, in effect, to push the skier over the snow in seated position straddling the apparatus, said seat means including a wraparound seat structure conforming closely to body contours to allow guidance control of the apparatus by bodily movements.

9. The apparatus defined by claim 8 including backing means, and in which said seat means serves as back cradling means to enable said apparatus to be back-packed when not in use.

10. The apparatus defined by claim 9 wherein said seat means includes a pair of first strut means each pivotally connected at one end to said chassis means and supporting said seat structure at the opposed ends thereof, said seat means including a pair of articulated second strut means interconnecting said chassis means and said first strut means, said second strut means being collapsible to enable said seat structure to be retracted when the apparatus is not in use.

11. The apparatus defined by claim 10 wherein said seat structure comprises a flexible web supported at each end by said first strut means.