United States Patent

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[72] Inventor **Guy-Noel Chaumont**
138 rue Gaulin, Princeville, Quebec, Canada

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[54] **SKI LEG FOR A SNOWMOBILE-TYPE VEHICLE**
3 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **180/5 R,** 280/21, 280/26, 287/100
[51] **Int. Cl.** **B62d**
[50] **Field of Search** 180/5, 6, 4; 280/26, 16, 21; 287/100

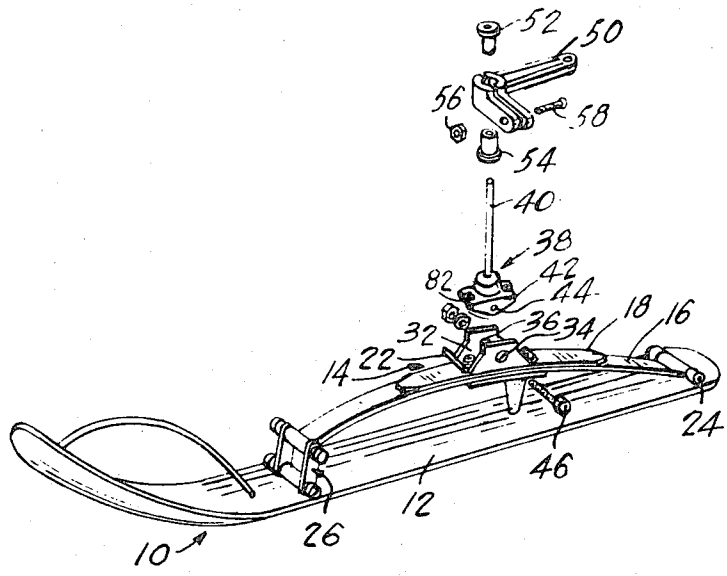
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Primary Examiner—Richard J. Johnson
Attorney—Cushman, Darby & Cushman

ABSTRACT: The present invention relates to the construction of the ski leg used on a snowmobile type vehicle for supporting the ski structure which is used to steer the vehicle. The improvement consists in providing to the ordinary ski leg a member which limits the longitudinal swing of the ski structure when the vehicle, travelling at relatively high speed, is jolted into a free-in-air position.



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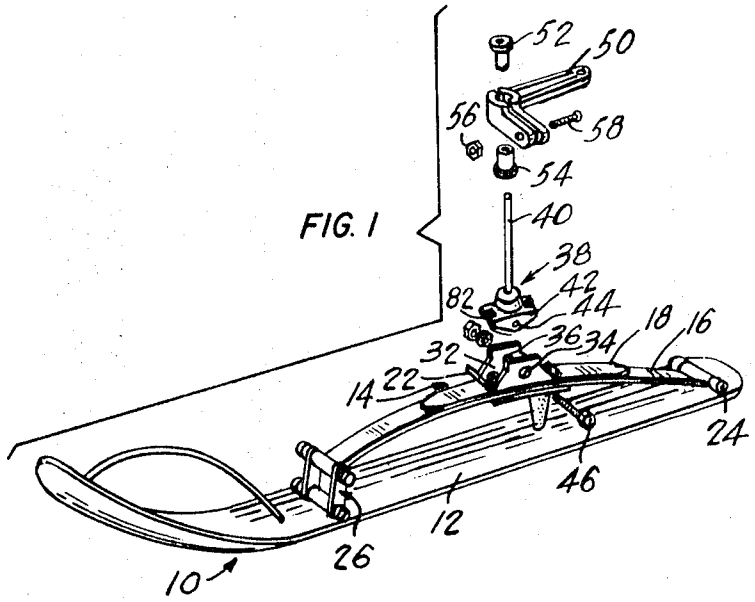


FIG. 1

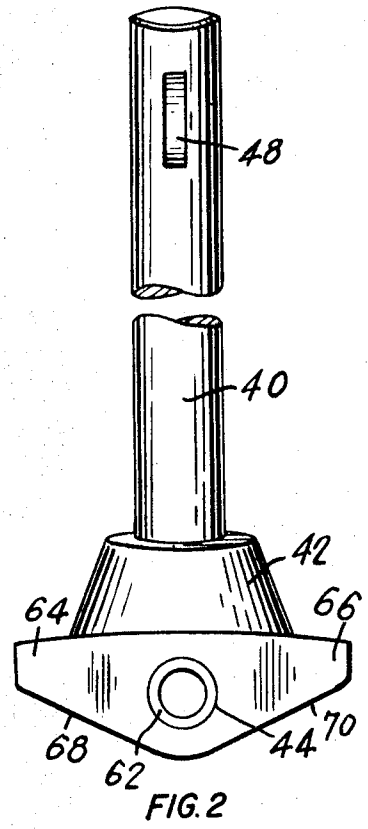


FIG. 2

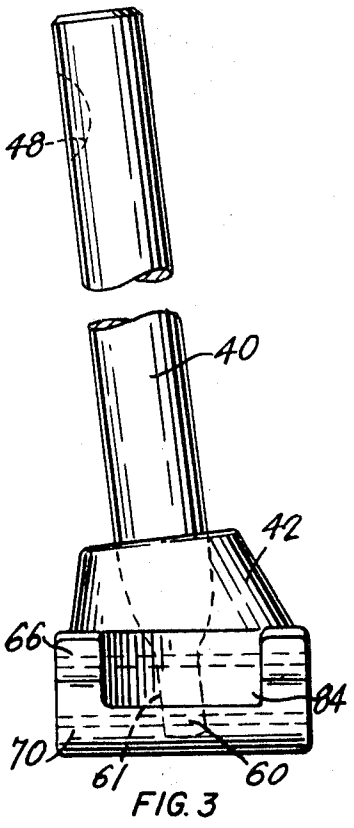


FIG. 3

INVENTOR
Guy-Noel CHAUMONT

By Cushman, Darby & Cushman

AGENTS

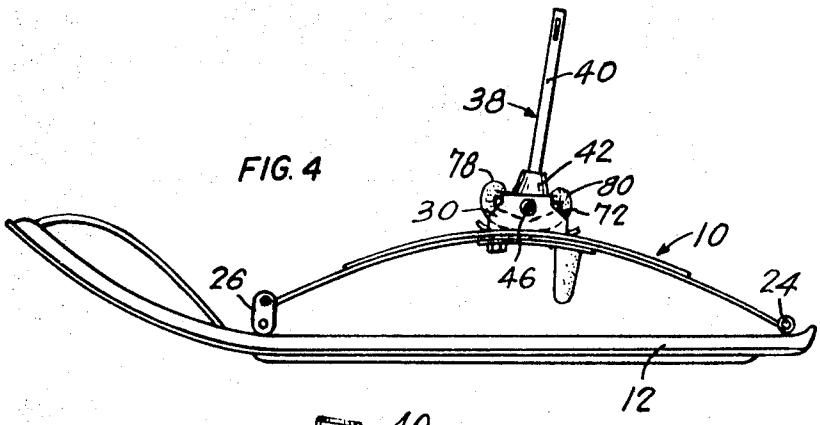


FIG. 4

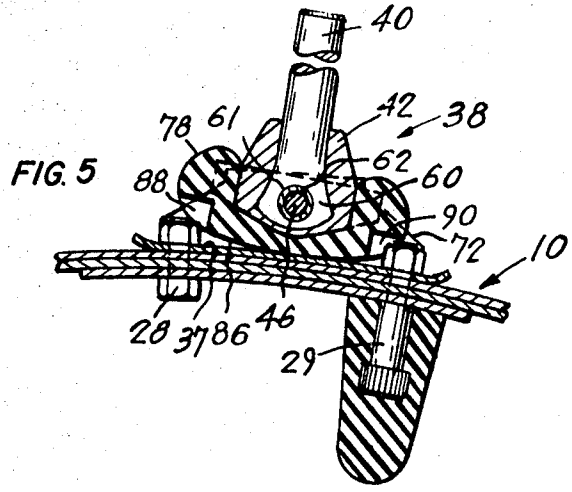


FIG. 5

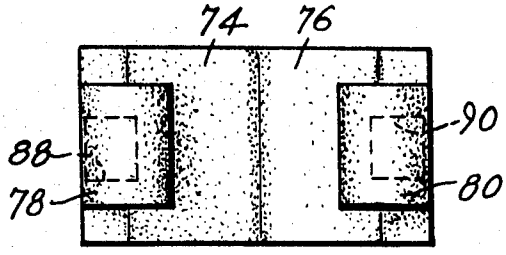


FIG. 6

INVENTOR
Guy-Noel CHAUMONT

By Cushman, Darby & Cushman

AGENTS

SKI LEG FOR A SNOWMOBILE-TYPE VEHICLE

The present invention relates generally to lightweight vehicles, travelling principally over snow and ice, which are supported and driven by an endless flexible track and steered by one or more longitudinally swingable ski structures mounted underneath the front end thereof. More particularly, this invention relates to an improved ski leg construction for use on a snowmobile-type vehicle for supporting each of such ski structures.

Snowmobile type vehicles are already known, as including a pair of gliding and steerable ski structures one of which is mounted on one side and the other of which is mounted on the other side of the longitudinal axis of the vehicle. Each ski structure is longitudinally swingable by being pivotally connected to the lower end of a strut member which, in turn, is linked at its upper end to the steering column of the vehicle by which both ski structures are laterally swingable.

A snowmobile, travelling at a relatively high speed over a bumpy terrain, is repeatedly jolted (at least the front end thereof) in a free-in-air position during which time the ski structures swing about the lower end of their respective strut members often striking against the chassis of the vehicle thus damaging the chassis as well as the skis. Furthermore, when regaining contact with the ground, the skis in most cases are not parallel to the ground surface thus causing additional damage to the skis by landing first on the heels of the skis. It has also been realized that the ski structures will undergo a twisting effect at the point where they are connected to their respective ski legs if, at the moment of contacting the ground, the longitudinal axis of the skis is not parallel with the travelling direction of the vehicle (this usually occurs when the driver accidentally turns the handlebars when the vehicle is in the air).

It has been found that these disadvantages may be overcome by providing at the lower end of the strut member a member extending lengthwise of the ski structure for limiting the longitudinal swing of the ski structure.

The present invention relates to a ski leg for supporting a longitudinal swingable ski structure mounted underneath a snowmobile-type vehicle which comprises, in its broadest aspect, a strut member having its upper end adapted for mounting on the vehicle and its lower end adapted for pivotally connecting the ski structure, and swing-limiting means fixedly mounted at the lower end of the strut member and extending lengthwise thereof for limiting the longitudinal swing of said ski structure.

Another object of the present invention is to provide the ski leg with an energy-absorbing material disposed between the swing-limiting means and the ski structure for absorbing vertical kinetic energy upon ground-contacting impact by the ski structure.

In order that the invention may be readily understood, preferred embodiments thereof will now be described, by way of examples, with reference to the accompanying drawings in which:

FIG. 1 is a perspective exploded view of a ski assembly embodying a ski leg construction in accordance with the present invention;

FIG. 2 is a side elevational view of the ski leg shown in FIG. 1;

FIG. 3 is a rear elevational view of the ski leg shown in FIG. 2;

FIG. 4 is a side elevational view of a ski assembly illustrating the use of an energy-absorbing material;

FIG. 5 is a vertical cross-sectional view of a portion of FIG. 4; and

FIG. 6 is a top plan view of the energy-absorbing material shown in FIGS. 4 and 5.

Referring to FIG. 1, there are shown different elements of a ski assembly which are adapted to be mounted underneath the front end of a snowmobile-type vehicle (not shown). Usually, a pair of such assembly is preferably so mounted with one on each side of the longitudinal axis of the vehicle. They are

linked to the steering column of the vehicle and are laterally swingable. Since snowmobiles of this general nature are now well known, a description of one of these vehicles and of its complete steering mechanism will not be given.

The ski structure designated by 10 in FIG. 1 is similar to those used on many snowmobiles and consists of a metal ski 12, shaped so as to easily glide over snow and ice; of a leaf spring assembly 14 including a main leaf spring 16, a secondary leaf spring 18 and a rebound leaf spring 20; and of a spring bracket 22 fastened to the spring assembly.

The leaf spring assembly 14 is secured to the metal ski 12 at one end thereof by appropriate means, such as bolt 24, and is pivotally mounted at the other end thereof through a shakle link arrangement 26, while the leaf spring assembly is held in place and fastened to spring bracket 22 by appropriate means, such as bolts 28 and 29 (see FIG. 5). Spring bracket 22 is formed of two vertical sidewalls 30 and 32, provided with holes 34 and 36 respectively and in alignment with one another; spring bracket 22 is also formed of a horizontal curvilinear bottom surface 37 corresponding in shape to the curvature of the spring leaf assembly, except for its upturned ends.

The spring bracket 22 is constructed to receive between sidewalls 30 and 32 the lower end of a ski leg construction 38 consisting of a strut member 40 and of a swing-limiting member 42, the function of which will hereinafter be described. An internally central opening 44 transversely extends through member 42 and the longitudinal axis of the strut member and is aligned with holes 34 and 36 of bracket 22. In order that the ski element 10 be longitudinally swingable about the lower end of ski leg 38, a pin 46 is inserted through holes 34 and 36 and central opening 44 and held therein by appropriate means, such as a lock nut (not shown).

The upper end of the strut member 40 is preferably circular and adapted for mounting the ski leg 38 on the vehicle and for steering its pivotally attached ski structure 10 by such appropriate connecting means as key 48 in the sidewall of strut member 40, tie rod 50, bushings 52 and 54, nut 56 and bolt 58. The lower end of strut member 40 (FIGS. 2 and 3) is completely embedded in a rigid member 42 and terminates in a flat portion 60 having a hole 61 in alignment with central opening 44. The flat portion 60 is noncircular in order to prevent possible shearing action between the lower end of strut member 40 and member 42, moulded together, when steering torque is applied to member 40. Furthermore, in order to increase the wear resistance of pin 46, a bushing or sleeve member 62 surrounds the pin in opening 44. The strut member 40 is located generally at an angle with the vertical plane, usually about 6°; this is provided on most snowmobile ski assemblies for better gliding and to prevent skidding.

Member 42 is die-cast and consists of a first end portion 64 extending forwardly of the central opening 44 and a second end portion 66 extending rearwardly thereof; both portions extend lengthwise in the longitudinal direction of the ski structure 10. Portions 64 and 66 have a continuous underside defining two contiguous sloping surfaces 68 and 70. These surfaces act as butting walls for the ski structure 10 when swinging about pin 46. The slope of these surfaces will determine the degree of swinging desired for a particular ski structure. However, it is to be understood that the present invention is not limited by an undersidewall having sloping surfaces; all kinds of shape are envisaged for the underside provided that there be two oppositely disposed end portions offering butting walls. However, it is considered preferable to have two sloping surfaces defining an included angle of less than 180° so that when contact is made between the ski structure and surface 68 for example, the latter will be flush with the bottom surface 37 and better load distribution will be provided.

As it will be readily apparent, when the snowmobile travels at relatively high speeds on a bumpy terrain, the swing of the ski structure will be limited by the contiguous surfaces 68 and 70 of the end portions 64 and 66 of member 42. Furthermore, because the lower end of the strut member is fixed by mould-

ing in member **42** greater resistance will be provided to the twisting effect caused at the connection of strut and ski structure when the ski structure hit the ground at an angle to the traveling direction of the vehicle.

Referring to FIGS. **5** and **6**, a crushable kinetic energy-absorbing material **72**, such as rubber, is disposed between member **42** and the ski structure **10**. The material **72** has two sloping surfaces **74** and **76** presenting substantially the same external configuration as the external configuration of surfaces **68** and **70** of member **42**; two upwardly extending rounded ends **78** and **80** are received in opposite recesses **82** and **84** respectively of member **42** (see FIGS. **1** and **3**). The underside **86** of material **72** may be rounded, as shown in FIG. **5**, or flat, the external configuration of this material being less important since the material is crushable between surfaces **68** and **70** and bottom surface **37** of the ski structure **10**. The underside **86** has two recessed areas **88** and **90** to freely receive the respective nuts of bolts **28** and **29** so that the material **72** will not be damaged under the crushing action. In addition to provide an energy-absorbing action, the material **72** will also urge the swinging ski structure to limit its longitudinal swing so that, on landing, contact will be made on the entire length of the ski.

Various other embodiments of the present invention will be apparent to those skilled in the art without departing from the spirit and scope thereof.

What is claimed is:

1. A ski leg for supporting a longitudinally swingable ski structure mounted underneath a snowmobile-type vehicle comprising a strut member having its upper end adapted for mounting on the vehicle; a swing-limiting rigid member mounted at the lower end of the strut member and extending lengthwise of the ski structure; said lower end of said strut member being completely embedded in said rigid member so as to form an integral part therewith; said swing-limiting member having an opening extending transversely therethrough and transversing the longitudinal axis of said strut member; and a bushing member received in said opening and providing a pivot axis; said rigid swing-limiting member having an underside formed of two contiguous inclined surfaces forming substantially planar surfaces which intersect along a line below and substantially parallel with the axis of said bushing and defining an included angle of less than 180°, each surface defining a stop wall for the impingement of the ski structure thereon when swinging, to thereby limit the swing thereof.

2. A ski leg as defined in claim **1** further comprising pin means extending through said bushing member for pivotally connecting the ski structure to the swing-limiting member and a rubberlike crushable material disposed between said contiguous surfaces of swing-limiting member and said ski structure and having top surfaces shaped to correspondingly receive the contiguous surfaces of the swing-limiting member, the swing-limiting action of the contiguous surfaces on the ski structure being transmitted through said rubberlike material.

3. A ski leg as defined in claim **2** wherein the strut member is circular in cross section except for the lower end thereof in the swing-limiting member which is flat, to provide greater resistance to a twisting effect at the connection of the strut member with the swing-limiting member.