The disclosure herein describes a ski leg assembly for mounting on a snowmobile and for connecting the ski runner assembly to the steering linkage thereof; the invention overcomes the problems encountered with the standard connection of a bolt in a U-shaped coupling member by providing a strut member with two lateral projections on which are mounted nylon bushings thereby preventing any metal-to-metal contact between the strut member and the coupling member. Also, a cushion member is provided under the strut member to limit the pivotal movement thereof.

7 Claims, 9 Drawing Figures
SNOWMOBILE SKI LEG

This invention relates generally to a ski unit for use in a snowmobile and, more particularly, to a ski leg assembly for pivotally connecting and supporting the longitudinally swingable ski runner assembly mounted at the front end of a snowmobile.

Prior to the present invention, the connection of the ski runner assembly to the steering linkage of the snowmobile was effected by having the upper end portion of a vertically extending shaft connected to the steering linkage of the vehicle and by having the lower end portion thereof welded to the outer surface of a transversely extending tube; a retainer bolt, extending through the tube and having its opposite ends mounted through the sidewalls of a U-shaped spring coupler, would support the ski runner assembly and provide for the pivotal movement thereof. Such ski mountings are disclosed, for example, in U.S. Pat. Nos. 3,525,411 and 3,525,412 issued Aug. 25, 1970 to H.A. Hagen and A.R. Erickson, respectively. It has been found, however, that this type of connection does not provide the tight fitting which is essentially required between the two assemblies; in some cases, breakage at the welded junction would often occur and, in most other cases, a loose connection due to wear between the retainer bolt and the spring coupler would cause a lateral displacement of the ski runner relative to the direction of travel of the snowmobile and result in improper steering and in twisting of the ski runner. Furthermore, since most snowmobile vehicles are provided with a pair of ski runners, the parallelism between both ski runners is seriously affected by such a loose connection.

The present invention is primarily directed to provide an improved ski leg assembly, the connection of which to the ski runner assembly overcomes the above disadvantages. This is accomplished by replacing the tube, the welded joint, the retainer bolt and the U-shaped spring coupler by a much simpler and sturdier arrangement.

It is therefore an object of this invention to provide a ski leg assembly where its connection to the ski runners is maintained even after severe loading and twisting conditions are imparted at the connection. This is principally achieved by means of a pair of wear resistant bushing members which prevent a metal-to-metal contact between the moving components on the ski leg assembly.

The present invention therefore relates to a ski leg assembly for use in a snowmobile which comprises, in its ski runner assembly is greatly improved and where parallelism between ski runners is strut member having its upper end adapted for connection with the steering linkage of the snowmobile, and having at the lower end of the strut member and having a central aperture receiving a portion of the strut member therethrough, the aperture being defined by a pair of longitudinally extending end portions adapted to be in contact engagement with the ski runner assembly and a pair of transversely spaced intermediate shoulder portions respectively extending over the projections of the strut member; and wear resistant bushing members closely fitted underneath the shoulder portions and around the projections to provide rigid bearing surfaces for the projections and the shoulder portions whereby forces transmitted from the ski runner assembly to the strut member are transmitted via the bushing members.

In a preferred embodiment of the invention; a resilient rubber material is placed underneath the lower portion of the strut member in order that the ski runner assembly, when the snowmobile is airborne, may be in a plane coincident with the longitudinal axis of the vehicle; this has the advantage of preventing the ski runner assembly to hit at an angle the terrain over which the snowmobile travels when regaining contact with the ground. The rubber material stabilizes the pivotal swing of the ski runner assembly when airborne and restores the ski runner assembly in a plane parallel to that of the axis of the snowmobile.

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

FIG. 1 is a side exploded view of a ski leg assembly and of a ski runner assembly with the view of the ski leg assembly slightly enlarged relative to that of the ski runner assembly;

FIG. 2 is a cross-sectional view taken along lines 2--2 of FIG. 1;

FIG. 3 is a side perspective view of one of the bushing members;

FIG. 4 is a side view of the strut member;

FIG. 5 is a front view of the strut member;

FIG. 6 is a top plan view of the coupling member;

FIG. 7 is a cross-sectional view taken along lines 7--7 of FIG. 6;

FIG. 8 is an end view of the coupling member of FIG. 6;

and

FIG. 9 is a side view of a preferred cushion member.

Referring to the drawings, there is shown in FIG. 1, a ski leg assembly 10 to be used on a snowmobile for mounting a longitudinally swingable ski runner assembly 12 to the steering linkage (not shown). For better illustration, the ski leg assembly has been shown slightly enlarged relative to the ski runner assembly.

The ski leg assembly and the ski runner assembly form a ski unit which is mounted at the front end of the snowmobile: on snowmobiles equipped with only one ski unit, the latter is centrally disposed at the front of the vehicle; on other snowmobiles, there are two ski units parallelly disposed on each side of the central longitudinal axis of the vehicle. In addition to providing steering of the vehicle, these ski units also serve to absorb the shocks imparted to the front end of the vehicle. The ski runner assembly 12 consists of a ski runner 14 and of a spring leaf assembly 16, the opposite ends of which are connected to the ski runner 14.

The ski leg assembly 10 consists of a strut member 18, preferably circular in cross-section and made of metal. Referring more particularly to FIGS. 4 and 5, the strut member is slightly inclined relative to the vertical and its upper end has a threaded bore 20 adapted to be engaged with a threaded component (not shown) part of the steering linkage of the vehicle. The lower end of the strut member is provided with an enlarged integral portion 22 with two opposite circular lateral projections 24 and 26 extending transversely of the strut member. The undersurface of the enlarged portion 22 may take various shapes, but a preferable form is to provide the undersurface with a rounded middle portion 28 and two inclined end portions 30 and 32, the inclination of which is determined by the desired angular displacement of the ski runner assembly.
The ski leg assembly 10 further consists of a coupling member 34. Referring to FIGS. 6, 7 and 8, member 34 is made of metal and has a generally rectangular shape; it is provided with a similarly shaped central aperture 36 through which a major portion of the strut member 18 is received. The central aperture 36 is defined by a pair of longitudinally extending end portions 35 and 37 and a pair of transversely spaced intermediate curved shoulder portions 38 and 40. Two holes 42 and 44 are respectively provided on end portions 35 and 37 to receive securing means, such as bolts 46 and 47 and nuts (not shown), extending through the leaf spring assembly 16, for attaching the coupling member 34 to the ski runner assembly 12. The underside 43 of the coupling member is slightly curved or convex to fit the semi-elliptic shape of the top spring leaf assembly with which it comes in contact. Two raised U-shaped borders 48 and 50 are respectively provided on the end portions 35 and 37 of the coupling member to reinforce the same.

The ski leg assembly 10, in accordance with the present invention, further comprises a pair of wear resistant bushing members 52 and 52' made of nylon for example or other suitable plastic material. The bushing members are closely fitted between the shoulder portions 38 and 40 of the coupling member 34 and the lateral projections 24 and 26 of the strut member 10. Referring more particularly to FIGS. 2 and 3, each bushing member has a circular hole 53 receiving a corresponding projection and a bearing surface 54, 54' on which the projection is supported. One side wall of each bushing member is provided with a flange portion 56, 56' which is snugly fitted between the shoulder portions 38, 40 and the enlarged section 22 of the strut member. Thus, the nylon bushing members prevent any metal-to-metal contact between the strut member 10 and the support member 34. The underside 58, 58' of each bushing member is slightly curved or convex to fit the semi-elliptic shape of the spring leaves of the spring leaf assembly 16; this is easily effected when the bushing members are injection moulded.

In addition to prevent metal-to-metal contact between the strut member and the support member thereby reducing wear, the bushing members provide rigid bearing surfaces 54, 54' for the later projections and rigid bearing surfaces 57, 57' for the shoulder portions whereby the forces exerted by the ski runner assembly on the projections are transmitted via the bushing members 52, 52'.

To limit the swing of the ski runner assembly about lateral projections 24 and 26, a cushion member 60 of rubber-like material is inserted underneath the strut member 18 between the underside surfaces 28, 30, 32 of the strut member 10 and the top surface of the leaf spring assembly 16. The configuration of the upper surface of member 60 consists of a rounded central portion 64 to receive surface 28 of the strut member 10 and of two inclined surfaces 66 and 68, having an inclination corresponding to related surfaces 30 and 32 of strut member 10. Many different shapes are envisaged for the cushion member 60; it is evident that the lower portion 22 of the strut member can take many different shapes since its shape does not have any bearing on the operation of the present invention, as long as there are two lateral projections to receive the bushing members.

To assemble the ski leg assembly 10, the bushing members 52 and 52' are first positioned onto respective lateral projections 24, 26. The assembly of strut member 18 and members 52, 52' is then inserted through aperture 36 of the coupling member 34 until the bearing surfaces 57, 57' of the two bushing members contact respective shoulder portions 38 and 40 while the flange portions 56, 56' are squeezed between the shoulder portions and the strut portion 22. A snug interengagement between the strut member and the coupling member is obtained and metal-to-metal contacting engagement between the two members is prevented. The ski leg assembly 10, now assembled, is placed over the mid-portion of the spring leaf assembly 16 on which a cushion member 60 has previously been placed; there the support member is bolted into engagement by securing bolts 46, 47 to the support member 34. Once mounted to the strut member, the ski leg assembly is longitudinally swingable thereto due to the bushing members pivoting about the lateral projections. With the ski runner in a horizontal plane, it is preferable to have surfaces 66 and 68 of the cushion member in contacting engagement with surfaces 30 and 32, respectively, of the strut member whereby any slight pivotal displacement of the ski runner assembly relative to the strut member will immediately tend to be corrected by the resiliency in the cushion member.

Although the invention has been described above in relation to one specific form of the invention, it is evident that persons skilled in the art may refine and modify it in various ways. It is therefore wished to have it understood that this invention is not limited in interpretation except by the terms of the following claims.

What is claimed is:

1. A ski leg assembly for mounting the ski runner assembly of a snowmobile to the steering linkage thereof, comprising, in combination:
   a. a strut member having its upper end adapted for connection with the steering linkage and having at its lower end an enlarged base portion and a pair of opposite lateral projections transversely fixed integrally to said base portion;
   b. a coupling member disposed at the lower end of said strut member and having a central aperture for receiving said base portion of said strut member therethrough, said aperture being defined longitudinally by a pair of opposite end portions adapted to be secured to said ski runner assembly and transversely by a pair of opposite intermediate shoulder portions each opened on the bottom and extending, respectively, over the projections of said strut member such that the coupling member can be mounted by being placed onto the strut from above and moved down to closely embrace the said projections;
   c. wear resistant bushing members closely fitted underneath said shoulder portions and around said projections to provide rigid bearing surfaces for said projections and said shoulder portions whereby forces exerted by the ski assembly on the projections are transmitted via the bushing members; and
   d. means securing said coupling member to said ski runner assembly.
2. A ski leg assembly as defined in claim 1 wherein said strut member is made of metal and said bushing members are made of nylon and wherein each of said bushing members is provided with a flange portion extending at one end thereof between the shoulder portions of the coupling member and the strut member to prevent metal-to-metal contact between the strut member and the support member.

3. A ski leg assembly as defined in claim 2 wherein said base portion of the strut member extends in the longitudinal direction of said ski runner assembly and includes an undersurface; the ski leg assembly further comprising a cushion member disposed between said undersurface of said base portion and said ski runner assembly to limit the longitudinal swing of the ski runner assembly relative to the strut member.

4. A ski leg assembly as defined in claim 2 wherein each of said end portions of said coupling member has an underside in contact with a leaf spring provided on said ski runner assembly, said underside being slightly curved to follow the shape of said leaf spring.

5. A ski leg assembly as defined in claim 4 wherein each of said bushing members has a bottom wall in contact with said leaf spring and wherein said wall is slightly curved to follow the shape of said leaf spring.

6. A ski leg assembly as defined in claim 5 wherein said lateral projections are circular and said shoulder portions are rounded, and wherein said bushing members have a rounded portion corresponding to the shape of said shoulder portions and a circular hole receiving a corresponding circular lateral projection for relative pivotal movement therebetween.

7. In a snowmobile, a ski runner assembly mounted at the front end thereof; a steering linkage and a ski leg assembly for mounting the ski runner assembly to the steering linkage; said ski leg assembly including, in combination, a strut member made of metal having its upper end connected to the steering linkage and having at its lower end an integrally mounted enlarged base portion and a pair of outwardly extending lateral projections integrally mounted to said base portion; a coupling member made of metal disposed at the lower end of the strut member and having a central aperture receiving therethrough said base portion of said strut member, said aperture being defined longitudinally by a pair opposite end portions secured to the ski runner assembly and transversally by a pair of opposite intermediate shoulder portions each opened on the bottom and extending, respectively, over the lateral projections of the strut member, such that the coupling member can be mounted by being placed onto the strut from above and moved down to closely embrace the said projections, wear resistant bushing members made of nylon closely fitted underneath said shoulder portions and around said projections to provide rigid bearing surfaces for said projections and said shoulder portions whereby forces exerted by the ski assembly on the projections are transmitted via the bushing members, said bushing members preventing metal-to-metal contact between said strut member and said coupling member; and means for securing said end portions of said coupling member to said ski runner assembly.

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