# United States Patent [19]

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[11] **3,711,164**

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## [54] SNOWMOBILE SLIDE RAIL SUSPENSION


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[52] **U.S. Cl.** .....**305/24,** 180/5 R

[51] **Int. Cl.** .....**B62d 55/10,** B62m 27/02

[58] **Field of Search** .....180/5; 305/17, 18, 24, 25



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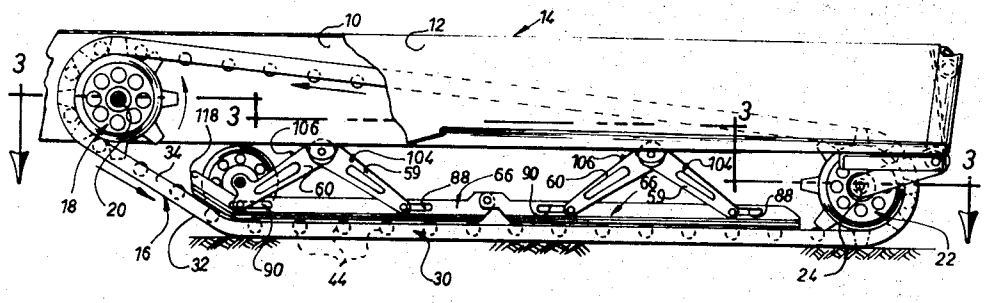
[57] **ABSTRACT**

The disclosure herein describes a slide rail for use in a snowmobile-type suspension assembly; the rail consists of an elongated member with a bottom wall and two side walls. Each side wall is provided with a pair of longitudinally spaced slots, one slot of one side wall being transversely aligned with a slot of the other side wall. The elongated member is mounted to a bearing shaft transversely extending beneath the vehicle, by means of separate link members with one end pivotally mounted on the shaft and with the other end adjacent the slots, of fastening members extending through the slots and securing the lower ends of the link members, and of torsion spring means which are supported on the bearing shaft and include end portions in yielding engagement with link members disposed fore and aft relative to the bearing shaft and urging the link members in a downward direction to thereby cause the rail to maintain contact pressure on the lower run of the track.


**12 Claims, 5 Drawing Figures**



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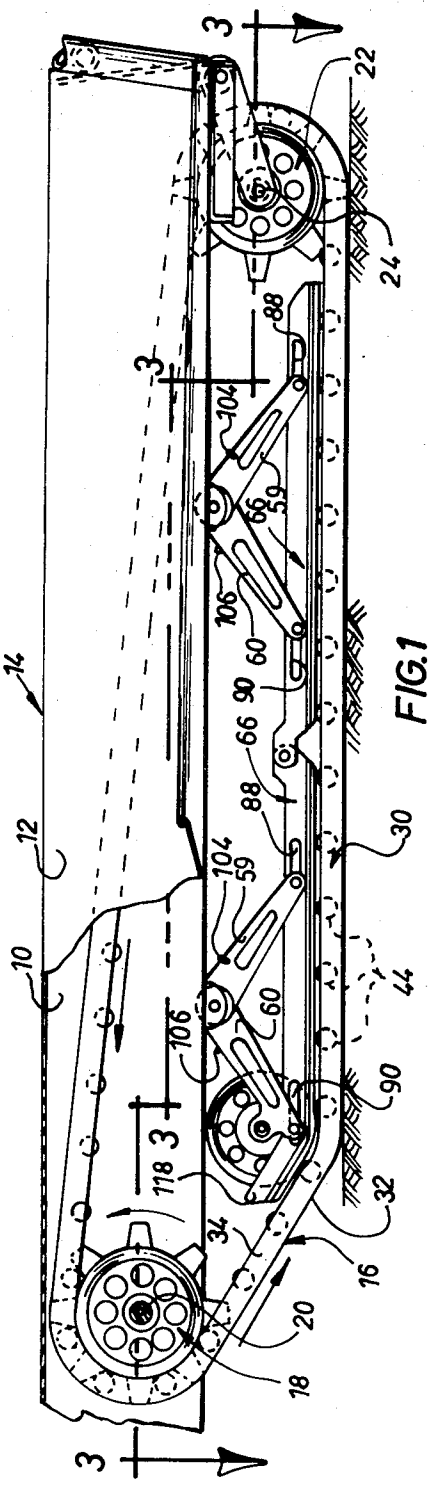

FIG.1

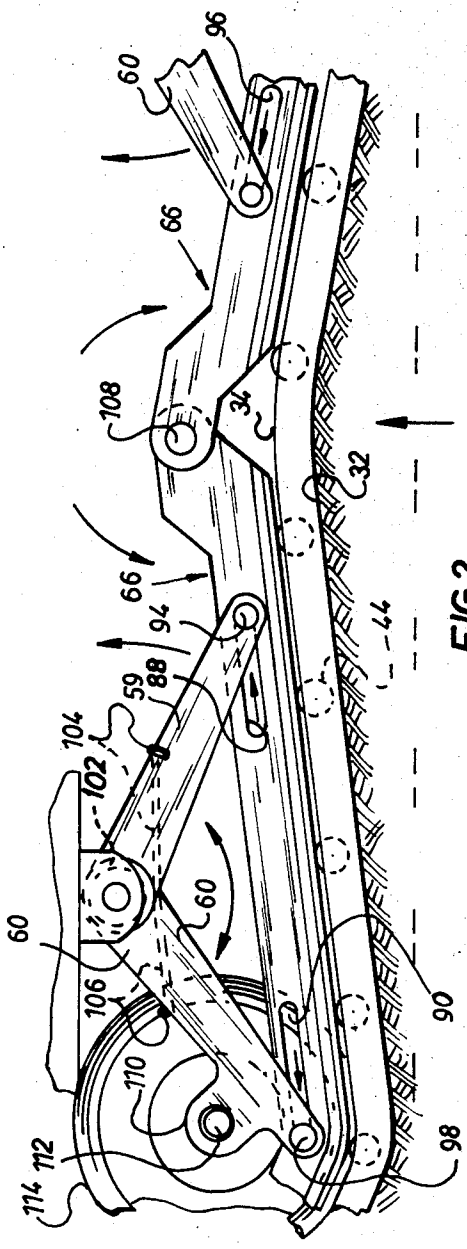

FIG.2

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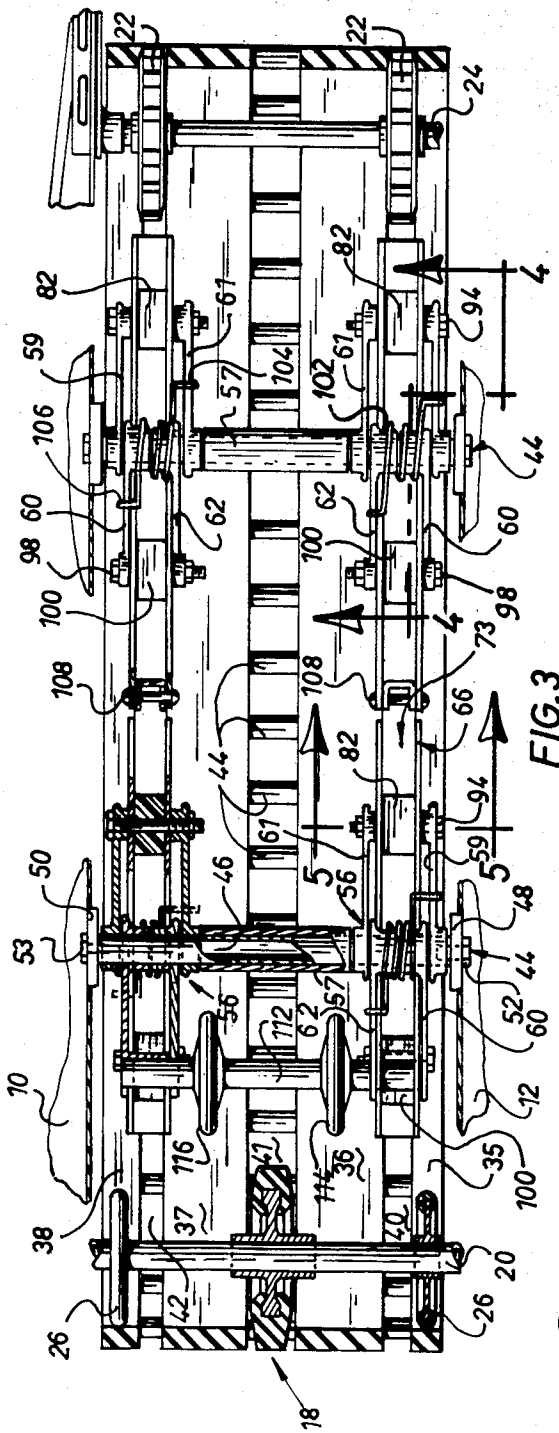

FIG. 3

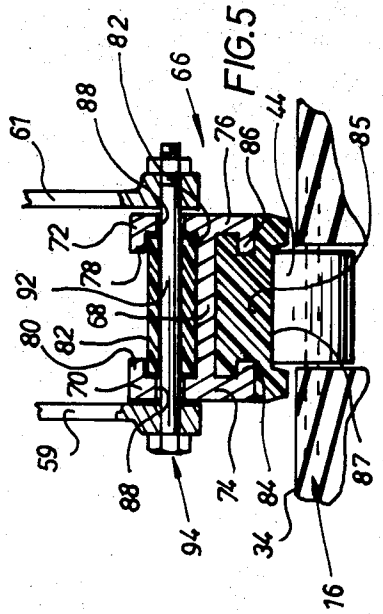

FIG. 5

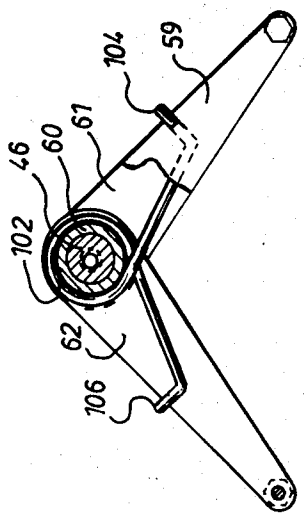

FIG. 4

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# SNOWMOBILE SLIDE RAIL SUSPENSION

This invention relates generally to a suspension assembly for use in a lightweight vehicle of the type driven by an endless flexible track. More particularly, this invention relates to an improvement in the construction of a suspension assembly for a snowmobile or the like using slide bars or rails to apply contact pressure on the inner surface of the lower run of the track.

Most present-day snowmobile suspension assemblies normally consist of an arrangement of a plurality of bogey wheels which are downwardly spring biased so as to be in constant rolling contact with the inner surface of the ground-engaging run of the track. More recently, a further suspension assembly (see, for examples, U.S. Pat. No. 3,527,505 and U.S. Pat. No. 3,527,506, both issued on Sept. 8, 1970 to A. E. Hetteen and A. R. Erickson, respectively) has been devised wherein one or more longitudinally extending rails slide on the inner surface of the track; this type of slide rail suspension, however, is normally combined with a bogey wheel type of suspension to provide maximum traction to the driving track.

It has been found that the manner in which slide rails are mounted to the body structure of the vehicle in order to maintain the lower run of the track in full driving engagement with the snow or ice is quite complex and requires a considerable number of parts thereby increasing the occurrence of breakdown due to component failure.

It is an object of this invention to provide an improved suspension assembly for track-propelled vehicles using longitudinally extending slide rails, the mounting of which to the body structure of the vehicle is simple and effective while providing to the upper part of the vehicle the necessary resilient action.

According to the present invention, there is provided an improved slide rail for use in a snowmobile-type suspension assembly comprising an elongated member having a bottom wall and two opposite upwardly extending side walls; each side wall is provided with a pair of longitudinally spaced slots, one slot of one side wall being transversely aligned with a slot of the other side wall. The elongated member is mounted to a bearing shaft transversely extending beneath the vehicle by means of separate link members which have one end mounted on the bearing shaft and the other end adjacent the slots, of fastening members which extend through the slots and secure the lower end of the link members to the rail, and of torsion spring means which are supported on the bearing shaft and include end portions in yielding engagement with link members disposed fore and aft the bearing shaft and urging the link members in a downward direction thereby causing said rail to maintain contact pressure on the lower run of the track.

In a particularly advantageous embodiment of the present invention, the fastening members are supported by nylon sliding members resting on the bottom wall of the rail; these sliding members maintain the fastening members transversely to the slots and also prevents the fastening members from wearing the edges of the slots.

In another preferred embodiment of the invention, two slide rails are positioned in longitudinal alignment on the lower run of the track and are interconnected at one of their ends in an articulated relationship to provide optimum contact pressure by the rails on the lower run of the track and to enable the track to more closely follow the conformation of the terrain over which the vehicle travels.



In order that the invention may be readily 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 elevational view of the lower portion of a vehicle embodying the present invention with the body of the vehicle partly cut away;

FIG. **2** is a fragmentary enlarged side elevational view showing two slide rails in an articulated relationship;

FIG. **3** is a longitudinal top plan view taken along lines **3—3** of FIG. **1**;

FIG. **4** is a cross-sectional view taken along lines **4—4** of FIG. **3**; and

FIG. **5** is a transverse cross-sectional view taken along lines **5—5** of FIG. **3**.

Referring generally to the drawings, there is shown the lower portion of a snowmobile-type vehicle consisting of the two lateral side walls **10** and **12** of an inverted U-shaped body structure **14**. The vehicle is driven by means of an endless flexible track **16** which is looped around a drive sprocket wheel **18**, journalled on the front axle **20**, and around one or more idler sprocket wheels **22**, mounted on the rear axle **24**. Also mounted on the front axle **20** are a pair of track support wheels **26** disposed on opposite sides of the drive sprocket wheel **18**. In the present case, only one track is shown mounted underneath the vehicle but it is well known in the snowmobile art that some vehicles are equipped with a pair of laterally spaced drive tracks. The loop divides the track into an upper run **28** and a lower run **30**, vertically spaced from one another; the lower run has a ground-engaging corrugated outer surface **32** and an inner generally flat surface **34**. The track **16** shown consists of four elongated strips of elastomeric material **35, 36, 37** and **38** longitudinally extending of the vehicle; the strips are laterally spaced by three rows of aligned sprocket-teeth-receiving openings **40, 41** and **42**. The strips are, however, held in spaced relation by means of a plurality of transversely extending reinforcing members (not shown) which may be partially or entirely embedded in the elastomeric material. An example of such a track is described in applicant's co-pending Canadian application Ser. No. 104,072 filed Jan. 29, 1971. At the level of the rows of openings, the reinforcing members support for rotation thereabout rollers **44**; the typical construction and operation of such track is disclosed in applicant's co-pending Canadian application Ser. No. 104,073 filed Jan. 29, 1971. Some other tracks are provided with a wearing metal clip crimped around the rubber material between adjacent openings.

Referring to FIGS. **1, 2** and **3**, an example of a suspension assembly made in accordance with the present invention is shown mounted on a plurality of transversely extending and longitudinally spaced support members **44** disposed between the lateral side walls **10** and **12** of the body structure **14**. Each support member **44** consists of a bearing shaft **46** which is secured at its opposite ends to side plates **48** and **50**,

respectively fixed to side walls **10** and **12** by means of bolts **52** and **53**. Each bearing shaft carries two sets **56** of separate link members; the sets are equidistantly disposed on each side of the longitudinal central axis of the vehicle and are separated from one another by a sleeve **57** coaxially mounted on the shaft **46**. Each set **56** consists of four link members **59**, **60**, **61** and **62** which have their upper ends pivotally mounted on shaft **46** and their lower end disposed adjacent an elongated rail **66** longitudinally extending beneath the bearing shaft and contacting the lower run **30** of the track **16**. The slide rail **66** is formed of any suitable rigid material, preferably extruded aluminum and consists of a bottom wall **68**, a first pair of opposite upwardly extending side walls **70** and **72**, and a second pair of opposite downwardly extending side walls **74** and **76** thereby forming a substantially H-shaped frame member (see FIG. **5**). Side walls **70** and **72** have inwardly bent upper flange portions **78** and **80** and define with the bottom wall **68** a first lengthwise channel **73** (see FIG. **3**) which receives a pair of slide members **82** and **100** of any suitable wear-resistant material, such as nylon. Side walls **74** and **76** have inwardly bent lower flange portions **84** and **86** and define with the bottom wall **68** a second lengthwise channel in which is fixedly received a longitudinal runner **85** of any suitable wear-resistant material, such as nylon. The runner **85** extends beyond the flange portions **84** and **86** and has an underside with a recess **87** in which are received for rotation the rollers **44** of the track **16**; this type of rail-and-roller construction greatly diminishes the wear of the track due to frictional contact or the occurrence of clip de-crimping.

Side walls **70** and **72** are each provided with a pair of longitudinally spaced slots **88** and **90** disposed fore and aft relative to the bearing shaft **46**, one slot of one side wall being transversely aligned with a like numbered slot of the other side wall. Slide members **82** and **100** are respectively received in channel **73** adjacent a pair of transversely aligned slots **88** and **90** and respectively support fastening members, such as bolts **94** and **98**. Referring to FIG. **5**, bolt **94** has a shank portion **92** which extends through the slide member **82**; bolt **94** secures the lower end of link members **59** and **61** to the rail **66**. In order to ensure that the shank portion of the bolt will not unduly wear the edges of slots **88**, the slide member **82** is constructed to receive bolt **94** so as to leave a clearance between the bolt and the edges of the slots. Furthermore, the function of the slide members **82** and **100** is to maintain the transverse bolt **94** perpendicular to the longitudinal axis of the rail thereby preventing the jamming of the bolt in the slots.

In order to yieldingly urge the link members in a downward direction to thereby cause the rails to maintain contact pressure on the lower run of the track, torsion spring means **102** are supported by the bearing shaft **46** and include end portions **104** and **106** in engagement with one link member disposed fore the bearing shaft and with one link member disposed aft the bearing shaft. The link members are mounted in pairs; however, since the link members of each pair are interconnected by the fastening members, the torsion springs **102** need only have one end in contacting engagement with each side of the bearing shaft.

The invention has been described above in relation to a suspension assembly mounted on one bearing shaft and with particular reference to the drawings wherein two longitudinally spaced shafts **44** carry two suspension assemblies equidistantly disposed on either side of the longitudinal axis of the vehicle. However, persons versed in this art will be aware that the present suspension assembly may be adapted to be mounted on vehicles having a different number of shafts or having a different track construction.

In another advantageous embodiment of the present invention, as shown in FIG. **3**, the slide rail suspension assembly mounted on one bearing shaft is disposed in longitudinal alignment with the slide rail suspension assembly mounted on the next longitudinally spaced bearing shaft. The two aligned rails **66** are interconnected in an articulated manner by having one of their ends pivotally connected by means of a pin or bolt **108**; thus each rail may individually and independently pivot about its bearing shaft and the track may more closely follow the conformation of the terrain over which the vehicle runs.

Referring to FIGS. **1–3**, the foremost slide rails **66** have an upturned inclined front portion **118** and the foremost link members (**60** and **62**) on these foremost slide rails support a shaft **112** carrying wheels **114** and **116**. This arrangement of upturned front portions and of wheels assists the track in sliding under the rails.

Although the invention above has been described in relation to one specific form of the invention, it is evident that, as mentioned above, it can be refined and modified 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 I claim is:

**1.** A slide rail suspension assembly for mounting on a bearing shaft transversely extending beneath a snowmobile-type vehicle driven by an endless track having upper and lower vertically spaced runs comprising, in combination:

a. an elongated rail member longitudinally extending beneath the bearing shaft and contacting the lower run of the track, said rail having a bottom wall and two opposite upwardly extending side walls, each of said side walls provided with a pair of longitudinally spaced slots disposed fore and aft relative to the bearing shaft, one slot of one side wall being transversely aligned with a slot of the other side wall;

b. separate link members each having one end pivotally mounted on the bearing shaft and the other end disposed adjacent said slots;

c. fastening members extending through transversely aligned slots and securing the lower end of said link members to said rail;

d. torsion spring means supported on said bearing shaft and including end portions in yielding engagement with link members disposed fore and aft the bearing shaft and urging the link members in a downward direction thereby causing said rail to maintain contact pressure on the lower run of the track.

**2.** A slide rail suspension assembly as defined in claim **1** wherein said bottom wall and said side walls define a first lengthwise channel; further comprising a pair of wear-resistant slide members, each slide

member being received in said channel adjacent a pair of transversely aligned slots; each slide member supporting one of said fastening members so as to prevent said fastening members to contact the edges of said slots and to prevent said fastening members to become jammed transversely in said slots.

3. A slide rail suspension assembly as defined in claim 2 wherein the side walls of said channel further include inwardly bent flange portions extending at least partially over said slide members thereby confining said slide members in said channel.

4. A slide rail suspension as defined in claim 3 wherein said rail further includes two downwardly extending side walls defining with said bottom wall a second lengthwise channel, and a longitudinal wear-resistant runner tightly received in said second channel and having an underside adapted to contact the lower run of the track.

5. A slide rail suspension assembly as defined in claim 4 wherein the separate link members are mounted in pairs fore and aft relative to the bearing shaft and wherein the end portions of said torsion spring means engage one link member of each pair of link members.

6. A slide rail suspension as defined in claim 4 wherein said slide members and said longitudinal wear-resistant runner are made of nylon.

7. In a snowmobile-type vehicle having a body structure and being driven by an endless track having upper and lower vertically-spaced runs, in combination:

I. two or more longitudinally spaced bearing shafts transversely extending beneath the vehicle and having their opposite ends secured to the body structure;

II. one or more slide rail suspension assemblies mounted on each of said bearing shafts, each assembly comprising:

a. an elongated rail member longitudinally extending beneath the bearing shaft and contacting the lower run of the track, said rail having a bottom wall and two opposite upwardly extending side walls, each of said side walls provided with a pair of longitudinally spaced slots disposed fore and aft relative to the bearing shaft, one slot of one side wall being transversely aligned with a slot of the other side wall;

b. separate link members each having one end pivotally mounted on the bearing shaft and the other end disposed adjacent said slots;

c. fastening members extending through transversely aligned slots and securing the lower end of said link members to said rail;

d. torsion spring means supported on said bearing shaft and including end portions in yielding engagement with link members disposed fore and aft the bearing shaft and urging the link members in a downward direction thereby causing said rail to maintain contact pressure on the lower run of the track.

8. In a snowmobile-type vehicle as defined in claim 7, wherein two slide rail suspension assemblies are mounted on each bearing shaft in laterally spaced relationship, the slide rail suspension assembly on one bearing shaft being in longitudinal alignment with the slide rail suspension assembly on a longitudinally spaced bearing shaft, said suspension assemblies in alignment being interconnected at one of their ends in an articulated relationship whereby each rail may individually and independently pivot about its bearing shaft.

9. In a snowmobile-type vehicle as defined in claim 8, wherein the foremost slide rails have an upturned inclined front portion and wherein the foremost link members on said foremost slide rails support a wheel carrying shaft.

10. A slide rail for use in a snowmobile-type suspension assembly comprising an elongated member having a bottom wall and two opposite upwardly extending side walls, each of said side walls provided with a pair of longitudinally spaced slots, one slot of one side wall being transversely aligned with a slot of the other side wall, said elongated member further including two downwardly extending side walls defining with said bottom wall a lengthwise channel, a longitudinal wear-resistant runner being secured in said channel and having an underside extending beyond the downwardly extending side walls.

11. A slide rail as defined in claim 10 wherein each of said upwardly and downwardly side walls include inwardly bent flange portions at their upper and lower edges, respectively.

12. A slide rail as defined in claim 11 wherein one end of said member has an upturned inclined portion and wherein the other end is adapted to be connected to another like elongated member.

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