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[56]

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[54] SHOCK MOUNTED SKIS FOR SNOWMOBILE
4 Claims, 5 Drawing Figs.

[52] **U.S. Cl.**..... **180/5 R,**
280/25, 280/26

[51] **Int. Cl.**..... **B62b 13/12,**
B62m 27/02

[50] **Field of Search**..... 180/3-6;
280/8, 9, 10, 11, 12, 13, 14, 16, 17, 21, 25, 26;
244/108; 267/31, 18, 8

ABSTRACT: Each spindle forming a part of the steering mechanism of the snowmobile is connected to a ski through its spring mechanism and is also connected through a lever arm extending along the longitudinal axis of the ski by a shock absorber. The shock absorber is pivotally connected to the lever arm which is secured to the spindle at one end, and to the ski at the other end. The shock absorber resists any changes in substantially vertical and rotational motions of the ski with respect to the spindle. The ski is stabilized against sudden impulses by the dampening action of the shock absorber.

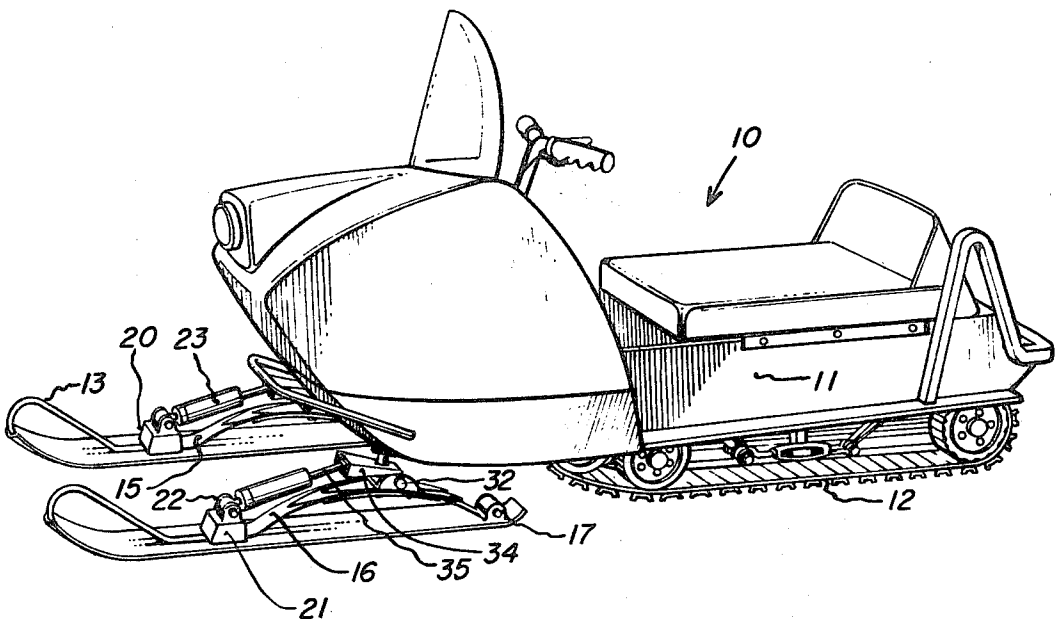


Fig. 2.

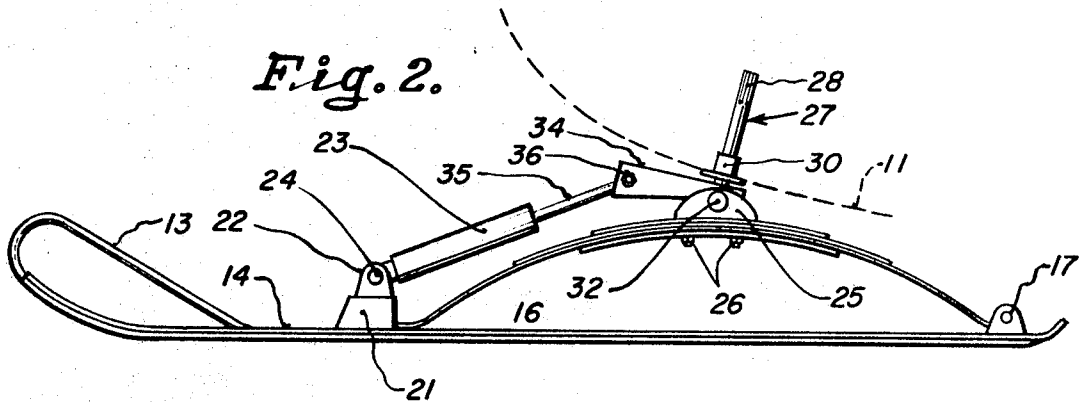


Fig. 3.

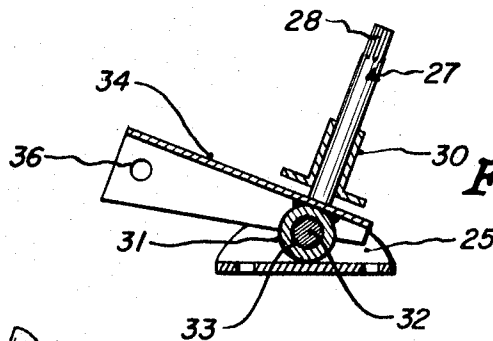
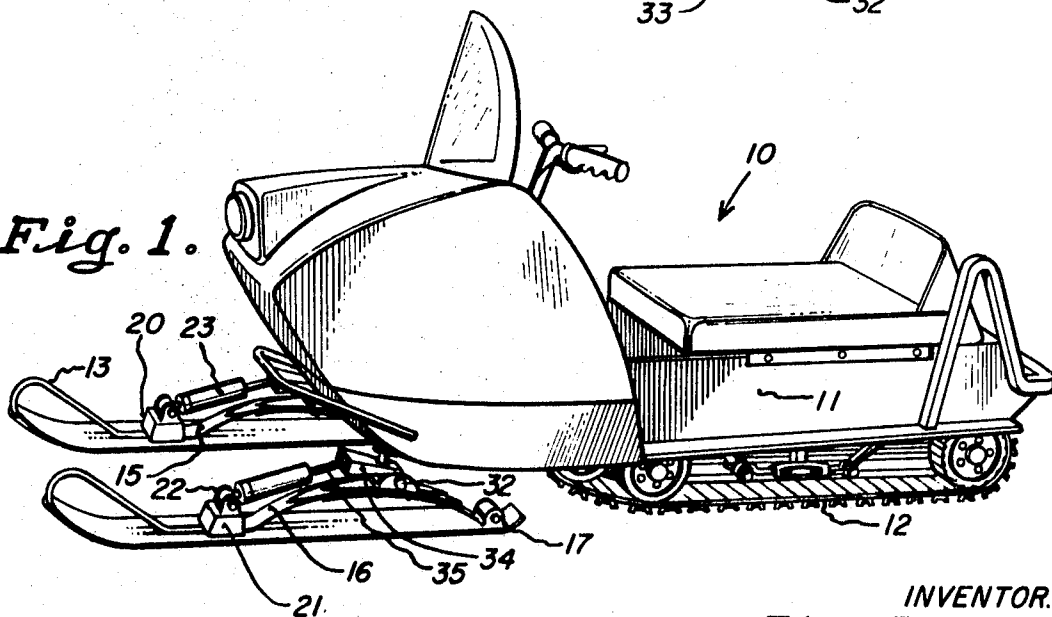


Fig. 1.



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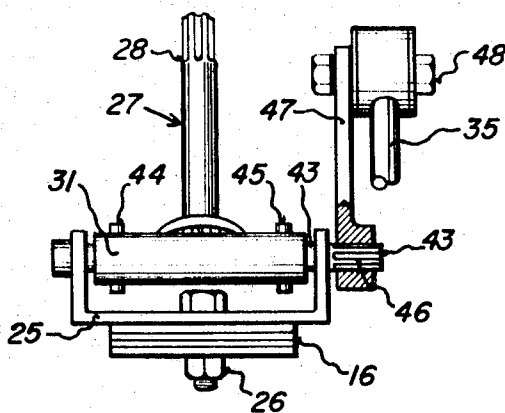
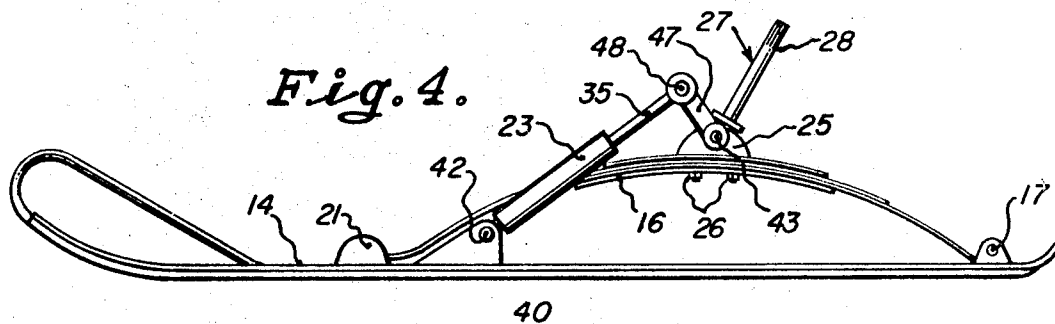


Fig. 5.

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SHOCK MOUNTED SKIS FOR SNOWMOBILE

This application relates to the field of snowmobile suspension systems and more particularly to shock absorbers used with the skis on snowmobiles.

It has been found that during the operation of a snowmobile, there are occasions when the snowmobile moves rapidly over a small mound or mogul and upon reaching its crest, the machine is propelled into the air and in so doing, the compression of the springs aids in the upward movement of the snowmobile. Additionally, the skis have a tendency to rotate about their spindles disposed at the upper portion of the spring mechanisms. Thus, there is a substantially vertical movement imparted to the skis and a rotational movement. It is also found that when moving over generally open country, or open terrain, that the skis produce a certain amount of "chatter" due to the manner in which they have been secured to the steering mechanism.

Each of the undesirable features just set forth is overcome by the present invention wherein the vertical movement of the snowmobile with respect to the skis and the rotational movement of the skis with respect to the spindle is controlled through a dampening action. Shock absorbers are secured between the forward portion of the ski and a lever arm which is fixedly secured to the spindle or shaft connected to the steering mechanism. Upon compression of the springs, or rotation of the ski with respect to its pivotal member on the spring mechanism, the shock absorber tends to dampen or smooth out any sudden change in movement and thus produce a much smoother operation of the skis which results in a smoother and more comfortable ride. The problems just enumerated are quite prevalent when the snowmobile is operated at a high speed.

It is therefore a general object of this invention to provide a dampening action to all forms of movement in the skis of a snowmobile with respect to the snowmobile body.

It is still a further object of this invention to provide dampening action for all forms of movement of the skis of a snowmobile regardless of the type of springs being used.

It is still another object of this invention to provide a shock absorber for skis used on snowmobiles dampening both translational and rotational motions of the skis.

It is a further object of this invention to provide a shock absorber for skis used on snowmobiles in which the shock absorber may be secured to the forward or rear portion of the skis.

These and other objects and advantages of the invention will more fully appear from the following description, made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

FIG. 1 is a perspective view of a snowmobile showing an embodiment of the invention;

FIG. 2 is a partial elevation view of a ski component showing additional detail of one embodiment of the invention;

FIG. 3 is a partial elevation view in section showing the relationship of a lever arm secured to a spindle member;

FIG. 4 is a partial elevation view of a ski component showing additional detail of another embodiment of the invention; and

FIG. 5 is a partial elevation view showing the relationship of another lever arm secured to the spindle means.

Referring to FIGS. 1 through 3, a snowmobile 10 is shown having a body portion 11 and a tread 12 which supports the rear portion of the snowmobile and produces the means for propelling the snowmobile. At the forward portion of body 11 is a pair of skis 13 and 14. While the details of the invention are disclosed particularly with respect to ski 14, it will be understood that ski 13 includes the same type of mechanism. A pair of springs 15 and 16 are secured respectively to skis 13 and 14 by a pivotal connection at the rear thereof, pivotal member 17 being shown in connection with ski 14. The springs 15 and 16 are secured to the front of the skis in a slidable arrangement through the use of a pair of inverted U-shaped members 20 and 21 which hold the ends of springs 15

and 16 in place and permit a longitudinal sliding action. Member 21 has an upstanding U-shaped member 22 secured thereto by suitable means such as welding and a shock absorber 23 is connected thereto through the use of a pin 24.

Another clevis member 25 is secured to spring 16 at its upper portion and in particular at its midpoint by suitable means such as bolts 26. A spindle member 27 in the form of an inverted "T" has an upstanding shaft member 28 which is generally splined at the end thereof for connection to a steering mechanism, the stem portion or vertically extending shaft member 28 being secured within a bearing 30 that is fixedly held to the body 11. A crossbar portion 31 forming the crossbar of the inverted T-shaped member is secured transversely between the upstanding lugs of clevis member 25 by passing a bolt or pin 32 through a bore 33 formed in member 31. In other words, bore 33 is transversely oriented to the longitudinal axis of ski 14. Suitably secured to spindle member 27 at a position adjacent cross bar member 31, is a lever arm 34 that is shown in section in FIG. 3. Lever arm 34 may be welded to insure that it is fixedly held in place. An arm 35 extends upwardly from shock absorber 23 and is connected to lever arm 34 by suitable means such as a machine bolt 36. Arm 35 is connected to the shock absorber piston member.

It will be apparent that ski 14 may be turned and that arm 35 which is connected to the piston within the shock absorber will not be materially affected. However, upon compression of spring 16, it will be noted that piston arm 35 will be directed inwardly to produce a dampening action for any sudden impulse or vertical movement of ski 14 with respect to body 11. Additionally, because pivot bolt 32 permits clevis member 25 to pivot about member 32, it will be seen that there is a relative motion created between lever arm 34 and ski 14 thus changing the length of piston arm 35 to again produce a dampening of any sudden impulses or rotational movement of ski 14. Therefore, both a pitching and vertical motion are dampened through the use of the shock absorber to held stabilize ski 14 and the same mechanism of course, would apply to ski 13 and the counterparts just mentioned.

An alternate embodiment is shown in FIGS. 4 and 5 in which a U-shaped clevis member 40 is secured adjacent the front edge of spring 16 and shock absorber 23 is secured to member 40 through suitable means such as a pin 42. A shaft 43 passes through a pair of bores formed in clevis member 25 and through bore 33 of member 31. A pair of pins 44 and 45 are used to secure member 31 to shaft 43 by drilling holes through member 31 and 43 to pin the shaft 43 to the crossbar 31 of the T-shaped member 27. Thus, shaft 43 does not turn with respect to spindle member 27. It will of course be recognized that any other suitable means may be used in place of pins 44 and 45 to secure the two members against movement with respect to each other. A splined portion 46 is formed on the end of shaft 43 and a lever arm 47 is secured thereto. Suitable means such as a pin or bolt 48 is used to pivotally secure piston arm 35 to lever arm 47. It will thus be seen that any vertical movement of ski 14 with respect to body 11 will again cause movement of piston arm 35 and any pitching movement of clevis member 25 and ski 14 about shaft 43 will again produce a movement of piston arm 35. Thus, it will be seen that another embodiment of the invention has been disclosed.

From the disclosure set forth herein, it will be seen that a new and novel means has been provided to dampen any sudden impulses or movements of the skis of a snowmobile which are caused by hitting an obstruction or being propelled through the air so that the skis are free to rotate about their connections with the spindle members of the steering mechanism. It will be thus seen that a much smoother and more stable ride is a result.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of the invention which consists of the matter shown and described herein and set forth in the appended claims.

What is claimed is:

1. A forward suspension system for snowmobiles, including:
 - a. snowmobile body means having bearing means extending substantially vertically through the forward portion of said body means;
 - b. spindle means having a vertically extending shaft portion rotatably secured within said bearing means and having a lower portion adapted for transverse rotational connection;
 - c. ski means disposed beneath said forward portion of said body means;
 - d. spring means secured to said ski means for biasing said body against substantially downward movement;
 - e. clevis means secured to the upper portion of said spring means and being rotatably connected to said spindle means through a transverse member permitting pivotal movement of said spring means and said ski means with respect to said spindle means;
 - f. lever arm means extending outwardly from said spindle means and normal to said transverse member;
 - g. securing means fixedly securing said lever arm means to said spindle means and against rotation with respect thereto;
 - h. and shock absorber means connected to said lever arm means and to said ski means adjacent one end thereof for dampening any sudden impulses, said shock absorber means resisting any changes in substantially upward and pivotal movement of said ski means.
2. The spring means set forth in claim 1 including:
 - i. a leaf spring assembly pivotally secured at one end thereof to said ski means and slidably secured at the other end thereof to said ski means, said clevis means being

- disposed at substantially the midpoint of said upper portion of said spring means.
3. The structure set forth in claim 2 including:
 - j. an inverted U-shaped member secured to said ski means and overlying one end of said leaf spring assembly, said shock absorber means secured to said U-shaped member and overlying said leaf spring assembly.
 4. A ski suspension system for snowmobiles comprising:
 - a. a pair of skis transversely disposed beneath the forward portion of the snowmobile;
 - b. a pair of spring mechanisms, each of said pair of spring mechanisms being secured to one of said pair of skis, said spring mechanisms biasing the front part of said snowmobile against substantially downward movement;
 - c. a pair of clevis members, each of said pair of clevis members secured to the upper portion of one of said pair of spring mechanisms;
 - d. a pair of spindle members, each of said pair of spindle members rotatably secured to one of said pair of clevis members about an axis transverse to the longitudinal direction of said skis, said spindle members including a vertically extending shaft rotatably secured to said forward portion of the snowmobile and a lever arm extending outwardly along the longitudinal direction of said skis;
 - e. and a pair of shock absorbers, each of said pair of shock absorbers connected to a distinct one of said pair of skis and to a distinct one of said lever arms of said spindle members and operative to control the vertical and rotational motions of said pair of skis with respect to said spindle members.

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