March 17, 1959 G. W. KENYON 2,877,573

TRIPPING DEVICES FOR SNOW PLOWS

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FIG. 1

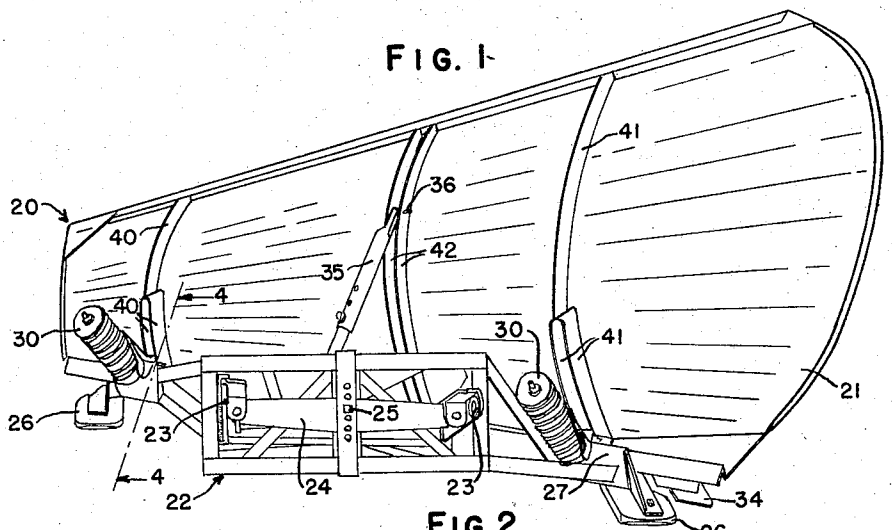

FIG. 2

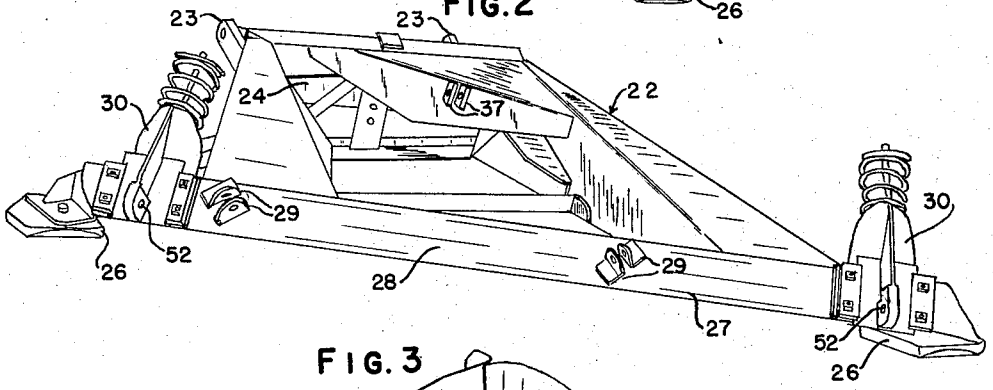

FIG. 3

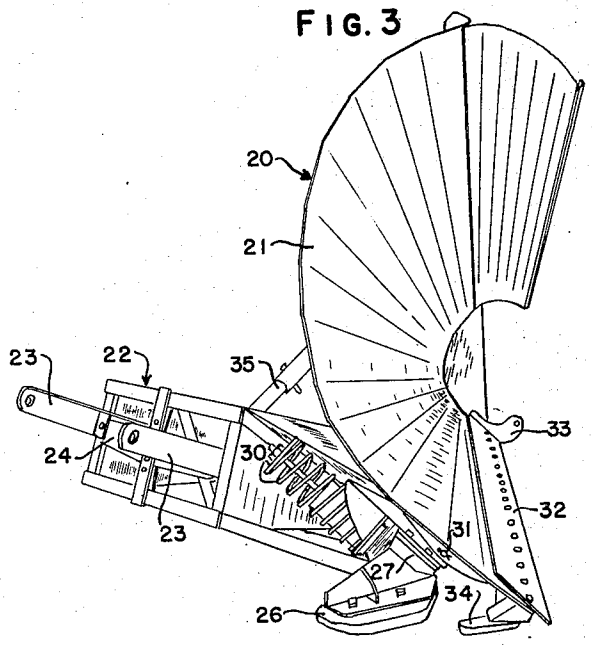

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FIG. 4

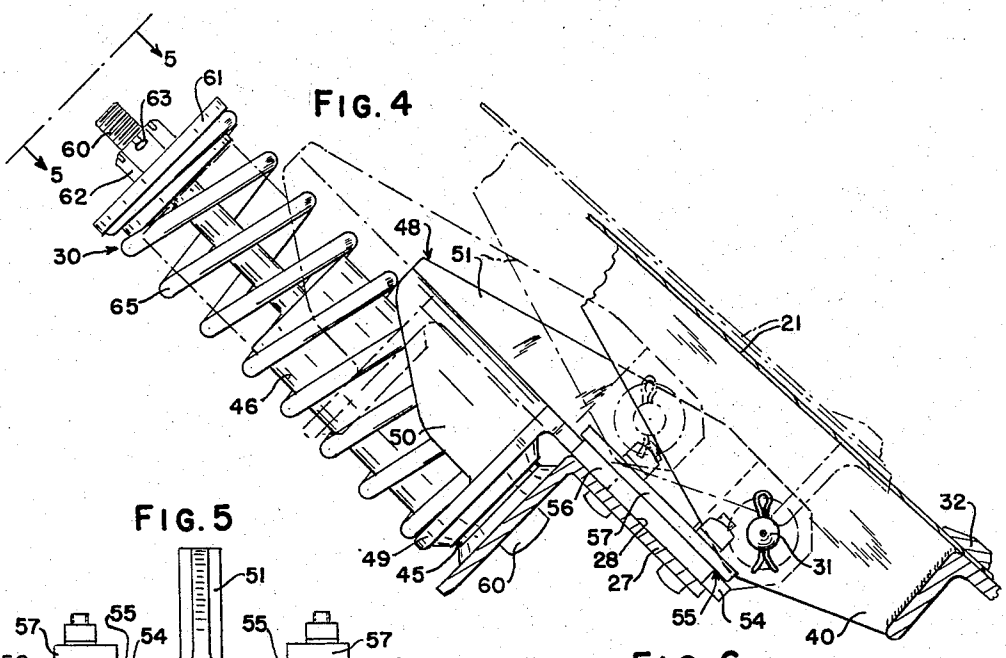

FIG. 5

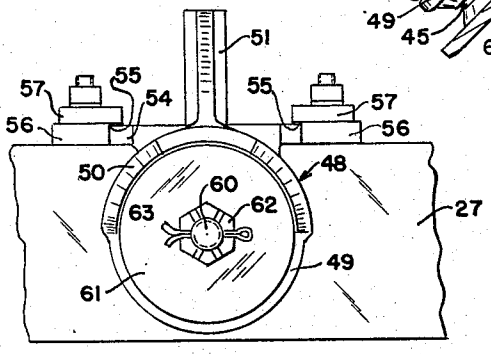

FIG. 6

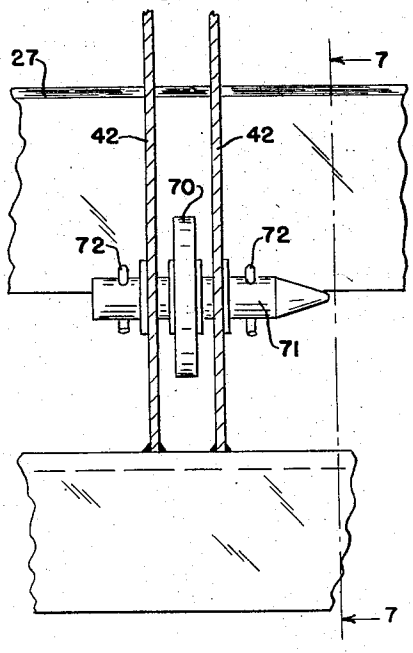

FIG. 7

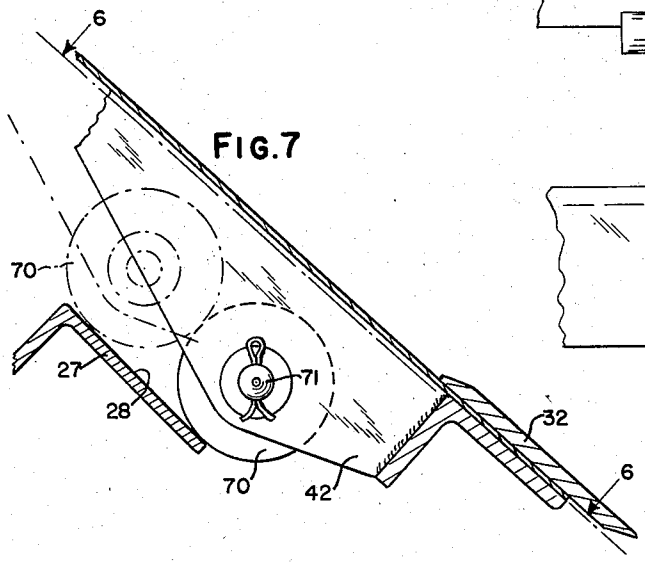

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FIG. 8

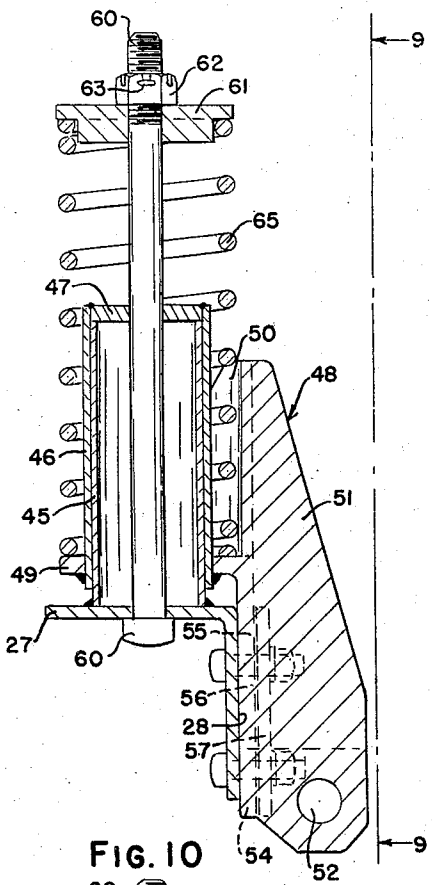


FIG. 9

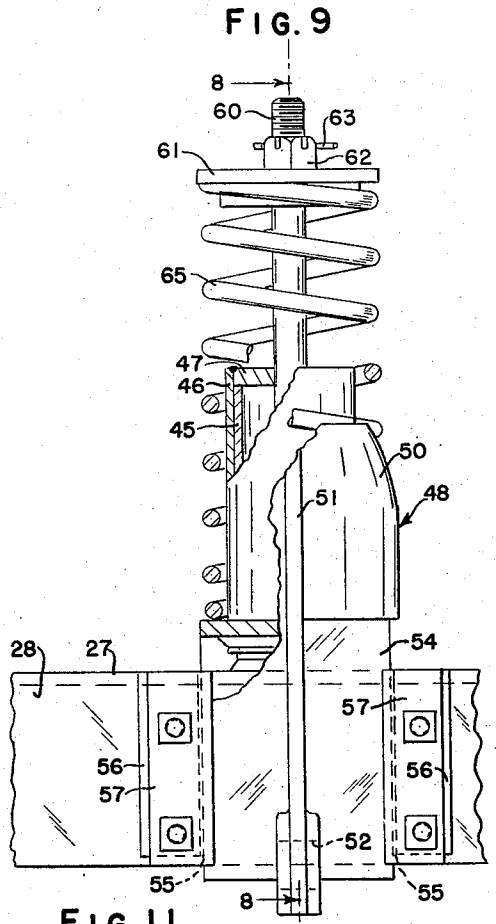


FIG. 10

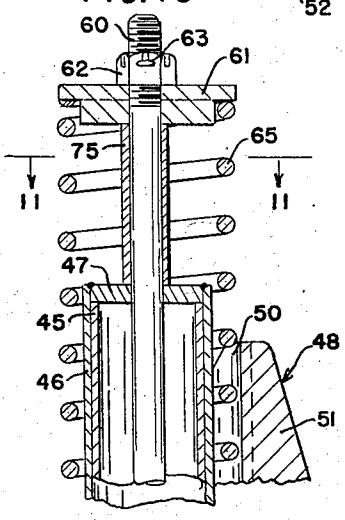
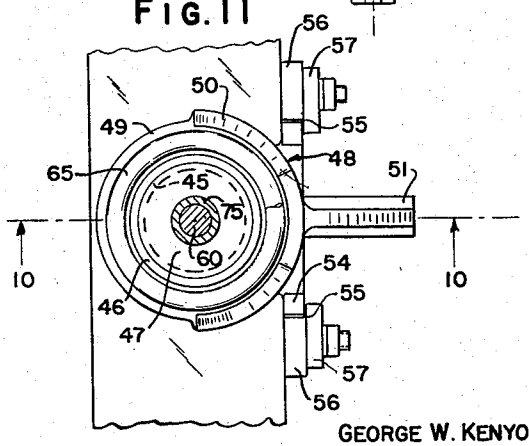


FIG. 11



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United States Patent Office 2,877,573 Patented Mar. 17, 1959

2,877,573

TRIPPING DEVICES FOR SNOW PLOWS

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Application October 27, 1954, Serial No. 465,059

3 Claims. (Cl. 37—42)

This invention relates to tripping devices for vehicle-mounted snow plows, and relates more particularly to a shock-absorbing, blade-tripping mechanism for a snow plow which will allow the blade to recoil and move upward from the roadway when an unyielding obstruction is encountered.

Vehicular snow plows are usually secured to the truck or other vehicle carrying them by pivoted drive bars so that the plow may be lifted from the roadway when not in use. When in use, the plow rests on the roadway and is held in contact therewith by its own weight, sliding on the roadway on metal shoes or runners. The thrust of the vehicle through the drive bars is forward and downward to assist in holding the plow in contact with the road while plowing. When the plow blade meets an unyielding, small obstruction in the roadway, it must recoil and bounce upward over the obstruction, otherwise the plow may be damaged. Numerous tripping devices have theretofore been used and proposed for this purpose, but all have had one shortcoming or another.

The principal object of this invention is to provide a snow plow tripping device of the character described that is simple and economical in construction and operates quickly and satisfactorily, and yet may be conveniently rendered inoperative when its use is undesirable because of special road conditions. More specific objects are to provide such a tripping device having fewer moving parts than prior devices, which lessens the shock on the truck when an obstruction is hit by permitting immediate yielding action between the plow blade and the plow supporting frame, and which, in the tripped position, allows increased clearance between the road surface and the cutting edge of the blade.

Other objects and advantages will be apparent from the following description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a perspective view of a snow plow embodying the present invention as viewed from the rear;

Figure 2 is a front perspective view of the plow supporting frame shown in Figure 1;

Figure 3 is a side perspective view of the plow of Figure 1;

Figure 4 is a side elevational view of a portion of the tripping mechanism of the present invention, part of the plow being shown in section and the position of the blade and associated parts in their highest position with respect to the supporting frame being indicated in broken lines;

Figure 5 is a plan view of the tripping mechanism of Figure 4 as viewed from the direction of the arrows 5—5 in Figure 4;

Figure 6 is a sectional view of another portion of the tripping mechanism on the line 6—6 of Figure 7;

Figure 7 is a sectional view of the parts shown in Figure 6 on the line 7—7 of Figure 6, the position of the parts when an obstruction is met being shown in broken lines;

Figure 8 is a sectional view of certain parts shown in Figure 4 on the line 8—8 of Figure 9;

Figure 9 is an elevational view of the parts shown in Figure 8 as viewed in the direction of the arrows 9—9 of Figure 8;

Figure 10 is a fragmentary sectional view similar to Figure 8 on the line 10—10 of Figure 11 showing an added element whereby the tripping mechanism may be easily rendered inoperative; and

Figure 11 is a sectional view of the parts shown in Figure 10 on the line 11—11 of Figure 10.

Referring to Figures 1, 2 and 3 of the drawings, the snow plow 20, which is of the one-way type, comprises a blade 21 and a supporting frame 22. The frame 22 is provided with two drive bars 23 (Figure 3) which are pivotally secured to the plow and to the vehicle which carries it in the usual manner. Drive bars 23 are also pivotally secured to either end of a cross member or equalizer bar 24, which is pivotally mounted at its center in the frame 22 at 25 as best seen in Figure 1 for allowing the plow to tip to the right or left independently of the vehicle, whereby the cutting edge of the plow blade may follow the crown or slant of the roadway.

The forward end of frame 22 is provided with the usual shoes 26, one at its leading side and the other at the trailing side. An angle iron 27 welded in place on the forward end of frame 22 and extending from leading side to trailing side provides a flat sloping surface 28 (Figure 2) facing forward and upward at an angle of approximately 45 degrees to the roadway. Brackets 29 are welded to the angle 27 and afford means by which chains may be secured to the plow for lifting the plow from the roadway by means of the usual lift mechanism on the vehicle.

The tripping devices 30, which are the subject of the present invention and are hereinafter more fully described, constitute slidable and resilient connections between the plow blade 21 and the angle 27, the plow blade 21 being pivotally connected to each tripping device 30 by a pin 31 (Figure 3) as also hereinafter more fully described.

The blade 21 is flared in the usual manner from leading to trailing side and is provided with the usual cutting edge 32 (Figure 3), a nose shoe 33 at the leading side and another shoe 34 at the trailing side. An adjustable link 35, pivotally secured at 36 to the blade (Figure 1) and pivotally secured to the frame 22 by means of the brackets 37 (Figure 2) in the usual manner, permits the blade to be adjusted at the proper angle to the roadway. It will be noted also in this connection that the pivot 25 of cross member 24 is vertically adjustable to permit the plow to be mounted on vehicles of different heights.

Blade 21 (Figure 1) has welded to its rear convex surface the vertically extending reinforcing ribs 40 and 41 adjacent leading and trailing sides respectively. Ribs 40 and 41 project from the rear of the blade 21 and are single along the top portion and double along the bottom portion of the blade. At the center of the blade a pair of ribs 42 extend from top to bottom, and it is to these latter ribs that the link 35 is pivotally secured.

Referring now more particularly to Figures 4–9, the shock-absorbing, tripping mechanism will be more fully described.

At either end of the angle 27 of the frame 22 is located one of the aforementioned tripping devices 30 for connecting the plow blade 21 to the frame 22. A guide tube 45, best seen in Figure 8, is welded to the angle 27 and extends in a direction parallel with the face 28. About the guide tube 45 is slidably mounted a slide tube 46 having its upper end closed by the disk 47 welded thereto. Welded to the slide tube 46 is the slide member 48, comprising an angular body portion having a flange 49 to which the slide tube 46 is joined, a spring guard portion 50 and a fin portion 51 whose lower thickened

end has a hole 52 therethrough (Figure 8). A pin 31 for each device 30 (Figures 3 and 4) passes through the hole 52 and through aligned holes in the double reinforcing ribs 40 and 41, respectively, to pivotally connect the plow blade 21 to the slide members 48.

The other flange 54 of the angular body portion of the slide member 48 forms a slide block which is slidably guided against the face 28 of angle 27 by the ways 55 (Figure 9). The ways 55 are formed by side members 56 and overhanging gibs 57 bolted to angle 27 on either side of the slide block 54 as best seen in Figures 5 and 9.

A bolt 60 extends axially within guide tube 45 and slide tube 46 through holes in the angle 27 and the disk 47 for a distance beyond the disk 47 substantially equal to the length of the tubes 45 and 46. The threaded end of bolt 60 bears a spring retainer 61, a safety nut 62 and a cotter pin 63 through a suitable hole in the bolt. Interposed between retainer 61 and the flange 49 of the slide member 48 is a coil spring 65 which surrounds the slide tube 46 and lies within the spring guard portion 50 of the slide member.

It will now be apparent that, as shown in Figure 4, when the plow blade 21 meets an obstruction in the roadway, it may rise, carrying with it the slide members 48 which are guided up and backwards with respect to frame 22 by means of the slide blocks 54 in ways 55 and by means of the slide tubes 46 sliding on guide tubes 45, the slide tubes acting as slides and the guide tubes as ways. As slide member 48 rises, it meets the resistance of the compression spring 65 whose upper end is secured to the angle 27 of the frame 22 by means of bolt 60, retainer 61 and nut 62.

The extreme upward travel of guide member 48 with respect to the frame 22 is indicated in Figure 4 in broken lines. The distance between the top of guide tube 45 and retainer 61 is normally somewhat less than the length of the guide tube 45 and ways 55. When the slide tube 46 rises with respect to guide tube 45, the disk 47 at the end of slide tube 46 comes into contact with retainer 61 before slide tube 46 has left guide tube 45 and before the slide block 54 has left the ways 55.

Blade 21 is curved, of course, having a concave surface facing forward. An imaginary plane, however, passing through the forward edge of the cutting edge 32 and intersecting the curved surface of the blade at its center, may be called the general plane of the blade. This general plane faces forward and upward and is also inclined to the direction of travel of the plow from leading to trailing side, as is usual. The thrust of the snow load is, in general, normal to this general plane of the blade.

Since the axis of spring 65 and the tubes 45 and 46 as well as the direction of action of the block 54 in ways 55 is at an angle of about 45 degrees upward and backward with respect to the road, the lines of action of the slide members 48 are at a small acute angle to the general plane of the blade. The thrust of the snow against the plow blade, being normal to the general plane of the blade, is hence nearly at right angles to the lines of action of the slide members 48.

When the blade meets an obstruction, such as a manhole cover, raised paving block or other solid object, the thrust on the blade exerted by such obstruction is in a direction generally opposite to the direction of travel of the blade and somewhat upward due to the upward camming action of the obstruction meeting the blade. The thrust of such an obstruction is also toward the leading side of the blade due to the inclination of the blade to the direction of travel. Consequently, the backward and upward thrust of such an obstruction on the blade is in generally the same direction as the lines of action of the slide members 48. The springs 65 may therefore be sufficiently powerful to hold blade 21 down in engagement with the roadway and yet be light enough to yield immediately when an obstruction is met.

In the embodiment shown and described above only two of the trip devices 30 are shown. It will be apparent, however, that any larger number may be used.

When only two devices are used, an auxiliary device may be installed at the center of the plow to prevent strain on the plow blade. As shown in Figures 6 and 7, a roller 70 is mounted on a pin 71 passing through the two central reinforcing ribs 42 of the blade so that roller 70 bears against the surface 28 of angle 27 of the frame. Pin 71 is provided with cotter pins 72 through suitable holes therethrough for retaining the pin in position and is similar to the pins 31.

It will be noted that the roller 70 contacts the sloping face 28 of angle 27 during the total travel of the blade upwards with respect to the frame permitted by the tripping device 30. In Figure 7, the maximum extent of this travel is indicated from the position of the roller 70 in full lines to that in broken lines.

When, because of certain road or weather conditions, it is desired to render the tripping mechanism inoperative, this is easily done by inserting a trip lock-out sleeve 75 about bolt 60 between disk 47 and retainer 61 as shown in Figures 10 and 11. Cotter pin 63, nut 62 and retainer 61 are removed, the sleeve 75 is slipped over bolt 60 and the retainer, nut and pin replaced. It will be obvious that slide tube 46 now will be unable to slide with respect to the guide tube 45 and the entire slide member 48 will be prevented from moving with respect to frame 22. The blade 21 can thus be made rigid with respect to the frame 22 if this is desirable for certain snow or ice conditions.

While there is herein described, and in the drawings shown, an illustrative embodiment of the invention, it is to be understood that the invention is not limited thereto, but may comprehend other constructions, arrangement of parts, details and features without departing from the spirit of the invention. I desire to be limited, therefore, only by the scope of the appended claims.

I claim:

1. In a vehicle propelled snow plow comprising a plow supporting frame adapted to be pivotally secured to a vehicle and having shoes for sliding along a roadway, a curved, side-delivery plow blade adapted to be pivotally supported by said frame along the bottom portion of said blade at a substantial angle to the line of travel of the vehicle, an adjustable link for securing the top portion of said blade to said frame in a plurality of selected positions of blade inclination with respect to the plane of the roadway, and a plate on said blade constituting a cutting edge adapted to lift snow from the roadway at an angle in the neighborhood of 45 degrees to the plane of the roadway, the angle of said plate with respect to the plane of the roadway being determined by the adjustment of said adjustable link; the improvement comprising a shock absorbing, blade tripping mechanism having a plurality of slideways on said frame disposed in a common plane extending upwardly and rearwardly from the plane of the roadway at an angle of approximately 45 degrees, said common plane being at the same substantial angle to the line of travel as said blade, a plurality of slide members slidably mounted on said slideways, pivoted connections on said slide members spaced from said slideways and secured to the lower portion of said blade, and resilient means disposed parallel to said common plane and operatively interposed between a portion of said frame and said slide members, whereby said slideways, said slide members and said resilient means interact in parallel planes extending rearwardly and upwardly from the plane of the roadway in a direction approximately normal to the thrust of the snow against the blade as a whole.

2. The combination as claimed in claim 1 wherein said resilient means comprise tubular guide means secured to said frame and axially aligned parallel to said common plane, tubular slide tubes secured to said slide members and adapted to slide on said tubular guide means, coil springs mounted about said slide tubes in compression be-

tween said frame and said slide members, whereby said springs are further compressed when the plow meets an obstruction.

3. The combination claimed in claim 1 wherein said frame has a flat sloping surface facing the rear of said blade and parallel to said common plane and said blade has at least one roller rotatably secured thereto in contact with said sloping surface.

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