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3,483,642

"V" PLOW WITH A FLOATING-TYPE MOUNTING LINKAGE

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2 Sheets-Sheet 1

Fig. 1.

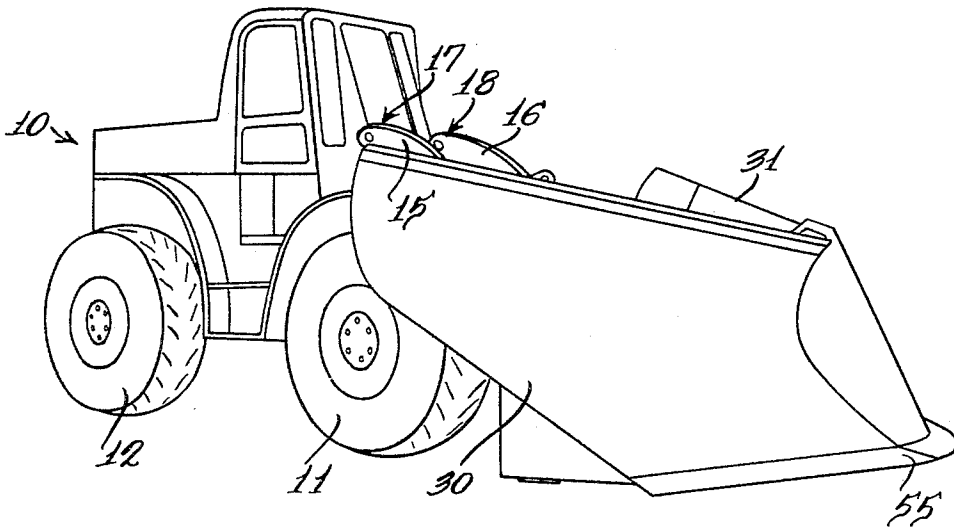
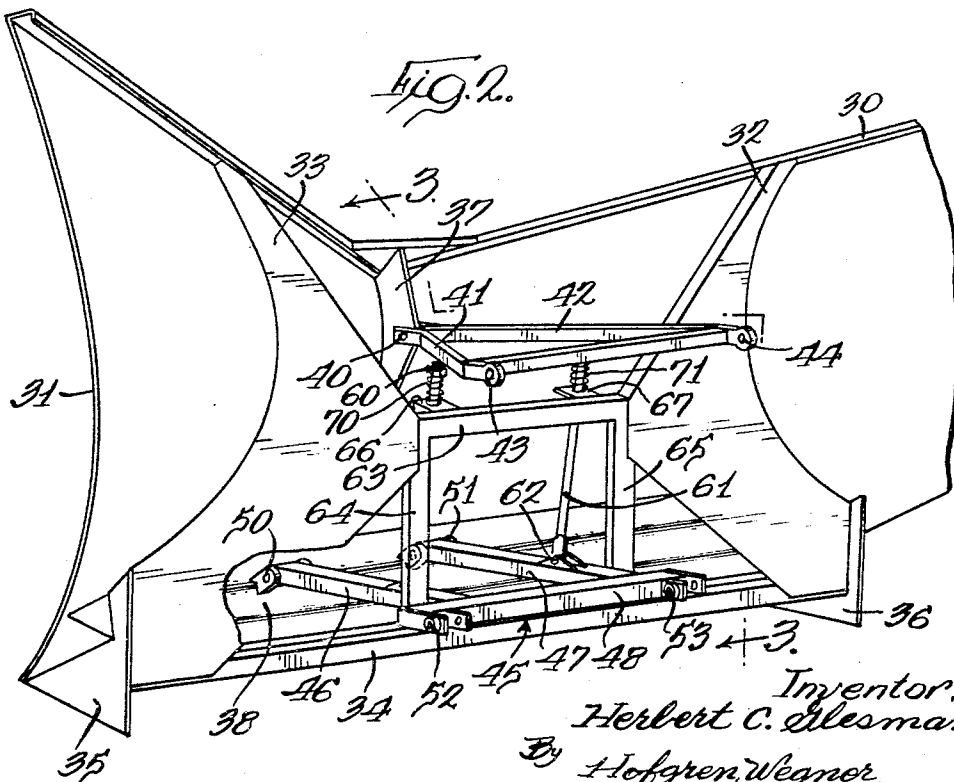


Fig. 2.



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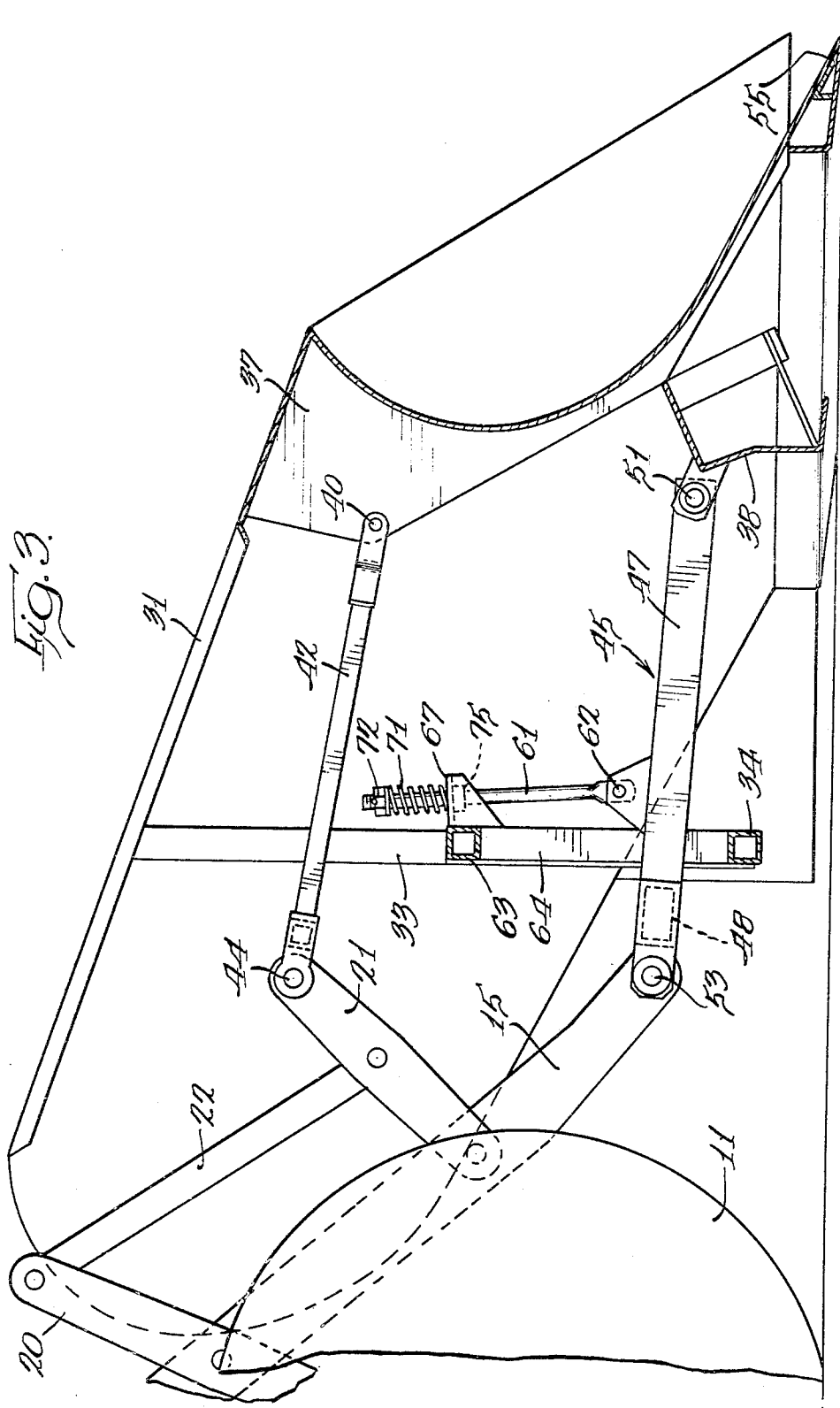
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"V" PLOW WITH A FLOATING-TYPE MOUNTING LINKAGE

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8 Claims

ABSTRACT OF THE DISCLOSURE

A "V" plow having a floating-type mounting linkage in which the blade has frame elements secured thereto to which a four-bar linkage is pivotally connected with an upper link and a lower push arm assembly with means at the ends of said upper link and the push arm assembly for pivotally connecting the plow to a vehicle or part thereof and with structure interconnecting certain of the frame elements and the push arm assembly to yieldably urge the plow downwardly relative to the push arm assembly and provide for floating mounting thereof.

BACKGROUND OF THE INVENTION

The usual procedure in operating plows on the front of a vehicle, such as a wheel loader, is to lower the lift arms to a suitable height so that the plow carried thereby comes in contact with the ground surface. The bucket cylinders are used to bring the plow into a normal position for plowing. In this position, there are three longitudinal points of engagement on the ground, namely, the wheels on the front and rear axles of the vehicle and the plow. The hydraulic lift cylinders of the wheel loader are normally set in the float position for plowing and when an unusual resistance is encountered by the blade of the plow, the force passes through the lift arms of the wheel loader to the point of pivoting thereof, generally above the front axle of the wheel loader, with the result that the front axle of the loader is forced up off the surface of the roadway, so that the vehicle loses traction and steering stability and is thus rendered ineffective to satisfactorily plow.

SUMMARY OF THE INVENTION

An object of this invention is to provide a new and improved snow plow having readily detachable linkage for mounting to one of several different types of vehicles or prime movers and wherein structure is provided for applying a controlled down pressure onto the blade of the plow for penetration under hard snow and, further, wherein the plow is provided with independent float action independent of the vehicle or prime mover to provide maximum traction and steering stability.

Still another object of the invention is to provide a V-type snowplow having a blade with frame elements secured to the rear thereof and with a four-bar linkage pivotally connected to certain of the frame elements at one end thereof and having means at the other end for connection to a vehicle or part thereof with the four-bar linkage including an upper link and a lower push arm assembly and with connections between certain of the frame elements and the push arm assembly including yieldable means to exert a compressible down pressure on the plow while permitting parallel floating of the V-type snowplow with the lift cylinders of the vehicle in hold position.

Still another object of the invention is to provide a V-type snowplow as defined in the preceding paragraph wherein structure is also provided to limit the floating action of the blade relative to the mounting structure.

An additional object of the invention is to provide a

snowplow having support structure for mounting on a wheel loader with the plow having a blade with frame elements fixed to the rear thereof and linkage connecting the frame elements to the lift arms and the bucket tipping links of the wheel loader including a push arm assembly pivotally connected between the lift arms and certain of the frame elements and means connected between the plow and the push arm assembly yieldably urging the plow downwardly and providing a stop limiting downward movement of the plow.

Further objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a wheel loader with a V-type snowplow associated therewith;

FIG. 2 is a rear perspective view of the V-type snowplow and the floating-type mounting linkage associated therewith with part of a frame element broken away; and

FIG. 3 is a vertical section, on an enlarged scale, of the V-type snowplow taken generally along the line 3—3 in FIG. 2 and showing the plow mounted to the lifting elements of a wheel loader.

DESCRIPTION OF THE EMBODIMENT

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail an embodiment of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

Although the V-type snowplow and floating-type mounting linkage structure associated therewith are capable of use with many different types of vehicle or prime mover, the structure will be shown in association with a wheel loader in the drawings and, particularly, in FIGS. 1 and 3. Referring to FIG. 1, the wheel loader is shown having a body, indicated generally at 10, having front wheels, one of which is shown at 11, supported by a front axle and rear wheels, one of which is shown at 12, supported by a rear axle. A pair of laterally-spaced lift arms 15 and 16 are pivoted at their upper ends to the body 10 as by pivots indicated generally at 17 and 18, respectively. Each of these arms has a boom lift cylinder (not shown) connected thereto and supported on the body of the prime mover. These cylinders control the elevation of the lift arms 15 and 16 relative to the prime mover and pivotally about the pivot points 17 and 18. The lift arms 15 and 16 each carry bucket tipping links, with the links associated with lift arm 15 being shown in FIG. 3 and including links 20 and 21 pivoted on the lift arm 15 and interconnected by a rod 22. The link 20 is connected to a bucket tipping cylinder (not shown) whereby valving associated with the bucket cylinder controls the extension of the piston rod of the cylinder to control the tipped position of the links 20 and 21 relative to the lift arm 15 and, in the conventional wheel loader application, resultingly control the attitude of a bucket supported by the lift arms 15 and 16.

The V-type snowplow shown in the drawings has a blade formed of curved, rearwardly and outwardly diverging sections 30 and 31 with a number of frame elements secured to the rear of the blade including a pair of brace plates 32 and 33 extending inwardly toward each other in line with a brace tube 34 extending transversely across the rear of the plow between a pair of

rearwardly extending brace plates 35 and 36. A central brace plate 37 extends rearwardly from the apex of the plow blade and a box-like frame structure 38 extends transversely along and to the rear of the plow, as shown particularly in FIG. 3.

The floating-type mounting linkage comprises a four-bar linkage with a top linkage assembly in the form of a triangular member shown particularly in FIG. 2 having a single pivot connection at 40 to the brace plate 37. The top linkage has a pair of rearwardly diverging legs 41 and 42 which terminate in spaced relation to each other to provide pivotal connections 43 and 44 for connection to a vehicle or prime mover and, more particularly as shown, for connection to the laterally-spaced links 21 of the bucket tipping link structure on lift arms 15 and 16.

The lower part of the four-bar linkage comprises a push arm assembly, indicated generally at 45, formed of spaced parallel bars 46, 47 and a transverse connecting bar 48. The front ends of the bars 46 and 47 are each pivotally connected to the frame structure 38 at the rear of the plow, as indicated at 50 and 51, respectively, and pivot connections 52 and 53 extend rearwardly from the connecting bar 48 for connection to the lift arms 16 and 15, respectively.

With the structure as now described, as seen particularly in FIG. 3, the snowplow blade is mounted for parallel floating movement in a general up and down direction and a force exerted against the leading edge 55 of the plow blade would result in upward movement of the plow blade by pivoting action about the front and rear pivot connections of the four-bar linkage and with the point of force application against edge 55 being beneath a line through pivots 51 and 53 to permit upward pivoting of the push arm assembly about its rear pivot mountings.

In order to provide a float action for the snowplow independent of the wheel loader or other prime mover and a controlled down pressure on the blade over irregular ground for penetration under hard snow, the structure now to be described is provided.

A pair of rods 60 and 61 extend upwardly from the frame bars 46 and 47 and are pivotally connected thereto at their lower ends, as by the pivot 62 shown for the rod 61. These rods extend upwardly to a position adjacent a transverse frame member 63 supported by a pair of legs 64 and 65 extending upwardly from the transverse brace tube 34. The transverse frame member 63 has a pair of forwardly-extending apertured brackets 66 and 67 each of which receives one of the rods 60 and 61, respectively. A pair of springs 70 and 71 are associated one with each of the rods 60 and 61, with the spring being captured between the associated apertured bracket and a nut 72 fitted on the end of the rod. The position of the plow blade is determined by the position of the lift arms 15 and 16 of the wheel loader as well as the tipping links 20 and 21 and force is applied to the rods 60 and 61 through the springs 70 and 71 to provide a controlled down pressure on the blade while, at the same time, permitting upward yielding movement of the blade and associated structure when an obstruction is encountered during advance of the blade over the ground. This movement is permitted by upward movement of the apertured brackets 66 and 67 on the rods 60 and 61.

In order to limit the downward movement of the plow blade, each of the rods 60 and 61 has a stop collar 75 affixed thereto in a position to engage the underside of the apertured bracket and resultingly limit the downward movement of the plow blade.

With the structure disclosed herein when the blade encounters an obstruction, the four-bar linkage and plow are permitted to move upwardly as the apertured brackets 66 and 67 move upwardly along the rods 60 and 61 as permitted by the springs 70 and 71. This upward movement is accompanied by pivoting about the pivotal con-

nection at both ends of the four-bar linkage while the vehicle lift cylinders are set in hold position. This reduces the transmission of push forces through the lift arms 15 and 16 back to the pivotal connection 17 and 18 for the lift arms to reduce the rotating moment forces on the loader and thus avoid lifting of the front axle of the loader and the wheels supported thereby off the surface of the roadway.

I claim:

1. A support structure for a snowplow mounted on a wheel loader comprising, plow frame elements immovably fixed to the rear of the plow blade, and linkage connecting said frame elements to the lift arms and the bucket tipping links of the wheel loader including a push arm assembly pivotally connected between said lift arms and certain of said frame elements located near the bottom of the plow to have the push arm assembly transmit force positively to said plow, and means connected between said plow and said push arm assembly intermediate the ends of said assembly yieldably urging the plow downwardly and providing a stop limiting downward movement of the plow.

2. A structure as defined in claim 1 wherein said means includes a pair of spaced rods extending upwardly from said push arm assembly, a plow frame element positioned adjacent the upper end of said rods with apertured brackets thereon to movably receive the adjacent rods, a pair of springs one on each rod above the brackets to accomplish said yieldable urging of the plow, and a pair of stop collars one on each rod beneath the brackets to accomplish said limiting of downward movement.

3. A structure as defined in claim 1 wherein said linkage includes a top link in addition to said push arm assembly to form therewith a four-bar linkage for parallel floating of the plow, and said yieldable urging means includes spring means supported by the push arm assembly and acting on a plow frame element.

4. A V-type snowplow detachably connectable to a vehicle and provided with self-contained structure to provide float action and controlled down pressure comprising a V-shaped blade, frame elements secured to the rear of said blade, a four-bar linkage pivotally connected to the frame elements including a top link and a lower push arm assembly all having means at their rear ends for connection to a vehicle or parts thereof, and means connected to said push arm assembly intermediate the ends thereof and extending transversely thereof to act yieldably between certain of said frame elements and the push arm assembly to urge the plow downwardly relative to said push arm assembly.

5. A V-type snowplow as defined in claim 4 in which said frame elements include an element mounting an apertured bracket, and said means includes at least one rod pivotally connected to said push arm assembly and extending upwardly through said apertured bracket, and a spring captured between the bracket and the upper end of the rod.

6. A V-type snowplow as defined in claim 5 wherein a stop collar is fitted on said rod beneath the bracket to limit downward movement of the plow by engagement of the bracket therewith.

7. A V-type snowplow as defined in claim 6 wherein there are a pair of said rods, said brackets and said spring means, and a stop collar is associated with each of the rods.

8. A support structure for a snowplow mounted on a wheel loader comprising, plow frame elements fixed to the rear of the plow blade, and linkage connecting said frame elements to the lift arms and the bucket tipping links of the wheel loader including a push arm assembly pivotally connected between said lift arms and certain of said frame elements and a top link in addition to said push arm assembly to form therewith a four-bar linkage for parallel floating of the plow, and means connected be-

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tween said plow and said push arm assembly yieldably urging the plow downwardly and providing a stop limiting downward movement of the plow including spring means supported by the push arm assembly and acting on a plow frame element.

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