United States Patent

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[54] **BACK BLADE ASSEMBLY AND CONTROL THEREFOR**
8 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **172/500,** 172/710, 172/491
[51] **Int. Cl.** **A01b 61/04**
[50] **Field of Search** 172/265, 464, 491, 482, 497, 500, 705, 710, 794, 499, 498, 711, 767

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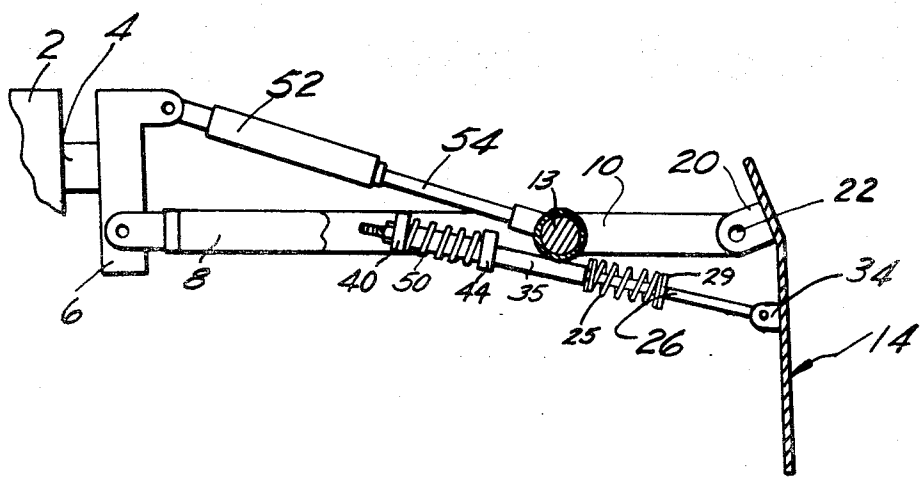
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ABSTRACT: This disclosure relates to a back blade assembly and a control system therefor. The blade is attached to the back of a vehicle through a rigid support which can be H-shaped, for example. This support is rotatably attached to the truck and to the blade so that the blade can be raised and lowered. A second support means is rotatably attached to the rigid support but reciprocatable at the attachment through this support and is rotatably attached to the blade below the attachment of the first support. Power means, such as a hydraulic cylinder are provided to raise and lower the blade. A hydraulic cylinder control system is provided to raise and lower the blade. The control system employs a modified four-way valve which actuates the raising and lowering of the blade and also has a means to maintain a predetermined pressure on the blade less than that pressure supplied when raising the blade.



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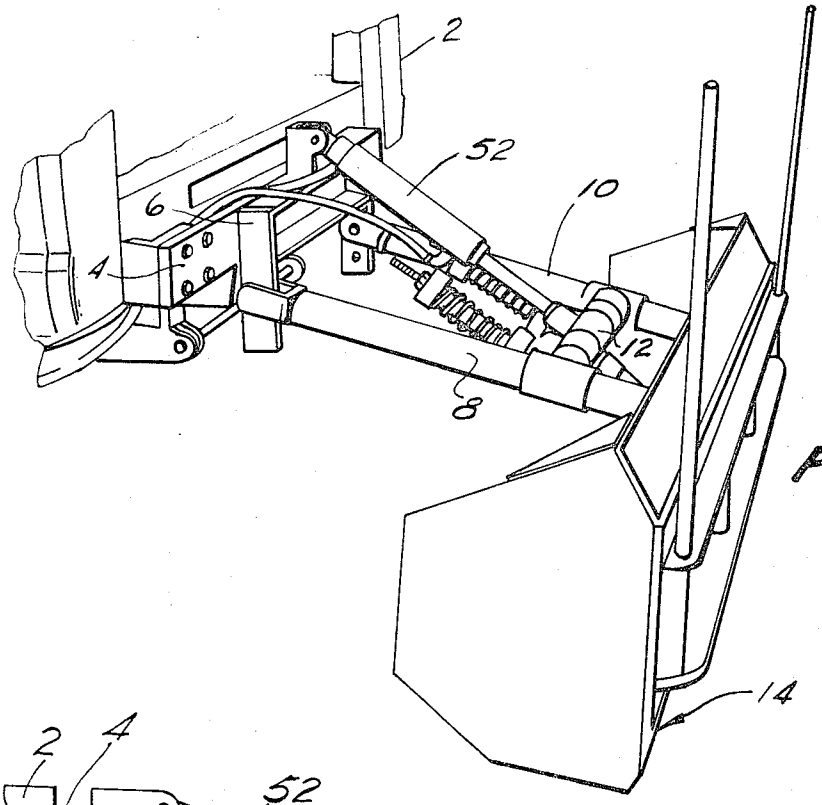


FIG. 1.

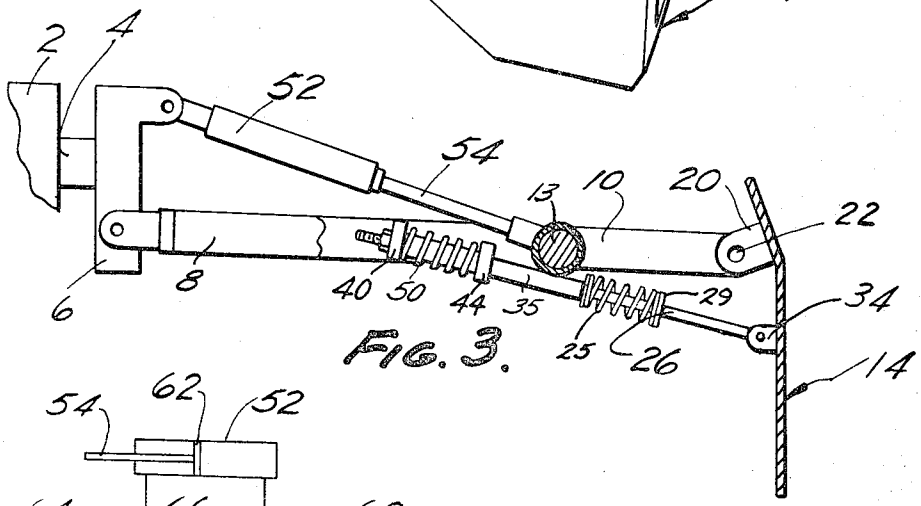


FIG. 3.

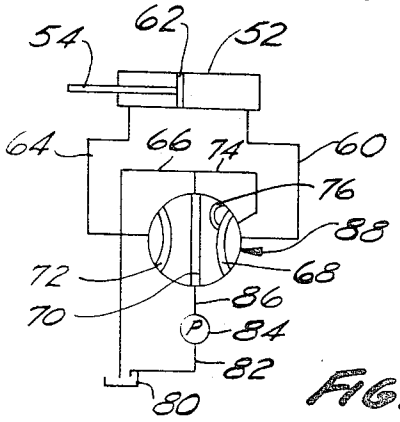


FIG. 4.

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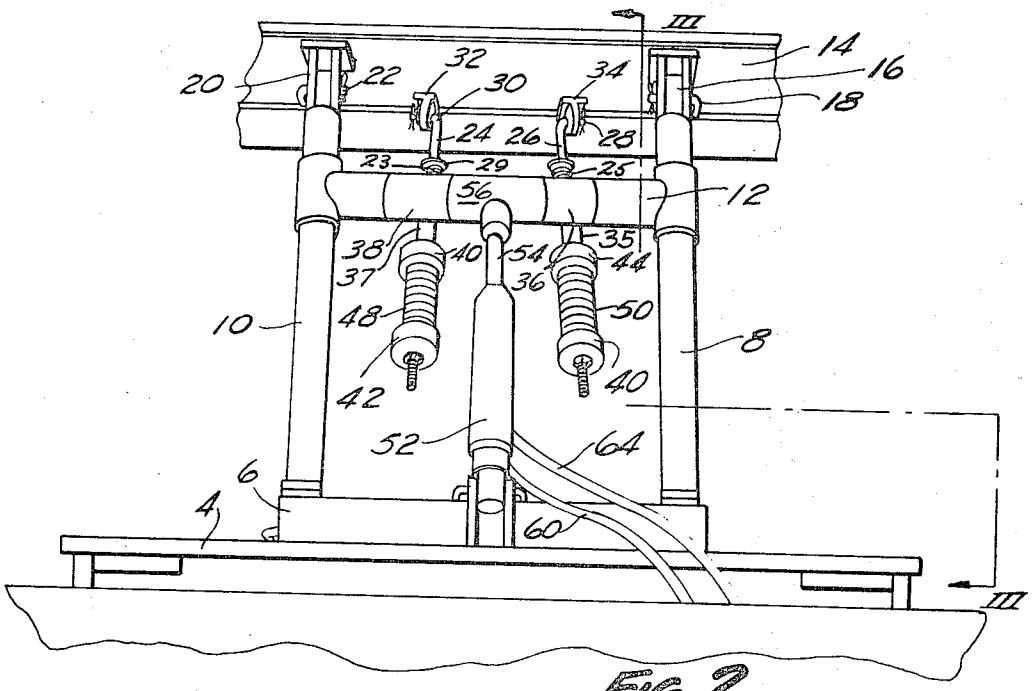


FIG. 2.

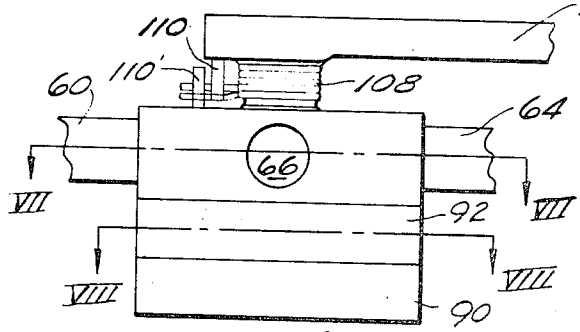


FIG. 6.

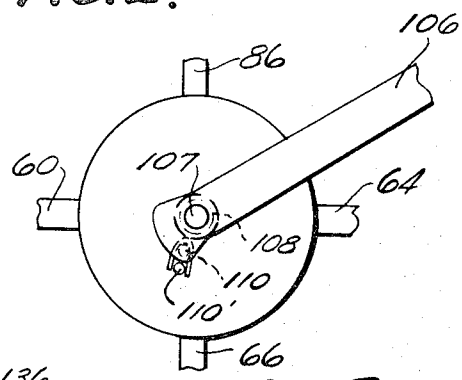


FIG. 5.

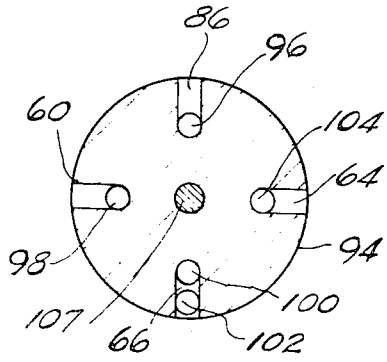


FIG. 7.

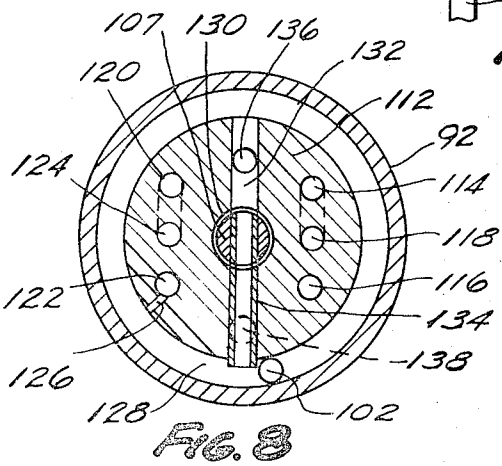


FIG. 8.

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BACK BLADE ASSEMBLY AND CONTROL THEREFOR

This invention relates to a back blade assembly and a control system therefor. In one of its aspects it relates to a back blade assembly for a truck and the like comprising a first support means adapted to be rotatably attached to the back portion of the truck, the support means being rotatably attached to the blade, a second support means rotatably attached to the blade a spaced vertical distance from the point of attachment of said first support means, said second support means being rotatably and reciprocatably attached to said rigid support means at a spaced distance from said blade, biasing means connected between said second support means and said first support means, and power means including a reciprocatable rod adapted to be rotatably attached to the back of a truck, and said reciprocatable rod attached to said assembly to raise and lower said blade when attached to a support.

In another of its aspects, the invention relates to a control system for a scraping blade assembly comprising a fluid supply means, a pressure supply means, a hydraulic cylinder having a piston at an inlet means at two ends of said hydraulic cylinder, a valve controlling the fluid supplied to either side of said cylinder to move said piston, said valve having means to maintain a piston in one position with a predetermined pressure on one side of said cylinder less than the pressure supplied from said pump.

Back blades for snowplows are employed to scrape the snow from the edges of the walls, garage doors and the like. The back blades must be positioned firmly on the ground and must also have a give in the horizontal direction if the blade contacts an uneven surface.

It is desirable to raise and lower the back blade since it is not always used. Considerable power is required to raise the blade. It is also desirable to apply pressure to the blade when it is in the down position. However, if too much pressure is applied over and above the weight of the blade assembly, the blade will wear out, or will have a tendency to raise the rear drive wheels of the vehicle off the ground thereby rendering the vehicle inoperative unless it has a four-wheel drive, and/or will create too much drag on the scraping operation.

I have now discovered a control system for a back blade assembly in which a first predetermined pressure is supplied to raise the blade and a second predetermined pressure less than the first pressure can be employed to hold the blade down in position.

By various aspects of this invention, one or more of the following or other objects, can be obtained.

It is an object of this invention to provide a novel back blade snowplow assembly for a truck.

It is a further object of this invention to provide a back blade assembly for a snowplow or the like wherein the blade is horizontally yieldable to compensate for normal ground protrusions.

It is a further object of this invention to provide a control system for a back blade of a vehicle where a predetermined pressure is maintained on a blade to hold the same against the ground, but which pressure is not sufficient to cause undue drag on the plowing operation, and/or is insufficient to cause excessive wear on the blade, or is insufficient to raise rear wheels off the ground.

Other aspects, objects, and the several advantages of this invention are apparent to one skilled in the art from a study of this disclosure, the drawings, and the appended claims.

According to the invention, there is provided a back blade assembly for a vehicle. The assembly comprises a first support means adapted to be rotatably attached to the back of a vehicle. The first support means is rotatably attached to a scraping blade. A second support means is rotatably attached to the blade, but a spaced vertical distance, preferably below the attachment of the first support means to the blade. The second support means is attached to the first support means such that the bottom scraping surface of the blade will be yieldable in a horizontal direction in the event that a ground protrusion is hit by the blade. To this end, the second support means is rotatably attached to the first support means and is also reciprocatable with respect to the first support means.

Power means are also provided to raise and lower the blade. The power means preferably are attached to the second support means.

Means are provided to yieldably maintain the blade in a vertical position.

According to one embodiment of the invention, the back blade is raised and lowered by a novel control system in which the power or pressure employed in forcing the blade against the ground surface.

The invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a novel back blade assembly as attached to the back portion of a truck;

FIG. 2 is a plan view of the assembly shown in FIG. 1;

FIG. 3. is a sectional view through lines III–III of FIG. 2;

FIG. 4. is a schematic view of the novel control system according to the invention;

FIG. 5 is a top view of a valve schematically shown in FIG. 4;

FIG. 6 is a side view taken along lines VI–VI of FIG. 5;

FIG. 7 is a sectional view of the valve shown in FIG. 5 taken along lines VII–VII of FIG. 6; and

FIG. 8 is another sectional view of the valve shown in FIGS. 5 and 6 taken along lines VIII–VIII of FIG. 6.

Referring now to the drawings and FIGS. 1 through 3 particularly, there is shown a back blade assembly for a snowplow. The back of a truck 2 is provided with a support beam 4 having a supporting box 6. Attached to the bottom portion of the supporting box 6 are support members 8 and 10 which are connected by a crossmember 12 to form a rigid H-shaped support. The members 8 and 10 are attached at 16 and 20, respectively to a scraper blade 14. Member 8 is attached through pin 18 and member 10 is attached through pin 22. Members 8 and 10 are rotatably attached to box 6. The cross member 12 includes a central rod 13 as seen in FIG. 3.

Also rotatably attached to back blade 14 are second support members 26 and 24. The back blade is attached at 34 and 32 through pins 28 and 30 to second support members 26 and 24 respectively. The other end of secondary support members 24 and 26 are attached to collar 38 and 36, respectively of cross member 12. The collars 38 and 36 are rotatable about crossmember 12 on rod 13. Support members 24 and 26 extend through sleeves 37 and 35 and are slidably engaged thereby. Sleeve 37 is fixed to collar 38 and sleeve 35 is fixed to collar 36. The end portion of supports 24 and 26 have attached thereto end caps 42 and 40. These end caps are biased against caps 40 and 44 through spring members 48 and 50, respectively. Support members 24 and 26 contain spring members 23 and 25 respectively, which are retained in place by caps 29. Set screws (not shown) in caps 29 fix their position on support members 24 and 26.

Thus, when the blade is in the down position against the ground, and a ground protuberance is hit by the blade, the blade will yield about pins 18 and 22 due to the spring action of 48 and 50, and springs 23 and 25.

The blade can be raised and lowered through a hydraulic cylinder 52 supplied through hoses 60 and 64. The hydraulic cylinder has an extensible rod which is attached to collar 56 of crossmember 12. The collar 56 is rotatable about crossmember 12. On the other end, the hydraulic cylinder is rotatably attached to the top portion of box 6. Thus, when the hydraulic cylinder 52 is actuated to extend rod 54, the blade 14 will be moved downwardly. Conversely, when the rod 54 is withdrawn into cylinder 52, the blade 14 will be raised.

The hydraulic cylinder is actuated through a novel control system shown in FIGS. 4 through 8. Referring now specifically to FIG. 4, a reservoir 80 supplies fluid through 82, pump 84, line 86 to valve 88. The fluid pressure can pass through valve 88 to line 60 to one end of hydraulic cylinder 52 containing piston 62 which is attached to rod 54. Depending on the position of valve 88, the fluid can also pass through line 66 and

back to reservoir **80** or to line **64** to the cylinder to cause the rod **54** to be retracted.

The valve **88** contains a first channel **68**, a second channel **70**, and a third channel **72**. When the valve is in the neutral position, supply line **86** communicates with return line **66** via channel **70**. When the valve is rotated in a clockwise direction, for example, line **86** communicates with line **60** to cause the piston **62** in the cylinder **52** to move to the left, as shown in FIG. **4**. At the same time, line **64** will communicate with return line **66** to exhaust fluid from the left end of the cylinder.

When the valve is rotated in the counterclockwise direction, supply line **86** will be in communication with line **64**, thereby forcing piston **62** to the right as shown in FIG. **4**. At the same time, line **60** will be communicating with return line **66**, whereby the fluid in the right side of the cylinder **52** will be exhausted.

According to the invention, a small bleed line **76** is provided in channel **68**. This bleed line **76** communicates with exterior line **74** which communicates with return line **66**. When the valve is rotated clockwise, so that supply line **86** communicates with line **60** through channel **68**, a small portion of the fluid supplied will pass through line **76**, line **74**, and be returned through line **66**. In this manner, the amount of pressure supplied to line **60** is less than that supplied by pump **84** to line **86**. In the operation of the invention, this reduction in pressure is advantageous, as it permits a required amount of pressure to be supplied to the left end of the cylinder to raise the blade assembly and a lesser amount of pressure to be employed in lowering the blade assembly and holding the same against the ground when scraping. In this manner, excessive wear and excessive drag on the back blade is eliminated.

Reference is now made to FIGS. **5** through **8**, wherein there is shown an example of the valve schematically shown in FIG. **4**. The valve contains sections **90**, **92**, and **94** suitably bolted together. Lines **60**, **64**, **66**, and **86** are attached to section **94**. As can be seen in FIG. **7**, a bore **98** communicates with line **60**, a bore **96** communicates with line **86**, a bore **104** communicates with line **64**, and bores **100** and **102** communicate with line **66**.

A handle **106** is provided and attached to shaft **107** to actuate the valve to various positions. The valve is spring biased by wound spring **108**, the ends of which bear against pin **110** on handle **106** and pin **110'** on the top of the valve. In this manner the handle is biased in a central position and can be turned clockwise or counterclockwise against the spring tension.

As can be seen in FIG. **8**, the central portion **92** is annular in cross section and has positioned therein a core **112**. Rod **107** is keyed to core **112** through pin **134** in channel **132**. Vertical bore **136** communicates with channel **132** and with bore **96** of top plate **94**. Vertical bore **138** communicates with channel **132** and with bore **100** of top plate **94**. On the other hand, bore **102** communicates with annular space **128** which surrounds core **112**. Bore **120** is connected to bore **122** through a diagonal bore **124**. Bore **122** also has a laterally extending smaller channel **126** which communicates with the annular space **128**.

Core **112** also has bore **114** which communicates with bore **116** through channel **118**.

As shown in FIGS. **5** through **8**, the valve is positioned at rest. In this position, fluid supplied through line **86** will pass through bore **96**, bore **136**, channel **132**, bore **138**, annular space **128**, bores **100** and **102** to line **66** back to the reservoir. When the handle is moved against the spring tension clockwise, as shown in FIG. **5**, the core member **112** will rotate so that bore **116** communicates with bore **100** and bore **114** communicates with bore **104**. At the same time, bore **122** will be positioned over bore **98** and bore **120** will be positioned over bore **96**. At this time, fluid supplied by pump **84** through line **86** will pass through bore **96**, **120**, **124**, **98**, and line **60** to cylinder **52**. At the same time, the fluid in line **64** will be exhausted through bore **104**, **114**, **118**, **116**, **100**, and line **66**. Also, fluid pressure will bleed from port **122** through narrow channel **126** into annular space **128** and into port **102**, through line **66**, back to reservoir **80**. In this manner, the pressure supplied to line **60** will be less than that supplied by pump **86**.

When the handle **106** is rotated counterclockwise, as shown in FIG. **5**, bore **114** will be positioned over bore **96**, bore **116** will be positioned over bore **104**, bore **120** will be positioned over **98**, and bore **122** will be positioned over bore **100**. In this position, the fluid will pass from line **86** through bore **96**, bore **114**, **118**, **116**, **104**, and into line **64**, forcing piston **62** to the right, as shown in FIG. **4**. At the same time, fluid in line **60** will pass through bores **98**, **120**, **124**, **126**, **138**, through line **66** to reservoir **80**.

The bottom plate member **90** of the valve shown in FIGS. **5** through **8**, is substantially solid in cross section, and merely blocks off the annular space **128** and the bottom end of core **112**.

Suitable seals (not shown) are provided between top plate **94** and shaft **107**, and between top plate **104**, part **92** and bottom plate **90**.

In constructing the valve shown in FIGS. **5** through **8**, a plurality of vertical screws are employed in fastening the three sections of the valve together. However, for purposes of simplicity in describing the invention, these bolts have not been shown.

Reasonable variation and modification are possible within the scope of the foregoing disclosure, the drawings, and the the claims to the invention without departing from the spirit thereof.

I claim:

1. A blade assembly for mounting on the rear end of a truck and the like comprising:

A. a scraper blade, a frame member;

B. a first support means rotatably attached to said frame member at one end and rotatably attached to said scraper blade at another end;

C. a rigid second support means rotatably attached at one end to said scraper blade a spaced vertical distance from said first support means;

D. means resiliently mounting said second support means to said first support means a spaced distance from said scraper blade such that said scraper blade is held substantially vertical but is yieldable at the bottom portion thereof in a horizontal direction; and

E. power means rotatably attached to said frame member, said power means including a reciprocable rod rotatably attached to said first support means.

2. A back blade assembly according to claim **1**, wherein said attachment means for said power means includes a means for rotatably attaching said rod to said support means.

3. A back blade assembly according to claim **1**, wherein said first support means comprises two rods rotatably attached to said blade and a crossmember connecting said two rods, said power means rod is rotatably attached to said crossmember, and said second support means is rotatably attached to said crossmember

4. A back blade assembly according to claim **1**, wherein said power means is a hydraulic cylinder with a piston attached to said rod.

5. A back blade assembly according to claim **1**, wherein said second support means is rotatably and reciprocably attached to said first support means and there is provided a biasing means between said first and second support means to provide said resilient mounting.

6. A truck having attached thereto the blade assembly of claim **1**, wherein said frame member is rigidly secured to the back portion of said truck.

7. A blade assembly according to claim **1** wherein said resilient mounting means includes a sleeve pivotably mounted on said first support means, and said second support means includes a shaft slidable in said sleeve.

8. A blade assembly according to claim **7** wherein said resilient mounting means further comprises biasing means between said shaft and said sleeve to resiliently maintain said shaft in a given position within said sleeve.