

[54] ADJUSTABLE DEFLECTOR FOR SNOW REMOVAL MACHINE

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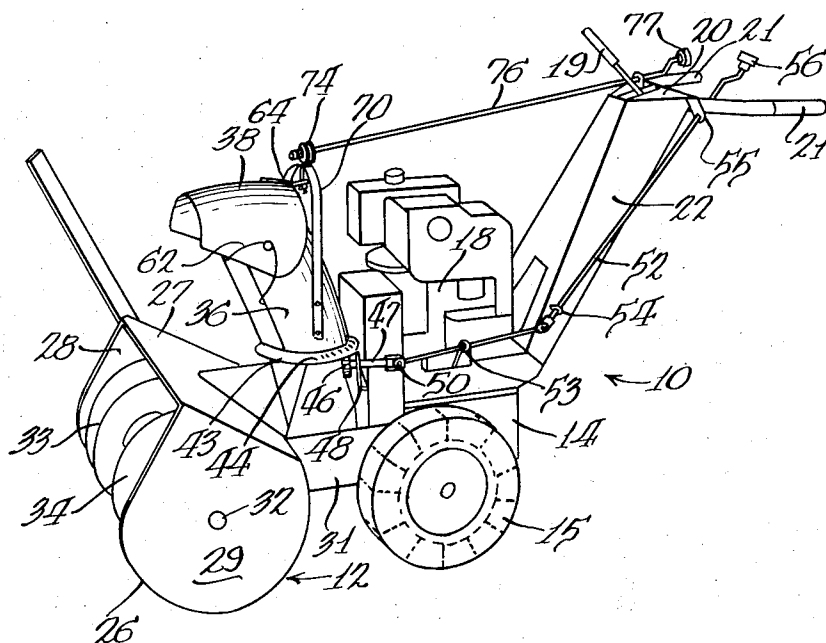
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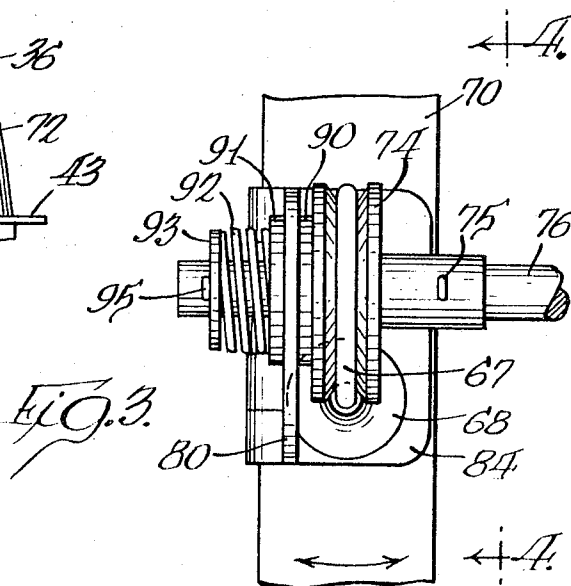
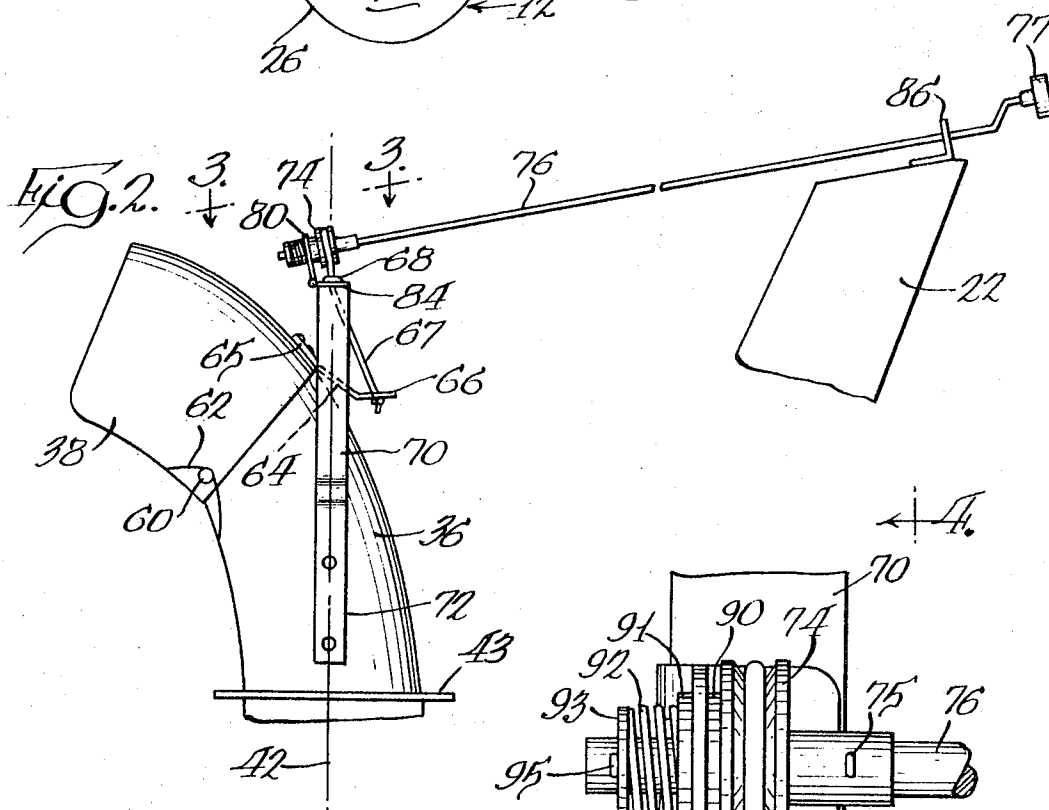
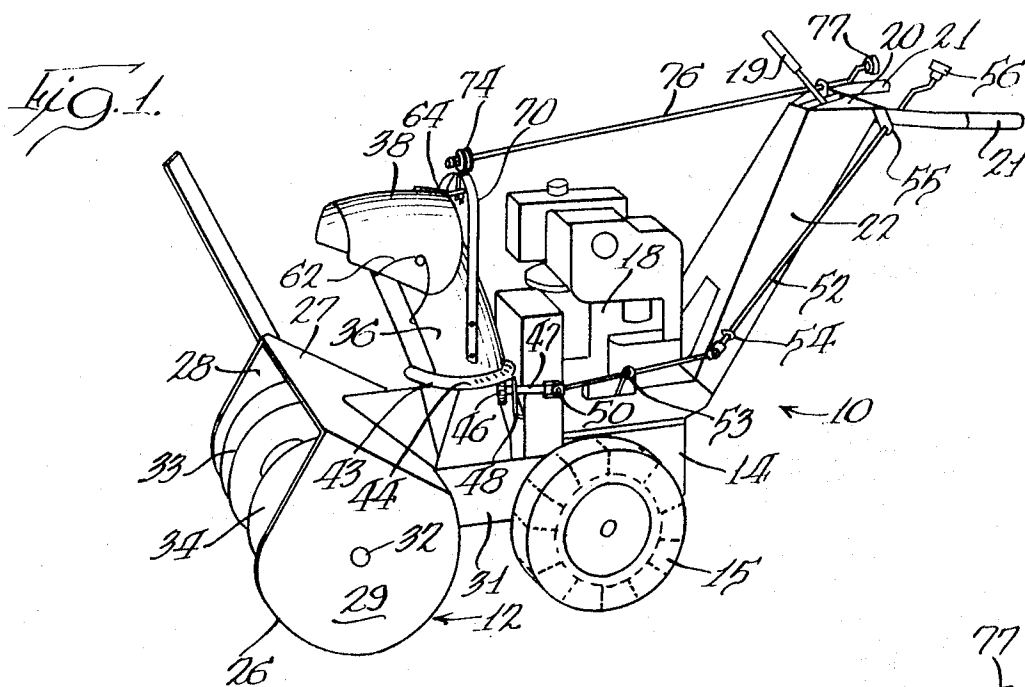
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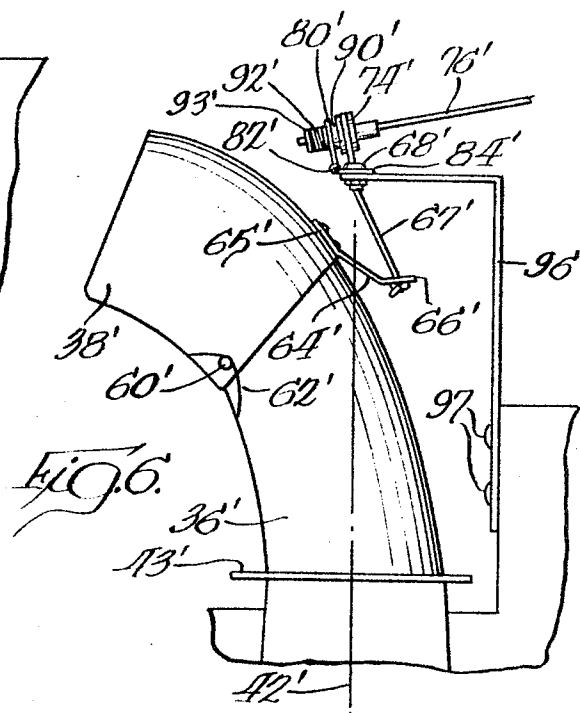
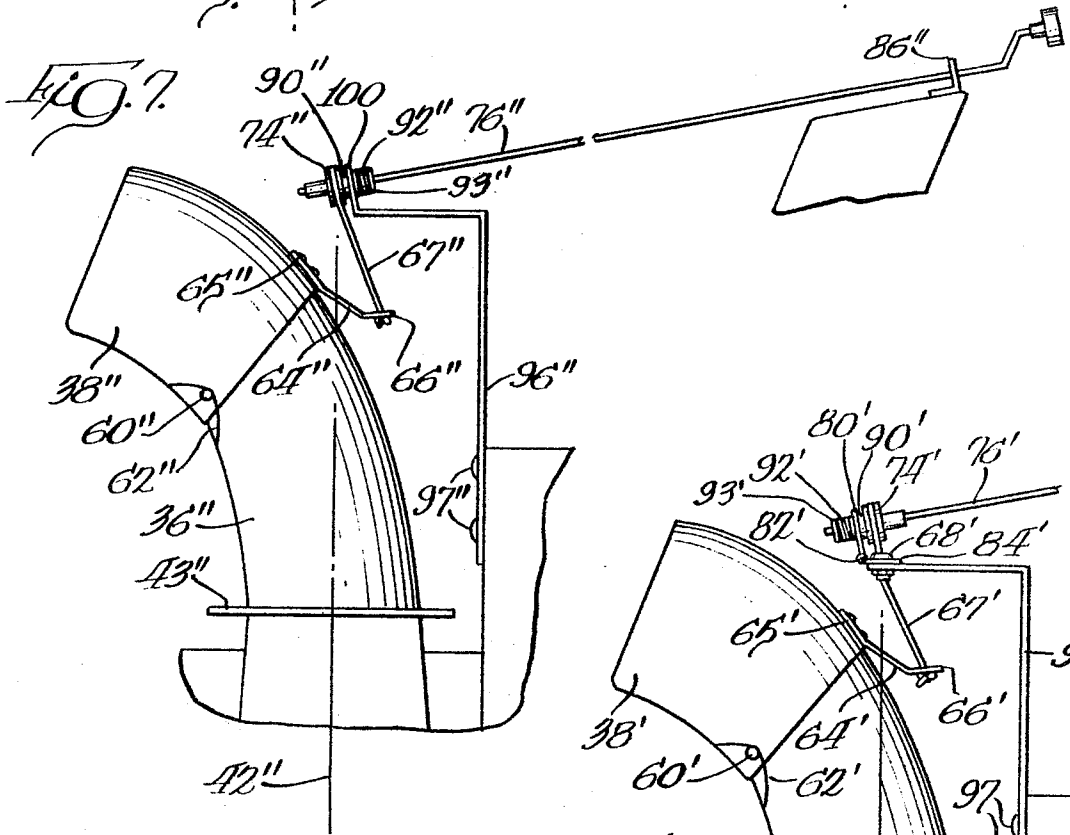
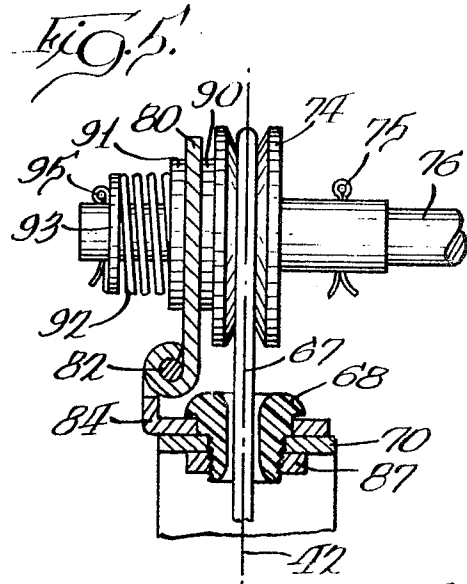
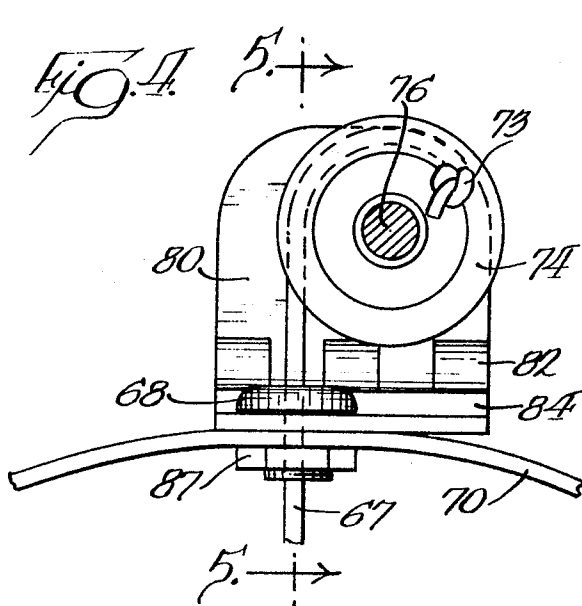
[57] ABSTRACT

A snow removal machine including a wheeled chassis with a prime mover and a control station, a snow removal frame mounted on the front of the chassis, a snow gathering housing on the frame, snow removal blades rotatable in the housing and driven by the prime mover, an upwardly directed snow discharge chute rotatable on the housing about an upright axis, a curved deflector pivotally mounted on the upper end of the chute, a cable connected for pivoting the deflector, and an angularly adjustable shaft connected to the cable and manually accessible at the control station for adjusting the deflector.

10 Claims, 7 Drawing Figures







ADJUSTABLE DEFLECTOR FOR SNOW REMOVAL MACHINE

BACKGROUND OF THE INVENTION

This present invention relates to a snow removal machine, and particularly to means for adjusting a pivotally mounted deflector at the upper end of a discharge chute in a snow removal machine.

There are various commercially available power operated snow removal machines which include a snow gathering housing at the front of a two-wheel or four-wheel chassis with rotatable snow removal blades for forcing snow into an upwardly directed snow discharge chute which is rotatable about an upright axis. The upper end of the snow discharge chute includes a pivotally mounted deflector, and angular adjustment of the chute enables snow discharge to one side or the other of the path of movement. In the past, it has been conventional to provide manually accessible means adjacent the operator's control station for angularly adjusting the discharge chute. On the other hand, it has not always been usual to provide remote control means for adjusting the deflector from the operator's control station. Instead, it has often been necessary to adjust the deflector locally at the position of its mounting, as a result of which it is necessary to discontinue operation of the machine in order to adjust the deflector.

In some machines, provision has been made for adjustment of a discharge deflector in snow removal machines and the like remotely at an operator's control station. For example, U.S. Pat. Nos. 2,741,512, 2,971,279, 3,299,546 and 3,510,171 disclose cable mechanisms for adjusting discharge deflectors by remote control. Also, my copending application Ser. No. 337,918, filed Mar. 5, 1973, relates to cable mechanisms for adjusting discharge deflectors by remote control.

While cable mechanisms are particularly suitable for constructions where the snow removal frame is pivotally mounted on the vehicle chassis, other adjustment mechanisms may be utilized in constructions where the snow removal frame is rigidly attached to the vehicle chassis.

SUMMARY OF THE INVENTION

It is a general object of the present invention to provide a new and improved mechanism for pivotally adjusting a deflector at the upper end of a rotatable discharge chute in a snow removal machine including a cable guide bracket mounted adjacent the axis of rotation of the chute, a cable secured to the deflector, an adjustable shaft having one end mounted on the cable guide bracket, and a reel on the end of the shaft adjacent the bracket connected to the cable and having a periphery aligned with the axis of rotation of the chute.

Another object is to provide a new and improved mechanism for adjusting a deflector at the upper end of the discharge chute in a snow removal machine including a bracket having a cable guide aligned with the axis of rotation of the chute, a cable secured to the deflector and engaging the cable guide, and an adjustable shaft mounted on the chassis and connected to the cable adjacent the cable guide.

As illustrated, the angularly adjustable shaft is frictionally retained in adjusted positions. Preferably, a friction disc on the shaft is spring biased in a manner to retard rotation of the shaft.

In one embodiment disclosed herein, the cable guide bracket is mounted on the snow discharge chute. In another embodiment, the cable guide bracket is mounted on the chassis of the snow removal machine.

In order to facilitate proper location of the adjustment shaft relative to the cable guide bracket, the shaft is mounted in an articulated bearing bracket. More particularly, the bearing bracket is mounted for pivotal movement about an axis transverse to the axis of the adjustment shaft. In the construction where the cable guide bracket is mounted on the discharge chute, the bearing bracket is mounted on the cable guide bracket for relative movement about an axis aligned with the axis of rotation of the discharge chute.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a snow removal machine having a deflector adjustment mechanism embodying the principles of the present invention;

FIG. 2 is an enlarged fragmentary side elevational view illustrating the deflector adjustment mechanism shown in FIG. 1;

FIG. 3 is an enlarged fragmentary top plan view, taken at about the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary elevational view taken at about the line 4—4 of FIG. 3;

FIG. 5 is a vertical sectional view taken at about the line 5—5 of FIG. 4;

FIG. 6 is a fragmentary side elevational view, similar to FIG. 2, showing an alternative construction; and

FIG. 7 is a side elevational view, similar to FIG. 6, showing another embodiment.

DETAILED DESCRIPTION OF EMBODIMENT OF FIGS. 1-5

Referring to the drawings in more detail, in FIGS. 1-5 the invention is illustrated in connection with a snow removal machine 10 having a power operated snow removal mechanism 12 at the front of the machine. The machine 10 includes a chassis 14 supported on propelling wheels as at 15. There is a prime mover in the form of a gasoline engine 18 on the chassis 14 connected to drive an appropriate transmission connected for rotating the propelling wheels 15. The engine is adapted to be started by hand and automatically controlled to maintain appropriate power for handling the load encountered, in a conventional manner. Transmission of power from the engine 18 to the propelling wheels 15 and to the snow removal mechanism may be controlled by a manually accessible handle 19 located at a control panel 20 disposed between a pair of handles 21 which may be utilized for steering the machine. The handles 21 are rigidly secured to the chassis 14 and extend upwardly from the chassis through a housing 22 and terminate in hand grip portions adjacent the control panel 20.

The snow removal mechanism 12 includes a snow gathering housing 26 extending transversely at the front of the machine and defining the width of the swath to be cut by the snow removal mechanism. The housing includes a rear wall (not visible), a top wall 27 and end walls as at 28 and 29. The front of the housing 26, and the bottom, are largely open to facilitate entry of snow into the front of the housing. As illustrated, the housing 26, as well as the mechanism carried thereby, is supported at the front end of a frame 31 extending rigidly forwardly from the chassis 14.

In order to collect and remove snow in a predetermined path as the machine progresses, the housing 26 includes appropriate rotary blade mechanism rotatably mounted as at 32 in opposite end walls 28 and 29. Preferably, the blade mechanism in the housing 26 includes oppositely directed blade portions 33 and 34 at opposite ends of the housing for moving snow inwardly toward the mid portion of the housing where it is directed upwardly through a chute 36. If desired, there may be a second stage blower or fan in the housing 26 associated with the chute 36 for forcing the gathered snow upwardly at a high rate of speed so that in effect the snow is thrown or blown with great force outwardly through the chute 36 in a direction determined by the angular adjustment of the chute 36 and a deflector 38 mounted at the upper end of the chute 36.

In order to provide for direction of the discharged snow toward one side or the other of the path of movement of the machine, the upright snow discharge to angularly 36 is mounted for rotation on the housing 26 about an upright axis which is designated at 42 in FIG. 2. The lower end of the chute 36 includes an annular outwardly extending flange 43 which is disposed transverse to the axis 42 and which has a plurality of apertures 44 adapted to be engaged by a toothed wheel 46 secured on a shaft 47 rotatably mounted in a bracket 48 fixed on the chassis 14. In order to angularly adjust the chute 36 remotely at the operator's station, the rotatable shaft 47 has a universal connection at 50 with an angulated shaft 52 supported in guides 53, 54 and 55 on the chassis 14. The angulated shaft 52 terminates at the upper end in a handle 56 which is accessible at the operator's station. As illustrated in the drawings, while the chute 36 is angularly adjustable about an upright axis 42, the chute actually is curved relative to the axis 42 for purposes of directing snow to one side of the axis 52 depending upon the angular adjustment of the chute. Thus, through the medium of the angulated drive shaft 47, 52 and the toothed gear wheel 46, the operator may turn the chute within a range of approximately 180° from one extreme position where the snow is directed laterally toward the left side of the machine to another extreme position where the snow is directed laterally toward the right side of the machine.

As thus far described, the snow removal machine is a standard commercially available product, and need not be further described in specific detail. According to the present invention, in order to control the vertical angle at which the snow is discharged from the end of the chute 36, provision is made for adjusting the deflector 38 about a horizontal axis relative to the chute, to turn the deflector more or less upwardly or downwardly relative to the chute, so that the snow is discharged at a higher or lower angle.

The deflector 38 is essentially an inverted channel-shaped member which has approximately a half-circular transverse cross-sectional configuration, and a longitudinal axis which is somewhat curved in a degree of curvature corresponding approximately to the curvature of the chute 36. At opposite edges, near the lower end, the deflector 38 is pivotally mounted on the chute 36 by means of pivot pins 60. Associated with each of the pivotal joints 60, there is a torsion spring 62 in the form of a wire-shaped member having a central portion wrapped around the pivot pin 60 and opposite ends hooked respectively on the chute 36 in the deflector 38 in a manner such that the springs 62 function to

bias the deflector upwardly relative to the chute toward a relatively open position where the snow would be permitted to discharge in an upward direction. In order to provide for adjustment of the deflector remotely, so that the operator may control the position of the deflector at the operator's station, to direct discharge at a lower angle, a remote control mechanism is connected to the deflector 38 and adjustable from the operator's station.

The remote control mechanism for adjusting the deflector 38 includes a cable attachment bracket or arm 64 having an upper end portion secured to the deflector 38 at 65. From the mounting 65, the arm 64 extends downwardly behind the chute 36 to a lower terminus 66 to which a cable 67 is attached. From the attachment 66, the cable 67 extends upwardly through a cable guide in the form of an eyelet or grommet 68 centrally located in an inverted U-shaped bracket 70 having lower ends secured as at 72 on opposite sides of the angularly adjustable chute 36. Preferably, the inverted U-shaped guide bracket 70 is constructed of yieldable material which permits bending of the bracket so that the lower ends may be moved toward or away from each other in a manner to accommodate the bracket for universal use in connection with various discharge chutes 36 having different diameters. In order to facilitate angular adjustment of the chute 36 without affecting the pivotal position of deflector 38, the grommet 68 is mounted on the bracket 70 in a position in alignment with the axis 42 about which the chute 36 is angularly adjustable.

After passing through the guide grommet 68, the cable 67 extends upwardly toward an upper end which is secured to a reel or pulley wheel 74 in turn secured at 75 for rotation with a shaft 76. For adjustment, the shaft 76 has a forward end portion rotatably mounted on the bracket 70 and a rear end portion rotatably mounted on the chassis 14. The rear end portion of the shaft 76 carries an appropriate handle 77 which is manually accessible to facilitate angular adjustment of the shaft 76 to wind or unwind the cable 67 relative to the reel 74 in a manner to angularly adjust the deflector 38. The forward end portion of the shaft 76 is rotatably supported adjacent the reel 74 in a bearing bracket 80, which is pivotally mounted at 82 for movement about an axis extending transverse to the axis of the shaft 76 and afforded by a mounting bracket 84. In turn, bracket 84 is mounted on the top of the U-shaped guide bracket 70 for angular adjustment about the axis 42 of the chute 36. The rotatable mounting of the bracket 84 on the bracket 70 facilitates angular motion of the bracket 70 relative to the bracket 84 when the chute 36 is angularly adjusted. The pivotal mounting of the bracket 80 on the bracket 84 facilitates angular disposition of the bracket 80 in order to appropriately incline the shaft 76 so that the rear end portion may be rotatably mounted in a guide located as at 86 on the housing 22. The mounting bracket 84 is rotatably supported on the central portion of U-shaped bracket 70 by means of grommet 68 which is preferably secured in position on the bracket 70 by means of a threaded nut 87.

In order to retain the adjustment shaft 76 in angularly adjusted positions, the shaft is frictionally retarded by yieldably biased friction means. As illustrated herein, a friction disc 90 is mounted on the shaft 76 between the

reel 74 and the bearing bracket 80. A second friction disc 91 is disposed on the shaft 76 at the opposite side of the bearing bracket 80. Adjacent the friction disc 91, a coiled compression spring 92 is positioned on the shaft 76 and bears at one end against the friction disc 91 and bears at the opposite end against a spring retainer 93 held on the shaft by means such as a cotter pin 95.

In operation, the springs 62 normally bias the deflector 38 in an upward direction, and the force of the springs may be opposed by the cable 67. That is, the shaft 76 may be manually rotated in a direction to wind the cable 67 on the reel 74 in a manner to pivot the deflector 38 downwardly in opposition to the bias of the springs 62. When the deflector 38 is adjusted to the desired angle, adjustment shaft 76 is held in angularly adjusted positions by the action of the friction disc 90 which engages the stationary bracket 80 and the rotatable reel 74 due to the action of the spring 92 in urging the shaft 76 in a direction to force the reel 74 toward the bracket 80. The location of the cable guide grommet 68 coincident with the axis of the angularly adjustable chute 36 assures that the cable guide 68 remains properly positioned for adjustment of the deflector 38 in all angular positions of the chute 36. Regardless of the angular disposition of the chute 36, the guide bracket 70 assumes a position in which the cable 67 is appropriately located to apply force to adjust the deflector against the bias of springs 62.

FIG. 6

Referring now to the embodiment of FIG. 6, an alternative construction is illustrated in which the cable guide bracket 96 is mounted on the front of engine housing 97 in a machine otherwise similar to the machine illustrated in FIGS. 1-5. In order to simplify the description of FIG. 6, parts therein corresponding to similar parts in the embodiment of FIGS. 1-5 are designated by similar reference numbers with a prime suffix. A chute 36' carries a pivotally adjustable deflector 38'. The chute 36' is angularly adjustable about an upright axis 42' and has an annular flange 43'. Deflector 38' is pivotally mounted at 60' and urged toward the upper position illustrated in FIG. 6 by torsion springs 62'. In order to provide for adjustment of the deflector 38' against the bias of the springs 62', a bracket or arm 64' is secured to the deflector at 65' and secured at 66' to a cable 67'. The cable 67' extends upwardly through a cable guide grommet 68' and is secured to a reel or pulley 74' rotatable with an adjustment shaft 76'.

The forward end portion of the shaft 76' is rotatably mounted in a bearing bracket 80' pivotally mounted at 82' on a mounting bracket 84'. The bracket 80' is thus angularly movable about an axis transverse to the axis of the shaft 76'. A friction disc 90' disposed on the shaft 76' between the reel 74' and the bearing bracket 80' yieldably retains the adjustment shaft 76' adjusted positions by virtue of a spring 92' which urges the shaft 76' longitudinally in a direction such that the reel 74' is urged toward the bearing bracket 80' and the friction disc 90' is gripped between the reel and the bearing bracket.

In the construction illustrated in FIG. 6, the mounting bracket 84' is supported on a cable guide bracket 96 which is stationarily mounted at 97 on the engine housing or some other stationary part of the frame which is rigid with the chassis. The bracket 96 thus

does not move angularly with the angularly adjustable chute 36'. As a result, the mounting bracket 84' need not be rotatably mounted relative to the bracket 96. Nevertheless, the cable guide grommet 68' is aligned with the axis 42' about which the chute 36' is angularly adjustable, so that in all positions of the chute 36', the cable 67' is properly guided from the deflector arm 64' to the reel 74'.

FIG. 7

The construction illustrated in FIG. 7 enables omission of a specific cable guide grommet and permits routing of the adjustment cable directly from the adjustable deflector to the reel on the manually adjustable shaft. In order to simplify the description of FIG. 7, parts therein corresponding to similar parts in FIG. 6 are designated by similar reference numbers with a double prime suffix. A chute 36'' is angularly adjustable about an upright axis 42'' and has an annular flange 43''. A deflector 38'' is pivotally mounted on the chute at 60'' and urged toward an uppermost position illustrated in a 7 by torsion springs 62''. In order to provide for adjustment of the deflector 38'' against the bias of springs 62'', a bracket or arm 64'' is secured to the deflector at 65'' and secured at 66'' to a cable 67''. The cable extends upwardly to the periphery of a reel 74'' rotatable with an adjustable shaft 76''.

The forward end portion of the shaft 76' is rotatably mounted in an upwardly directed flange 100 at the front of a mounting bracket 96'' stationarily mounted at 97'' on the engine housing or some other stationary part of the frame which is rigid with the chassis. A friction disc 90'' disposed on the shaft 96'' between the reel 74'' and the mounting flange 100 yieldably retains the adjustment shaft 76'' in angularly adjusted positions by virtue of a spring 92'' which urges the shaft longitudinally in a direction such that the reel 74'' is urged against the mounting flange 100 and the friction disc 90'' is driven between the reel and the mounting bracket. It should be understood that the periphery of the reel 74'' is aligned with the axis 42' in a manner to appropriately guide the cable in all angularly adjusted positions on the chute 36''.

I claim:

1. A snow removal machine, comprising,
 - a. a wheeled chassis having a prime mover and a control station,
 - b. a snow removal frame on the chassis including a snow gathering housing,
 - c. snow removal blades rotatable in the housing,
 - d. an upwardly directed snow discharge chute rotatable on the housing about an upright axis,
 - e. a deflector pivotally mounted on the upper end of the chute for movement between an upper position and a lower position and means for normally urging said deflector toward said upper position, and
 - f. means for pivotally adjusting the deflector from the control station, including
 - F-1. a support bracket having a cable guide,
 - F-2. means mounting the bracket with the cable guide in line with the axis of rotation of the chute,
 - F-3. a single cable having one end secured to the deflector for moving said deflector toward said lower position, and
 - (f-4)

A rotable shaft mounted on the bracket and having an end portion positioned above the cable guide and being connected to the other end of the cable, an intermediate portion of the cable bearing on the cable guide whereby rotation of the end portion of the shaft advances the cable past the guide and about the end portion to move the deflector toward said lower position.

2. A snow removal machine as defined in claim 1, including a bearing bracket rotatably supporting one shaft end portion, and means mounting the bearing bracket for rotation on the guide bracket about the axis of rotation of the chute.

3. A snow removal machine as defined in claim 1, including a bearing bracket rotatably supporting one shaft end portion, and means mounting the bearing bracket for pivotal movement on the guide bracket about an axis transverse to the shaft axis.

4. A snow removal machine as defined in claim 1, including a mounting bracket supported on the guide bracket for rotation about the axis of rotation of the chute, and a bearing bracket rotatably supporting one shaft end portion and pivotally mounted on the mounting bracket for movement about an axis transverse to the shaft axis and transverse to the chute axis.

5. A snow removal machine as defined in claim 1, in which the cable guide bracket is mounted on the chassis, and a bearing bracket is provided rotatably supporting the shaft end portion, and means are provided for mounting the bearing bracket for pivotal movement on the guide bracket about an axis transverse to the shaft axis.

6. A snow removal machine as specified in claim 1 in which means are provided for retaining the end portion of the rotatable shaft in angularly adjusted positions so

as to vary the positioning of the deflector.

7. A snow removal machine, comprising,

- A. a wheeled chassis having a prime mover and a control station,
- b. a snow removal frame on the chassis including a snow gathering housing,
- c. snow removal blades rotatable in the housing,
- d. an upwardly directed snow discharge chute rotatable on the housing about an upright axis,
- e. a deflector pivotally mounted on the upper end of the chute, and
- f. means for pivotally adjusting the deflector from the control station, including
 - f-1. a support bracket,
 - f-2. means mounting the support bracket adjacent the axis of rotation of the chute,
 - F-3. a cable secured to the deflector,
 - f-4. an adjustable shaft mounted on the support bracket, and
 - F-5. a reel on the end of the shaft adjacent the bracket connected to the cable and having a periphery aligned with the axis of rotation of the chute.

8. A snow removal machine as defined in claim 7, wherein the support bracket is mounted on the snow discharge chute.

9. A snow removal machine as defined in claim 7, wherein the support bracket is mounted on the chassis.

10. A snow removal machine as specified in claim 7 in which the deflector is swingable between an upper position and a lower position and is spring-urged toward said upper position, the winding of the cable upon the reel moving said deflector toward said lower position.

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