Dec. 28, 1937. C. H. FRINK 2,103,775

SNOW PLOW

Filed May 28, 1936

FIG. 1.

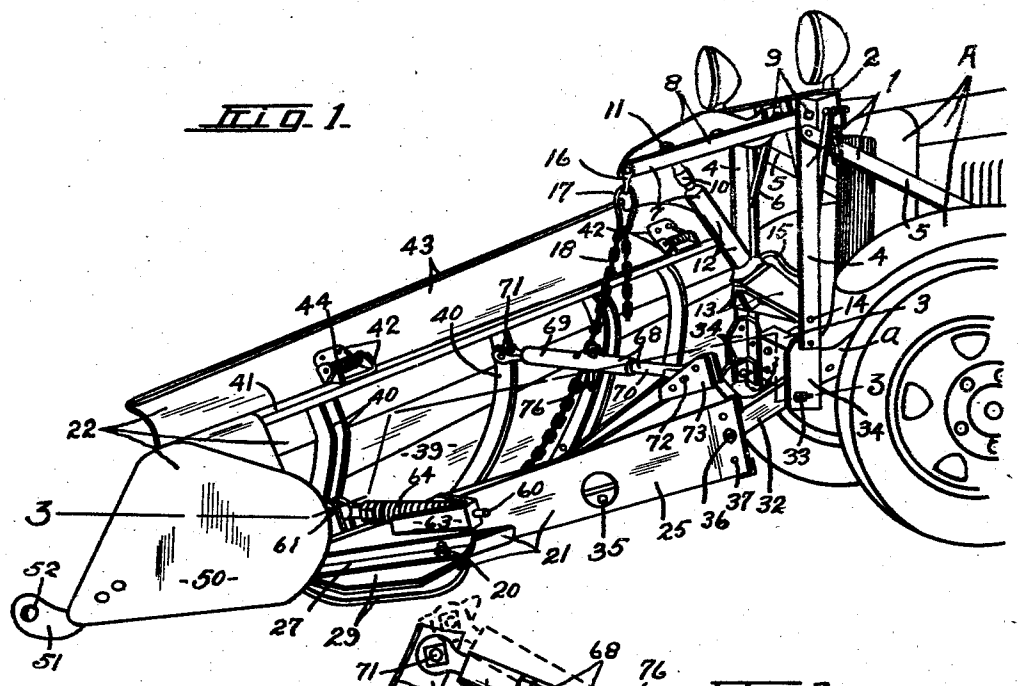

FIG. 2.

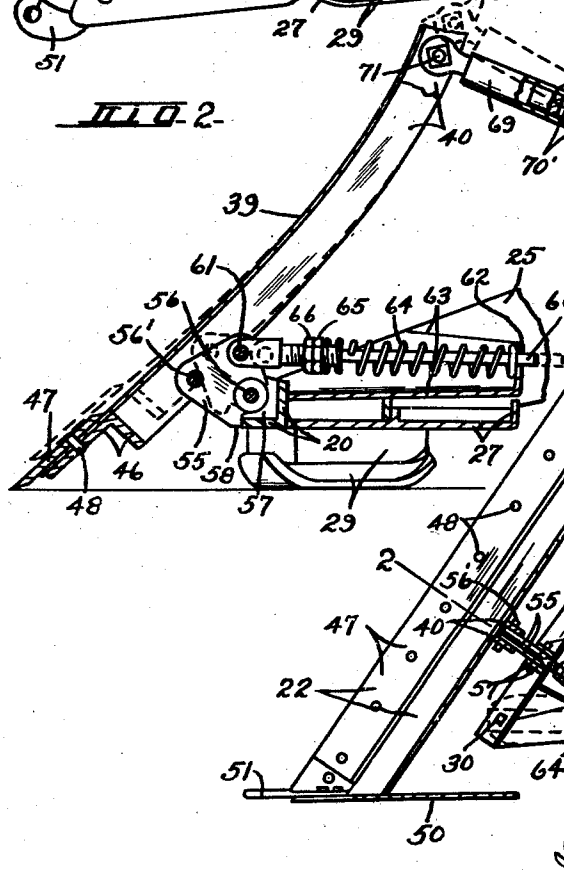

FIG. 3.

INVENTOR
Carl H. Frink
BY
Theodore E. Simonton
ATTORNEY

Patented Dec. 28, 1937 2,103,775

UNITED STATES PATENT OFFICE

2,103,775

SNOW PLOW

Carl H. Frink, Clayton, N. Y.

Application May 28, 1936, Serial No. 82,304

9 Claims. (Cl. 37—42)

This invention relates to improvements in snow plows adapted to be connected to the forward end of a motor truck, tractor or the like. The invention pertains more particularly to a novel attachment means for operatively connecting a push snow plow to a motor vehicle and which is especially adapted to be used in connection with a snow plow of the one-way type wherein the mold board is arranged diagonally across the direction of travel of the vehicle to extend at opposite sides of the longitudinal center line of the vehicle for deflecting the snow and ice laterally to one side of the road bed.

Snow plows of the above mentioned class are often operated for long distances at relatively high speed over widely varying road conditions. During such use, various obstacles such as manhole covers, car tracks, raised paving blocks, etc., often project into the path of movement of the snow plow so that when encountered thereby, subject the snow plow and the operating machine therefor to more or less severe shocks and mechanical stresses.

The primary object of this invention is to provide a simple, strong and efficient means for operatively supporting a snow plow mold board in such manner that the road shocks and mechanical stresses incident to the use thereof will be reduced to a minimum.

In carrying out the above mentioned object, I have provided a supporting or push frame of light, rigid construction which is provided with ground engaging elements for supporting the same upon the road bed. This frame is operatively connected to the chassis frame of a motor vehicle by suitable push bars which are pivotally connected with said chassis frame to permit free vertical movement of the supporting frame as the same rides along the road bed. The mold board of the plow is pivotally connected to the supporting or push frame by drive links and a brace bar in such a manner as to permit the mold board to swing vertically relative to the supporting frame.

Another important object of this invention is to so arrange the connections of the drive links with the mold board and the supporting frame that when the lower cutting edge of the mold board encounters an unusual obstruction, the mold board will be caused to move vertically upward so as to lift the cutting edge of the mold board above the obstruction and to pass over said obstruction with a minimum amount of shock to the mold board and the supporting and propelling means therefor.

A more specific object of the invention is to provide means for yieldingly urging the mold board to its lowermost operative position.

Another specific object of the invention resides in providing simple and efficient means for limiting the downward movement of the mold board relative to the supporting frame whereby the lower cutting edge of the mold board will be maintained at a predetermined position relative to the road bed by the supporting or push frame.

A further object is to provide simple and efficient means whereby the force for yieldingly maintaining the mold board in its lowermost operative position may be varied to eliminate undesirable vibration or chattering of the mold board when operating in heavy snow or ice and to permit easy operation of the mold board when contacting stationary objects during operation in light snow.

A still further object is to provide a snow plow attachment mechanism whereby either end portion of the plow mold board may, upon encountering an unusual obstruction, rise independently of the other end portion thereof.

Yet another object is to provide an adjustable brace bar for varying the vertical angle of inclination of the mold board whereby the lower cutting edge of the mold board may be raised or lowered relative to the supporting frame to effect cutting of ice and snow from the road bed at a predetermined level and also to compensate for wear of the cutting edge.

In other words, I have sought to bring the lower edge and axis of movement of the mold board in relatively close proximity to the road engaging elements of the supporting frame so that when the mold board is adjusted to bring its lower edge more or less closely to the surface of the road, the mold board will be carried by the supporting frame in said adjusted relation and at the same time, the mold board is free to move upwardly relative to the supporting or push frame to permit the free edge of the mold board to pass over an unusual obstacle projecting above the normal path of movement of the cutting edge of the mold board and then to return to its lowermost operative position directly after having passed said obstacle and to also prevent rebound of the mold board after having encountered such an obstacle.

A further object of the invention is to provide simple and efficient means for elevating the supporting frame and the mold board carried thereby to maintain the snow plow in an inoperative position during transportation.

Other objects and advantages relating to the specific parts of the snow plow will be brought out in the following description taken in connection with the accompanying drawing in which:

Figure 1 is a perspective view of my improved plow and the front end of a motor truck to which it is attached, the plow being in its lowermost, operative position.

Figure 2 is a detail vertical sectional view taken on line 2—2, Figure 3.

Figure 3 is a horizontal sectional view partly in top plan taken substantially in the plane of the line 3—3, Figure 1.

The motor truck A, indicated in Figure 1, may be of any suitable construction and as illustrated, is provided with a chassis frame *a* which has secured thereto a supplemental frame 1. This supplemental frame comprises upper and lower cross bars 2 and 3 respectively, which are connected to each other by a pair of laterally spaced parallel upright posts 4 bolted or otherwise secured to the cross bars. The lower cross bar 3 may be bolted or connected in any other suitable manner to the chassis frame *a*. Braces 5 are connected at their forward end to the upper end portion of the post 4 and extend rearwardly therefrom and have their rear ends connected in any suitable manner to the chassis frame for maintaining the supplemental frame 1 in fixed relation with the chassis frame. The intermediate portion of the cross bar 2 may be connected as shown, to the upright posts 4 by diagonally disposed braces 6.

The supplemental frame 1 carries a plow hoisting mechanism 7 which, in this instance, comprises a frame 8 pivotally connected as at 9 to the upper end portion of the frame 1 to extend forwardly therefrom in a more or less horizontal position. A plunger 10 is pivotally connected at its upper end to the frame 8 in slightly spaced relation to the outer end of said frame as at 11. This plunger 10 extends downwardly from the frame 8 into a cylinder 12 which is secured at its base or lower end to a support 13 which is mounted intermediate the posts 4 and is pivotally connected as at 14 to said posts in slightly spaced relation to the cross bar 3. The cylinder 12 may be connected in any suitable manner to a source of fluid under pressure, not shown, as by a flexible tubing 15 so that as pressure is admitted to or permitted to flow from cylinder 12, a corresponding longitudinal movement of plunger 10 will be produced thereby for rocking the frame 8 about its pivot 9 to raise or lower the outer end of said frame. Any suitable valve means may be associated with the tubing 15 for controlling the flow of fluid through said tubing into and out of the cylinder 12. The outer end of the frame 8 is provided with a clevis 16 which carries a grab ring 17 in which is positioned one end of a cable or chain 18 which has the other end thereof connected to a clevis 19 secured to an angle bar 20 which extends across the forward portion of a supporting or push frame 21, which carries the mold board 22. The connection of the clevis 19 with the supporting frame is preferably such that the weight of the frame and mold board will be substantially equal at opposite sides of the clevis.

The snow plow attachment forming the subject matter of this application, comprises the frame 21 for the mold board 22 which mold board, as shown in the drawing, is of the one-way type. It is to be understood, however, that my novel attachment is equally applicable by slight changes in the construction thereof to other forms of snow plows such, for instance, as that known as the V-type whereby the snow and ice may be deflected laterally to both sides of the road bed. It will be obvious, therefore, that the frame 21 may be so constructed as to adapt the same to other types of mold boards than that shown in the instant application.

The frame 21, as illustrated, comprises the hereinbefore mentioned angle bar 20 positioned at the forward portion of the frame and a pair of laterally spaced parallel bars 24 positioned at the rear portion of the frame. The bars 24 are secured to each other and to the bar 20 by end members 25 and 26. These end members 25 and 26, as shown, are composed of sheet metal and are inverted U-shape in cross section, said members being secured to the bars 20 and 24 by electric welding or other suitable means. A bed plate 27 extends transversely of the frame adjacent the bar 20 and beneath the forward end portions of the end members 25 and 26 and is secured to said bar and members by electric welding or other suitable means.

The supporting frame 21 is provided with a pair of supporting or ground shoes 29 arranged in spaced relation to each other adjacent the forward portion thereof. These shoes are adapted to ride upon the surface of the road for supporting the front end of the frame and maintaining mold board 22 at a desired height when in use and also to relieve the plow from excessive wear and strains incidental to its operation. These shoes are shown rigidly connected with the bed plate 27 and bar 20 by bolts 30. It is to be understood, however, that if desired, these shoes may be pivotally secured to the frame to permit the shoes to more readily ride over uneven portions of the road way.

The frame 21 is operatively connected with the supplemental frame 1 by means of a pair of drive or thrust bars 32 which have their rear ends hingedly connected by pivotal bolts 33 to angle irons 34 secured to the frame 1. The thrust bars 32 extend forwardly from the pivots 33 between the bars 24 of the frame 21 and have the forward ends thereof pivotally connected by bolts 35 or their equivalent to the inner face of corresponding end members 25 and 26. Each of these bars 32 is also adjustably connected with the frame 21 by means of a bolt 36 which extends through aligned holes formed in the bar and corresponding end member 25 or 26 adjacent the rear end of said members.

Each of the frame members 25 and 26 is provided with a plurality of holes or apertures 37 at the rear end thereof for the reception of the bolt 36 whereby the corresponding thrust bar 32 may be adjusted relative to the side member to permit the bars to be connected with motor vehicles of different sizes or heights while maintaining frame 21 at a predetermined level. The adjustment of the bars 32 relative to the frame 21 provided by the bolts 36 and holes 37 is for the purpose of so positioning the frame that shoes 29 will engage the road bed throughout the central portions of the shoes irrespective of the distance the pivotal connections 33 are maintained by the motor vehicle from the road bed.

The mold board 22 comprises a sheet metal section 39 which is concavo-convex in cross section vertically and is reenforced by separate flanges or ribs 40 welded or otherwise rigidly secured to the rear surface of the section in laterally spaced relation. The upper edge of the mold board section 39 may, as shown, be bent rearwardly and downwardly to form an angular reenforcing flange 41. To the flange 41 is secured

hinge members 42 which are also secured to a deflector plate 43 which extends longitudinally of the mold board section 39 across the upper edge thereof, as shown in Figure 1. The plate 43 is yieldingly urged to its forward operative position by springs 44 mounted on the pintles of hinge members 42.

The lower edge of the mold board section 39 is straight and horizontal and is provided with a reenforcing angle iron 46 welded or otherwise rigidly secured to the rear face of the section, as shown more clearly in Figure 2. A scraper blade 47 composed of tempered steel or equivalent material, is rigidly secured by bolts or rivets 48 to the front face of the lower edge of the mold board section 39 to permit it to be replaced from time to time when worn or otherwise impaired, said scraper blade being extended the full length of the mold board section, as shown in Figure 3.

A deflector plate 50 is welded or otherwise rigidly secured at its forward end to the left hand end of the mold board section 39 to extend rearwardly therefrom and from top to bottom thereof in a plane substantially parallel with the longitudinal center line of the machine A. The deflector plate 50 is provided near its lower edge with a draft lug 51 which extends forwardly therefrom and has the outer end thereof provided with an aperture 52, whereby the lug and, therefore, the snow plow, may be attached to another vehicle. This lug 51 also serves to guide the plow over raised obstacles such as car tracks, paving blocks and the like.

The length of the mold board 22 is greater than that of the supporting frame 21 and is connected with the supporting frame in such a manner that it extends laterally beyond the outer sides of said frame and ground shoes 29 for clearing the snow and ice from the pavement corresponding distances to opposite sides of the line of travel of the wheels of the truck or other propelling mechanism, as shown in Figure 3. It will also be observed by referring to Figure 3, that the angle bar 20 of the supporting frame is maintained in substantial parallel relation with the mold board due to the end member 25 being of greater length than the opposite end member 26 of said frame.

The means for operatively connecting the mold board 22 with the supporting frame 21 comprises, in this instance, a pair of drive links 55 arranged with one link adjacent a corresponding end of the frame 21. These links are each pivotally connected to said frame by a pin 56 passing through aligned apertures formed in the rear portion of the drive link and in a pair of lugs 57 secured to the angle bar 20 in slightly spaced relation to each other for receiving the corresponding drive link therebetween.

Each drive link 55 extends between a pair of mold board ribs 40 which, as shown in Figures 1 and 3, are arranged in slightly spaced relation to each other for the reception of said link therebetween. The links are pivotally connected with said ribs by means of pivotal pins 56'. Each link 55 is provided with a shoulder 58 in the lower edge thereof adapted to engage the forward lower edge of the bar 20 when the mold board is in its lowermost operative position relative to the supporting frame 21, as illustrated by full lines in Figure 2. The relation of the shoulder 58 to the pivotal pins 56 and 56' is such that when said shoulder is in engagement with the bar 20, the pivotal pin 56' will be maintained in an elevated position relative to the pin 56 so that the direct line of thrust between the pins 56 and pins 56' extends forwardly and upwardly from the axis of pins 56.

It is thus evident that when the mold board 22 contacts a relatively fixed obstruction, as the same is being moved forwardly, the lower edge of said mold board will be carried upwardly as the links 55 swing about the supporting pivots 56 carried by the supporting frame 21 and thereby lift the lower cutting edge of the mold board above the obstruction and permit the same to pass over said obstruction.

In order that the mold board and links may be quickly returned to their lowermost operative positions, after the mold board has passed beyond the obstruction, I have provided each link 55 with a plunger 60, pivotally connected thereto at one end by a pin 61 in a plane above the pivot 56 as shown in Figure 2. Each plunger 60 extends rearwardly from the pivot 61 and has the rear end thereof extending through an aperture provided in the rear end 62 of a plunger supporting member 63 which, in this instance, is a trough-like member secured by spot welding or the like, to the adjacent portions of the supporting frame 21. A coil spring 64 is mounted upon each plunger 60 intermediate the end 62 of the support and a nut 65 screw threaded on the plunger a short distance from the pivoted end thereof. The nut 65 may be adjusted along the plunger 60 for varying the tension of the corresponding spring 64 and may be secured in the adjusted position by a lock nut 66.

The upper longitudinal portion of the mold board 39 is supported by an adjustable brace bar 68 which, in this instance, is composed of two sections 69 and 70 arranged in telescoping relation with each other. One of the sections as 69 is pivotally connected by a bolt 71 with one of the ribs 40 of the mold board 39 adjacent the upper end thereof, said rib being arranged approximately midway between the ends of the mold board. The rear end of the other brace bar section 70 is pivotally connected by a bolt 72 to a pair of lugs 73 secured to the rear portion of the supporting frame 21, as illustrated in Figures 1 and 3, said lugs being arranged in spaced relation for receiving the bar section therebetween. The lugs 73 are provided with a plurality of, in this instance 3, aligned holes 74 for receiving the bolt 72 therethrough, arranged in spaced relation longitudinally of the lugs whereby the brace bar may be connected with the supporting frame at different positions, as may be required to position the mold board at the proper angle.

In this instance, the brace bar section 69 is a tubular member, while the other section 70 is a cylindrical member which is slidably received in the tubular member. These sections are removably secured together by a pin 76 which passes through aligned holes provided in the bar sections.

One of the bar sections as 70, as shown in Figure 2, is provided with a plurality of holes as 70' extending diametrically therethrough and arranged in longitudinal spaced relation with each other for registration with the holes as 69', provided in the tubular section 69 whereby the two sections 69 and 70 may be held in their different positions of adjustment for the purpose of rigidly holding the mold board in different angular positions vertically. The locking pin 76 may be connected by a chain or equivalent attachment 77 to the brace section 69 to prevent loss or mis-

placement of the pin when detached from the brace section.

The front end of the brace bar 68 will always be disposed a considerable distance above the hinge bolts 56' for the mold board and inclines rearwardly and downwardly therefrom to its connection with the frame 21 so as to cooperate with the drive links 55 for producing upward movement of the mold board 22 in the event an unusual obstacle is encountered. The connections between the drive links 55 and the supporting frame 21 and mold board 22 have sufficient play therebetween to permit either end of the mold board to rise independently of the other end so that if one end portion only of the mold board encounters an obstruction only that end portion of the mold board will be elevated by the action of the drive link 55 connected therewith to a point where the obstruction is cleared.

It will now be understood that when the plow is being transported from one place to another, the mold board 22 and frame 21 will be maintained in a raised position with the shoes 29 held some distance above the road bed by the operation of the hydraulic hoist 7 and cable 18.

When it is desired to use the plow for clearing the road bed from snow and ice, the mold board and frame 21 will be lowered by permitting the plunger 10 to move into the cylinder 12 until the shoes 29 contact with the surface of the road at which time the lower edge of the cutter blade 47 will assume a definite relation to said surface. This relation of the cutting edge of blade 47 with the road surface may be varied within limits as desired by simply removing the lock pin 76 from the brace bar 68 and then adjusting the brace bar sections 69 and 70 lengthwise of each other. During this adjustment of the brace bar sections, the mold board section 39 will be rocked about the pins 56' as a horizontal axis and the lower edge of the bar 47 will be moved in a direction toward or from the road surface depending upon the direction the mold board section is moved during the swinging action thereof until said blade is brought to the proper height after which the locking pin 76 may be reinserted in the registering holes 69' and 70' to hold the mold board in its adjusted position.

During the plowing operation, the shoes 29 ride upon the surface of the road, thereby relieving the cutting blade 47 and mold board from excessive wear and strain. When using the plow for removing a relatively thin coating of snow or light snow from the road bed, it is desirable that the springs 64 have a relatively light tension so that if the mold board encounters a stationary object, said mold board will readily move upwardly to clear the object with a minimum amount of friction and vibration.

On the other hand, when removing relatively heavy snow and ice from the road bed, it is desirable that the tension of springs 64 be increased above that when the plow is used in relatively light snow so as to eliminate chattering or vibratory movement of the mold board which often occurs during insufficient tension of the spring 64. It will be understood, however, that the increased tension of spring 64 will be insufficient to maintain the mold board in its lowermost operative position with the shoulders 58 of the drive links 55 in engagement with the bar 20 of the supporting frame when engaging a permanent obstruction and that the mold board will readily move upwardly to clear the obstruction due to the increased pressure normally exerted by the heavy snow and ice upon the mold board section 39, and cutting blade 47.

The structure shown and described is particularly simple, strong and durable and it will be observed that the supporting frame 21 and mold board 22 may be easily and quickly attached to or detached from trucks of various sizes by simply removing the pivotal pins 33 or connecting said pins with the drive bars 32 and supplemental frame 1 and by connecting or disconnecting the cable 18 with the grab ring 17.

Although I have shown and described the preferred embodiment of my invention, I do not wish to be limited to the exact construction shown as various changes both in the form and relation of the parts thereof may readily be made without departing from the spirit of the invention set forth in the appended claims.

I claim:

1. The combination with a snow plow mold board and a truck chassis having a supplemental frame connected therewith, of drive means including a single series of linkage elements having both forward and rearward horizontally disposed pivotal connections operatively connecting the mold board to the frame whereby the mold board may swing vertically about one of said pivotal connections and has forward and rearward tilting movement independent of said vertical movement about the second one of said pivotal connections, stop means associated with the linkage elements independently of the supplemental frame for limiting the downward vertical movement of the mold board to maintain the linkage elements in an upward inclination forwardly from their rearward pivots in all positions of the mold board, and adjustable means connected with the mold board for maintaining said mold board in a predetermined tilted position.

2. A device as in claim 1 having means connected with the supplemental frame for elevating the drive means and mold board.

3. In a snow plow attachment for motor vehicles, a supplemental frame rigidly secured to the front end of the vehicle, in combination with a push frame having thrust bars hinged to the supplemental frame for vertical swinging movement, said push frame being provided with road engaging supporting elements near the outer portion thereof, a mold board, drive links pivotally connecting the mold board and push frame, said drive links being inclined upwardly and forwardly from the push frame in all positions of the mold board, and additional means connected with the mold board for varying the angle of inclination thereof vertically.

4. In a snow plow attachment for motor vehicles, a supplemental frame rigidly secured to the front end of the vehicle, in combination with a push frame having thrust bars hinged to the supplemental frame for vertical swinging movement, said push frame being provided with road engaging supporting elements near the outer portion thereof, a mold board, drive links pivotally connected with the mold board and with the push frame, said drive links and push frame being provided with stop means co-acting to maintain the drive links inclined upwardly and forwardly from the push frame, and additional means connected with the mold board for varying the angle of inclination thereof vertically.

5. A device as in claim 4 having means connected with the drive links for yieldingly urging the mold board to its lowermost position.

6. The combination with a snow plow mold board and a motor vehicle chassis, a push frame having road engaging supporting elements, means pivotally connecting the push frame to the vehicle chassis to permit vertical swinging movement of said push frame, means securing the mold board to the push frame including a plurality of drive links, substantially coaxial means pivotally connecting the drive links to the mold board whereby said mold board may have a forward and rearward tilting movement relative to the frame, separate substantially coaxial means pivotally connecting the drive links to the push frame whereby said mold board may move vertically independently of said tilting movement thereof, adjustable means connected with the frame and mold board for maintaining said mold board in a predetermined tilted position, and stop means coacting with the driving links and push frame for limiting the downward vertical movement of the mold board.

7. A device as in claim 6 having spring actuated means connected with the drive links and push frame for yieldingly urging the mold board to its lowermost vertical position with respect to the push frame.

8. In combination with a snow plow mold board and a truck chassis, of means operatively connecting the mold board to the truck chassis comprising a push frame, means pivotally connecting the push frame to the vehicle chassis to permit vertical swinging movement of said push frame, drive means including a single series of linkage elements having both forward and rearward horizontally disposed pivotal connections operatively connecting the mold board to the push frame whereby the mold board may swing vertically about one of said pivotal connections with respect to the push frame and has forward and rearward tilting movement independent of said vertical movement about the second one of said pivotal connections, stop means co-acting with the linkage elements and push frame for limiting the downward vertical movement of the mold board with respect to said push frame, and adjustable means connected with the push frame and mold board for maintaining said mold board in a predetermined tilted position.

9. A device as in claim 8 having means connected with the push frame and co-acting with the linkage elements for yieldingly urging the mold board to its lowermost position.

CARL H. FRINK.