July 22, 1969 J. E. LEPOSKY 3,456,369

SNOW PLOW WITH TILTABLE BLADE STRUCTURE

Filed July 20, 1966 3 Sheets-Sheet 1

Fig. 1

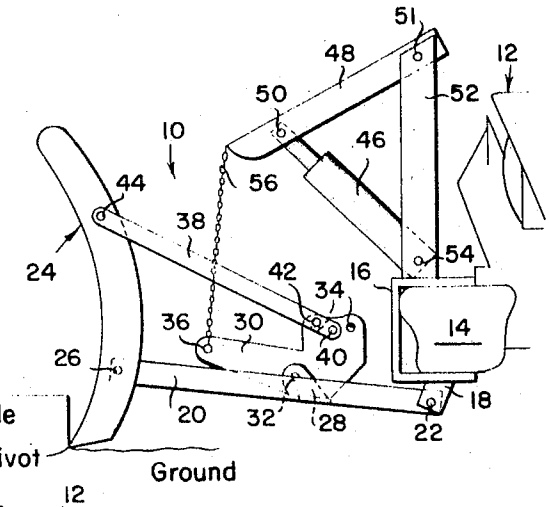


Fig. 2

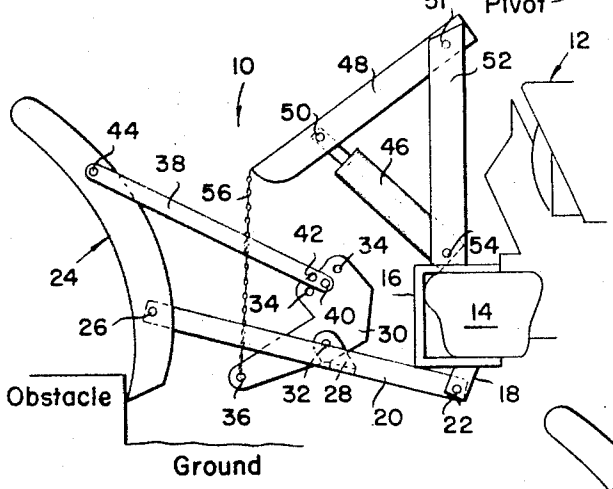


Fig. 3

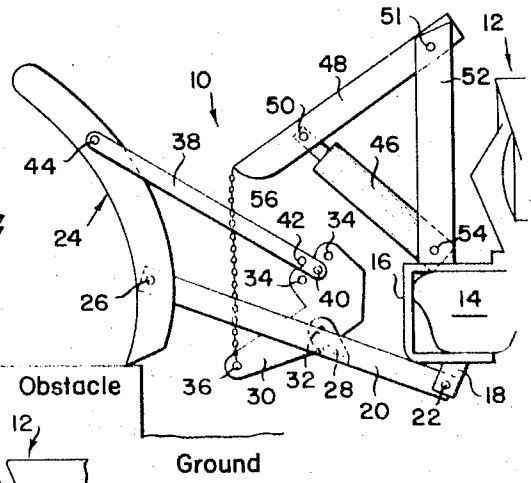
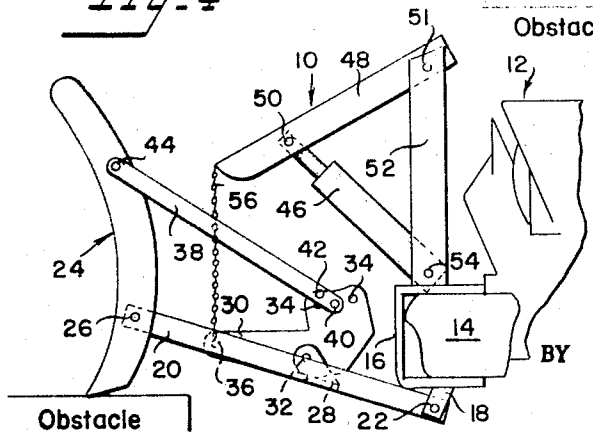


Fig. 4



INVENTOR
John E. Leposky

BY *Schlesinger, Ackwright & Lowy*

ATTORNEYS

July 22, 1969 J. E. LEPOSKY 3,456,369

SNOW PLOW WITH TILTABLE BLADE STRUCTURE

Filed July 20, 1966 3 Sheets-Sheet 2

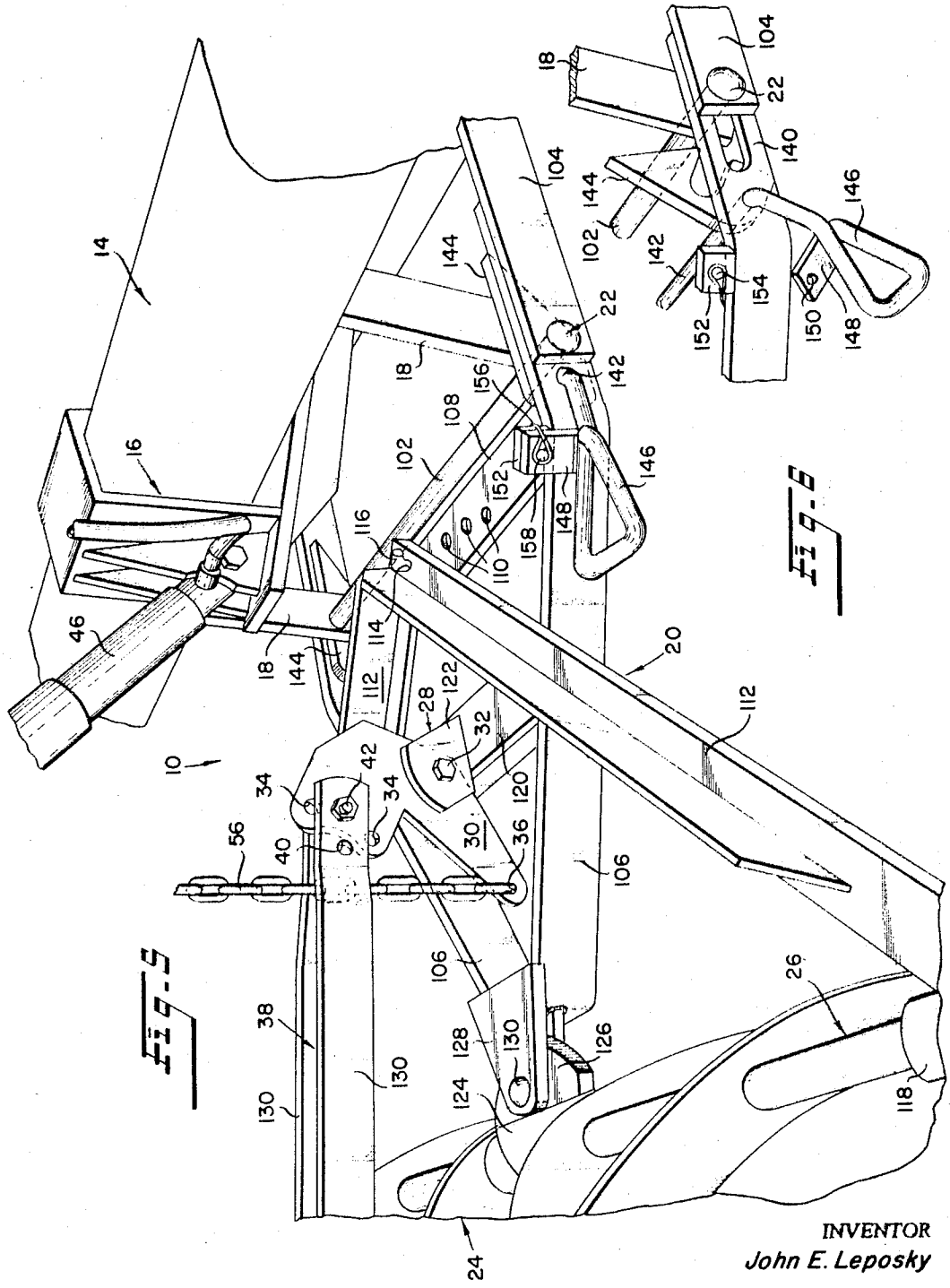


Fig-5

Fig-5

INVENTOR
John E. Leposky

BY Schlesinger, Arkwright & Garvey
ATTORNEYS

July 22, 1969 J. E. LEPOSKY 3,456,369

SNOW PLOW WITH TILTABLE BLADE STRUCTURE

Filed July 20, 1966 3 Sheets-Sheet 3

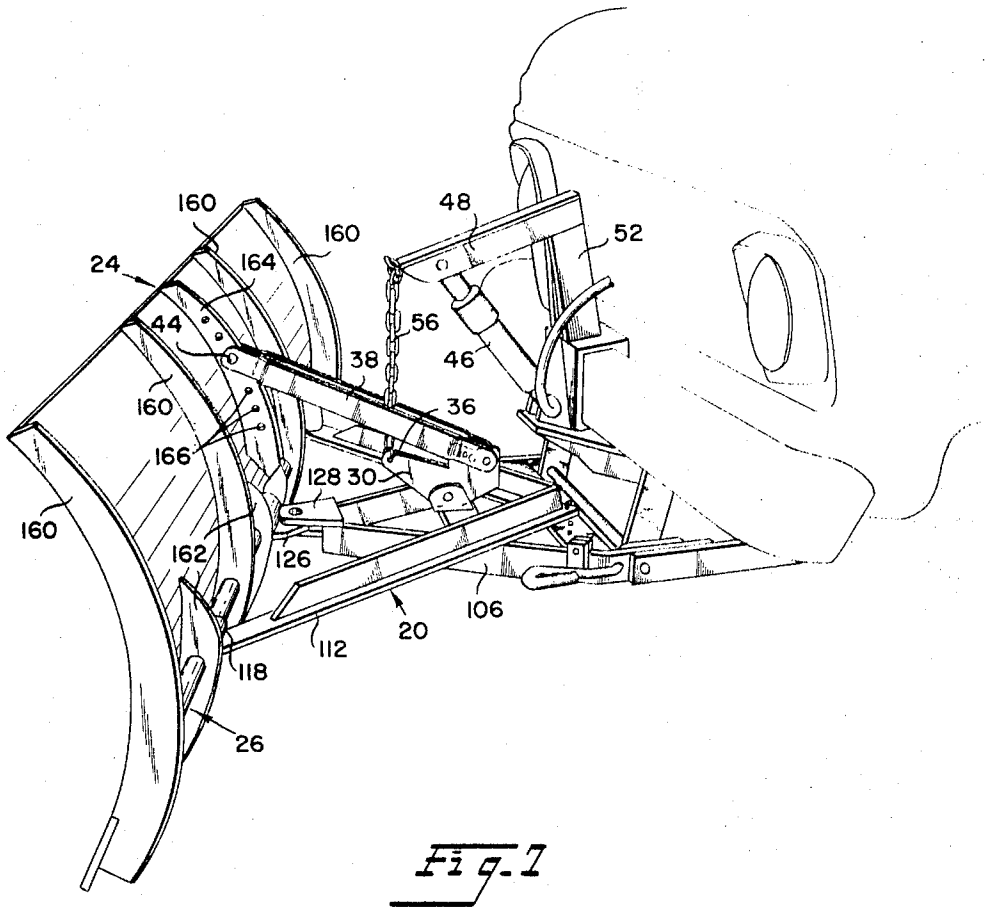


Fig. 1

INVENTOR
John E. Leposky

BY Sellsingor, Ackwright & Savey

ATTORNEYS

United States Patent Office 3,456,369 Patented July 22, 1969

3,456,369

SNOW PLOW WITH TILTABLE BLADE STRUCTURE

John E. Leposky, 2766 E. Larch Road, Harrison, Mich. 48625

Filed July 20, 1966, Ser. No. 566,506
Int. Cl. E01h 5/06; E02f 3/85
U.S. Cl. 37—42 15 Claims

ABSTRACT OF THE DISCLOSURE

A plow for vehicles including a plow blade which is pivotally movable when an obstacle is struck, including a bell crank means pivotally connected to the plow blade and which is returnable to its normal operating position by means of a spring-free, gravity operated structure.

This invention relates to a plow, and more particularly to a snow plow.

There has been considerable development in the field of snow plow attachments to various types of vehicles. It has been recognized that there is a need to provide the plow with means to absorb the shock or to tilt the plow blade out of the normal path of operation when an obstacle is struck.

Various approaches have been attempted to facilitate the tilting operation, and more particularly in returning the moldboard to its original operating position. However, many of these require spring mechanisms to bring the moldboard back to its original position.

A common failing of devices of this type occurs in the fact that the spring biasing means provides an inherent weakness in the device, thus accounting for many breakdowns and uncertainty in the operation of the spring members.

One object is to provide a snow plow having a plow blade or moldboard which will tilt when an obstacle is struck.

Another object is to provide a pivoting moldboard which is free from the need of any biasing members and utilizes gravity and a unique linkage arrangement to return the moldboard to its normal operating position.

A further object is to provide a tiltable blade snow plow with means to vary the normal position of the moldboard relative to a horizontal axis perpendicular to the line of movement of the plow.

Another object is to provide means located on the moldboard or means located on a bell crank on the support assembly for varying the above mentioned angle of the moldboard. This in turn will control the amount of snow or the like in the blade.

Another object of the invention is to provide means to vary the angular location of the moldboard relative to a vertical axis.

Still another object of the invention is to provide means for coupling the snow plow to the frame of the pushing vehicle. It is desired to provide means on the hitch to easily facilitate opening and closing of the hook portion on the hitch. Particularly, it is an object to be able to open the hook on the hitch by merely stepping on the operating member, without the need of bending down to unhitch the support.

Another object of the invention is to provide a bell crank lifting mechanism for tilting the moldboard about the point at which the blade meets the obstruction on the ground.

SUMMARY

In general the invention includes a moldboard having a pusher means pivotally connecting it to the frame of a pushing vehicle. A bell crank arrangement is pivotally connected to the pusher frame. Another member pivotally connects the bell crank to a location on the moldboard remote from the location of the pusher member, the entire device closely approximating a parallelogram. Means is also provided to raise and lower the entire device when it is desired to transport the snow plow from one plowing location to another.

These and other objects and advantages of the invention will become more fully apparent from the accompanying description made in connection with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

FIGURES 1–4 are a series of side elevation views in schematic form showing the overall operation of the device;

FIGURE 5 is a perspective view of a portion of the invention showing certain elements in greater detail;

FIGURE 6 is a detail of the hitch; and

FIGURE 7 is a perspective view of the invention showing the rear of the plow blade.

BRIEF DESCRIPTION AND SCHEMATIC OF OPERATION

Referring now particularly to FIGURES 1–4, a snow plow attachment **10** is seen connected to a vehicle **12**. The vehicle **12** has a bumper **14** having a bracket shaped support member **16** attached thereto. Also attached to the vehicle frame is a depending brace portion **18**. A pusher frame member **20** is pivotally connected to member **18** at **22**. Connected to the other end of the pusher member **20** is a plow blade or moldboard **24** which pivotally connects to the pusher at **26**. Rigidly secured to the pusher member is an upstanding bracket **28**. A bell crank **30** is pivotally connected to the bracket at **32**.

The bell crank **30** has a plurality of apertures **34** located at the upper extremity thereof and another aperture **36** located at the forward extremity. Pivotally connected to the bell crank **30** at one of the upper apertures is a rigid connection means in the form of a bar **38**. The bar is pivotally connected at **40** to the bell crank through one of a plurality of apertures **42**. The other end of the bar **38** is pivotally connected at **44** to a remote portion of the moldboard.

Positioned on the brackets **16** is a hydraulic cylinder **46** which pivotally connects to an arm **48** at point **50**. Arm **48** is in turn pivoted at **51** on an upstanding rod **52** which is mounted on the frame **16**. The hydraulic piston **46** is connected either to the frame or upstanding member **52** at point **54**.

At the end of arm **48** is connected a chain or the like **56** which in turn is connected to aperture **36** on the forward extremity of the bell crank member. This forward extremity is at a point forward of the upstanding bracket **22** which limits rearward pivotal movement of the bell crank.

BRIEF OPERATION OF THE SCHEMATIC DIAGRAMS OF FIGURES 1–4

As seen in FIGURE 1 the plow moves along the ground with the moldboard **24** in substantially an upright position. As the plow hits an obstacle, the vehicle will still tend to move forward. Therefore, the pusher member **20** will tend to force the moldboard **24** to pivot around the point so marked in FIGURE 1. As seen in FIGURE 2 the moldboard will be pivoting at both **26** and **44** on members **20** and **34**. The bell crank **30** which more or less forms a parallelogram with members **20**, **24**, and **38** will pivot downward as seen also in FIGURE 2. It should be pointed out that the pusher member **20** will also be pivoting at point **22** on the frame.

Since the vehicle **12** is continuously itself approaching the obstacle, the pressure on the moldboard **24** causes the moldboard to tilt. As it tilts to its limit and as the vehicle moves forward, the pusher arm **20** will rotate around the pivot point **22** and the moldboard will rise up above the obstacle as bell crank **30** rotates to its lowermost position as seen in FIGURE 3. Gravity will always tend to bring the device as close to its position seen in FIGURE 1. Therefore, as it rides up over the obstacle as seen in FIGURES 3 and 4, the moldboard will tilt back toward its normal position as seen in FIGURE 4, with the bell crank pivoting more nearly to its normal longitudinal position.

It will be seen that when it is desired to move the plow from one plowing location to another, the hydraulic cylinder **46** will be actuated and will raise the entire device by means of chain **56** pulling on the forward end of bell crank **30** at point **36**. As will be described in more detail below, the bell crank **30** and hence the bar **38** is limited in its clockwise rotation around pivot **32** by the construction of the bracket **28**.

DETAILED DESCRIPTION OF BELL CRANK AND FRAME APPARATUS

As best seen in FIGURES 5 and 7 the supporting frame on the truck includes the depending portions **18** and a trapeze-type bar **102** which corresponds to the pivot point **22** discussed in regard to FIGURES 1–4. A pair of bars **104** are connected for example to the axle of the vehicle and project outwardly to the pivot point **22** to add further rigidity. The pusher bar **20** which is pivotally connected to the vehicle includes a pair of lower frame sections **106** and a connecting section **108**. The connecting section **108** has a plurality of apertures **110** arranged in an arc to provide equi-distant connection points from the blade. A pair of upper frame members **112** meet at a point adjacent one of the apertures **110**. The upper frame member **112** includes an aperture **114** into which a drop pin **116** is positioned.

The upper frame **106** has a connecting portion **120** forming an A-shaped member with the portions **106**, the connecting member **120** being parallel to the connecting section **108**. The bracket **28** is in the form of a pair of upstanding members **122**, while the pivot **32** includes a bolt or the like going through apertures in both of the parallel bracket members **122** and through a corresponding aperture in the bell crank **30** which is positioned between bracket members **122**.

The forward end of the lower frame **106** is pivotally connected to pivot rod **26** by means of a bushing or the like **124**. Connected to the bushing is a rearwardly extending member **126** having an aperture therein. A plate **128** is attached to the lower frame member **106** and includes an aperture and corresponding pin **130** therein which will provide a vertical axis for the pivotal movement of the lower frame relative to the plow blade when the upper frame is selectively positioned in apertures **110**.

The bell crank arrangement discussed in regard to FIGURES 1–4 is seen in greater detail in FIGURE 5. Also, the rigid connection means or bar **38** referred to above is seen as a pair of parallel members **130** sandwiched around the bell crank **30** for greater rigidity.

HITCH MECHANISM

The frame **106** has a pair of forked rearwardly extending portions **140**. These portions extend over the rod **102** between the support member **104** and depending bracket member **18**. Pivotally connected by means of a rod **142** is a hook-shaped member **144**. On the outer portion of the rod **142** is a triangular-shaped foot operated mechanism **146**. Attached to the upper portion of operating member **146** is a bracket **148** having an aperture **150** therein. A corresponding bracket **152** with aperture **154** therein is located on the upper portion of the lower

frame member **106**. A spring **156** attached to a pin **158** is seen in the apertures to prevent the foot operated member from rotating when the hitch is in the position seen in FIGURE 5. In operation, the forked member **140** is slid into the space between members **18** and **104** and onto the rod **102** on both sides of the vehicle. The hook **144** is lowered onto the rod **102**, the apertures **150** and **154** are lined up, and pin **158** is inserted. It will be noted that through the connecting rod **142**, both sides may be opened and closed with one movement of the triangular foot operated means **146** because the rod **142** is connected to the triangular foot operated member on the other side of the vehicle.

CONSTRUCTION OF THE PLOW BLADE

The plow blade consists of a plurality of vertically spaced parallel risers **160**. The pivot rod **26** is supported by the risers and additional bracket means **162**. An intermediate riser **164** includes a plurality of spaced apertures **166** into which the pivot pin **44** is selectively inserted. This construction provides a blade which is both rigid and adaptable to the operating mechanism.

OVERALL OPERATION

The overall operation of the invention will be seen with reference to the various figures in the drawing including the schematics of FIGURES 1–4 and the detailed views of the remaining figures. It should be pointed out that the detail of FIGURE 6 most nearly corresponds to the schematic seen in FIGURE 3 wherein the bell crank **30** is pivoted almost to its extreme lowermost position. The scraper blade will therefore also be generally pivoted forward. It will also be noted that the flat bottom surface of the bell crank **30** will abut against the frame **120** thus limiting the clockwise rotation of the bell crank. This will facilitate in raising the entire device by means of chain **56** attached to the hydraulic element **46**. It will also limit the rearward movement of the rigid connecting bar **38** and thus the clockwise rotation of the scraper blade.

In operation, the plow assembly is connected to the vehicle as described above in the description of the hitch. The angle at which the blade is to be positioned relative to the front of the vehicle (whether it is to push the snow or dirt forward or to the side) is determined by the location of upper frame **112** in relation to the cross member **108**. The pin **116** is placed in opening **114** in frame **112** and a corresponding selected opening **110** in cross member **108**.

Chain **56** is attached to the hydraulic operating means **46**, **48** and **52**. Again, the chain is used primarily to lift the plow for transportation from one location to another.

The angle of the blade **24** and its position relative to the horizontal axis will be determined by which of the apertures **166** the pivot pin **44** is positioned within. Also the position of the blade may be determined by selectively positioning the pivot **40** in one of the apertures **34** in the bell crank **30**. It is obvious that by adjusting the location of the lower frame member relative to the blade or adjusting the bell crank relative to the lower frame will provide similar angle changes by changing the shape of the parallelogram.

From this point on, the operation will be the same as set out above wherein the operation of the schematic diagrams of FIGURES 1–4 were described.

Having thus described my invention, what I claim is:

1. A plow for vehicles comprising
   (a) a plow blade,
   (b) first horizontal pivot means connected to the lower portion of said plow blade,
   (c) second horizontal pivot means connected to the upper portion of said plow blade,
   (d) frame means pivotally connected to said first horizontal pivot means,

(e) rigid connection means having one end pivotally connected to said second horizontal pivot means,
(f) a bell crank pivotally connected to said frame means,
(g) said rigid connection means having its other end pivotally connected to said bell crank,
(h) means on said frame means limiting the pivotal movement of said bell crank on its axis thereby to limit rearward travel of said rigid connection, and
(i) means connected to a point relatively stationary to said aforementioned means and connected to said bell crank at a point opposite the bell crank pivot and said limiting means for providing a spring-free, gravity operated device for returning said plow blade to its normal operating position.

2. A plow for vehicles as in claim **1** and wherein
(a) said first horizontal pivot means includes three spaced pivots and
(b) said frame means includes three spaced horizontal pivot connections secured to said three spaced pivots.

3. A plow for vehicles as in claim **1** and wherein
(a) the middle of said spaced horizontal pivot connections includes a vertical pivot,
(b) said frame means includes an upper and lower frame section,
(c) one of said sections being pivotally secured to said vertical pivot, and
(d) the other of said sections being secured to the outer of said spaced horizontal pivot connections.

4. A plow for vehicles as in claim **3** and wherein
(a) said upper and lower frame sections are pivotally connected to each other.

5. A plow for vehicles as in claim **4** and wherein
(a) said upper frame section is secured to the outer of said spaced horizontal pivot connection and
(b) said lower frame section is pivotally secured to said vertical pivot.

6. A plow for vehicles as in claim **5** and wherein
(a) said bell crank is secured to said lower frame section.

7. A plow for vehicles as in claim **3** and wherein
(a) said frame means includes vehicle connection means.

8. A plow for vehicles as in claim **7** and wherein
(a) said vehicle connection means includes a pivoted foot operated disconnect lever.

9. A plow for vehicles as in claim **8** and wherein
(a) said pivoted foot operated disconnect lever includes removable lock means for preventing pivoting.

10. A plow for vehicles as in claim **1** and wherein
(a) said plow blade includes means for vertically adjusting said rigid connection.

11. A plow for vehicles as in claim **10** and wherein
(a) said frame means includes means for adjusting the curb angle of said plow blade.

12. A plow for vehicles as in claim **1** and wherein
(a) said bell crank includes means for adjustably connecting said rigid connection means thereto.

13. A plow for vehicles as in claim **1** and wherein
(a) said bell crank and said rigid connection means each include means for cooperative mutual adjustable connection.

14. A plow for vehicles as defined in claim **1** including
(a) means for adjusting the pivotal movement of said plow blade relative to said vehicle.

15. A plow for vehicles as defined in claim **1** wherein a hydraulic lifter is connected to said spring-free, gravity operated returning device for lifting and said plow blade.

References Cited

UNITED STATES PATENTS

1,383,409	7/1921	Liddell	37—42
2,166,424	7/1939	Coates	37—42
2,264,368	12/1941	Gettelman	37—42
2,420,591	5/1947	Frame et al.	37—42
2,577,145	12/1951	Wearing et al.	37—42
2,704,495	3/1955	Schwindt et al.	37—98
2,792,650	5/1957	Kenyon	37—42
2,867,921	1/1959	Brown	37—42
3,150,884	9/1964	Drott	37—42
3,165,842	1/1965	Holopainen	37—42
3,307,275	3/1967	Simi	37—42

FOREIGN PATENTS

546,886	10/1957	Canada.

ROBERT E. PULFREY, Primary Examiner

EUGENE H. EICKHOLT, Assistant Examiner

U.S. Cl. X.R.

172—803