United States Patent [19]

Miceli

[11] **3,828,449**

[45] **Aug. 13, 1974**

[54] **PLOW BLADE LIFT FRAME AND METHOD OF USING SAME**

[75] Inventor: **Marc L. Miceli,** Cleveland, Ohio

[73] Assignee: **Meyer Products, Inc.,** Cleveland, Ohio

[22] Filed: **Dec. 27, 1972**

[21] Appl. No.: **318,897**

[52] **U.S. Cl.** **37/41,** 293/70

[51] **Int. Cl.** **E01h 5/00,** B60r 19/00

[58] **Field of Search** ..... 37/41, 42 R, 42 VL, 50; 172/801, 805; 293/70, 85, DIG. 2

[56] **References Cited**

UNITED STATES PATENTS

1,373,822	4/1921	Kleine	293/DIG. 2
2,508,836	5/1950	Morris	293/DIG. 2
2,775,830	1/1957	Kenyon	37/42 R
2,959,251	11/1960	Landman et al.	293/DIG. 2
2,999,697	9/1961	Winget	37/50 X
3,005,511	10/1961	Riedy	37/42 R X
3,214,138	10/1965	Jocher et al.	37/42 R
3,238,647	3/1966	Hall et al.	37/42 X
3,252,716	5/1966	Gaterman	37/42 R
3,706,144	12/1972	Miceli	37/50
3,715,139	2/1973	Tuggle	293/85 X

Primary Examiner—Robert E. Pulfrey
Assistant Examiner—E. H. Eickholt
Attorney, Agent, or Firm—Meyer, Tilberry, & Body

[57] **ABSTRACT**

There is provided a snow plow lift frame for use on the front of a motor vehicle wherein the lift frame is provided with mounting arrangements for energy absorbing devices or units to be secured onto a bumper which is in turn attached to the plow blade lift frame.

4 Claims, 8 Drawing Figures

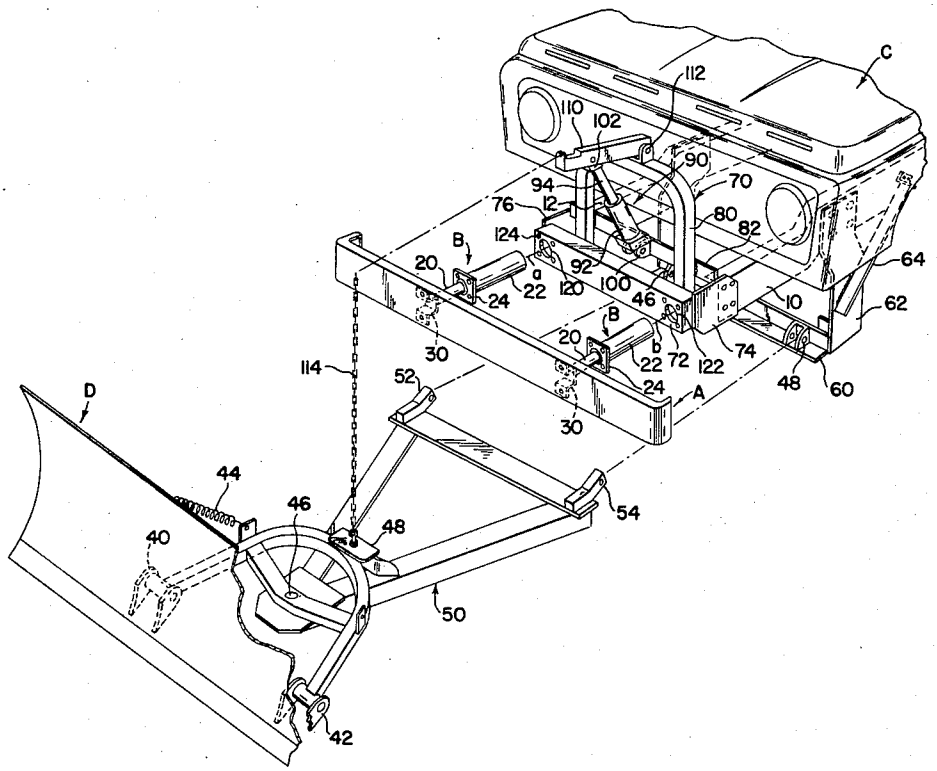
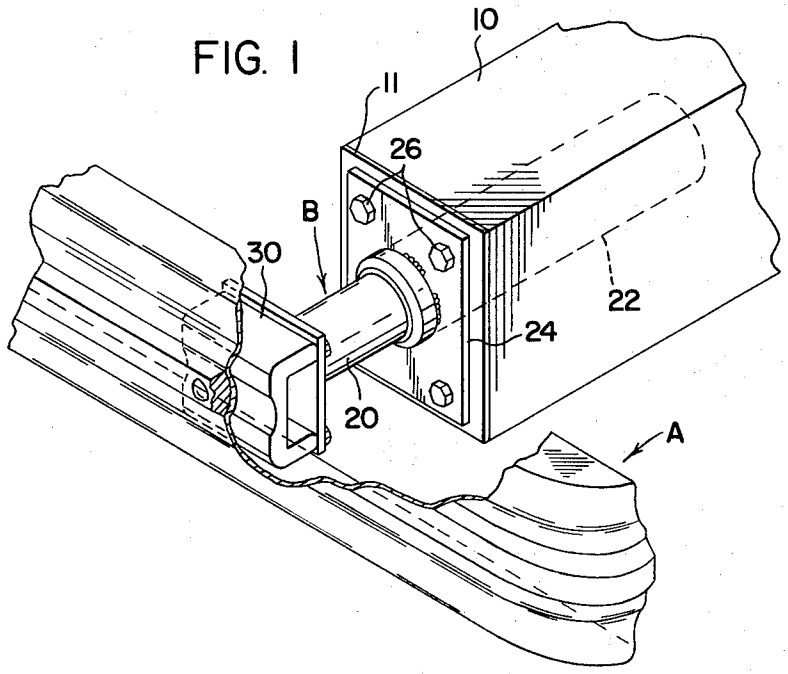


FIG. 1



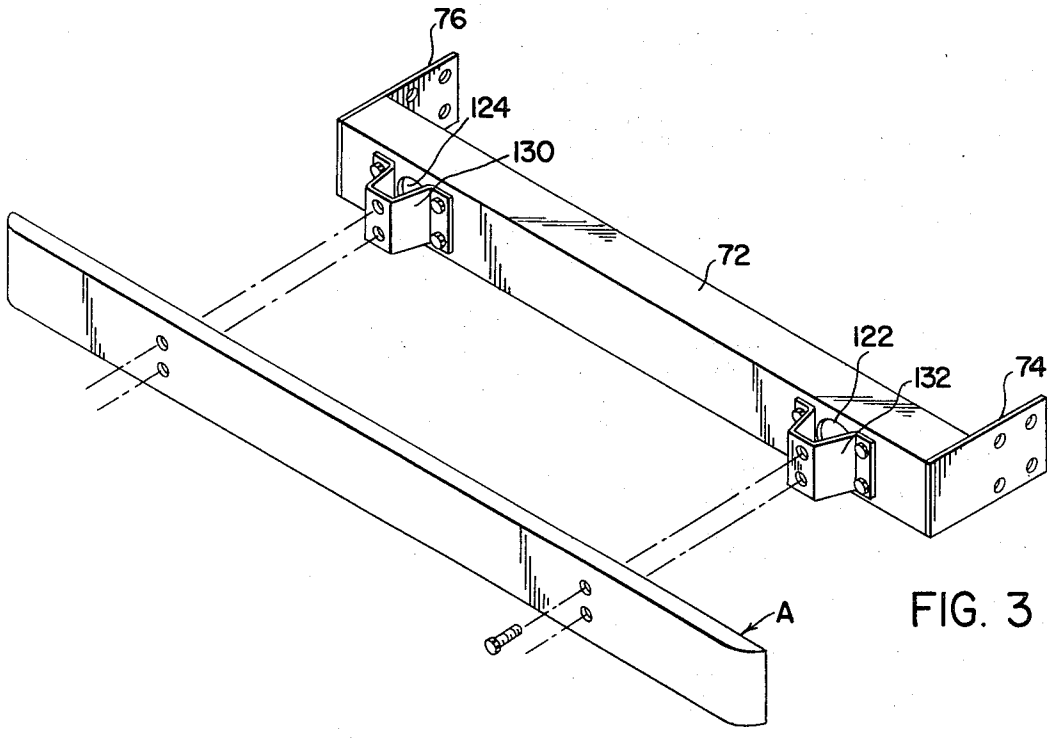


FIG. 3

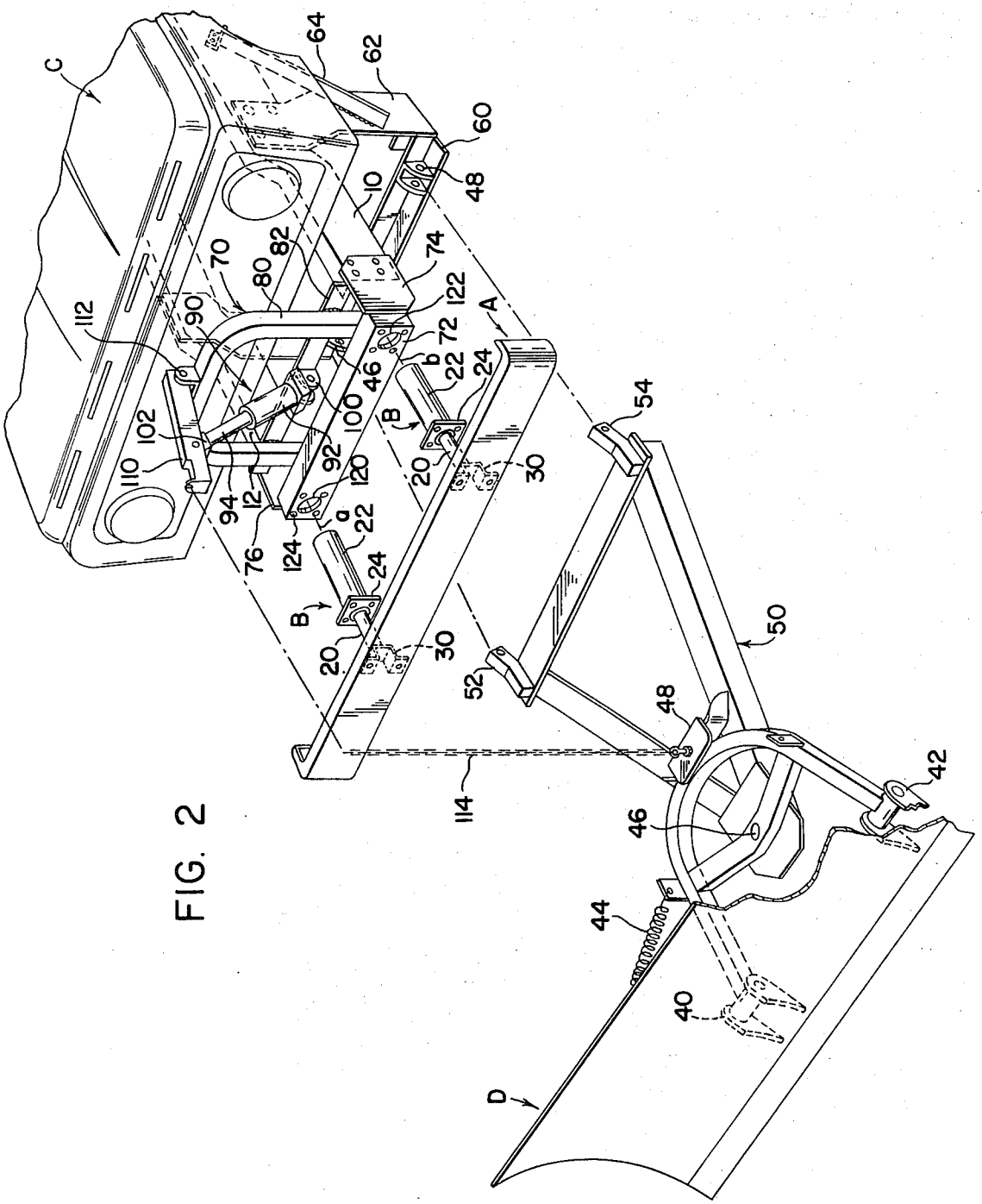

C
64
62
60
48
10
74
122
A
72
70
80
82
90
112
46
b
22
24
B
54
100
102
110
92
120
20
30
94
12
a
76
124
B
50
52
48
114
42
46
44
40
D

FIG. 2

FIG. 4

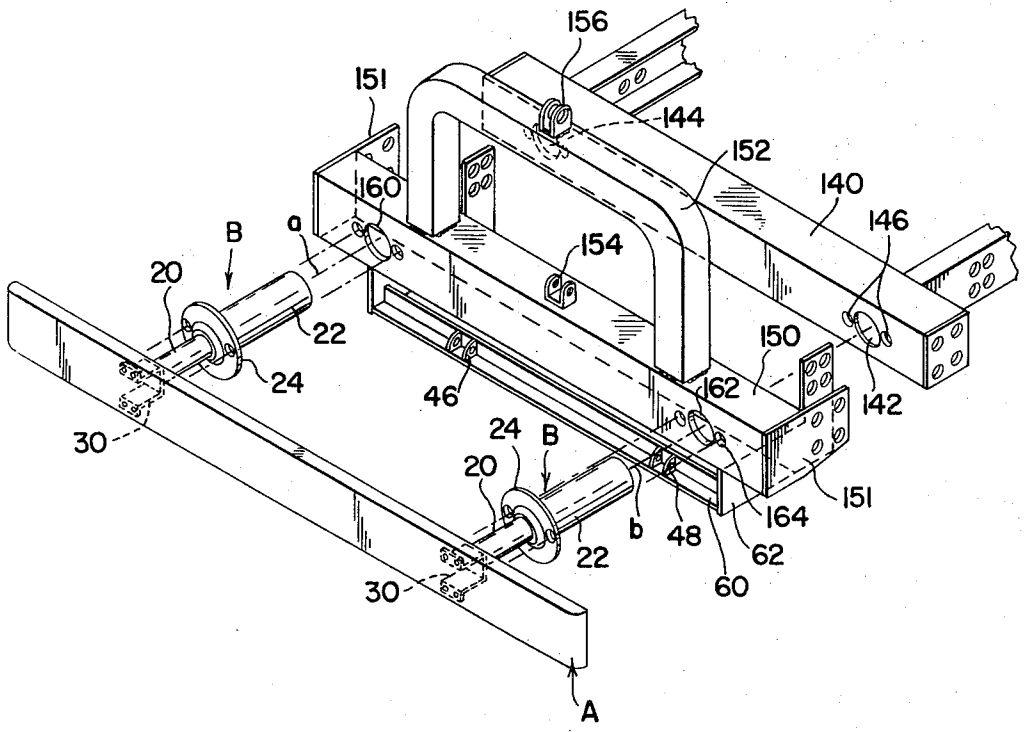

156
151
144
152
140
146
160
a
B
154
20
22
24
46
150
162
142
30
24
B
20
164
151
b
48
62
22
60
30
A

FIG. 4A

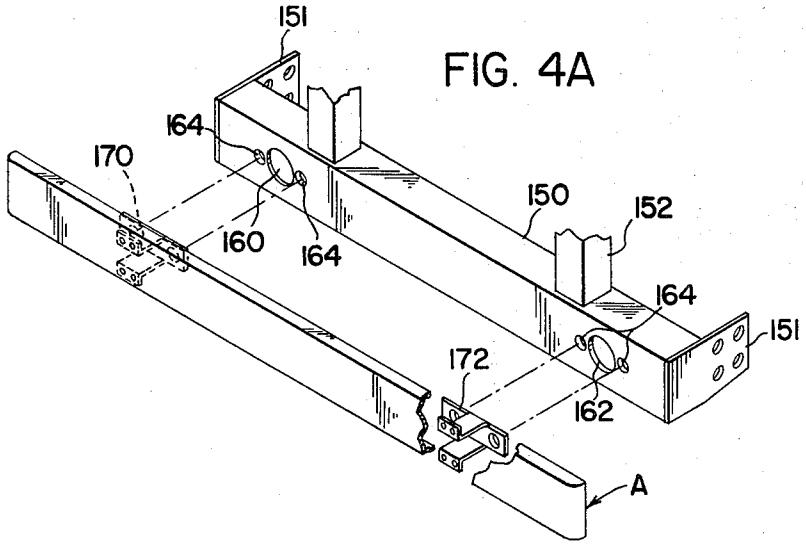

151
164
170
150
152
160
164
164
151
172
162
A

FIG. 5

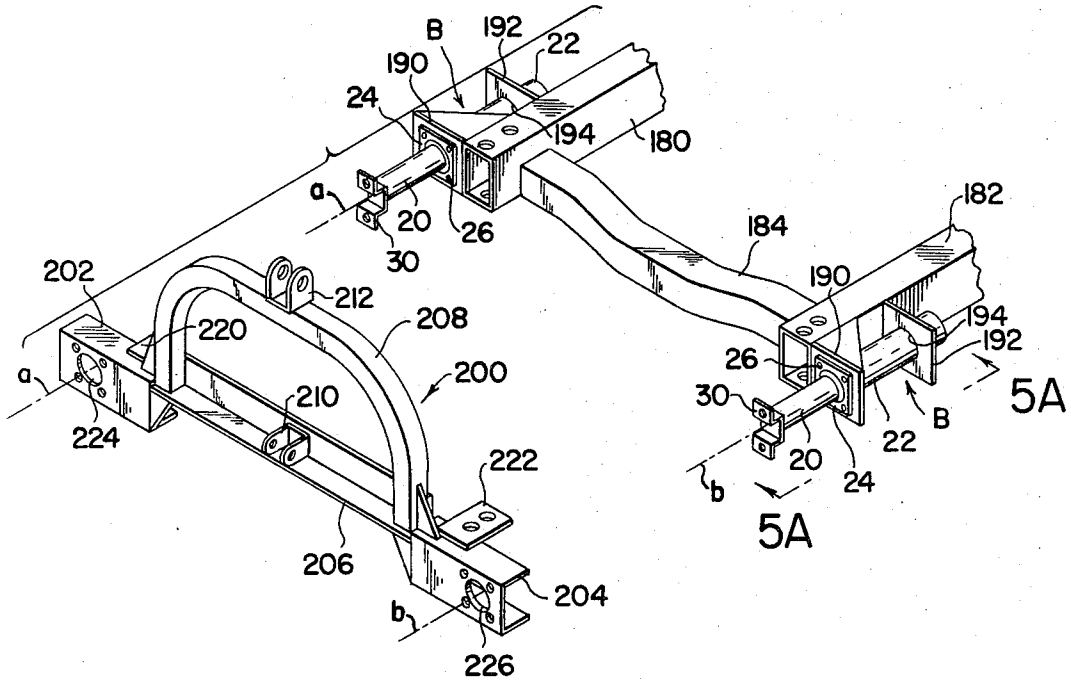
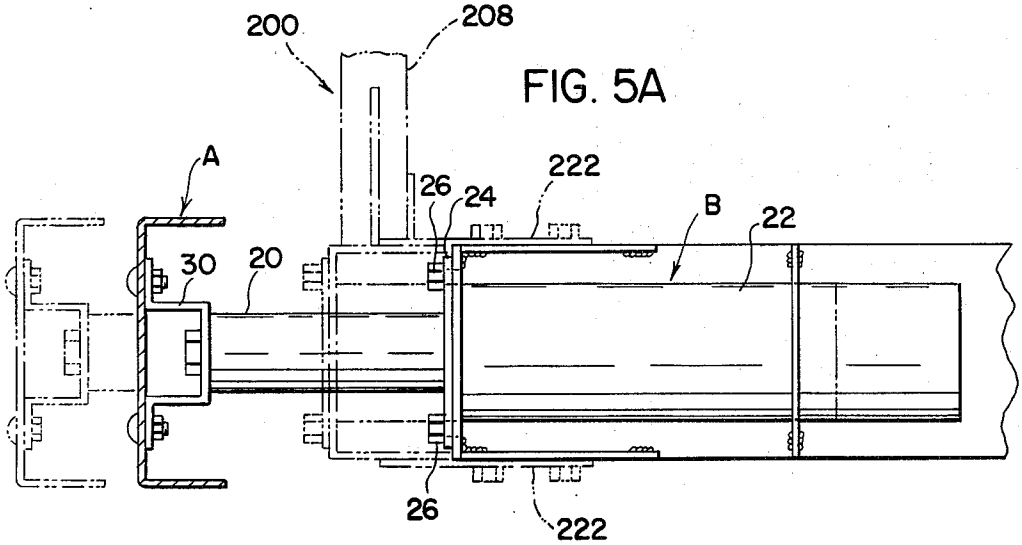

B
192
22
190
24
194
180
a
20
26
30
182
184
202
212
190
208
220
194
192
200
26
a
210
30
5A
224
B
22
20
24
222
b
5A
206
204
b
226

FIG. 5A


200
208
A
222
26
24
B
22
30
20
26
222

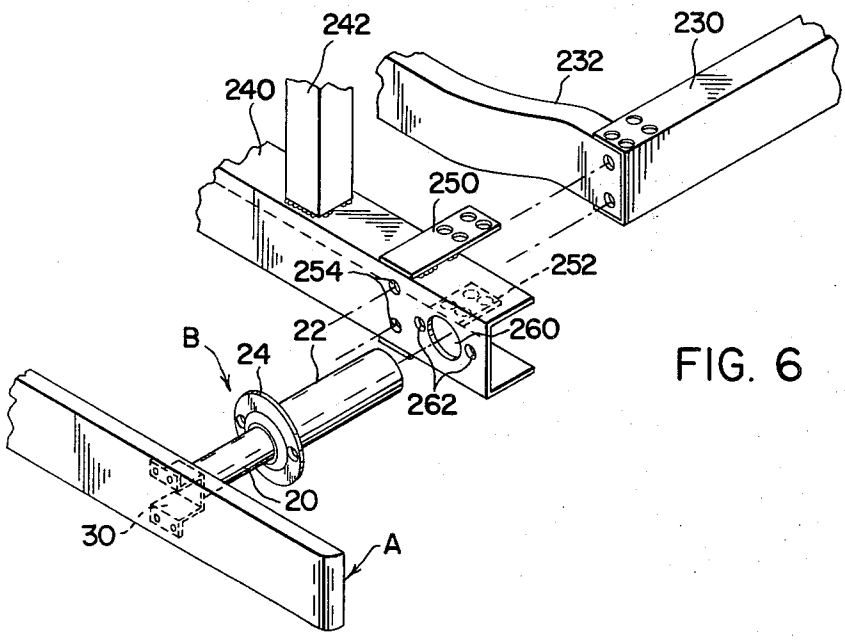


FIG. 6

PLOW BLADE LIFT FRAME AND METHOD OF USING SAME

This invention relates to the art of lifting devices for plow blades and more particularly to a plow blade lift frame and a method of using the same.

The invention is particularly applicable for mounting a snow plow onto the front of a relatively small vehicle, such as a Jeep or pick-up truck, and it will be described with particular reference thereto; however, it is appreciated that the invention has broader applications and may be used for mounting various types of blades onto the front of a motor vehicle.

It has become common practice to mount snow plow blades onto the front of a small vehicle, such as a pick-up truck, for the purpose of removing snow from a roadway. To increase the convenience of using the vehicle mounted plow blade, hydraulic lift units are mounted onto the front of the vehicle for selectively raising the blade into an inoperative position. With the adoption of these hydraulic lift units, special lift mounting frames have been used between the vehicle chassis and bumper. These frames generally include a lower member for supporting the hydraulic lift unit and an upper pivoting arm secured to the ram of the lift unit. As the ram is extended, the upper arm is pivoted in an upward direction to pull the blade upwardly. When the ram is retracted, the arm is pivoted in a downward direction so that the blade can be lowered by gravity into its operative position. The lift unit mounting frame is assembled onto the vehicle chassis at the position allocated for the vehicle bumper, and the bumper is secured onto the lift frame forward of its normal position.

In recent years, automobiles have been provided with energy absorbing bumper arrangements so that the bumper can absorb energy caused by relatively low speed impact. This type of arrangement is not now required for pick-up trucks and related small vehicles, such as Jeeps. The use of such devices would appear to be impractical, if not impossible, for use with front mounted accessories, such as a plow blade. However, the energy absorbing bumper arrangements reduce the amount of damage caused by low velocity impact. Consequently, such bumpers could be very beneficial for use on vehicles of the type using snow plows of the variety discussed above. The present invention relates to a mounting arrangement for the snow plow which can be used with a pick-up truck having an energy absorbing bumper. In accordance with the invention, the snow plow lifting frame can also be used as a device for providing an energy absorbing bumper for a pick-up truck which is not originally provided with such a bumper. By using the present invention, the advantages of a low velocity, energy absorbing bumper system can be utilized at the same time as a snow plow lifting device of the type presently used.

In acccordance with the present invention, there is provided an improvement in a frame for mounting a snow plow lifting device of the type described above, which improvement includes a bumper support means on the lift mounting frame which support means includes a plate having a surface extending in a generally vertical plane and an opening therethrough, and an energy absorbing device having a ram connected to the bumper, a cylinder extending through the opening, and a mounting element affixed to the cylinder. Also,

means are provided for releasably securing the mounting element onto the aforementioned plate.

In accordance with another aspect of the present invention, there is provided an improvement in a plow blade mounting frame of the type described above which improvement comprises a transversely extending member having an opening aligned with each position occupied by an energy absorbing cylinder secured to the chassis of a vehicle with the openings being dimensioned greater than the dimension of the energy absorbing device and means on the aforesaid member for securing the energy absorbing cylinder onto the member after being removed from its original position on the chassis of the vehicle.

In accordance with another aspect of the present invention, there is provided a method of mounting a snow blade lift unit onto the front of a vehicle of the type having energy absorbing devices releasably secured onto the chassis thereof. This method includes the steps of removing the energy absorbing devices from the chassis, mounting the snow plow lift frame onto the chassis, mounting the energy absorbing devices onto the lift frame and mounting a snow blade lift onto the frame.

The primary object of the present invention is the provision of an improved plow blade lift frame, which frame may be used on a truck or other vehicle having an energy absorbing bumper system.

Another object of the present invention is the provision of an improved plow blade lift frame, which frame can be used to provide a vehicle bumper with a set of energy absorbing devices.

Yet another object of the present invention is the provision of a method of mounting a plow blade lift onto a vehicle, which method can be used to provide an energy absorbing bumper system for the vehicle.

These and other objects and advantages will become apparent from the following description taken together with the accompanying drawings, in which:

FIG. **1** is a pictorial, enlarged view illustrating an energy absorbing device of the type to which the present invention is directed;

FIG. **2** is an exploded view illustrating one embodiment of the present invention;

FIG. **3** is an exploded view illustrating a characteristic of the invention as shown in FIG. **2**;

FIG. **4** is an exploded view showing a further modification of the present invention;

FIG. **4A** is a view showing another function of the embodiment illustrated in FIG. **4**;

FIG. **5** is an exploded view showing still a further embodiment of the present invention;

FIG. **5A** is an enlarged, partial view taken generally along line **5A—5A** of FIG. **5**; and,

FIG. **6** is a partial exploded view showing an additional function of the present invention.

Referring now to the drawings wherein the showings are for the purpose of illustrating preferred embodiments of the invention only, and not for the purpose of limiting same, FIG. **1** shows a somewhat standard energy absorbing arrangement for a motor vehicle. In accordance with this disclosure, a standard bumper A is secured onto a vehicle chassis **10** by an intermediate energy absorbing unit B. Of course, one energy absorbing device is positioned at each end of the bumper A. Each of these energy absorbing units includes an outwardly extending ram **20** received within an elongated

cylinder 22 supported by a flange 24 and bolts 26 onto the end plate 11 of the chassis 10. A bracket 30 carried by ram 20 forms a joint between the ram and the bumper. Ram 20 remains in the extended position, as shown, until the bumper collides with an obstacle. At that time, ram 20 is forced backwardly into cylinder 22 in a manner similar to a shock absorber. This type of energy absorbing unit for bumpers is designed to protect a vehicle against impacts at low speeds, such as speeds below about 5 mph. Various types of these energy absorbing devices are now on the market and are used extensively in automobiles. They are not now used for pick-up trucks and other small commercial type vehicles such as Jeeps and similar multiple purpose vehicles which use front mounted accessories.

Referring now to FIG. 2, one embodiment of the present invention is illustrated wherein a small vehicle or truck C is provided with a snow plow D. The present invention relates to the mounting arrangement for the lift device used in controlling the vertical disposition of snow plow D with respect to the front of truck C. Truck C includes chassis elements 10, 12 corresponding essentially to the chassis 10 of FIG. 1. The mounting of snow plow blade D will be described in detail; however, this description is only representative in nature and various other standard arrangements could be used for mounting the blade for upward pivoted movement on the front of the vehicle and for angular adjustments with respect to the front of the vehicle. In accordance with the illustrated embodiment the blade D is provided with rear pivot trunions 40, 42. Springs 44, only one of which is shown, hold the blade in an upright position. When the blade engages an obstacle, it pivots around trunions 40, 42 against the action of springs 44. The angular position of the blade is adjusted by a swinging movement around a center pin 46. The angular position is fixed by an appropriate lock 48, constructed in accordance with normal practice. The pin and lock are supported upon a standard A frame having rearwardly extending pivot arms 52, 54 which coact with trunions 56, 58 on a cross brace 60 secured onto chassis elements 10, 12 by supports 62, 64.

The snow plow lift mechanism is supported by a body frame 70 which includes a horizontal, transversely extending cross beam 72 mounted by plates 74, 76 onto the chassis members 10, 12. Of course, plates 74, 76 could be secured onto the end plate 11 in the same holes as bolts 26, if a central opening were provided to allow for clearance of a cylinder 22 of the energy absorbing units B. Extending upwardly from beam 72 is a U-shaped vertically extending element 80 welded onto the beam and carrying a cross bar 82. A snow plow lift unit 90 which generally includes a cylinder, a ram, gear pump, reservoir and an appropriate valve is schematically illustrated as including a cylinder 92 and a controllable ram 94. The lift unit is secured onto frame 70 by a mounting bracket 100 which allows pivoted movement of lift unit 90. The upper end of ram 94 includes a trunion member 102 received within an arm 110 pivotally mounted at trunion 112 on U-shaped element 80. A chain 114 on the outer end of the operating arm raises the blade D when arm 110 is moved upwardly by protraction of ram 94 from cylinder 92. The axes *a*, *b*, are the original axes of the energy absorbing units B as they existed as original equipment on the truck C. The beam 72 includes openings 120, 122 which surround the axes *a*, *b*, and are large enough to receive the cylinders 22 of units B. The holes 124 are positioned in the same pattern as the holes into which bolts 26 extend. Consequently, the flanges 24 of the energy absorbing units B can be secured onto the cross beam 72 by the same bolts 26. In this manner, the bumper A is secured onto the lift mounting frame 70 in a position forward of its original position and in a manner to provide clearance and support for the lift unit 90. Thus, the lift unit 90 can be provided on the front of truck C without requiring that the truck remove its bumper energy absorbing system. After the energy absorbing units B are mounted as shown in FIG. 2, the bumper A functions as an energy absorbing bumper in the same manner that it would function were it secured directly onto the frame. Consequently, in accordance with the present invention, the lifting unit 90 can be attached onto the front of a truck which includes energy absorbing bumper mounting devices similar to those now provided on automobiles.

Referring now to FIG. 3, only a small portion of the mounting frame 70 is illustrated. In accordance with this aspect of the disclosed embodiment of the invention, the beam 72 of frame 70 can be provided with bumper brackets 130, 132 which are supported over the openings 122, 124. Bumper A is then bolted directly onto the brackets without intermediate energy absorbing devices B being used. In this manner, mounting frame 70 can be used when energy absorbing devices B are optional original equipment for truck C. If no energy absorbing device is used, the bumper can be installed as shown in FIG. 3. If the energy absorbing devices are used, the bumper is mounted as shown in FIG. 2.

Another embodiment of the invention is illustrated in FIG. 4 wherein chassis 140 includes holes 142, 144 for originally mounting energy absorbing units B by appropriately arranged holes 146. The lift unit mounting frame includes a transverse member or beam 150 having support plates 151 for securing the mounting frame onto the chassis 140. A U-shaped element 152 extends upwardly from beam 150 so that the lower lift mounting trunnion 154 can coact with an arm pivotally secured onto trunnion 156 to perform the blade lifting system, as previously described. This beam 150 includes openings 160, 162 aligned with openings 142, 144 of chassis 140 and surrounding the axes *a*, *b* which are the original axes for the energy absorbing devices when they were mounted directly onto chassis 140. Holes 164 correspond to holes 146 so that the energy absorbing units can be mounted directly onto the cross beam 150 with the cylinder 22 extending through the two openings and into the space originally used for the energy absorbing units on the vehicle. If the lift mounting frame shown in FIG. 4 is to be used without energy absorbing units B, brackets 170, 172, shown in FIG. 4A, can be secured onto the bumper A. These brackets have holes which align with holes 164 to mount the bumper directly into the cross beam 150. This arrangement is similar to that shown in FIG. 3 for the first embodiment of the present invention.

Referring now to FIGS. 5 and 5A, the energy absorbing units B may be mounted adjacent the outside of the chassis, as shown in FIG. 5. In this illustrated embodiment, the vehicle chassis includes members 180, 182 joined by a cross member 184. Plates 190, 192 secure the energy absorbing units B with respect to the chassis during original assembly of the truck. Of course, the

plates have clearance openings **194** to accommodate the cylinder **22.** Lift mounting frame **200** is a welded structure including terminal channels **202, 204** that are generally orthogonal to axes *a, b.* Transverse beam **206,** between the channels **202, 204,** supports an upwardly extending, U-shaped member **208.** The lower lift mounting trunnion **210** and the upper arm pivoting trunnion **212** perform the function as similar elements in the other embodiments. The mounting frame **200** is secured onto the chassis by rearwardly extending sets of support brackets **220, 222.** This is best shown in FIG. 5A. The solid line disclosure of this figure represents the original equipment arrangement without a lift frame **200.** The phantom line illustrates the extension of bumper A after the lift frame **200** has been assembled in place as best illustrated in FIG. **5.** Channels **202, 204** are provided with openings **224, 226** which allow insertion of the energy absorbing units B onto the frame **200** after the frame has been secured onto chassis elements **180, 182.** This embodiment of the invention operates in the same manner as the previously discussed embodiments of the present invention. Of course, brackets could be secured onto the channels **202, 204** when an energy absorbing unit is not to be disposed between the bumper and the lift unit mounting frame.

Another aspect of the present invention is illustrated in FIG. **6.** In some instances, it may be desirable to provide energy absorbing units B for vehicles which do not have such units as original equipment. In that instance, the chassis **230** having a cross beam **232** can support a lift unit mounting frame including a cross beam **232** and an upwardly extending, U-shaped element shown partially as member **242.** Brackets **250, 252** support the lift mounting frame onto the chassis member **230.** An opening **260** is provided to receive the energy absorbing unit B, which is secured in place onto the cross beam **240** by bolts through holes **262.** The bumper A is secured to the energy absorbing unit by bracket **30,** as previously described. In this embodiment, the energy absorbing unit is applied to the vehicle when the vehicle itself was not originally provided with this type of structure. This could be used in converting older trucks to an energy absorbing mode of operation with a minimum of structural changes.

Having thus described my invention, I claim:

1. In a lift frame for mounting a plow blade lifting device onto the front of a vehicle, said lift frame including a front facing away from said vehicle, a generally horizontal support base, a mounting element extending upwardly from said base, a blade lifting arm having a first end pivotally mounted to said mounting element at a point above said support base and a second end adapted to be connected to a plow blade whereby said blade is lifted when said arm is pivoted upwardly, bracket means fixed with respect to and adjacent said horizontal support base for supporting a hydraulic ram lift unit, said lift unit having an outwardly extendible hydraulically controlled ram, bracket means for securing said ram of said lift unit onto said lifting arm whereby said lifting arm can be selectively pivoted by movement of said lifting ram, means for securing said lift frame onto the front of said vehicle and means for supporting a vehicle bumper onto the front of said lift frame whereby said lift frame spaces said bumper outwardly from said vehicle, the improvement comprising: said horizontal support base including a surface extending in a generally vertical plane, and an opening therethrough, and said bumper support means includes an energy absorbing device having a ram connected to said bumper, a cylinder extending through said opening, a mounting plate affixed to said cylinder, and means for releasably securing said mounting plate onto said support base with said cylinder extending through said opening whereby said bumper is secured onto said lift frame by said energy absorbing device at a position spaced outwardly from said lift frame in a direction opposite to said vehicle.

2. In a lift frame for mounting a plow blade lifting device onto the front of a vehicle, said lift frame including a front facing away from said vehicle, a generally horizontal support base, a mounting element extending upwardly from said base, a blade lifting arm having a first end pivotally mounted to said element at a point above said support base and a second end adapted to be connected to a plow blade whereby said blade is lifted when said arm is pivoted upwardly, bracket means fixed with respect to and adjacent said horizontal support base for supporting a hydraulic ram lift unit, said lift unit having an outwardly extendible hydraulically controlled ram, bracket means for securing said ram of said lift unit onto said lifting arm wherein said lifting arm can be selectively pivoted by movement of said lifting ram, means for securing said lift frame onto the front of said vehicle and means for supporting a vehicle bumper onto the front of said lift frame whereby said lift frame spaces said bumper outwardly from said vehicle, the improvement comprising: said support means including first and second transversely spaced mounting structures, each of said mounting structures including a plate having a surface extending in a generally vertical plane, and an opening therethrough, and two energy absorbing devices each having a ram connected to said bumper, a cylinder extending through one of said openings, and a mounting flange affixed to said cylinder, and means for releasably securing said mounting flange onto said plate with said bumper spaced from said lift frame on the side of said lift frame opposite to said vehicle.

3. A plow blade mounting frame for a vehicle having a chassis and first and second energy absorbing devices releasably secured onto said chassis at transversely spaced positions, each of said energy absorbing devices comprising an elongated cylinder having a given elongated axis, an outside dimension and a mounting flange and a ram extending outwardly of said vehicle on said given axis and means on said chassis for releasably securing said flanges onto said chassis with said cylinders extending horizontally with said given axes having set locations, said plow blade mounting frame comprising a transversely extending member having an opening aligned with each of said set locations and with a dimension greater than said outside dimension of said cylinders and means on said member for securing said flanges onto said member with said cylinders extending through said openings.

4. A method of mounting a plow blade lift onto the front of a vehicle having a chassis and first and second energy absorbing devices releasably secured onto said chassis at transversely spaced positions, each of said energy absorbing devices comprising an elongated cylinder and a ram secured onto a vehicle bumper and extending outwardly of said vehicle and means on said cylinder for releasably securing said flanges onto said

chassis with said cylinders extending horizontally, said method comprises the steps of:

a. removing said energy absorbing devices from said chassis;

b. mounting a snow plow lift frame onto said chassis;

c. mounting said energy absorbing devices onto said lift frame; and,

d. mounting a snow plow lift onto said frame.

* * * * *