United States Patent [19]

Traficant

[11] **3,891,108**

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[54] **HIGH LIFT MECHANISM**

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[52] **U.S. Cl.** **214/512;** 254/122

[51] **Int. Cl.** **B60p 1/02**

[58] **Field of Search** ..... 214/512; 254/122, 8 C, 254/124; 187/18

[56] **References Cited**

UNITED STATES PATENTS

2,501,001	3/1950	Neely	254/122
2,706,102	4/1955	Cresci	254/122 X
2,928,558	3/1960	Bamford et al.	254/8 C
3,259,369	7/1966	Gridley	254/122

FOREIGN PATENTS OR APPLICATIONS

248,357	11/1962	Australia	254/122

Primary Examiner—Albert J. Makay

[57] **ABSTRACT**

A high lift mechanism for trucks comprised generally of a scissors-type of lever mechanism which may be mounted to any standard truck chassis without extending below the channel beams of said chassis. Hydraulic cylinder means, normally laying almost flat in the chassis frame, first pushes against the top end of a pivoted link resulting in vertically directed forces to accomplish the first phase of the lift cycle. Roller means, carried by the head of the hydraulic cylinder piston, move along a bearing plate during the first portion of the lift cycle and when said roller means contacts abutment means at the end of the bearing plate, forces are directed thereagainst to accomplish the final phase of the lift cycle.

8 Claims, 4 Drawing Figures

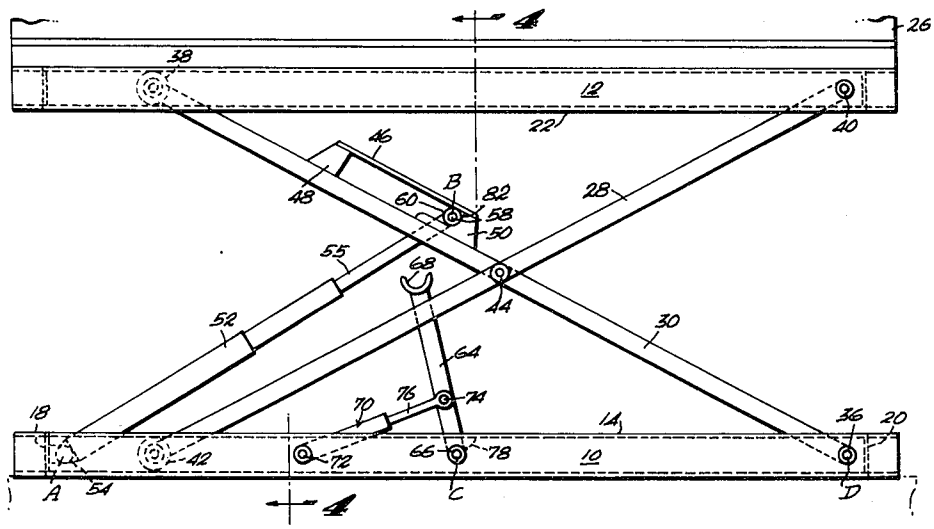


Fig. 1

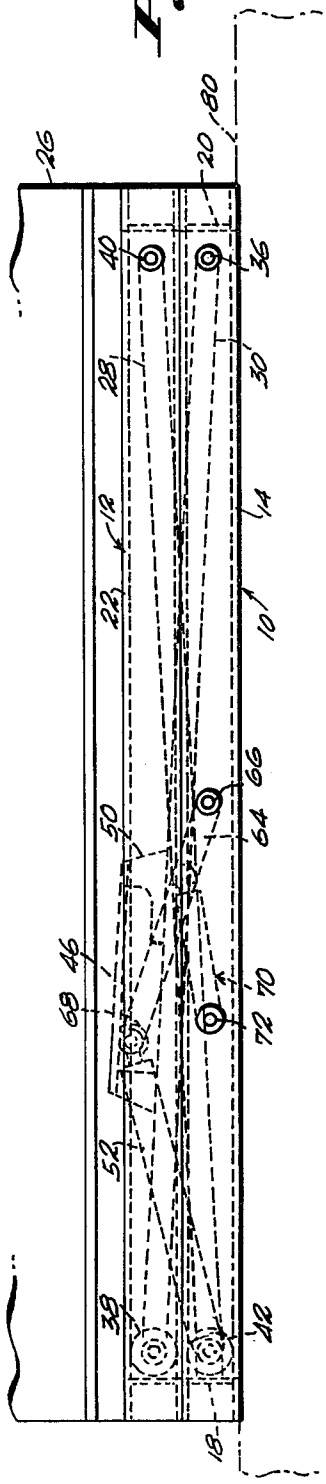
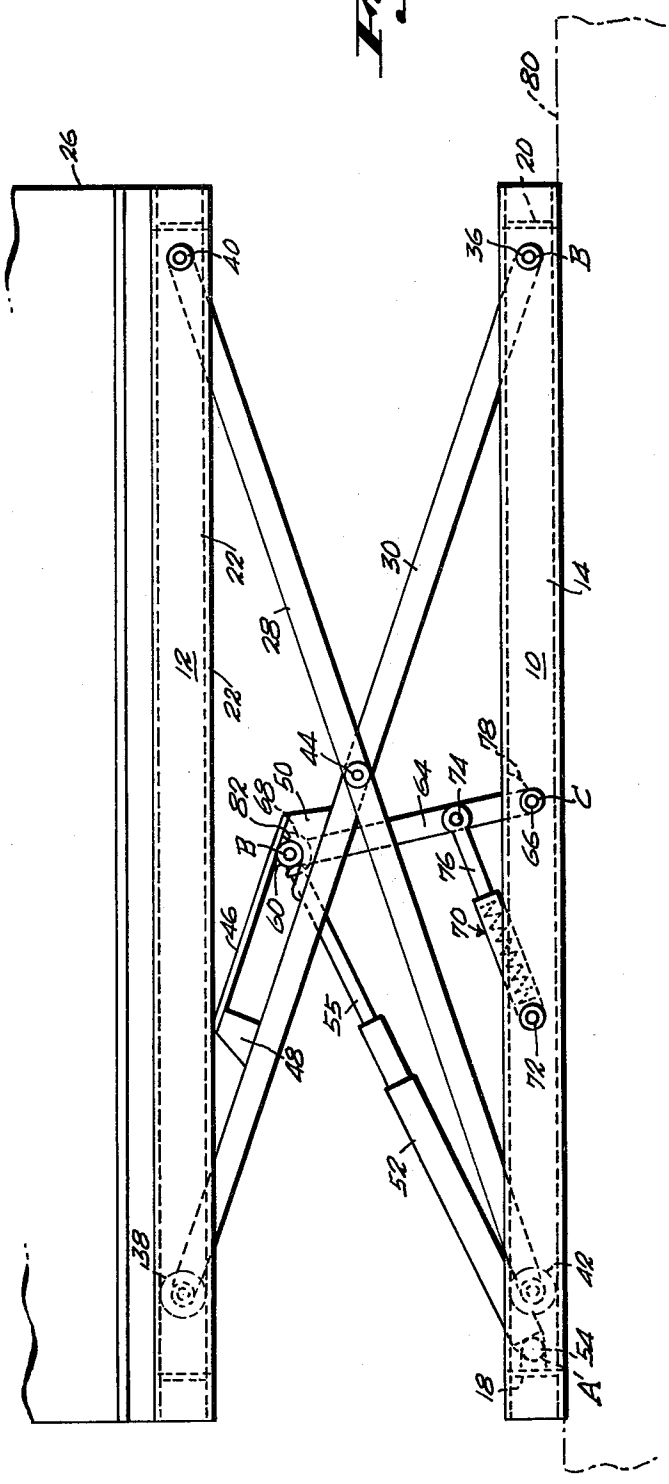

26
20
80
40
36
28
30
14
18
22
10
64
66
50
46
68
70
72
52
38
42
18

Fig. 2


26
20
80
40
36
B
22
30
28
14
12
10
44
82
68
50
64
74
78
C
B'
66
76
70
60
46
55
48
72
52
38
42
18
A'
54

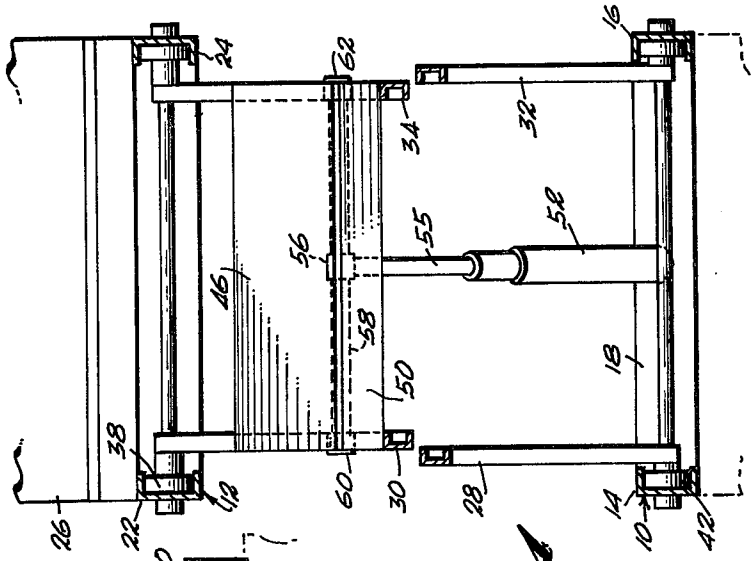


Fig. 4

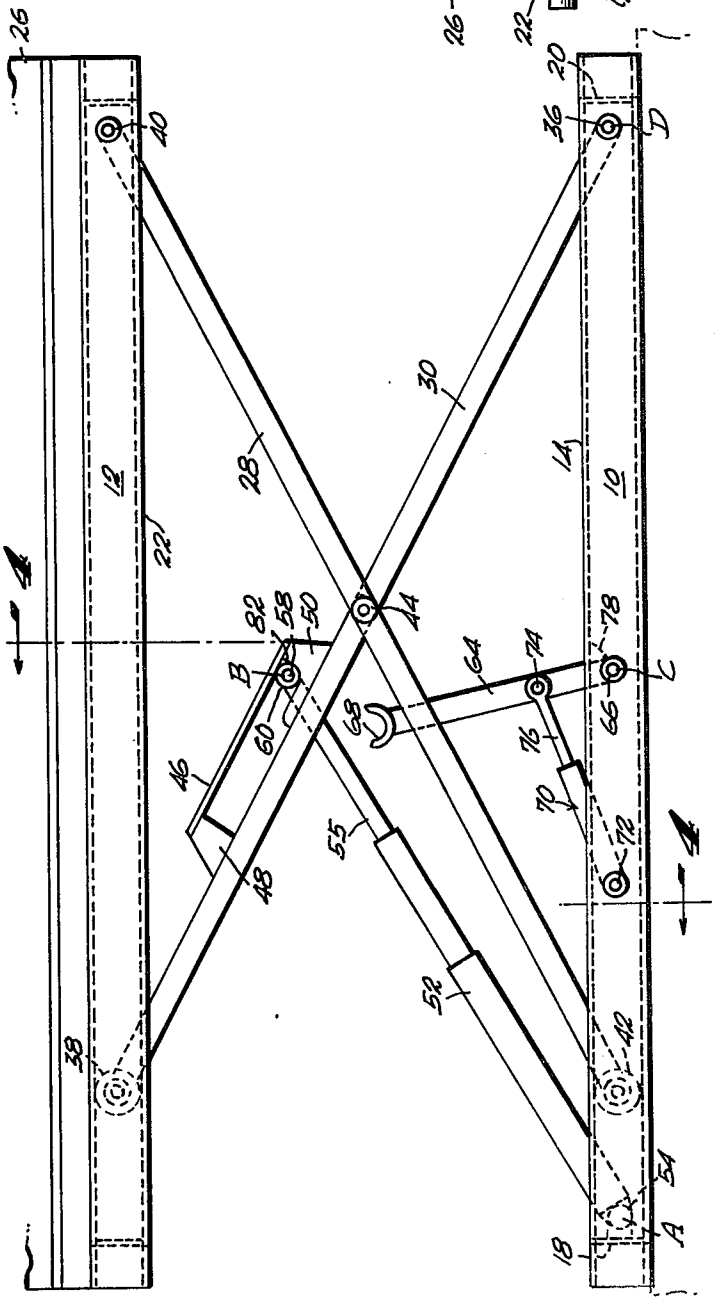


Fig. 3

HIGH LIFT MECHANISM

STATE OF THE PRIOR ART

U.S. Pat. No. 2,412,158 to N. V. Kuehlman et al. discloses a scissors type of high lift truck mechanism which is directed primarily to providing auxiliary wheels on the freight body to permit the truck proper, that is, the frame and cab, to be withdrawn from the freight body. The scissors type of levers employed are pivotally connected intermediate their lengths and links are pivotally connected to one end of each lever to eliminate the need for rollers in top and bottom tracks. A portion of the mechanism of this device extends below the truck chassis and the piston head is pivotally connected to the lever mechanism to function as a straight push-type through the entire lift cycle.

U.S. Pat. No. 2,935,218 to C. M. Fritz also discloses a scissors type of high lift truck mechanism which includes pivotally connected levers and a hydraulic cylinder, mounted well below the chassis, which provides a straight push system.

Another type of scissors type of elevating device is disclosed in U.S. Pat. No. 2,945,551 to M. H. Annin et al. Three sets of hydraulic power devices are employed, one pushes vertically, directly on the scissors, the second is longitudinally disposed in the chassis frame and the third is similarly disposed in the elevator platform. The second and third hydraulic devices exert longitudinally directed forces on the ends of the top and bottom scissors levers.

U.S. Pat. No. 3,220,585 to D. N. McCartney et al discloses a high lift trailer employing scissors type of levers, pivotally connected intermediate their lengths. Six hydraulic rams are utilized to lift the load carrying bed. Four small rams are positioned adjacent the four corners of the device to initiate the lifting operation and two large rams are utilized to complete the lift cycle.

BACKGROUND OF THE PRESENT INVENTION

The present invention pertains to a compound linkage, high lift mechanism to elevate the cargo body of the truck to a degree whereby the cargo may be directly transferred to a cargo plane, for example.

One of the principal objects of the present invention is to provide a high lift mechanism that provides no elements extending below the upper flanges of the main beam members of a truck chassis. In this manner the high lift device may be bolted to the top flanges of the chassis beams, requiring only the drilling of appropriate holes therethrough.

Upper and lower, generally rectangular shaped frames are provided, the lower frame being fixed to the truck chassis with the upper frame normally having a cargo body fixed thereto. Two pairs of scissors type levers interconnect the respective sides of the upper and lower frames. A single hydraulic lift system serves to elevate the upper frame and the cargo body from a lower position of contact against the top of the lower frame to a fully elevated position. For heavy loads, the hydraulic lift system preferably incorporates a pair of cylinder assemblies operating in tandem.

Another principal jbject of the present invention is to provide a device which is a combination of two lift mechanisms, timed together, with an interlocked mechanical transfer of the lifting force from one mechanism to the other. This transfer of lifting forces is captive and cannot get out of timing or synchronization.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevational view of the high lift mechanism of the present invention with the cargo body carrying frame in its fully retracted position;

FIG. **2** is a view similar to FIG. **1** with the frame elevated to an intermediate position;

FIG. **3** is a view similar to FIGS. **1** and **2** with the frame fully elevated; and

FIG. **4** is a cross sectional view taken along line **4—4** of FIG. **3.**

DETAILED DESCRIPTION OF THE DRAWINGS

With reference to the drawings in which like reference characters designate like or corresponding parts throughout the various views, the numerals **10** and **12** generally indicate the lower and upper frames. The lower frame **10** is comprised generally of a pair of side, inwardly turned channel rails **14** and **16** which are connected by one or more transverse members such as **18** and **20.**

The upper frame **12** may be quite similar in construction but in any event includes a pair of side, inwardly turned channel rails **22** and **24.** As fragmentarily illustrated at **26,** a cargo body is fixed in any conventional manner atop the upper frame **12.** Two pairs of scissors type levers **28, 30** and **32, 34** interconnect the lower and upper frames **10** and **12** adjacent to the side edges thereof.

As best illustrated in FIGS. **2** and **3,** the first end of the lever **30** is pivotally connected at **36** to the lower frame channel rail **14** adjacent one end thereof. From the pivot **36,** the lever **30** extends angularly, upwardly toward the opposed end of the device and carries a roller **38** on its second end which tracks within the upper channel rail **22.**

The first end of the lever **28** is pivotally connected at **40** to the upper frame channel rail **22** in a position vertically above the pivot **36.** From the pivot **40,** the lever **38** extends angularly downwardly toward the opposed end of the device and carries a roller **42** on its second end which tracks within the lower channel rail **14.** In this manner, the two levers **28** and **30** cross in scissors fashion and are pivotally attached at **44,** intermediate their lengths.

The above description of the levers **28** and **30** has been in the singular, however, it should be understood that the levers **32** and **34** are exact duplicates of, and function with, the levers **28** and **30.**

One pair of opposed side levers **30** and **34** are rigidly spanned by a bearing plate **46** which is connected to said levers **30** and **34** by outer and inner plate members **48** and **50.** A hydraulic cylinder **52** is pivotally attached at **54** to the transverse member **18** and provides a telescoping ram or piston **55** having a roller **56** on its outer end for engagement against the underside of the bearing plate **46.** The roller shaft **58** may extend outwardly to both sides and carry additional rollers as indicated at **60** and **62.**

A link **64** is pivotally attached at its lower end, as at **66,** between the lower channels **14** and **16,** and includes a yoke end **68,** normally engaging the piston roller **56.** A spring loaded piston assembly **70** is pivotally attached at **72** between the bottom channels **14, 18** and a point **74,** intermediate the length of link **64,** to main-

tain said link **64** in a predetermined position when the upper frame is elevated as in FIG. **3.** The positioning may be provided by the maximum extension of the piston rod **76** or by any type of stop abutment such as **78.**

It should be noted that, in practice, two hydraulic ram assemblies are positioned in a side-by-side relation and operate in tandem. The number of such ram assemblies is determined by the amount of weight to be lifted. It should also be understood that various other modifications, changes and arrangement or positioning of elements such as the bearing plate, rollers **56, 60** and **62,** and link **64** can be made without departing from the basic principle of providing a combination of two lift mechanisms, timed together, with an interlocked mechanical transfer of lifting forces from one mechanism to another as will be apparent from the following description of the lift operation.

In use, the lower frame **10** is bolted to the main chassis beams **80** of a track. Referring first to FIG. **1,** it should be noted that all of the mechanism is contained within the confines of the upper and lower channel beams **14, 16** and **22, 24** when in the rest or fully retracted position.

The first part of the lifting mechanism defines a triangle A, B, C, with its three corners comprising the pivots **54, 56** and **66.** In this position (FIG. **1**) the hydraulic piston assembly is the triangle side AB. Attached to the end of the piston rod is the roller **56** which bears against the bottom of the bearing plate **46.** This roller is also contained in the yoke **68** and the link **64** forms triangle side BC. Side AC is the base of the ABC triangle. Points AC are fixed and never move from their original positions. When hydraulic forces are applied to extend the piston **55,** point B which is the roller moves along the underside of the bearing plate **46** while being confined in the yoke. The resulting forces at point B are straight up and in yielding to these forces, point B moves along an upwardly angled path because of the continued extension of the piston rod **55** and its engagement with the bearing plate **46.**

FIG. **2** illustrates the extent of upward movement of the top frame **12** by the initial forces applied to the mechanism defined by the triangle ABC. As FIG. **2** illustrates, point B has contacted an abutment **82** formed by the inner plate member **50.** Point B is now lifted from the yoke **68** and continues to move upwardly from the intermediate position of FIG. **2** to the position of FIG. **3** where the cargo body has been lifted to its fully elevated position.

As the cargo body proceeds from the position shown in FIG. **2** to that shown in FIG. **3,** the mechanism defined by the triangle ABC ceases to exist as a working assembly and the force triangle is now made up of points ABD.

The return of mechanism to its "At Rest" position is a reverse of its upward cycle. When the upper frame **12** reaches of the the position shown in FIG. **2,** the roller **56** reseats in the yoke **68** and all of the elements then return to the position of FIG. **1.**

In the above description, the roller **56** is described as seating in the yoke **68** while, in fact, other rollers such as **60** and **62** will accomplish the same end result if the shaft **62** seats in a smaller yoke. It is only necessary to confine the path of travel of B along the bearing plate until some element carried by the end of the piston rod contacts the abutment **82.**

What is claimed is:

1. A high lift mechanism, for mounting on a truck chassis, to move a cargo body fixed thereto between a retracted, down position and an elevated position comprising,

A. a lower frame for fixed engagement with the truck chassis;

B. an upper frame to carry the cargo body threatop;

C. lever means interconnecting said frames comprised of,

1. a first combination of levers, and

2. a second combination of levers;

D. fluid actuated ram means for moving said upper frame between said positions;

E. means to drivingly engage the extended end of said ram means to said first combination of levers to elevate said upper frame to a predetermined, intermediate, level, in a first phase operation, when pressurized fluid is delivered to said ram means;

F. means to disengage said means to engage from said first combination of levers at said intermediate level and to simultaneously engage same with said second combination of levers to elevate said upper frame to its maximum elevated position in a second phase of operation;

said interconnecting lever means includes a pair of scissors type lift levers interconnecting each of the respective sides of said upper and lower frames and a link means pivotally attached at a first end to said lower frame, intermediate the opposed ends of said scissors levers; said scissors levers and link means comprising said first combination of levers and said scissors levers comprising said second combination of levers;

said means to drivingly engage comprises a bearing plate, fixed to and spanning a portion of one corresponding pair of said scissors levers, and a yoke means at the second end of said link means to receive a tip end portion of said ram; said bearing plate being sized and positioned to maintain said tip end portion in said yoke through said first phase of operation during which forces are directed upwardly by the movement of the ram and the resulting pivotal movement of said link means.

2. A high lift mechanism as defined in claim **1** wherein said means to disengage comprises abutment means fixed to and extending between said bearing plate and said corresponding pair of scissors levers, said abutment means being arranged and positioned to contact the tip end portion of said ram at the end of said first phase, resulting in disengagement of said tip end from said yoke, continued operation of said ram resulting in said second phase of operation during which lifting forces are directed to said upper frame by the scissors levers.

3. A high lift mechanism as defined in claim **1** including roller means, carried by said tip end portion, in bearing engagement between said yoke and bearing plate.

4. A high lift mechanism as defined in claim **1** including a spring loaded piston means connecting between said lower frame and link means.

5. A high lift mechanism as defined in claim **1** wherein the side rails of said upper and lower frames are formed of channel beams, each of said scissors levers having a first end pivotally attached to one of said beams and a second end provided with a roller which tracks in the channel of an opposed beam.

6. A high lift mechanism as defined in claim 1 wherein all of said elements are positioned entirely within the confines of said lower and upper frames when said upper frames is in its down position.

7. A high lift mechanism as defined in claim 1 wherein said fluid actuated ram means comprises at least one hydraulic cylinder and piston assembly.

8. A high lift mechanism as defined in claim 1 wherein said fluid actuated ram means comprises at least two hydraulic cylinder and piston assemblies.

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