United States Patent [19]

Zimmerman

[11] **3,918,601**

[45] **Nov. 11, 1975**

[54] **LINKAGE RESTRAINING SAFETY DEVICE**

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[22] Filed: **July 15, 1974**

[21] Appl. No.: **488,354**

[52] **U.S. Cl.** **214/776;** 214/140

[51] **Int. Cl.**[2] **E02F 3/36**

[58] **Field of Search** ..... 214/140 R, 776, 773, 774, 214/775, 130 R, 131 R; 187/8.49

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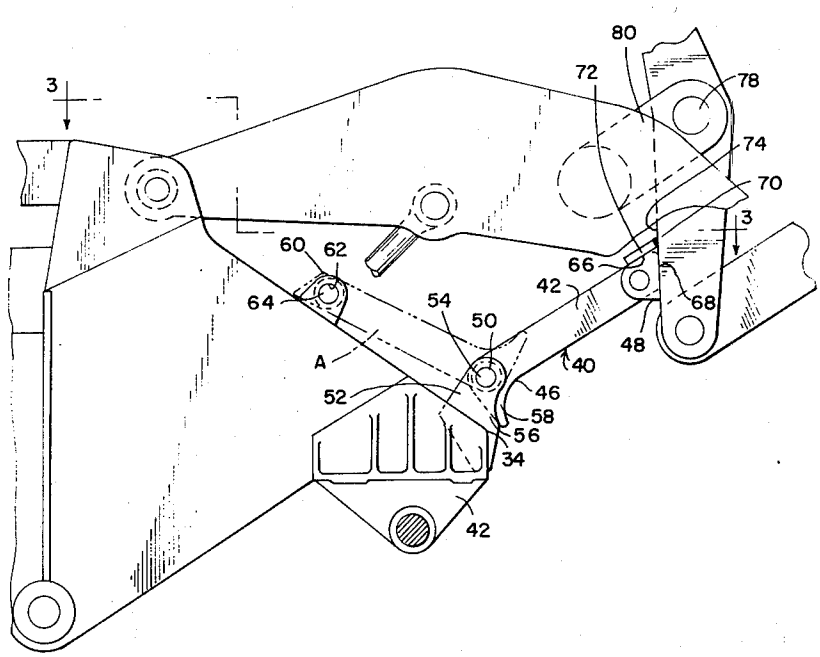
[57] **ABSTRACT**

A locking lever for securing the linkage of a loader vehicle in a predetermined position. The locking lever is pivotally secured to the vehicle whereby it can be swung out to a position where it keys with a bracket means, fixed to the linkage, when the linkage achieves a given orientation.

3 Claims, 3 Drawing Figures



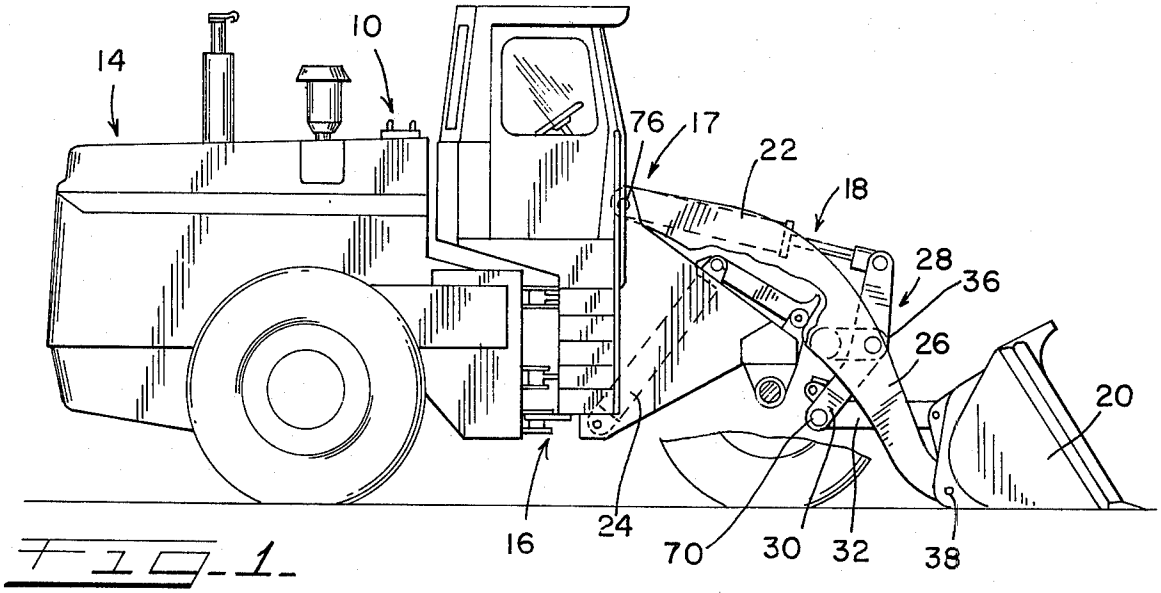


FIG. 1

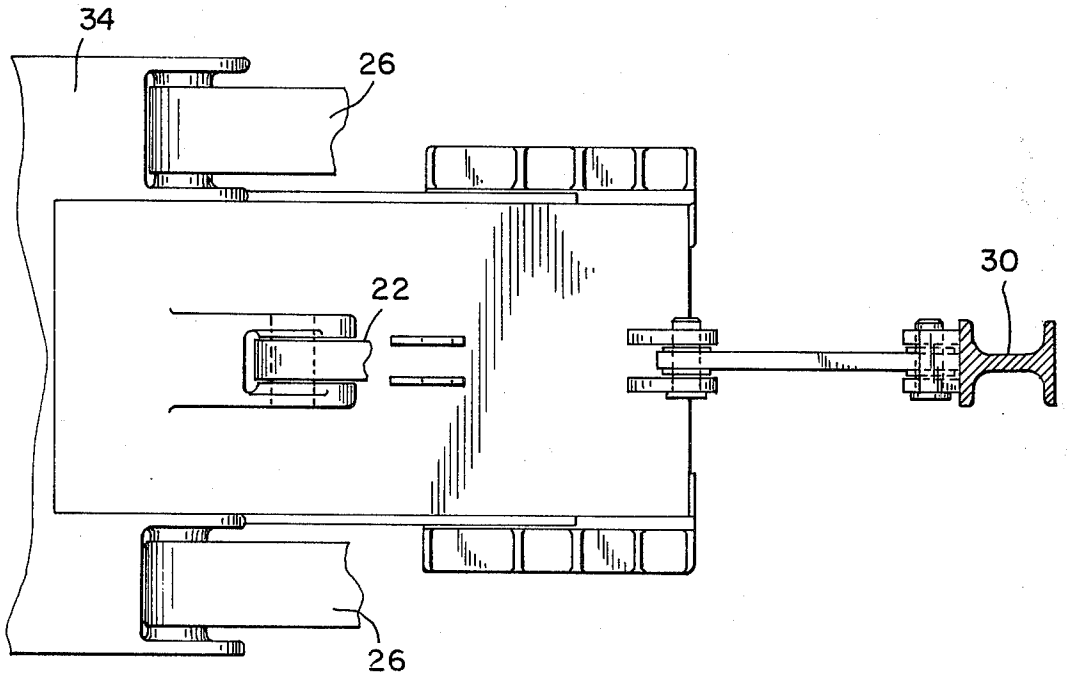


FIG. 3

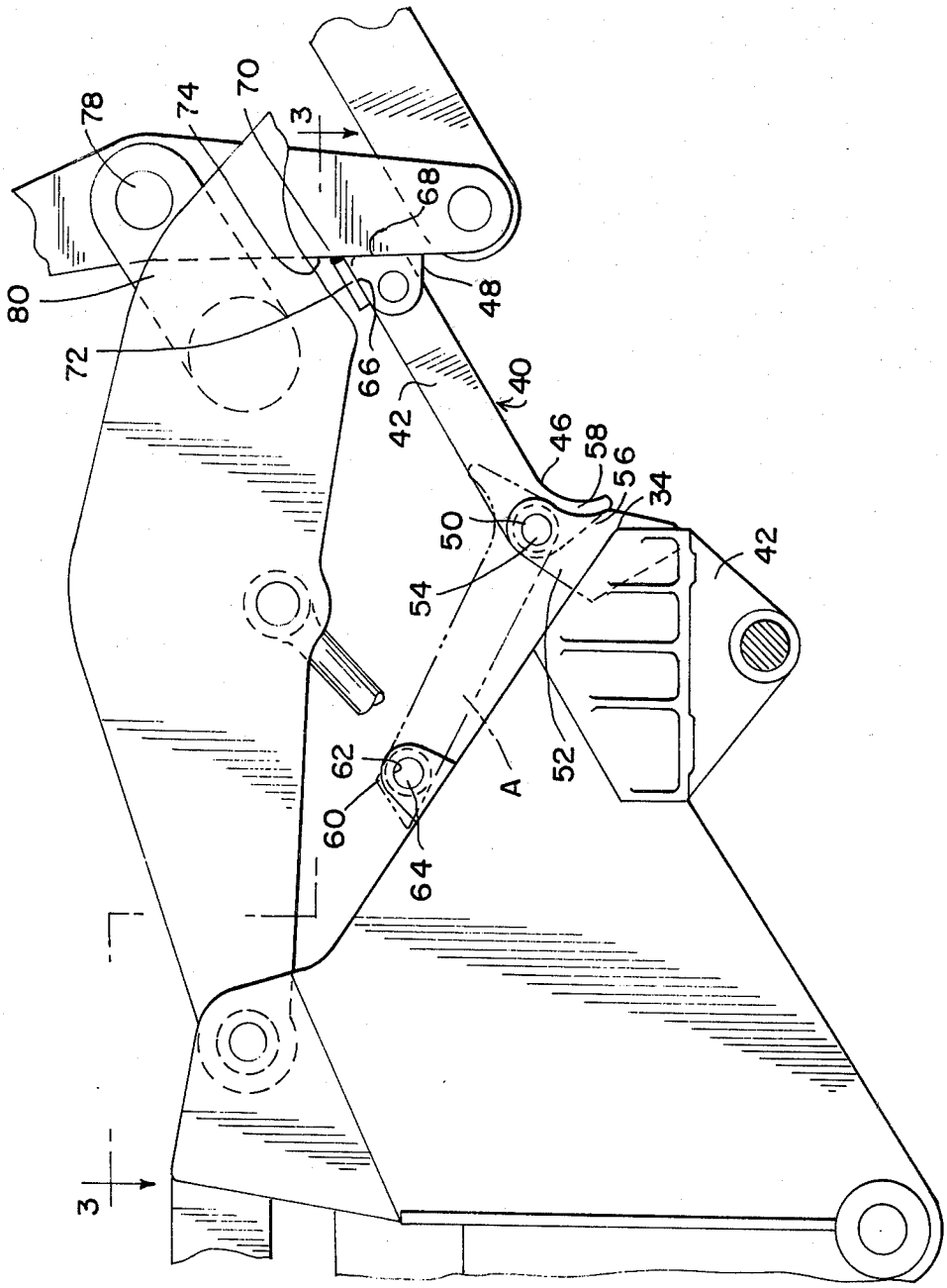


FIG. 2

LINKAGE RESTRAINING SAFETY DEVICE

This invention relates to vehicles having front end carried implements and, more particularly, to a locking device for restraining the linkage associated with said implement.

Vehicles carrying front end mounted earth-working equipment, such as articulated front-end loaders for example are well known in the art. For the most part, such vehicles have a frame boom and implement linkage as well as a series of hydraulic cylinders necessary to actuate these components. In the case of bucket type implements the size of the vehicles and associated linkage etc. can be better appreciated when it is realized that some such buckets can hold up to 19 cubic yards of material. With such an assemblage of huge parts the dangers inherent with replacement or servicing are apparent.

Because of the interrelationship of the boom linkage, the implement linkage, the implement cylinders, and the boom cylinders, it should be appreciated that movement in anyone of these components will effect the entire assemblage. That is, if it desired to remove and repair one of the cylinders, it is necessary to compensate for the effect the removal will have on the entire assemblage. Because of the amount of movement possible and the fact that gravity is constantly effecting each component and because of the size and weight of the elements any type of human error during servicing or repair could result in serious injury.

Various procedures have been developed for immobilizing the implement and the associated linkage for service and repair. Often these means involve solely the hydraulic cylinders and they consist of devices for fixing the cylinder in a given position. Difficulties with this, however, arise when it is desired to remove the cylinder and yet hold the linkage. Other means includes grasping the entire implement assemblage and linkage with a crane or hoist and simply supporting it while work or repairs are performed thereon. As is apparent none of these means are satisfactory.

It is therefore an object of the present invention to provide a locking means for immobilizing the linkage of a vehicle carried implement in a given position with respect to the vehicle.

It is another object to provide a locking means secured to the vehicle and securable to the linkage in a position whereby because of mechanical advantage the implement and boom can be supported.

Still another object of this invention is to provide a locking means which secures the implement, linkage and boom to allow removal of the hydraulic cylinders associated therewith.

Another object of this invention is to provide a locking means for securing a vehicle carried implement which cannot be overriden by the associated hydraulics.

This invention generally relates to front end implement type vehicles onto a locking means for securing said implement and its associated assemblage in an immobile position with regard to the vehicle. The front end implement includes a boom, an implement such as a bucket, bucket linkage, boom linkage, implement cylinders and boom cylinders. The device herein disclosed is pivotally secured to the frame of the vehicle and when used is swung outwardly to a position whereby it intersects bracket means carried by the linkage as the boom is lowered. The locking means when not in use is pivoted against the vehicle and stored. The bracket assembly is located on a point of the linkage whereby maximum mechanical advantage can be achieved. That is, with only one point of securement the implement, the implement linkage, the boom, the boom linkage, the implement cylinder, and the boom cylinder can all be immobilized with respect to the vehicle.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIG. 1 is a side elevational view of an articulated front end loader type vehicle, in which is provided the linkage restraining safety device of the present invention;

FIG. 2 shows the detailed operation of the locking lever and the attaching mechanism operating on the linkage in accordance with the preferred embodiment of the invention; and

FIG. 3 is a cross sectional view taken along the lines 3—3 of FIG. 2.

While the invention will be described in connection with a preferred embodiment, it will be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

Referring now to the drawings and, more particularly, to FIG. 1 there is shown an articulated front end loader type vehicle **10** having front section means **12** and a rear section means **14**. An articulated pivot means **16** connects the front and rear sections, said rear section means **14** carrying the engine (not shown) and said front section means **12** carrying the implement and associated implement linkage **18**. In the preferred embodiment the implement constitutes a bucket means **20** of a form and design known to the art. The implement linkage means **18** includes bucket cylinder means **22**, boom cylinder means **24** (shown in phantom), boom means **26**, and bucket linkage means **28**. The bucket linkage means **28** including a bellcrank means **30** and a tension link means **32**. In the preferred embodiment, and referring to FIG. 3 it will be apparent that there are two boom cylinder means **24** each pivoted to the frame means **34** of the front section means **12**. Each of these cylinder means is acting on a boom means **26** which is also pivotally secured to the frame. Between the two boom arms and the associated hydraulic cylinders is the bucket actuation cylinder means **22**, only partially shown in FIG. 3. The bucket cylinder causes rotation of the bellcrank means **30** around bellcrank pivot means **36** whereby force is delivered to the bucket causing it to pivot around boom bucket pivot point **38**.

In operation the boom cylinders act upon the boom causing the raising and lowering of the entire assemblage, that is, the implement, the implement leakage, and the implement hydraulic cylinders. Actuation of the implement is achieved by either the extension or retraction of the rod of the implement hydraulic cylinder means **22**. It should be noted that it would be impossible to remove the boom hydraulic cylinders unless the boom were supported by an independent means. Additionally, even if the boom were supported by an independent means it would not be impossible to remove the bucket hydraulic cylinder without gravity causing the rearrangement of the linkage in the bucket.

Referring now to FIG. 2 wherein is shown the linkage locking means **40** pivotally secured to the frame of the vehicle **34.** In the preferred embodiment the securement can also be made to the front axle housing means **42.** The locking lever means **40** includes a generally elongated section means **42** having first and second end means **46** and **48.** Said first end means **46** including a bore means **50** and is pivotally secured to a bracket means **52** also having bore means by pin means **54** which journals said bore means. Bracket means **52** includes a stop means surface **56** which limits the pivotal movement of lever means **40** by the provision of a positive abutment with abutting tow surface **58** thereof. As is apparent lever means **40** may be pivoted around shaft means **54** its movement to the left being limited by frame means **34** and its movement to the right being determined when tow abutting means **58** abuts stop means **56.** Thus, the locking lever means **40** need only be actuated either to the left or the right with the knowledge that it would always assume a given known position. As shown in FIG. **2** and particularly phantom position A, a second bracket means is provided on the surface of frame means **34** both the bracket means and second end means **48** are provided with an aperture means **62,** such that when it is desired to store a lever means **40** in an out-of-the way position, it need only be actuated to the left such that engagement with bracket means **60** is achieved whereafter a bolt means **64** is passed through the provided aperture means. The second end means **48** has a first top means **66** and a second side means **68** as will be more fully hereafter discussed.

Referring back to FIG. **1** and specifically to the nature of the work cycle of the boom and associated linkages and implement. It will become apparent that if the boom is raised and the bucket is rolled back sufficiently such that the bracket means **70,** positioned on bellcrank means **30,** will key with locking lever means **40** as the boom is lowered depending on the actual physical shape of the elements. Because of the nature of abutting toe means **58,** lever means **40,** when it keys with bracket means **70,** can be considered grounded. The top surface **66** abuts plate **72** against vertically directed forces and surface **68** abuts the rear face means **74** of bellcrank means **30.** To insure an absolutely grounded condition the bracket means **70** is provided with apertures such that bolt means **64** can be passed therethrough as well as aperture **62.** As a result the implement, the tension link, the bellcrank, and the implement cylinder are affectively grounded. Since the boom means **26** is pivotally secured to the frame at **76** its ability to pivot around bellcrank pivot point **78** via tension link **80** is nullified and the boom also becomes effectively grounded. As is apparent the bellcrank means must be provided with a bracket means or other device which is positioned such that a lever means or such mounted on the vehicle can effectively ground the assemblage.

Applicant has thus provided a positive locking assembly which when secured effectively grounds out the boom as well as the bucket and bucket linkage. The connection is achieved via bracket means located on the bellcrank connection of the implement linkage assembly while the locking lever is effectively secured to the frame of the vehicle.

Thus, it is apparent that there has been provided, in accordance with the invention a linkage restraining or locking means that fully satisfies the objects, aims, and advantages set forth above. While the invention has been described in conjunction with specific embodiments thereof it is evident that many alternatives, modifications, and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications, and variations as fall within the spirit and broad scope of the appended claims.

What is claimed is:

1. In combination, a vehicle, an implement, a boom, an implement linkage arrangement movably securing said implement to said boom, a hydraulic cylinder for actuating said implement through said linkage, a bracket attached to said linkage in the force transmission path from said cylinder to said implement, at least one linkage locking means including a lever having first and second abutting ends, said first abutting end being pivotally secured to said vehicle and said second end being swingable to abuttingly engage said bracket means when said linkage is orientated in a given position.

2. The linkage locking means of claim **1** wherein said first end includes a toe for limiting pivotal motion thereof and said second end includes a guide means for facilitating engagement with said bracket means.

3. The combination of claim **2** wherein said bracket is a channel having a downwardly extending opening.

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