Dec. 23, 1952 N. J. HUGGER 2,622,500

ADJUSTABLE SUPPORT FOR TOOL FRAMES ON A LIFT TYPE TRACTOR

Filed Nov. 2, 1950 2 SHEETS--SHEET 1

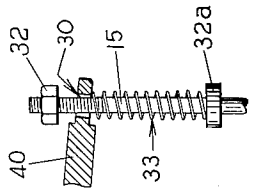


fig. 5

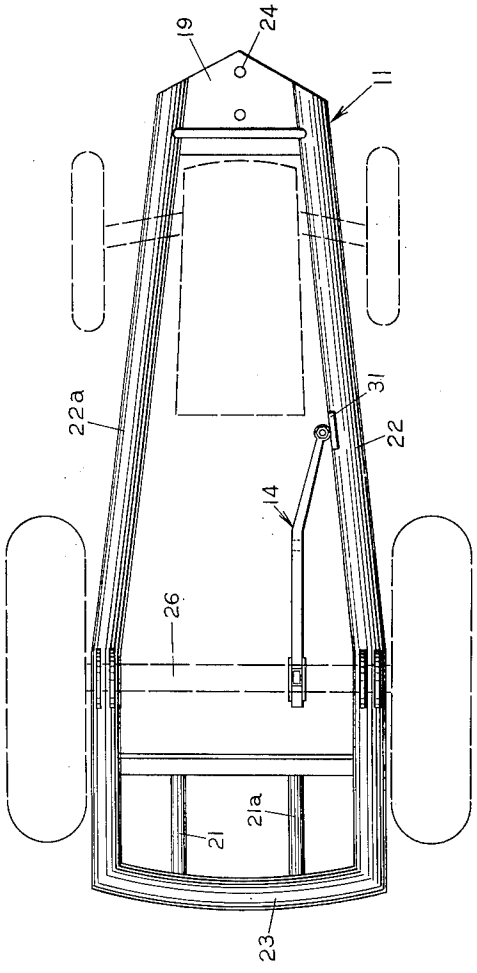


fig. 2

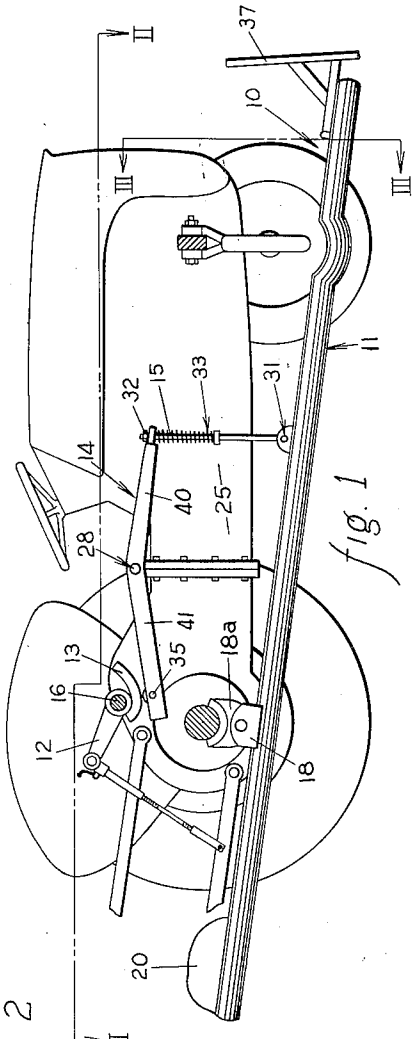


fig. 1

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2 SHEETS--SHEET 2

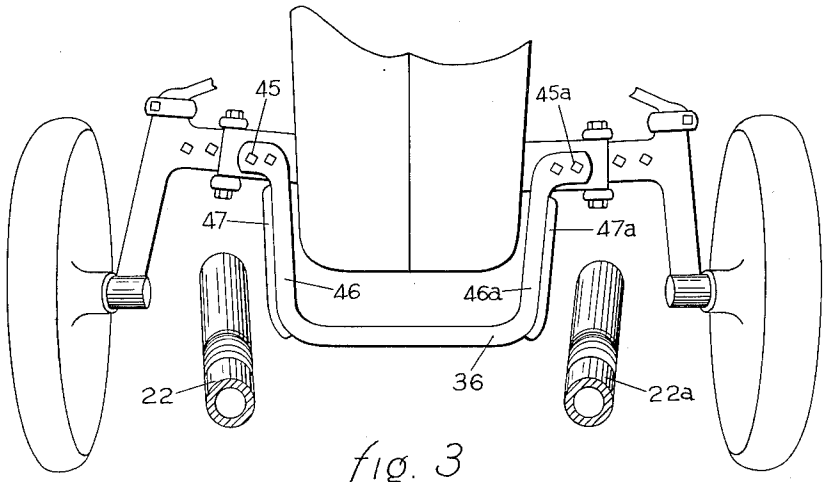


fig. 3

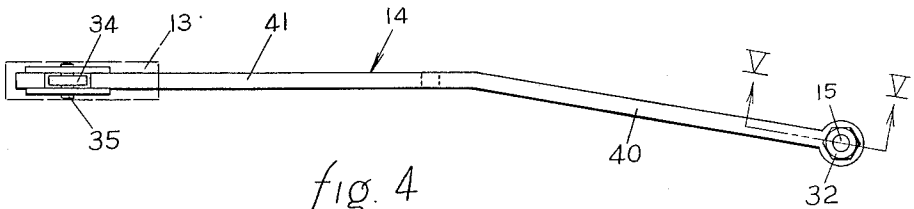


fig. 4

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ADJUSTABLE SUPPORT FOR TOOL FRAMES ON A LIFT TYPE TRACTOR

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Application November 2, 1950, Serial No. 193,666

2 Claims. (Cl. 97—50)

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This invention relates in general to a tool lift mechanism and more particularly to a type thereof applicable to a tractor of the so-called lift type for raising and lowering a tool frame pivotally secured to the rear axle of said tractor and extending beyond the forward end thereof.

Tool frames of this type are conventionally used with tractors of the so-called "lift" type, which type is illustrated in U. S. Patents No. 1,687,719, No. 2,118,180 and No. 2,118,181. The tool frames are used to mount ground working tools, such as bull-dozer blades, on the forward end of the tractor. In present support and lift mechanisms for such frames, adapted for use with the lift type of tractor, the lifting force is normally applied by cables, supported upon the tractor frame, forwardly of the front axle of the tractor for the purpose of obtaining the maximum lifting effect with a minimum of force applied. However, this has occasionally resulted in causing the tractor to rotate about the front axle and to lift the rear end of the tractor, when a greater than usual lifting force is applied to the frame for the purpose, by way of example, of disengaging a tool, mounted upon said frame, from the ground. In some cases said cables are supported upon the front axle whereby the vertical movement of the front wheels is translated to the tool.

I have found that, by applying the lifting force to the tool frame at a point intermediate the axles of the tractor, such raising of the rear end of the tractor is eliminated, and vertical movement of the tool is greatly reduced. In order to accomplish this end, I have conceived an improved tool lift mechanism which is hereinafter disclosed.

Accordingly, a primary object of this invention has been the provision of a tool lift mechanism for a tool frame pivotally supported upon the rear axle of a tractor and extending beyond the forward end thereof, whereby the rear end of the tractor does not tend to raise when force is applied to lift the tool frame.

A further object of this invention is to provide a tool lift mechanism, as aforesaid, which applies its lifting force to the tool frame at a point intermediate the axles of the tractor.

A further object of this invention is to provide a tool lift mechanism, as aforesaid, which can be operated from the conventional hydraulic tool lift of a conventional tractor equipped therewith.

A further object of this invention is to provide

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a tool lift mechanism, as aforesaid, in which the parts thereof are easy to construct and can be mounted upon a conventional tractor having a hydraulic tool lift with a minimum of effort and skill.

Other objects of this invention will become apparent to those familiar with this type of device by reading the following description and examining the accompanying drawings.

In the drawings:

Figure 1 is a side elevational view of my invention shown positioned on a lift type of tractor.

Figure 2 shows the frame and lift lever as viewed from the line II—II in Figure 1.

Figure 3 is a sectional view taken substantially along the line III—III of Figure 1.

Figure 4 is an enlarged top view of the lift lever.

Figure 5 is an enlarged, broken, sectional view taken along line V—V of Figure 4.

For the purpose of convenience and without intending any limitations, the terms "rearwardly" and "forwardly," as used herein, shall have reference to the front and rear ends of the tractor as shown in Figure 1 and the parts associated therewith. The terms "upwardly" and "downwardly" shall also be used in referring to the invention and parts thereof as positioned in Figure 1.

General description

In meeting the above outlined objects, as well as others incidental thereto, I have provided a lift mechanism 10, Figure 1, having a rectangular tool frame 11 pivotally secured to the rear axle of a standard lift type of tractor, said tractor including a shaft 16 disposed adjacent, here above, said rear axle, means for controllably rotating said shaft in either direction and manually operable means for controlling said last-named means. A cam 13 is secured to said shaft 16. A lift lever 14 is pivotally supported upon the transmission housing of said tractor with its rearward end engaging the cam 13. A rod 15 is pivotally secured at its lower end to said tool frame 11, and its upper end is slidably and resiliently engaged by said lift lever 14.

It is to be understood that in employing my tool lift mechanism 10 on a tractor, two sets of such mechanism are used, one on each side of the tractor. However, since they are identical with each other, my invention will be sufficiently disclosed by describing in detail only one set of such lift mechanism 10. It is understood that the tractor here employed for the purpose of describing the operation of this invention is of

a standard commercial type and forms no part of this invention by itself.

Detailed description

The tool frame **11** (Figures 1 and 2), which is substantially rectangular in shape, is positioned beneath a standard lift type of tractor with its side members **22** and **22***a* pivotally secured, near their rearward ends, to the rear axle **26** of the tractor by conventional pivot means, such as pivot brackets **18** and **18***a* and a conventional connecting pin.

The side members **22** and **22***a* and the rear end member **23** of the tool frame **11** are frequently constructed from steel tubing, preferably of about 4" diameter; the forward end member **19**, which extends beyond the forward end of the tractor, is preferably a flat steel plate having a plurality of suitable openings **24** extending therethrough for attaching bulldozer blades or other earth working implements.

A counter-weight **20** is usually positioned at the rear end of the tool frame **11** and secured to the support elements **21** and **21***a* (Figure 2) by any conventional means.

The shaft **16** (Figures 1 and 4), normally mounting a lift arm **12**, is rotatably secured upon the housing **25** of the tractor in a position parallel with and above the rear axle **26** of the tractor. The lift arm **12**, which turns with the shaft **16**, extends perpendicularly therefrom.

The details of construction of the shaft **16** and the means for actuating it are not herein further described, inasmuch as such mechanism is conventional equipment on all standard lift type tractors and its construction is well known.

The cam **13** (Figure 1) is secured to one end of said shaft **16** and in this particular embodiment has its greatest radius at its forwardmost portion. It conveniently comprises a curved piece of steel fixed at its one end in any convenient manner, as by being stud bolted, to the hub of the lift arm **12** and extending forwardly therefrom. The radius of said cam being greater than the radius of said hub, the cam will extend away from said hub in its forward portion. Thus, the radius of said cam will be at a minimum at its rearward end and it will increase progressively toward its forward end.

It will be recognized that this cam may be affixed permanently in place since its presence will not interfere with other normal uses of the tractor or with the operation of the lift arm **12**.

The lift lever **14** (Figures 1 and 4) is pivotally supported intermediate its end points at a pivot point **28** on the tractor transmission housing **25** above said tool frame and forwardly of said shaft **16** and is substantially parallel with the lengthwise extent of the tool frame **11**. As shown in Figure 1, the pivot point **28** is preferably spaced above the tool frame **11** substantially the same distance as the shaft **16** is spaced above the tool frame **11**.

The forward end **40** of the lift lever **14** has an opening **30** extending vertically therethrough and said lift lever is bent outwardly slightly with respect to the rearward end **41** thereof.

The rearward end of the lift lever **14** is bent downwardly slightly with respect to the forward end **40** and extends rearwardly to a point directly below and adjacent the cam **13**.

A cam follower, here a steel roller, **34** is rotatably secured within the rearwardmost end of the lift arm **14**, by conventional means such as pin **35**. The roller **34** extends slightly above the upper surface of the lift arm **14** for engagement with the lower surface of the cam **13**.

The rod **15** (Figures 1 and 5) is pivotally secured at its lower end to the side member **22** of the tool frame **11** at a point **31** intermediate the front and rear axle of said tractor in vertical alignment with the opening **30** in the lift lever **14**. The upper end of the rod **15** extends vertically upward through the opening **30** and is externally threaded at its uppermost end to receive the stop nut **32**.

The rod **15** is of a diameter slightly less then the inside diameter of the opening **30** to allow the rod **15** to slide easily through the opening **30**. The nut **32**, however, is of a diameter greater than the opening **30** so as to prevent downward movement of the rod **15** through the opening **30** beyond the nut **32**.

A spring **33** encircles the rod **15** between the lower surface of the lift lever **14** and the stop nut **32***a* so as to yieldably urge the lift lever **14** against the upper stop nut **32**.

A U-shaped guide frame **36** (Figure 3) is constructed from any convenient material, here one inch steel tubing, is secured to the front axle of the tractor by conventional rivets, or bolts, **45** and **45***a* and is positioned between the side members **22** and **22***a* of the tool frame **11**. The side members **46** and **46***a* of the guide frame **36** are positioned adjacent the side members **22** and **22***a* and have a bearing strip **47** and **47***a* welded to their outer surface. The bearing strips **47** and **47***a* are slidingly engaged by the respective side members **22** and **22**a when the tool frame **11** is pivoted about the rear axle **26** of the tractor.

Operation

In operation, when a tool, as a bulldozer blade **37** (Figure 1), is attached to the front plate **19** of the tool frame **11**, the tool may be conveniently raised or lowered by simple manipulation of the hydraulic lift mechanism of the tractor.

When the shaft **16** is rotated counter-clockwise to its lowermost position of the lift arm **12**, as shown in Figure 1, that portion of the cam lower surface having the shortest radius, thus the rearward portion, contacts the steel roller **34** and the rearward end **41** of the lever arm **14** is in its uppermost position.

As the shaft **16** is rotated in a clockwise direction to the uppermost position of the lift arm **12**, that portion of the lower surface of the cam having the greatest radius, thus the forward portion, engages the steel roller **34** and the rearward end **41** of the lever arm **14** is depressed.

When the rearward end of the lever arm **14** is depressed, the forward end **40** is pivoted upward and the rod **15** is lifted, which in turn lifts the forward end of the tool frame **11**.

The steel roller **34**, which engages the lower surface of the cam **13**, rotates with movement of the cam **13**, thus reducing friction between the engaging surfaces.

When the tractor is in operation, the tool attached to the frame **11** will oftentimes bounce over an irregularity in the earth's surface, which will in turn cause the tool frame **11** to bounce. Therefore, the rod **15** has been slidingly attached to the lever arm **14** and a spring **33** has been provided around the rod **15** to prevent undue bouncing of the tool frame **11**.

The guide frame **36**, which is secured to the front axle of the tractor, guides the upward and downward movement of the tool frame **11** between the front wheels of the tractor.

As pointed out above, the advantage of having the lifting force intermediate the axles of the tractor is that raising of the rear end of the tractor is substantially eliminated. Further, a device of maximum simplicity, but great durability, is here provided.

While it is necessary in this structure to apply more force to the tool frame **11** to lift same from its middle than from its end, this disadvantage is overcome in the mechanical advantage derivable from the cam. The conventional counterweight **20** will also assist.

Although the above mentioned drawings and description apply to one particular preferred embodiment of this invention, it is not my intention, implied or otherwise to eliminate other variations or modifications which do not depart from the scope of the invention unless specifically stated to the contrary in the hereinafter appended claims.

I claim:

1. Tool supporting and controlling mechanism for use with a lift type tractor, said tractor having a shaft parallel with and positioned adjacent its rear axle and having also means for controllably rotating same, the combination comprising: a rectangular tool frame including spaced longitudinal members positioned parallel to the longitudinal extent of the tractor and extending forwardly of said tractor, including tool supporting means connecting the forward ends of said longitudinal members and counterweight supporting means connecting the rearward ends of said members, means associated with said longitudinal members for pivotally supporting said frame member upon the housing of the rear axle of said tractor; a cam and means for attaching same to said shaft; a level disposed substantially parallel to, and above, one of said longitudinal frame members, and means pivotally mounting said lever intermediate its ends onto the frame of the tractor, said lever having means at its rearward end for engaging said cam; means connecting the forward part of said lever with said one of said longitudinal members at a point thereon longitudinally intermediate (1) the forward wheels of the tractor and (2) the point of attachment of said frame to the housing of the rear axle of the tractor; whereby rotative movement of said shaft will act through said cam to raise and lower the rearward end of said lever and thereby raise and lower the forward end of said rectangular frame.

2. Tool supporting and controlling mechanism for use with a lift type tractor, said tractor having a shaft parallel with and positioned adjacent its rear axle and having also means for controllably rotating same, the combination comprising: a rectangular tool frame including spaced longitudinal members positioned parallel to the longitudinal extent of the tractor and extending forwardly of said tractor, including tool supporting means connecting the forward ends of said longitudinal members and counterweight supporting means connecting the rearward ends of said members, means associated with said longitudinal members for pivotally supporting said frame member upon the housing of the rear axle of said tractor; a cam and means for attaching same to said shaft; a lever disposed substantially parallel to, and above, one of said longitudinal frame members, and means pivotally mounting said lever onto the frame of the tractor, said lever having means near its rearward end for engaging said cam; means connecting a part of said lever forwardly of its point of engagement with said cam with said one of said longitudinal members at a point thereon longitudinally intermediate (1) the forward wheels of the tractor and (2) the point of attachment of said frame to the housing of the rear axle of the tractor; whereby rotative movement of said shaft will act through said cam to raise and lower the rearward end of said lever and thereby raise and lower the forward end of said rectangular frame.

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