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PIVOT PIN STRUCTURE

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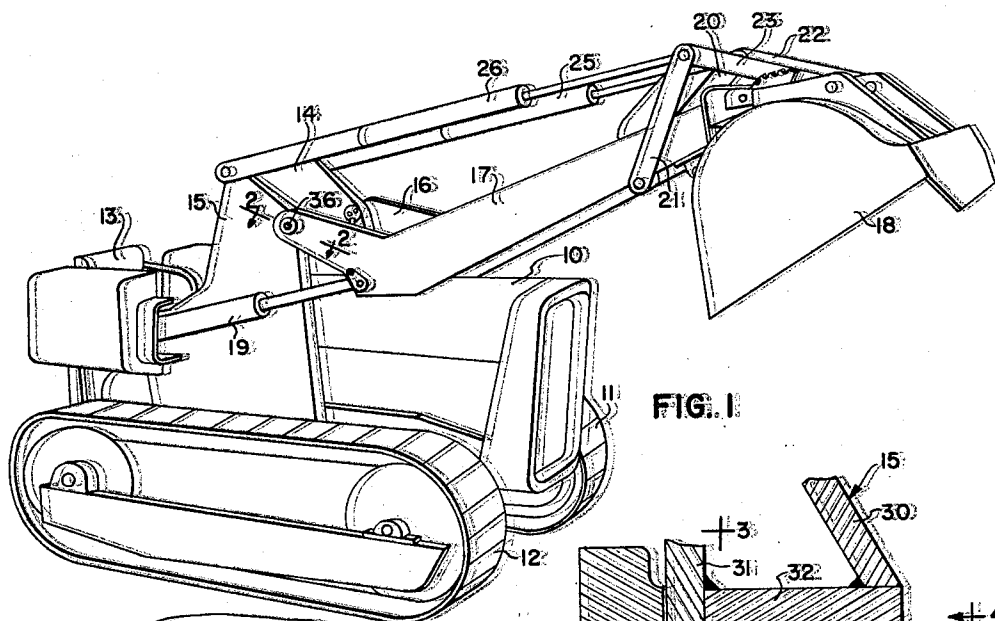


FIG. 1

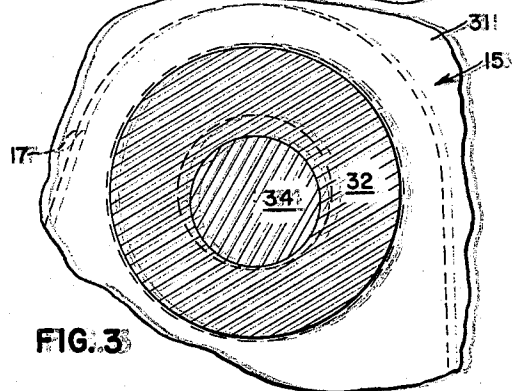


FIG. 3

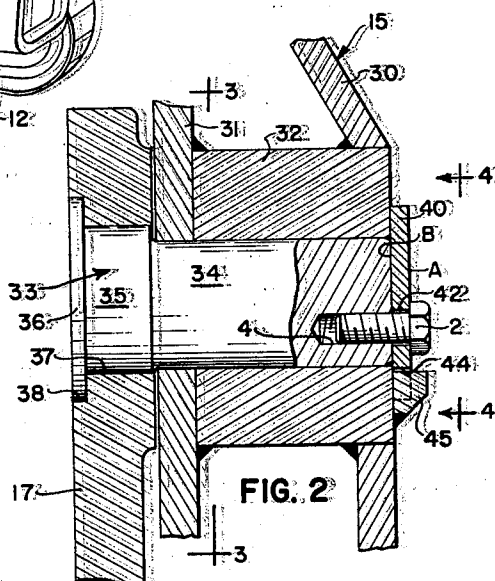


FIG. 2

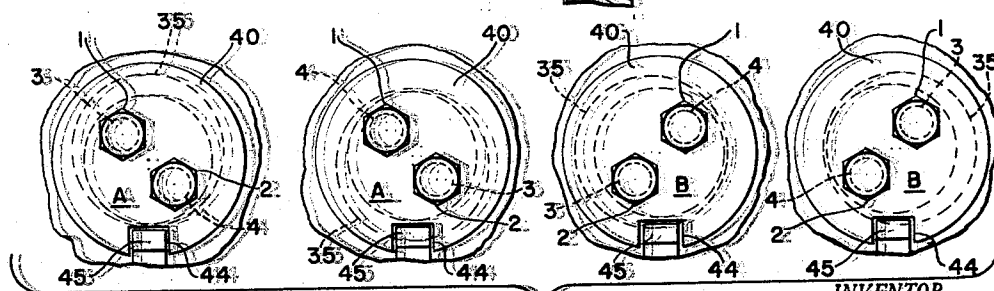


FIG. 4

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PIVOT PIN STRUCTURE

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This invention relates to an earth moving implement and more particularly for the means of mounting the implement on a tractor. Still more particularly this invention relates to a particular type of pivot pin mounting which permits the implement frame to be minutely adjusted relatively to the tractor body.

On the conventional type earth mover that may be mounted on a tractor, there are provided upright supporting frameworks on opposite sides of the tractor which are pivotally connected to a pair of forwardly extending lift arms connected at their forward ends to an earth moving piece of equipment such as a loader bucket. The lift arms are normally interconnected either by means of beam structure or by the bucket so as to become a rigid U-shaped member. In many instances, and particularly on what is considered an inside loader, i.e. in which the lift arms extend between the tractor body and the tractor wheels or tracks, there is often created the problem of preventing interference of the lift arms with portions of the tractor. In the vertical swing of the lift arms, they will often come closely adjacent to some portion of the tractor or the tracks or wheels as the case may be. In these instances, even a slight error in manufacturing tolerances or an accumulation of errors due to manufacturing tolerances will cause interference between the lift arms and the tractor.

It is therefore one of the primary objects of the present invention to provide pivot means connecting the lift arms to the respective supporting frames on the side of the tractor which may be slightly adjusted to effect minute movement laterally of the lift arms in order to avoid interference with a portion of the tractor. This is fundamentally done by moving the pivot pin support for one or both of the lift arms in fore-and-aft directions in order to swing the arms laterally to one side or the other. The entire lift arm structure may be swung laterally as far as one-half an inch by merely moving the rear pivots.

Specifically it is the object of the present invention to provide a pivot pin structure connecting each lift arm to its respective supporting frame which is composed of opposite end portions eccentric to one another. One end portion extends through the supporting frame and the other end portion extends through the respective lift arm. Therefore, by merely turning the pivot pin, the eccentric connection to the lift arm will cause the arm to move forwardly or rearwardly relative to the supporting structure.

It is a further object of the present invention to incorporate with the aforementioned pin structure a plate member which is connected to one end portion of the pin by means of a pair of bolts disposed on a diameter of the respective end portion. The plate has a notch on its outer edge, and the supporting frame has a lug which is insertable in the notch. In one position of the plate, the pin may be adjusted at 180 degree intervals and the bolts inserted and locked in that position. By turning the plate over, the pin may be rotated at intervals of 180 degrees and 90 degrees offset as respects the previous settings. The plate may be again locked in these positions. Consequently, by this simple connection, the pin may be positioned angularly at 90 degree intervals.

Other objects and advantages of the present invention will become apparent to those skilled in the art as the nature of the invention is better understood from the

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following description and as shown in the accompanying drawings.

FIG. 1 is a side perspective view of a tractor and loader assembly incorporating the principles of the present invention.

FIG. 2 is an enlarged sectional view taken substantially along the line 2-2 of FIG. 1.

FIG. 3 is a sectional view taken substantially along the line 3-3 of FIG. 2.

FIG. 4 is a composite view showing various positions of the pin and its surrounding structure as viewed in a location shown on the line 4-4 of FIG. 2.

Referring now to the drawings, there is provided a tractor having a tractor body 10 carried on a pair of side tracks 11, 12. An operator's station with suitable controls is provided and is indicated by the reference numeral 13. Mounted on opposite sides of the tractor and in conventional manner are a pair of upright loader supporting frames 14, 15. Supported on and extending forwardly from the supporting frames 14, 15 are a pair of lift arms 16, 17 which are interconnected at their forward ends by a loader bucket 18. Other means such as a transverse beam may extend across the forward end of the lift arms 16, 17 to interconnect the arms and generally rigidify the entire lift arm structure. A pair of lift cylinders, one of which is shown at 19, extends from the supporting frames 14, 15 to the respective lift arms 16, 17 and operates to raise and lower the arms 16, 17 about their rear transverse pivots. The bucket is tilted by means of linkage composed of a pair of links 20, 21 supported on the lift arms 16, 17 respectively and connecting links 22, 23 which extend from the upper end of the links 20, 21 to the rear portion of the bucket 18. Also connected to the upper ends of the links 20, 21 are a pair of tilting cylinders 25, 26 extending from upper portions of the supporting frames 14, 15. Extension and retraction of the cylinders 25, 26 causes the bucket 18 to roll about the pivotal connection to the lift arms 16, 17.

Referring now to the pivotal structure connecting the arms 16, 17 to the supporting frame 14, 15 and particularly to the structure shown in FIGS. 2 and 3, it should be understood that the structure for each lift arm 16, 17 is identical. Consequently, detailed description will be limited to the pivot structure connecting the right lift arm 17 and the right supporting structure 15. The supporting frame 15 is composed of inner and outer upright plates 30, 31 which are spaced apart and carry at upper forward ends an elongated horizontal pin support 32. The parts 30, 31, 32 are welded to supply a rigid support for the pivot pin. A pin, indicated in its entirety by the reference numeral 33, is composed of an inner end portion 34 which is carried by the support 32 and the outer wall 31, and an outer portion 35 which is eccentric to the inner end portion 34. The outer end of the pin 33 is provided with an integral flat round head portion or flange 36. The arm 17 is provided with an opening 37 which receives the eccentric end portion 35 and with a shoulder 38 which receives the integral plate portion or flange 36. As may be clearly seen from viewing FIGS. 2 and 3, the pin 34, upon angular movement about its axis and within the frame structure 15, will cause the offset portion of the eccentric end 35 to be offset either to the front, top, bottom, or rear and will consequently affect positioning of the arm 17. Provision, as will be presently described, is provided to rotate the pin 33 at 90 degree intervals.

A plate 40 lies adjacent the inner end of the pin portion 34 and overlies slightly the surface of the supporting structure 15. The plate 40 is provided with oppositely disposed surfaces A, B. The inner portion 34 is provided with a pair of tapped openings 3, 4, which extend axially into the pin 34 and are diametrically opposite to one

another. The plate 40 is similarly provided with a pair of openings, one of which is shown at 42 in FIG. 2, which may be aligned with the tapped openings 3, 4 in the pin portion 34. A pair of bolts, indicated at 1 and 2 extend through the openings in the plate 40 and into the tapped openings 3 and 4 of the pin 34. The plate 40 is provided with a notch 44 in its outer edge which overlies the supporting structure 15. A lug 45 is fixed to the surface of the supporting structure 15 and is received in the notch 44. Consequently the plate is rigid with the pin 33 and is locked against angular movement by the lug 45. When connected to the pin 33, the plate 40 becomes a detachable flange of the pin 33.

Reviewing FIG. 4, by placing the side B of the plate 40 against the end of the pin portion 34, the offset part of the eccentric portion 35 may extend above the portion 34. The bolts 1, 2 may temporarily be removed and the pin 33 rotated 180°. The offset portion will then be below the inner portion 34 of the pin. This is shown substantially in the second view in FIG. 4. Since the openings 3, 4 are diametrically opposed to one another, the plate 40 will not need to be rotated.

In the two views of the pin structure shown at the right of FIG. 4, the plate B is reversed so that the surface A lies adjacent the end of the inner pin portion 34. Consequently the surface B is exposed. With this arrangement, the pin 33 may be rotated so that the two openings 3, 4 are placed in intermediate positions as compared to the positions shown in the two views on the left of FIG. 4. In the third view, the offset part of the eccentric 35 is to the left. On the far right view of FIG. 4, the offset part of the eccentric portion 35 extends to the right. Consequently FIG. 4 clearly shows that the offset part of the eccentric 35 may be positioned above, below, forwardly or rearwardly of the inner pin portion 34. The part or arm 17 may therefore be moved slightly to the rear, upward or downward relative to the supporting frame 15. Since the arm is part of rigid U-shaped structure and interconnected to the arm 16, such movement will result in minute lateral adjustment of the arms 16, 17.

Referring again to FIG. 1, it becomes apparent that minute adjustment of the lift arms 16, 17 laterally may occur due to the movement of the pivot pins connecting the respective arms 16, 17 to the supporting structures 14, 15. For example, should the right arm 17 contact slightly the front end of the tractor body 10, the pin 33 could be rotated so that the eccentric part of the offset portion 35 extends rearwardly to thereby draw the arm laterally to the right in order to avoid the tractor body 10. This type of adjustment is not expected to overcome major defects or improperly manufactured implements. Primarily it is for the purpose of overcoming a combination of tolerances which would shift the loader arms 16, 17 slightly to the left or right so as to contact the tractor body or it is possible to overcome a situation in which the frame may become slightly deformed so that a minute adjustment would be required to effect its not contacting the tractor body.

While only one form of the invention has been shown, it should be recognized that other forms and variations will occur to those skilled in the art. Therefore, while the present form was shown in concise and detailed manner, it should be recognized that such was for the purpose of clearly and concisely illustrating the principles of the invention and it was not intended to limit or narrow the invention beyond the broad concepts set forth in the appended claims.

What is claimed is:

1. In an earth moving piece of equipment for a tractor having a pair of upright supporting frames on opposite sides of the tractor, a pair of forwardly extending lift arms extending from the supporting frames, and means interconnecting the arms beyond one end of the tractor, the improvement comprising: a pair of horizontally disposed and alined pivot pins, each of said pins

having opposite eccentric end portions with one end portion extending through one of the upright frames and the opposite end portion extending through a respective lift arm for permitting vertical movement of the arm; a pair of tapped openings extending axially through said one end portion of each of the pivot pins, the tapped openings being on a diameter of the respective end portion and equal distance from its axis; plates lying adjacent the latter end portions and overlying partially the respective supporting frames, said plates having alined openings with the tapped openings of the respective end portions; threaded elements extending through the latter openings and threadably received in the tapped openings; and means on each of the respective supporting frames contacting the overlying portion of the respective plates for preventing rotation of the respective pins.

2. In an earth moving piece of equipment for a tractor having a pair of supporting frames on opposite sides of the tractor, a pair of forwardly extending lift arms extending from the supporting frames, and means interconnecting the arms, the improvement comprising: a pair of horizontally disposed and alined pivot pins, each of said pins having opposite eccentric end portions with one end portion extending through one of the upright frames and the opposite end portion extending through a respective lift arm for permitting vertical movement of the arm; a pair of tapped openings extending axially through said one end portion of each of the pivot pins, the tapped openings being on a diameter of the respective end portion and equal distance from its axis; plates lying adjacent the latter end portions and overlying partially the respective supporting frames, said plates having alined openings with the tapped openings of the respective end portions and lug receiving notches; threaded elements extending through the latter openings and threadably received in the tapped openings; and lugs on the respective supporting frames contacting the notches of the respective plates for preventing rotation of the respective pins.

3. In an earth moving piece of equipment for a tractor having a pair of supporting frames on opposite sides of the tractor, a pair of forwardly extending lift arms extending from the supporting frames, and means interconnecting the arms, the improvement comprising: a pair of horizontally disposed and alined pivot pins, each of said pins having opposite eccentric end portions with one end portion extending through one of the upright frames and the opposite end portion extending through a respective lift arm for permitting vertical movement of the arm; and means on the respective supporting frames for preventing rotation of the respective pins, said means being adaptable to lock the pins at various angular positions to thereby adjust the arms relative to the supporting frames.

4. In an earth moving piece of equipment for a tractor having a pair of upright supporting frames on opposite sides of the tractor, a pair of forwardly extending lift arms extending from the supporting frames, means interconnecting the arms beyond one end of the tractor, the improvement comprising: a pair of horizontally disposed and alined pivot pins, each of said pins having opposite and eccentric end portions with one end portion extending through one of the upright frames and the opposite end portion extending through a respective lift arm for permitting vertical movement of the arm; plates rigid with the end portions and overlying partially the supporting frames; and means on each of the respective supporting frames contacting the overlying portion of the respective plates for preventing rotation of the respective pins, said means being adjustable relative to the plates to effect angular position of the pins to thereby adjust the arms relative to the supporting frames.

5. A pivot pin structure for connecting a pair of parts comprising: a pivot pin having opposite and eccentric end portions with one end portion extending through one of the parts and the opposite end portion extending through the other of the parts; a pair of tapped openings

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extending axially through one end portion of the pivot pin, the tapped openings being on a diameter of the respective end portion and equal distance from its axis; a plate lying adjacent the latter end portion and overlying partially one of said parts, said plate having alined openings with the tapped openings of the respective end portion; threaded elements extending through the openings in the plate and threadedly received in the tapped openings; and means on the one of said parts detachably connected to the overlying portion of the respective plate for preventing angular movement of the pin, said overlying plate being removable and reversible to permit angular positioning of the pin to cause movement of one part relative to the other.

6. A pivot pin structure for connecting a pair of parts comprising: a pivot pin having opposite and eccentric end portions with one end portion extending through one of the parts and the opposite end portion extending through the other of the parts; a pair of tapped openings extending axially through one end portion of the pivot pin, the tapped openings being on a diameter of the respective end portion; a plate lying adjacent the latter end portion and overlying partially one of said parts, said plate having alined openings with the tapped openings of the respective end portion and a notch in its outer edge; threaded elements extending through the openings in the plate and threadedly received in the tapped openings; and lug means on the one of said parts insertable in the notch of the overlying portion of the respective plate for preventing angular movement of the pin.

7. A pivot pin structure for connecting a pair of parts having adjoining surfaces and side faces away from the surfaces comprising: a pivot pin having opposite annular end portions extending into the respective parts with one portion being eccentric to the other and affording a shoulder

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at the juncture between the portions that abut the surface of one of the parts; a pair of flanges on opposite ends of the pivot pin engaging the respective side faces of the parts for limiting axial movement between the parts and the pin, one of the flanges being detachably supported on the pin for angular adjustment in respect thereto, the latter flange having abutment means adjacent its edge, and the other of said flanges being integral with the pin; and means on the side face of the part adjacent the detachable flange engaging the abutment means for preventing rotation of the pin relative to the respective part.

8. A pivot pin structure for connecting a pair of parts having adjoining surfaces and side faces away from the surfaces comprising: a pivot pin having opposite end portions extending into the respective parts with one portion being eccentric to the other and affording a shoulder at the juncture between the portions that abut the surface of one of the parts; a pair of flanges on opposite ends of the pivot pin engaging the respective side faces of the parts for limiting axial movement between the parts and the pin, one of the flanges being detachably supported on the pin and the other of the flanges being integral with the pin; and means between a side face of the part adjacent one of the flanges and the respective flange engaging the latter for preventing rotation of the pin relative to the respective part.

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