Jan. 13, 1959 G. S. ALLIN 2,867,922

HYDRAULIC RAM MOUNTINGS FOR EARTH MOVING MACHINES

Filed Dec. 31, 1954 2 Sheets-Sheet 1

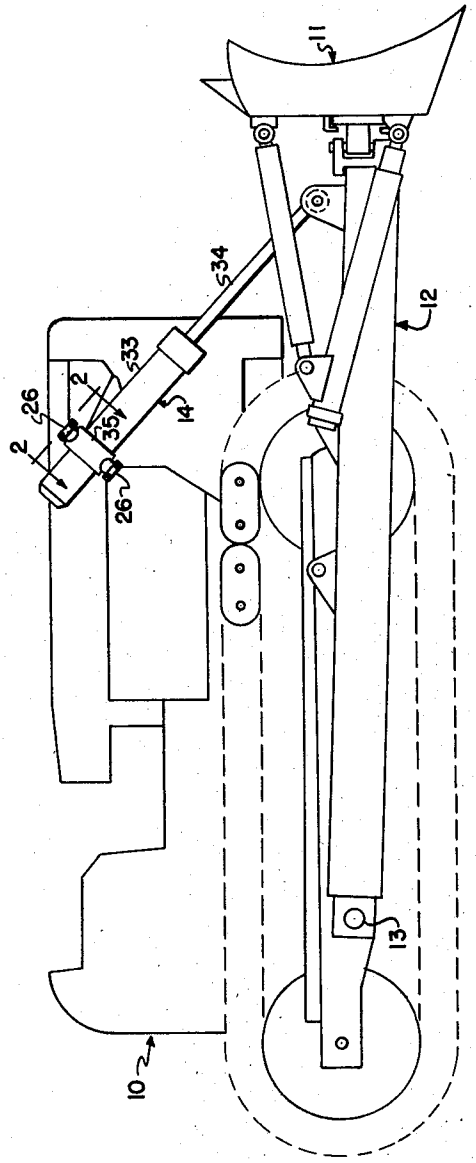


FIG. 1

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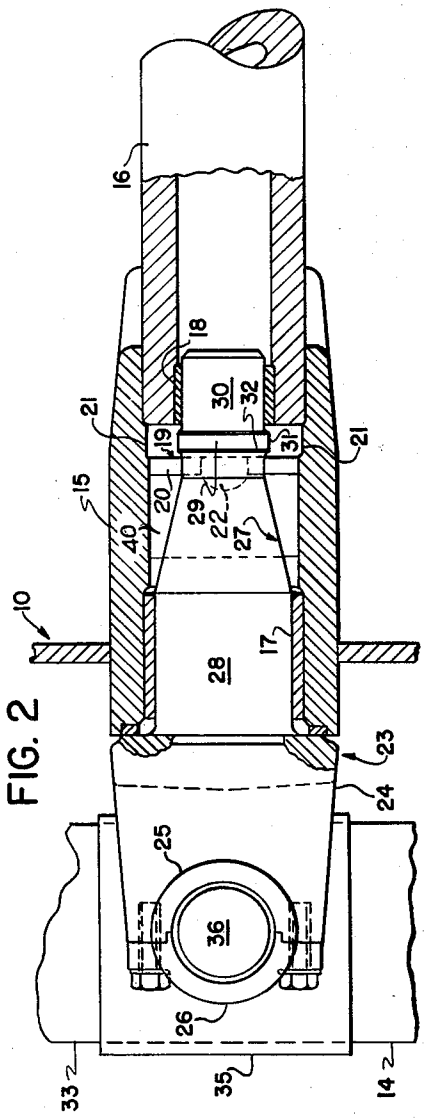


FIG. 2

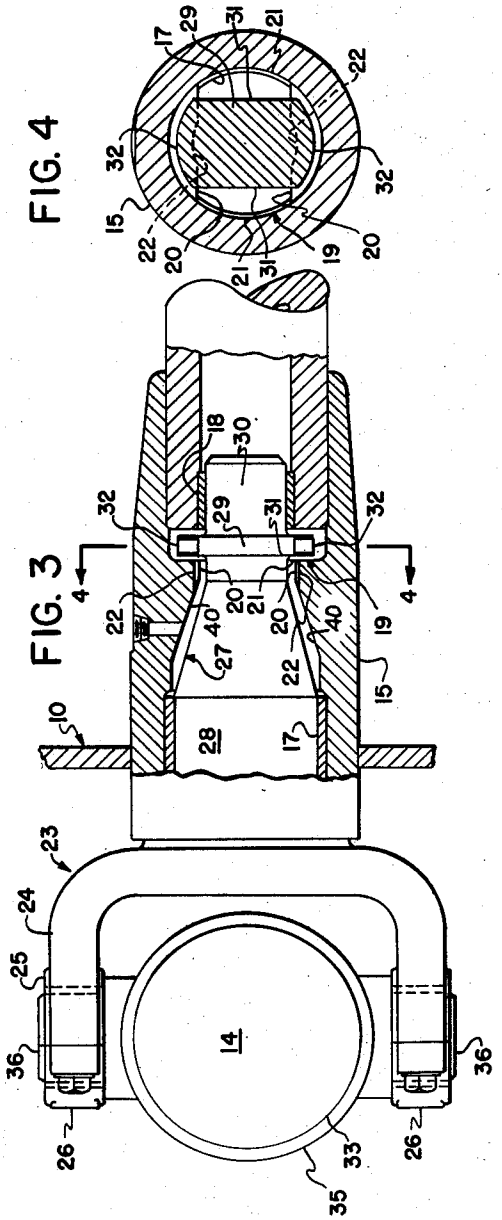


FIG. 3

FIG. 4

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HYDRAULIC RAM MOUNTINGS FOR EARTH MOVING MACHINES

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5 Claims. (Cl. 37—144)

This invention relates generally to angle dozers, and more specifically, to an improved gimbal arrangement for mounting a hydraulic ram on an earth-moving machine.

An object of this invention is to provide an improved gimbal arrangement for a hydraulic ram for an angle dozer wherein the hydraulic ram is mounted between the tractor and some portion of the angle-dozer blade or blade frame.

Another object of this invention is to provide a gimbal arrangement for a hydraulic ram for an angle dozer wherein the gimbal arrangement provides adequate support under the extreme load conditions encountered in the use and operation of such an earth-moving machine.

It is another object of the present invention to provide a gimbal arrangement for a hydraulic ram for an angle dozer wherein the hydraulic ram and gimbal arrangement may be easily removed from and replaced on the tractor.

Other objects and features of the present invention will be apparent upon perusal of the following specification and drawings, of which:

Figure 1 is a side-plan view of an angle dozer embodying the present invention;

Figure 2 is an elevational view, partly in cross section, taken along the line 2—2 of Figure 1;

Figure 3 is a top-elevational view, partly in cross section, of the structure shown in Figure 2; and

Figure 4 is a cross-sectional view of the structure shown in Figure 3 and taken along the line 4—4.

The present embodiment is the preferred embodiment, but it is to be understood that changes can be made in the present embodiment by one skilled in the art without departing from the spirit and scope of this invention.

For a detailed description of the present invention, reference is made to the drawings.

In the present embodiment, the invention is shown as mounted to a crawler-type tractor 10. The angle dozer for the tractor 10 comprises a blade 11 adjustably mounted to a supporting frame 12 which is, in turn, pivotally mounted on the tractor 10 by means of pivotal mounting means 13. To raise and lower the angle dozer, a hydraulic ram 14, formed in duplicate portions disposed on each side of the tractor 10, is provided. This invention is concerned with the particular mounting of the hydraulic ram 14 to the tractor 10.

Since the gimbal arrangement on each side of the tractor 10 is substantially identical, only one side need be described in detail. The portion of the gimbal arrangement fixedly mounted to the tractor 10 comprises a particularly formed casting 15. The casting 15 is generally tubular, and each portion thereof, disposed on each side of the tractor 10, is interconnected by a transverse tubular member 16, shown in Figure 2. The outer end of the casting 15 is provided with a bearing 17 of a relatively large diameter. Some distance inwardly therefrom, the end of the tubular member 16 is provided with a

bearing 18. Between the bearings 17 and 18, the casting 15 is formed to comprise the female portion 19 of a bayonet-type connection. The female portion 19 is formed as an opening, or slot, of two parallel sides 20 and two arcuate sides 21. The two parallel sides 20 are spaced apart a distance slightly less than the outer diameter of the bearing 18, and an arcuate notch 22 is formed in each parallel side 20 to present an opening of a size sufficient to permit insertion of the bearing 18, through the outer end of the casting 15. The female portion 19 is further formed to have inclined surfaces 40 extending from each of the parallel sides 20 outwardly to the inner edge of the bearing 17.

The male portion of the bayonet-type connection for the gimbal arrangement is designated with the numeral 23. The male portion 23 comprises a U-shaped yoke section 24. The legs of the yoke section 24 are spaced apart a distance greater than the diameter of the hydraulic ram 14, and ends of the legs of the U-shaped yoke 24 are formed as one-half of a bearing 25. To form a complete bearing at the end of each leg of the U-shaped yoke 24, a pair of bearing blocks 26 are provided. The bearing blocks 26 comprise one-half of a bearing matching the half of the bearing 25. The end of each leg of the U-shaped yoke 24 is tapped, and each bearing block 26 is provided with a pair of openings. A pair of bolts are projected through the pair of openings in each bearing block 26 and threaded into the ends of the legs of the U-shaped yoke 24 to form two complete bearings spaced along a common axis. The male portion 23 is further formed to have a shaft 27 thereon and extending from the cross piece of the U-shaped yoke 24. The shaft 27 is formed to comprise three sections: a relatively large bearing section 28, a locking and retaining member 29 and a reduced bearing section 30. The bearing section 28 is of a diameter and length sufficient to permit a journalling thereof within bearing 17, and the bearing section 30 is of a diameter and length to permit journalling thereof within bearing 18. The locking and retaining section 29 is formed as two straight parallel sides 31 and two arcuate sides 32. The two straight parallel sides 31 are spaced apart a small amount less than the distance between parallel sides 20 of the casting 15. The two arcuate sides 32 of the locking and retaining section 29 have a curvature substantially equal to the curvature of the curved sides 21 of the casting 15, and are spaced apart a small amount less than the distance between the arcuate side 21 of the casting 15.

The hydraulic ram 14 comprises a cylindrical head portion 33 and a piston rod 34. The head portion 33 of the hydraulic ram 14 is provided with a collar 35 which is fixedly mounted thereabout. The collar 35 is provided with a pair of stub shafts 36 which are axially aligned. The stub shafts 36 have a diameter sufficient to permit journalling within the bearings in the legs of the U-shaped yoke 24.

In the assembly of the various described members of the present invention, the shaft 27 of male element 23 is inserted into the casting 15 with the straight parallel side 31 parallel to the parallel sides 20; and when the bearing section 30 is journalled within the bearing 18 and the locking and retaining member 29 is within the section 19, the male element 23 is rotated through an angle approximately 90° to the position shown in the drawings to lock the male element 23 against axial movement of the shaft 27. It can easily be seen that while locked against axial movement, rotation of the male element 23 through an angle of approximately 180° is permitted. The stub shafts 36 of the collar 35 are positionable within the bearing section of the U-shaped yoke 24 and the bearing blocks 26 are mounted on the remainder of the stub shafts 36 to complete the gimbal arrangement for the hydraulic

ram 14. The piston rod 34 of the hydraulic ram 14 is pivotally connected to the supporting frame 12.

Having described the invention what is considered new and desired to be protected by Letters Patent is:

1. In an angle dozer having a tractor and having a forwardly extending blade assembly pivotally mounted on said tractor, a hydraulic ram, means mounting the cylinder of said hydraulic ram against any movement along a transverse horizontal axis to said tractor while providing for a certain range of pivotal movement of said hydraulic ram about said axis, said means further formed to release said cylinder from said tractor when said cylinder is pivoted to a certain position beyond said range, said certain range of a certain amount and said means positioned on said tractor and said cylinder so that when the piston of said hydraulic ram is pivotally connected to said blade assembly said range coincides with the increment of pivotal movement of said cylinder as said hydraulic ram is operated to raise and lower said blade assembly through the entire operating range of said blade assembly, and said means further positioned on said tractor and said cylinder so that said cylinder attains said certain position when said cylinder is pivoted beyond said increment.

2. In an angle dozer having a tractor and having a forwardly extending blade assembly pivotally mounted on said tractor, a hydraulic ram, a gimbal arrangement for mounting the cylinder of said hydraulic ram to said tractor, said gimbal arrangement comprising a tubular female element having one member of a bayonet joint formed therein and having a pair of bearings mounted therein with the axis of rotation thereof positioned substantially horizontally and transversely of said tractor, a male element pivotally mounted to the cylinder of said hydraulic ram and having the other member of said bayonet joint formed on a shaft, said male element positioned within said bearings with said members of said bayonet joint cooperating to prevent any movement of said male element along said transverse horizontal axis to said tractor while providing for a certain range of pivotal movement of said hydraulic ram about said axis, said members of said bayonet joint further cooperating to release said cylinder from said tractor when said cylinder is pivoted to a certain position beyond said range, said certain range of a certain amount and said female element positioned on said tractor and said male element positioned on said cylinder so that when the piston of said hydraulic ram is pivotally connected to said blade assembly said range coincides with the increment of pivotal movement of said cylinder as said hydraulic ram is operated to raise and lower said blade assembly through the entire operating range of said blade assembly, and so that said cylinder obtains said certain position when said cylinder is pivoted beyond said increment.

3. In an angle dozer having a tractor and having a forwardly extending blade assembly pivotally mounted on said tractor, a hydraulic ram, a gimbal arrangement for mounting the cylinder of said hydraulic ram to said tractor, said gimbal arrangement comprising a tubular female casting mounted on said tractor, said casting provided with a pair of longitudinally spaced bearings mounted therein, the outer one of said bearings formed to be substantially larger than the inner one of said bearings, said casting formed to have a slot positioned between said bearings, a male element comprising a yoke and a shaft formed to extend therefrom, said shaft journalled in said bearings, a retaining member, said retaining member positioned on said shaft inwardly of said slot, said yoke pivotally mounted to said cylinder, said slot and said retaining member formed so that said male element is locked against any movement along the longitudinal axis of said casting while providing for a certain range of pivotal movement of said hydraulic ram about said axis, said slot and said retaining member further formed to release said cylinder from said tractor when said cylinder is pivoted to a certain point beyond said range, said certain range being of a certain amount and said female positioned on said tractor and said malet element positioned on said cylinder so that when the piston of said hydraulic ram is pivotally connected to said blade assembly said range coincides with the increment of pivotal movement of said cylinder as said hydraulic ram is operated to raise and lower said blade assembly through the entire operating range of said blade assembly, and so that said cylinder attains said certain point when said cylinder is pivoted beyond said increment.

4. In an angle dozer having a tractor and having a forwardly extending blade assembly pivotally mounted on said tractor, a pair of hydraulic rams, means mounting the cylinders of said hydraulic rams on opposite sides of said tractor against any movement along a transverse horizontal axis to said tractor while providing for a certain range of pivotal movement of each of said hydraulic rams about said axis, said means further formed to release said cylinders from said tractor when each of said cylinders are pivoted to a certain position beyond said range, said certain range being of a certain amount and said means positioned on said tractor and said cylinders so that when the pistons of said hydraulic rams are pivotally connected to said blade assembly said range coincides with the increment of pivotal movement of each of said cylinders as said hydraulic rams are operated to raise and lower said blade assembly through the entire operating range of said blade assembly, and said means further positioned so that said cylinders attain said certain position when said cylinders are pivoted beyond said increments.

5. In an angle dozer having a tractor and having a forwardly extending blade assembly pivotally mounted on said tractor, a pair of hydraulic rams, a tube mounted on said tractor and extending substantially transversely thereof, a gimbal arrangement for mounting each of said hydraulic rams to said tractor, said gimbal arrangement comprising a pair of tubular female elements, each of said female elements having a pair of spaced apart bearings formed therein and formed to have a slot positioned between said bearings, each of said female elements mounted on one end of said tube with said bearings positioned along said transverse axis, said gimbal arrangement further comprising a pair of male elements, each of said male elements formed to have a shaft extending therefrom, each of said male elements pivotally mounted to one of the cylinders of said hydraulic rams, said shaft of each of said male elements journalled in one pair of said bearings, a retaining member formed on each of said shafts and positioned within one of said slots, said slots and said retaining members formed to cooperate so that each of the cylinders of said hydraulic rams are maintained against any movement along said transverse horizontal axis while providing for a certain range of pivotal movement of said hydraulic rams about said axis, said slots and said retaining members further formed to release said cylinders from said tractor when said cylinders are pivoted to a certain position beyond said range, said certain range being of a certain amount and said female elements positioned on said tube and said male elements positioned on said cylinders so that when the pistons of said hydraulic rams are pivotally connected to said blade assembly said range coincides with the increments of pivotal movement of said cylinders as said hydraulic rams are operated to raise and lower said blade assembly through the entire operating range of said blade assembly, and so that said cylinders attain said certain position when said cylinders are pivoted beyond said increments.

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