MANIPULATIVE SUPPORT MECHANISM FOR MOUNTING
EARTH WORKING EQUIPMENT
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MANIPULATIVE SUPPORT MECHANISM FOR MOUNTING EARTH WORKING EQUIPMENT

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5 Claims

ABSTRACT OF THE DISCLOSURE

A mounting mechanism attachable with a power of mobile vehicle to support a piece of earth working equipment and to provide a manipulative structure capable of inducing a variable shifting or cutting action and/or adjustment for the location of the earth penetrating edge of said piece of equipment.

This invention is directed broadly to support structures for various types of earth working units to connect such units to maneuverable mobile vehicles and to introduce certain adjustments or controllably controlled movements that are transmitted to the working units to enhance their designed material handling functions under operation.

More specifically this invention relates to cooperative mounting assemblies attachable to opposite outward sides of a power unit or to a mobile vehicle to support at least one end of an earth working device in a workable relation to such vehicle and wherein each assembly includes mechanism adapted to change the relationship of the mounting axes of such earth working device with respect to the vehicle to obtain various earth loading adjustments and manipulations of the loading means of such earth working device.

One of the objects of the present invention is to provide manipulative mounting assemblies to connect an earth working machine with opposite outward portions of a power unit to obtain various adjustable supporting locations of the attached end of the earth working machine on said power unit to meet different conditions of operation as said machine is moved by the power unit.

Another object is to provide a manipulative supporting mechanism to mount earth working equipment on a power unit or tractor to push or tow the equipment by said unit and to provide means in said supporting mechanism to hold the earth penetrating edge or cutting blade of such equipment in a transverse position to the path of travel of the joined units or to induce angular adjustment of such edge or blade to cant forwardly to the right or forwardly to the left at either side of the line of travel of the described units.

Another object is to provide a pair of manipulative supporting mechanisms for opposite sides of a power unit or tractor to mount an earth working device on such unit or tractor and to incorporate operate means in such mechanisms to be able to shift or adjust the earth penetrating edge or blade of the device bodily in a fore or aft direction in relation to a median transverse support axis.

A further object is to provide a pair of manipulative supporting assemblies for opposite sides or in spaced location laterally on a power unit or tractor for the attachment of an earth working device or machine to push or pull such device and wherein said assemblies incorporate controllable means whereby to induce reciprocal motion or oscillatory motion to the earth penetrating edge or blade of the earth working device to enhance soil or earth working efficiency of such device under operation.

Another object is to provide a pair of mounting assemblies to attachably mount or support at least one end of an earth working device for earth penetration or for loading over a leading edge or blade upon a mobile vehicle which mounting assemblies are provided with operable mechanisms that can shift the mounting points relative to the mobile vehicle to obtain various earth penetration attitudes of the leading edge or blade of the earth working device in relation to the normal path of travel of said mobile vehicle and its companion earth working device.

All other objects and advantages relating to the present invention shall hereinafter appear or become apparent from the following detailed description of the invention having reference to the accompanying drawing of the disclosure providing a part of this specification.

In the drawing:

FIG. 1 is a side elevational view of conventional type front end loader that is carried by and mounted upon a power vehicle or tractor by means of the manipulative means of the present invention which are duplicated on both opposite outward sides of the vehicle shown by way of example or at any laterally spaced locations on such a vehicle;

FIG. 2 is a diagrammatic plan view of the front end loader bucket and the relationship of this apparatus to the manipulative mounting or supporting mechanisms and this view demonstrates the opposite outward canting of the earth loading edge or blade of the bucket by the use of the supporting mechanisms;

FIG. 3 is another diagrammatic plan view of the bucket end of the loader to illustrate the shifting phase of the earth engaging edge or open end of the loader by the use of the supporting mechanisms;

FIG. 4 is still another diagrammatic plan view of the bucket end of the loader to here illustrate the nudging or oscillating action of the bucket which is brought about by the manipulative means of the supporting assemblies of the present invention;

FIG. 5 is a general side elevational view of a large capacity earth moving scraper and a mobile vehicle or tractor which are joined by means of the manipulative support mechanism that can function to induce various controlled displacements of the attached end portion of the earth moving scraper to change the attitude or relationship of the earth loading end of the scraper to meet different conditions of operation.

Referring now to FIG. 1, here illustrated is a conventional type front end loader 1 and a conventional type power vehicle or tractor 2, which two main units function together for earth working purposes. In the mounting means for the loader to attach the latter to the power vehicle are the main operative mechanisms of the present invention which are designated as assemblies 3 and 4 best seen in FIGS. 1 and 2, such mechanisms being the manipulative assemblies hereinafter referred to that function to change the attitude of the earth cutting edge or material receiving end of the earth working facility.

The front end loader comprises, generally, a material carrying bucket 5 having an earth penetrating edge or material receiving blade 6, and upper and lower hitch elements or links 7 and 8 constituting hitch means which extend between the bucket 5 and power vehicle 2. This link mechanism is the near side structure or assembly as viewed in FIG. 1 and such a structure is duplicated on the far side of FIG. 1. All reference numbers will be the same for both duplicated structures except that the far side numbers will be primed, particularly in FIGS. 2, 3 and 4.

The bucket end of link 8 is connected to pin 9 on lug 10 of the bucket 5 and link 7 is connected with pin 11 on the swinging bracket link member 12 pivoted on pin 9 and forming part of the bucket dumping mechanism 13. Mechanism 13 comprises an upright 14 on bucket 5 and a hydraulic cylinder 15 pivotally connected at 16 on
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A bracket member 12 is mounted to the vehicle 2 and carries a pin 20 to attach to the vehicle end of link 7 at the vehicle. The bucket 5 is raised and lowered by the hydraulic cylinder means 21 pivotally mounted at 22 on vehicle 2 and at 23 on extension 24 at the right end of link 7. And the vehicle end of link 8 that is supported by and connected with the manipulative mechanism 3 now to be described.

As stated before, there are two such manipulative support mechanisms 3 and 4 that provide mounting structures for the front end loader. Since these assemblies are identical in construction they will have the same reference numerals except that the front side support mechanism 4 will have primed numerals to simplify the description.

Assembly 3 comprises a pendulum mounted triangular plate 25 rockably pivoted on a stub shaft or pin 26 suitably carried by vehicle 2. A pin 27 in the dependent member of the hanger plate 25 pivotally connects and supports the vehicle end of link 8 on the plate. Both pin 26 and pin 26 on the other side of vehicle 2 are axially aligned as best seen in FIG. 2.

A pair of double acting hydraulic cylinders 28 and 29, preferably located between usual hydraulic service lines, are pivotally supported at 30 and 31 on vehicle 2 and these cylinders are pivotally joined at laterally spaced points on plate 25 with pins 32 and 33 respectively, as well shown in FIG. 1, thus placing the cylinder reaction points to either side of the plate supporting pin 26.

It will be the described assemblies 3 and 4 working through attachable means such as links 8 that these twin mechanisms can change the positionable attitude of the earth engaging edge or blade of the material handling means of an earth working device or vehicle. Three of the various possible manipulations are characterized diagrammatically in FIGS. 2, 3 and 4. Other adjustments and regulatory motions are possible.

In FIG. 2 a blade 6 or edge cant is brought about by operating cylinders 28' and 29' to rock plate 25' to move link 8'' as per arrow 34. Cylinders 28 and 29 are oppositely biased to move link 8 as per arrow 35 thus changing the position of bucket 5 from a true transverse position to the line of travel into the dotted line position 36. Reversing the four cylinder activation from the above described procedure will cant the bucket to a position indicated by the dot and dash line showing 37 as will readily become apparent.

FIG. 3 diagrammatically shows how the position of the device such as bucket 5 can be bodily adjusted from some forward position 38 to a rearward position 39 to either side of a normal median transverse position as shown in full lines and this is brought about by the simultaneous use of the same or like cylinders on each side to rock plates 25 and 25' together either forwardly or rearwardly as desired by the operator.

And in FIG. 4 the bucket 5 is nudged or reciprocated fore and aft of a given position by more rapid operation of the cylinders, using the same procedure on both cylinder assemblies 3 and 4 to shift the bucket and its working edge between any two positions such as shown by dotted lines 40 forwardly and by dot and dash lines 41 rearwardly. In this connection it should be noted that a back and forth slicing action is possible as in FIG. 2 by more rapid operation of the opposite cylinder sets in changing the angular edge of the bucket 5.

It is also further possible to obtain other combinations of adjustment or movements of the leading edge or blade of an earth working device through the use of certain other combinations of action of the pair of cylinders 28-29 and 28'-29'. Since this manipulative mounting arrangement is readily adaptable to any type of a connected earth or material carrying vehicle, FIG. 5 shows a scraper generally designated at 42 having a front wheel support 43, scraper bowl 44, blade means 45, universal coupling means 46 and hitch means 47 built into it as shown. A near side manipulative support mechanism 49 shown as mounted on a power unit such as 50. The scraper is generally of the character and type set forth and described in my copending application Ser. No. 685,172, filed Nov. 28, 1967, but the scraper may be of another type and need not necessarily be a scraper the construction illustrated in FIG. 5.

Mechanism 49 is duplicated laterally on the far side of the power unit 59 and the operation and function of the assemblies 49—49 are the same as are the two described assemblies 3 and 4 shown in FIGS. 1-4.

The foregoing specification has been directed to certain preferred constructions to characterize and illustrate the present invention by way of example and not by way of limitation. Changes in the combinations shown or in the respective individual salient elements of the invention are contemplated without departure from the fundamental inventive concept herein described and disclosed. The extent of such modifications are, therefore, not to be limited however except by the breadth and scope of the subject matter contained in the appended claims directed to the manipulative supporting mechanisms for earth or material moving working equipment of the kind and character herebefore disclosed and described.

What I claim is:

1. In a manipulative support apparatus for coupling a material handling or earth working device having a material penetrating and loading edge or blade with a maneuverable mobile vehicle to guide such device comprising, in combination, a pair of support elements pivotally mounted on opposite sides of said vehicle for rocking movement about a common axis transverse of said vehicle, a pair of hitch means pivotally connected at one end thereof and transversely spaced points on said material handling or earth working device and at the opposite ends thereof to said support elements at positions spaced from said axis, selectively operable double-acting motor means interconnecting said vehicle and said support elements for positively imparting on said motor means of both of said support elements oscillating rocking movement about said axis, and control means for said motor means providing various blade movements imparted there to through said support elements by virtue of the selective operation of said motor means including canting to either the right or the left, extension, retraction and rapid reciprocation.

2. In a manipulative support apparatus as set forth and defined in claim 1, wherein said rockable support elements are freely pivotally mounted upon fulcrums on said vehicle, said fulcrums constituting the pivotal mounting of said support elements, said hitch means being connected to radially outward portions of said rockable support elements and said motor means being connected with said support elements at oppositely related locations taken in relation to the pivotal fulcrum points of said rockable support means on the vehicle.

3. In a manipulative support apparatus of the kind set forth and defined in claim 2, wherein said motor means for said support elements are positioned for operation in planes disposed angularly with respect to the common axis of said fulcrums.

4. In the combination of claim 1, wherein said rockable support elements each comprise an integral member pivotally mounted on a trunnion on said vehicle for free fore and aft pendulum motion relative to its trunnion, and said motor means are respectively pivotally connected at said trunnion locations to said integral members to induce fore and aft pendulum rocking thereof for direct transmittal to the hitch means of said earth working device.
5. In the combination of claim 4, wherein said integral member is mounted for rocking about said transverse axis and in a longitudinal plane parallel with the line of travel of the vehicle, and said motor means comprise coacting hydraulic means connected for operation in the plane of said integral member and to react on said members at the spaced locations on said members.

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