MOUNTING FOR MATERIAL HANDLING MASTS


Filed Nov. 8, 1966, Ser. No. 592,935

8 Claims. (Cl. 214—138)

ABSTRACT OF THE DISCLOSURE

The disclosure is concerned with excavators particularly of the type commonly known as "backhoes" wherein a material handling boom is mounted on a tractor mounted support frame. The boom carries a dipper stick with an excavating bucket mounted on the end of the dipper stick. The dipper stick is pivotally mounted on the boom, and the boom is mounted on the supporting frame for pivotal movement in an upward and downward direction as well as from side to side. The boom, dipper stick and bucket are operated hydraulically. The entire boom assembly is mounted for angular adjustment on the supporting frame about a fore and aft axis.

BACKGROUND OF THE INVENTION

Field of the invention

The invention relates to mountings for material handling devices movable in various paths relative to a support.

Description of the prior art

Material handling apparatus of the type commonly referred to as "backhoes" include the type mounted on a transverse supporting frame attached to the rear end of a tractor or similar vehicle, the backhoe boom or mast being mounted for side to side swinging movement on a swing unit carried by the transverse supporting frame. Examples of such devices are disclosed in U.S. Patents 3,117,685, Davis, dated Jan. 14, 1966; 3,263,837, Noller et al., dated Aug. 2, 1966; 3,263,839, Hauff, dated Aug. 2, 1966; 3,270,894, Elliott et al., dated Sept. 6, 1966; and 3,276,603, Noller, dated Oct. 4, 1966.

The above referred to Patents 3,117,685 and 3,263,837 disclose mountings for backhoes which can be adjusted transversely to the longitudinal axis of the tractor to shift the vertical pivotal axis of the backhoe boom transversely of the vehicle to permit the excavating bucket to be operated alongside buildings, foundations or fences. The bucket is however, confined to operate in transversely fixed planes relative to the vehicle on which it is supported, such planes being parallel to the surface of the ground on which the vehicle rests. Consequently, this class of excavating equipment has not been capable of being used for grading, shaping and contouring operations.

SUMMARY OF THE INVENTION

In accordance with the present invention, the excavating bucket can be tilted about an axis parallel to the longitudinal axis of the vehicle so as to be operable in planes transversely inclined to the vehicle. In the preferred embodiments, the boom mounting includes a mounting plate secured to the supporting frame in a manner such that it can be rotated about the longitudinal axis of the vehicle, or an axis parallel thereto, to tilt the bucket relative to the vehicle.
bers 14 to cooperate with slide members 19 in the manner disclosed in Noller et al. U.S. Patent 3,263,837. Projecting from the opposite face of mounting plate 48 from guide members 50 is a pair of arcuate spacers 52. The bolts or shanks 17 project from slide members 19 through openings in spacers 52 and are received in arcuate slots 54 formed in the bracket 18. Nuts 17a are threaded onto the ends of shanks 17. Four such arcuate slots 54 are shown in the illustrated embodiment, and it is apparent that bracket 18 can be rotated from the full line position shown in FIG. 2 about an axis normal to mounting plate 48 when the nuts 17a are loosened.

Projection from the lower right-hand corner of mounting plate 48 as shown in FIG. 2 is an arm 56 for supporting one end of a hydraulic actuator having a cylinder 58 pivotally connected at 60 to arm 56, and a piston 62 pivotally connected at 64 to a lug 65 formed on bracket 18. Retraction of piston 62 into cylinder 58 from the position shown in FIG. 2 will cause clockwise rotation of bracket 18 from its full line position shown in FIG. 2, and conversely, extension of piston 62 from cylinder 58 will cause counterclockwise rotation of bracket 18. Bracket 18 may be secured in any selected position within the limits of the arcuate slots 54 by tightening the nuts 17a on the shanks 17 of guide members 50, as well as by a hydraulically actuated slide 66 at the lower left corner of bracket 18 in FIG. 2.

With reference to FIG. 4, the hydraulically actuated slide 66 has a shank portion 68 which projects through the guide and spacer portions 50, 52 of mounting plate 48 through the lower left-hand portion 54 in bracket 18. Formed on the end of shank 68 opposite slide 66 is a piston 70 reciprocably mounted in a hydraulic cylinder 72 connected with a source of hydraulic fluid through a hose 74. A vent port 76 is formed in the outer wall of the cylinder 72. Admission of fluid through hose 74 actuates the piston in slide 66 toward the left to lock the flanges of the associated truck member 14 between slide 66 and guide member 50.

The supporting frame 2 may further include a pair of stabilizing legs 78, 80 operated by hydraulic actuators 82 in the manner disclosed in Noller Patent 3,276,036, dated Oct. 4, 1966.

When bracket 18 is in the vertical, full line position shown in FIG. 2, the excavating bucket 42 operates in a horizontal plane P1 as shown in FIG. 2. When bracket 18 is rotated in a clockwise direction to the broken line position of FIG. 2, the bucket operates in the inclined plane P2. Rotation of the bracket 18 in the opposite direction permits the bucket to excavate along the plane P3. The present invention has particular utility in conjunction with the invention disclosed in my co-pending application entitled, "Backhoe Having Straight Line Motion," filed concurrently herewith, Ser. No. 592,932, the entire disclosure of which is incorporated herein by reference, for grading and contouring operations.

As disclosed in the latter application, bucket 42 is caused to move in a straight line path from its extended to retracted positions by means of a compensating mechanism designated collectively by reference numeral 83. The compensating mechanism includes a compensating cylinder 84 mounted on the boom at 36 and having a piston 86 reciprocable therein with a cam follower 88 on the free end of the piston rod. Cam follower 88 engages the surface of a compensating cam 90 secured to the dipper stick by conventional fasteners 92. The configuration of the cam such that movement of the cam follower 88 causes proper movement of piston 86 into or out of cylinder 84. Cylinder 84 is hydraulically connected with the cylinder 35 by a hose 96 such that as piston 86 is retracted into cylinder 84, hydraulic fluid on the left side of piston 86 is forced through hose 96 into cylinder 35 on the right side of piston 35 to retract into cylinder 35 and raise boom 33 about pivot point 34. Conversely, as piston 86 extends from the com-
6. The construction claimed in claim 1 wherein said mounting assembly includes a mounting plate, a bracket, bolts securing said mounting plate to the supporting frame, a plurality of arcuate slots in said bracket, one for each of said bolts, said bolts each being received in one of said arcuate slots, and means threadedly mounted on said bolts for clamping said bracket in said selected angular position relative to the mounting plate, said boom being mounted on said bracket.

7. The construction claimed in claim 6 further including a hydraulic piston and cylinder actuator mounted between said mounting plate and bracket for rotating said bracket about said fore and aft axis when said last named means are loosened.

8. The construction claimed in claim 7 further including hydraulic locking means between said mounting plate and bracket for securing said bracket in said selected angular position about said fore and aft axis.

References Cited

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Inventor</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,847,134</td>
<td>8/1958</td>
<td>Slate</td>
<td>214—138</td>
</tr>
<tr>
<td>3,155,250</td>
<td>11/1964</td>
<td>French et al.</td>
<td>214—138</td>
</tr>
<tr>
<td>3,263,839</td>
<td>8/1966</td>
<td>Hauff</td>
<td>214—138</td>
</tr>
<tr>
<td>3,304,100</td>
<td>2/1967</td>
<td>Long</td>
<td>214—138 X</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>209,410</td>
<td>7/1957</td>
<td>Australia</td>
</tr>
</tbody>
</table>

HUGO O. SCHULZ, Primary Examiner.