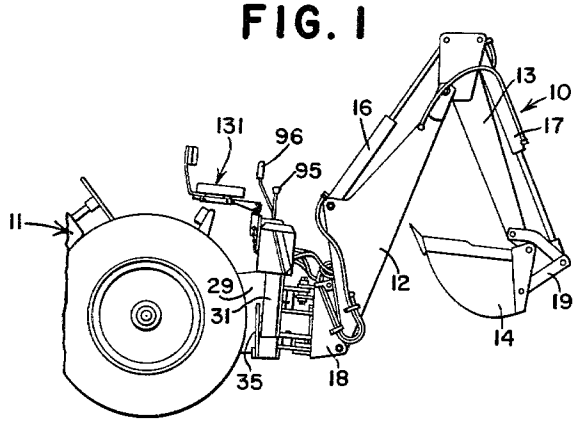
Feb. 22, 1966 L. G. McMULLEN 3,236,394

SUPPORTING STRUCTURE FOR AN EARTH MOVING IMPLEMENT

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FIG. 1



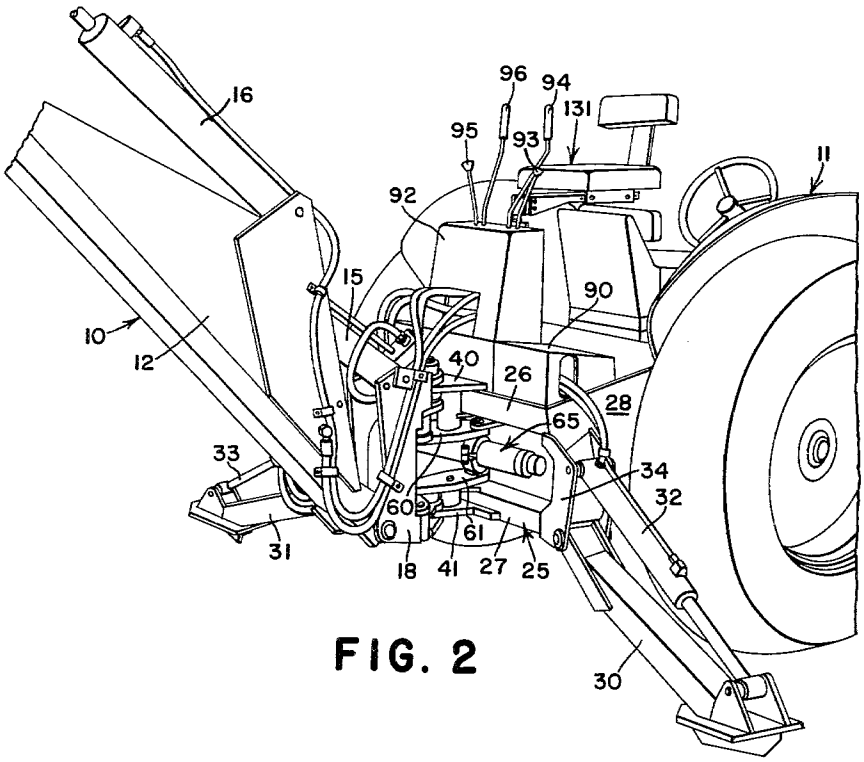


FIG. 2

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SUPPORTING STRUCTURE FOR AN EARTH MOVING IMPLEMENT

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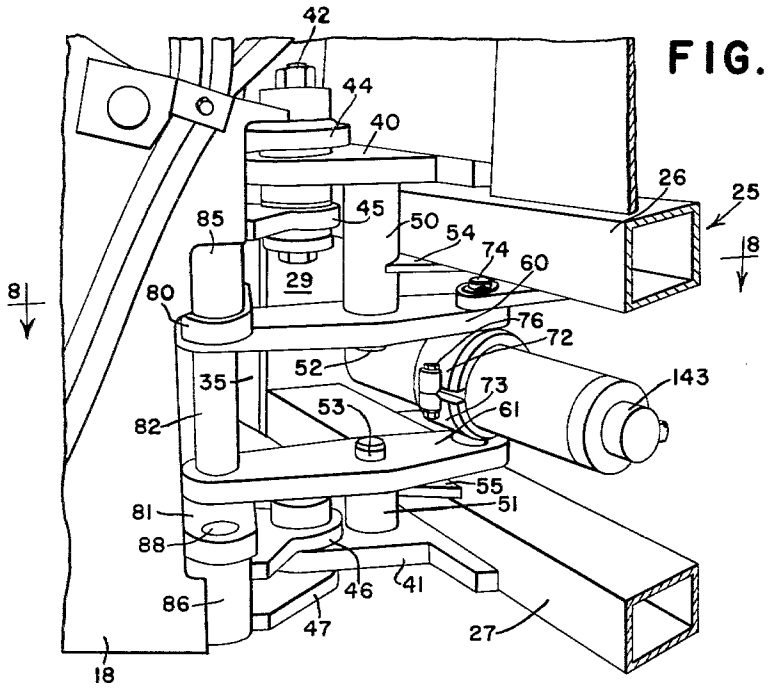


FIG. 3

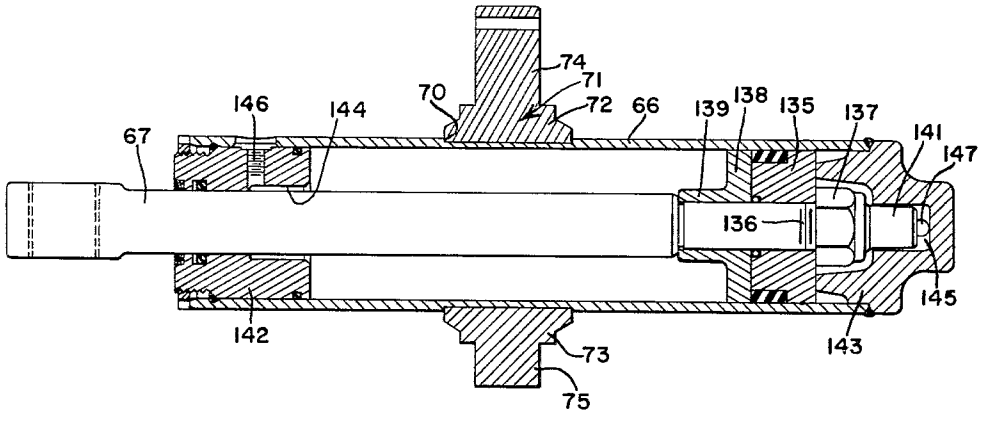


FIG. 4

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SUPPORTING STRUCTURE FOR AN EARTH MOVING IMPLEMENT

Filed Jan. 17, 1964 4 Sheets-Sheet 3

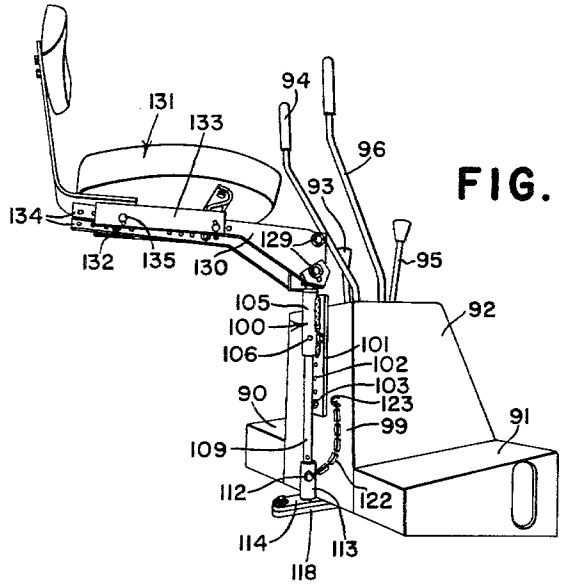


FIG. 5

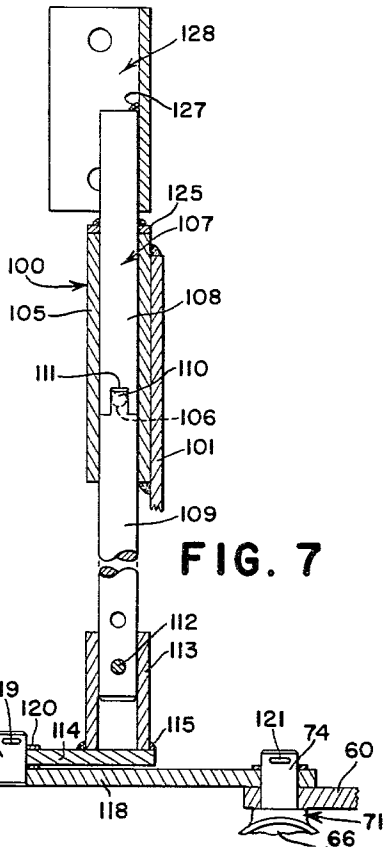


FIG. 7

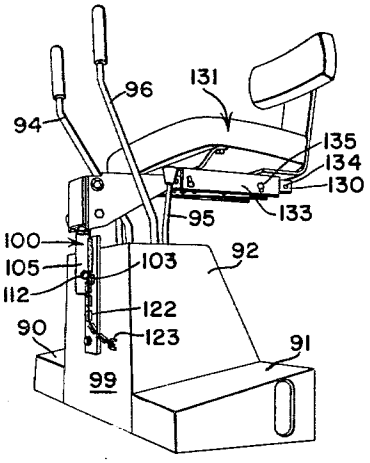


FIG. 6

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SUPPORTING STRUCTURE FOR AN EARTH MOVING IMPLEMENT

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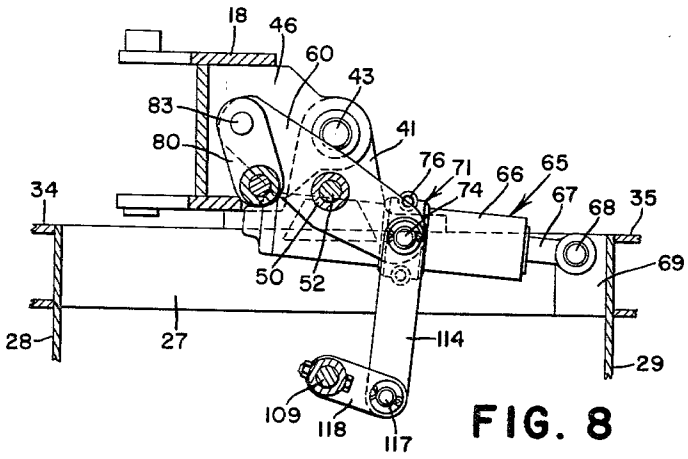


FIG. 8

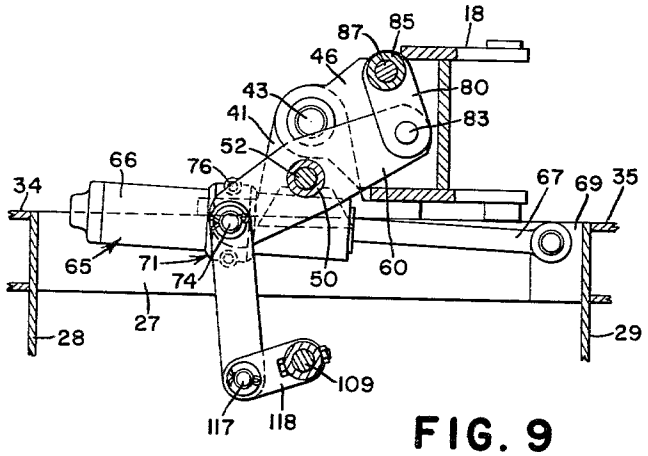


FIG. 9

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United States Patent Office 3,236,394 Patented Feb. 22, 1966

3,236,394

SUPPORTING STRUCTURE FOR AN EARTH MOVING IMPLEMENT

Larry G. McMullen, East Moline, Ill., assignor to Deere & Company, Moline, Ill., a corporation of Delaware

Filed Jan. 17, 1964, Ser. No. 338,427
21 Claims. (Cl. 212—66)

This invention relates to an earth moving piece of equipment and more particularly relates to an implement generally referred to as a backhoe. Still more particularly this invention relates to the supporting structure between the main boom of the backhoe and the moving vehicle that normally carries the backhoe assembly. Still more particularly this invention relates to a new and novel type of vertical swivel and the means effecting vertical swivel between the main boom and the frame supporting the end of the boom.

In the conventional type of backhoe, there is normally provided a moving vehicle having a transversely extending stand at one end thereof disposed between the vehicle and a vertically adjustable boom that is part of the backhoe. The boom is carried on the supporting stand by means of a vertical swivel or pivot that permits the boom to swing laterally over the ground for purposes of unloading the material dug by the backhoe and also for purposes of digging or penetrating the earth at one side of the vertical pivot. The backhoe is swung laterally on the vertical pivot by various power means, common within the industry, but differing somewhat depending upon the source or the manufacturer of the backhoe.

It is the primary object of the present invention to provide a supporting structure or stand, normally to be disposed between the tractor and the backhoe proper, that carries a forwardly projecting structure defining the vertical swivel or pivot for the boom. The supporting stand is defined by upper and lower transverse beams spaced apart to permit a transversely disposed hydraulic cylinder to operate, generally about and within a horizontal plane. A lever is supported on the supporting stand to swing laterally about a vertical axis rearward of the vertical swivel or pivot of the boom on the stand. One end of the lever is connected to the cylinder portion of the hydraulic cylinder and the opposite end is connected to the boom by means of an articulate connection. Therefore, by extending and retracting the hydraulic cylinder, the lateral position of the boom will be affected. It should here be recognized that in the commercial type of backhoes presently on the market, it is conventional to use at least one pair of hydraulic cylinders for swiveling the backhoe or a rotary type hydraulic cylinder for effecting swiveling. In both respects the present structure distinguishes considerably therefrom.

It is a further object of the present invention to provide with the supporting stand on the backhoe an operator's station defined in part by a pair of foot rests, transversely spaced apart and on top of the supporting stand, and in part by an operator's seat disposed fore and aft relative to the supporting stand. In operation of the backhoe, there is normally disposed on top of the supporting stand a valve structure including operating elements or levers projecting upwardly and forwardly of the supporting seat and generally at a level above the level of the seat so that the levers are in easy access to an operator on the seat. In the present invention, the seat is supported by a cantilever beam or structure having a vertical swivel or pivot at one end connected to the supporting stand and having means at the opposite end for direct connection to the seat. The beam is adapted for disposition, in one of its plurality of positions, between the upwardly projecting levers of the hydraulic control system. Means are provided for locking the beam in this latter position and generally within the confinement of the levers or control elements. This type of arrangement has particular advantage when the backhoe is supported on a relatively small tractor. Normally the backhoe supporting stand is at the rearward end of the tractor and consequently when the tractor is relatively small the operator's supporting stand will overlie the seat of the tractor. Consequently it is necessary, in order to move the tractor, to first move the seat of the backhoe to an unobstructing position relative to the seat on the tractor. Consequently it is desirable to be able to adjust the seat in a fore-and-aft position.

As a further object of the present invention it is proposed to support the seat on the cantilever beam so as to permit adjustment of the seat along the beam. This in combination with mounting the beam between the control levers will permit an operator to sit on the seat while in its forwardmost position and operate the control levers from that position. This might become important in conditions where the backhoe is digging at substantially right angles to the fore-and-aft direction of the tractor and it is desirable to view the operation. Such an occurrence might be at a location in which a foundation wall is being built or dug closely adjacent an existing building. In this latter location, it would be difficult if not impossible to move the tractor so that the tractor wheels would straddle the trench for the foundation, the latter condition being the normally desired position of the tractor relative to the trench.

It is a further object of the invention to provide a connection between the seat swivel and the hydraulic cylinder effecting swiveling of the backhoe whereby the seat and backhoe may swivel in unison.

Other objects of the invention will become apparent to those skilled in the art as the nature of the invention is better understood from the following description and as shown in the accompanying drawings.

FIG. 1 is a side view of a rear portion of a tractor and the backhoe assembly incorporating the principles of the present invention.

FIG. 2 is a front and side perspective view of a portion of the backhoe and a portion of the tractor.

FIG. 3 is an enlarged front and side perspective view of the swiveling control device for the backhoe.

FIG. 4 is a vertical sectional view taken through the hydraulic cylinder operating the swiveling mechanism for the backhoe.

FIG. 5 is a rear and side perspective view of the backhoe operator's station.

FIG. 6 is a view similar to FIG. 5 but showing the operator's seat in a different location.

FIG. 7 is a vertical section view through the seat swivel.

FIG. 8 is a plan view, partially in section, showing the operating linkage for swiveling the seat structure and backhoe boom.

FIG. 9 is a view similar to FIG. 8 but showing the linkage in a different location.

The backhoe structure, indicated in its entirety by the reference numeral **10**, is conventionally supported on the rear end of a tractor **11**. The backhoe is composed of a vertically swingable boom **12** supported at its lower rear end on a boom-supporting frame or stand **18** and pivotally carrying at its upper forward end a dipperstick **13**, having a material carrying bucket **14** supported thereon. An hydraulic cylinder **15** extends from the boom-supporting frame **18** to the boom **12**, and effects raising and lowering of the boom **12**. An hydraulic cylinder **16** extends between the boom **12** and a rearward extension of the dipperstock **13**, and operates to move the dipperstick **13** vertically about the upper end of the boom **12**. A bucket

control cylinder 17 extends between the dipperstick and a rollover linkage 19, connected to the bucket 14, and operates to swing the bucket 14 about the end of the dipperstick 13. Suitable hydraulic hoses extend from a hydraulic system, not shown, but incorporated in the tractor 11. It should here be recognized that while the normal direction of movement of the tractor would determine the fore-and-aft direction, for purposes of the present invention, the backhoe will be considered as being forward of the tractor and the directional limitations in regard to various locations of the backhoe parts will be based upon the forward side being directed outwardly from the tractor 11.

The backhoe 10 also includes a basic supporting stand 25 composed of upper and lower spaced apart transverse beams 26, 27 interconnected at their ends by end structures 28, 29. The structures 28, 29 project rearwardly from the ends of the transverse beams 26, 27 and are connected to the tractor supporting frame, not shown. Extending outwardly from the respective end structures 28, 29 is a pair of stabilizing legs 30, 31 pivoted to the respective end structures 28, 29 and controlled for vertical movement by hydraulic cylinders 32, 33. The legs 30, 31 and cylinders 32, 33 are carried on plate or bracket structures 34, 35 projecting outwardly from the end plates 28, 29. When in transport, the legs 30, 31 are raised upwardly to a position, as shown in FIG. 1, and when the backhoe is in operation, the legs 30, 31 normally extend outwardly and downwardly, and slightly forwardly, in the manner shown in FIG. 2.

Fore-and-aft extending structures in the form of upper and lower lateral brackets 40, 41 extend forwardly from the respective upper and lower beams 26, 27 and are provided with vertically alined pivot openings, not shown specifically but indicated in their general location by upright pivot pins 42, 43 that extend through the respective pivot openings. The pivot openings form one part of an upright swivel connection for the boom-supporting frame 18. The frame 18 has rearwardly projecting brackets 44, 45 and 46, 47 disposed above and below the respective plates 40, 41, with each of the brackets 44–47 having vertically alined pivot openings that receive the respective pivot pins 42, 43. The pivot pins 42, 43 as well as the respective pivot openings in the brackets 44–47 serve the second part of the swivel connection between the boom-supporting frame 18 and the supporting stand 25. As may be readily appreciated, the entire boom 12 as well as its frame 18 may be swiveled laterally so that the boom 12 may be moved to extend to opposite sides of the swivel.

The bracket supporting structure 40, 41 supports a second vertical pivot in the form of upper and lower pivot columns 50, 51 projecting downwardly from the face of the bracket 40 and upwardly from the face of the bracket 41 respectively. The columns 50, 51 have pivot portions 52, 53 alined vertically. The columns 50, 51 are further supported on the beams 26, 27 by truss elements 54, 55 respectively.

A lever in the form of upper and lower parallel lever elements 60, 61 respectively is supported on the vertical pivot portions 52, 53. The elements 60, 61 have forward ends forwardly of the respective vertical swivel for the boom-supporting frame 18, and rear ends disposed between the upper and lower beams 26, 27. Also disposed between the upper and lower beams 26, 27 is a horizontal transversely extending hydraulic unit 65 composed in part of an hydraulic cylinder 66 and a piston rod 67. The free end of the rod 67 is pivotally connected to the transversely extending supporting stand 25 adjacent the end structure 29 by a pivot pin 68 suitably carried on bracket structure 69 projecting inwardly from the plate 29. The stabilizer supporting plates 35 are on the opposite side of the plate 29 and afford rigidity of the plate 29 at the point of connection of the bracket 69. The cylinder 66 has an annular groove 70 on its external surface, intermediate the ends thereof, receiving a trunnion support 71 composed of upper and lower halves 72, 73 with upper and lower vertically extending pivot pins 74, 75 respectively, pivotally received in the rear ends of the upper and lower lever elements 60, 61. The half portions 72, 73 are bolted together as indicated at 76 in FIG. 3. Therefore, as is obvious, as the hydraulic unit extends and retracts, the lever elements 60, 61 will swing in unison about their vertical pivots 52, 53.

The forward ends of the lever elements 60, 61 are connected to the boom-supporting frame 18 by upper and lower parallel links 80, 81 pivotally pinned to the ends of the levers 60, 61 by an upright pivot element 82 having a reduced upper end 83 connected to the link 80 and a similar lower end, not shown, connected to the lower link 81. Welded to one side of the boom support 18 is a pair of vertically alined pivot pin supports 85, 86 carrying downwardly projecting and upwardly projecting pivot pins 87, 88 respectively that connect the ends of the links 80, 81 to the boom-supporting frame 18.

Reviewing the structure as presently described, and referring specifically to FIGS. 3, 8 and 9, adjusting the hydraulic unit 65 will effect swinging of the boom 12. When the elements 60, 61 are positioned in substantially a fore-and-aft direction or substantially at the midpoint of the stroke of the cylinder 65, the boom 12 will be in a fore-and-aft disposition. However, upon retracting the hydraulic unit 65 to the position shown in FIG. 8, the lever elements 60, 61 will swing the boom frame 18 into a complete maximum position in which the boom 12 projects in a left outward direction. When the cylinder is completely extended, as shown in FIG. 9, the lever elements 60, 61 will swing the frame 18 in a position in which the boom 12 projects outwardly in a right direction.

The location and the relative positions of the swivel axes for the boom-supporting frame 18, the vertical pivots 52, 53 for the lever elements 60, 61 and the vertical pivot axis of the shaft 82 are important since they permit a single hydraulic unit 65 to be used to permit the full 180° throw or adjustment of the boom 12. By positioning the pivot pin 82 forwardly of the swivel axis 43, a relatively short throw of a single hydraulic unit 65 may be utilized to obtain a large angular movement of the supporting frame 18. Also, it should be recognized that the hydraulic unit 65 is retained substantially between the upper and lower beams 26, 27 and the beams consequently operate in a protective relation to the hydraulic unit. Further, the hydraulic unit, being transversely disposed, permits the fore-and-aft length of the entire supporting stand 25 to be relatively small.

There is provided with the backhoe an operator's station composed in part of a pair of transversely spaced foot rests 90, 91 fixed on a pedestal type arrangement having a centrally located valve housing 92 between the foot rests with upwardly projecting hydraulic control elements 93, 94, and 95, 96 disposed in pairs on opposite sides of a fore-and-aft center line of the backhoe. Reviewing FIG. 5, it will be noted that the inner elements 94, 96 of the pairs of elements are spaced apart to provide a relative wide space therebetween. The valve housing 92 is rigid with the foot rests 90, 91 and the entire assembly is rigidly supported atop the transverse frame 25 and is a rigid upward extension thereof. The valve housing 92 includes a rear upright structural plate 99. Extending rearwardly from the face of the plate 99 is a second upright swivel 100 composed of an upright plate 101 lying adjacent the surface of the wall 99 and having a plurality of openings 102 adapted to receive bolts 103 for fixing the plate 101 to the wall 99. As is therefore clearly evident, the second swivel part 100 may be adjusted vertically on the wall 99. The second swivel part also includes an upright pipe 105 disposed rearwardly of and rigidly connected with the plate 101. The pipe 105 is provided with diametrically opposite openings 106 adapted to receive a

pin for purposes later to be explained. Contained within the pipe **105** is a complementary swivel part or shaft structure **107** composed of an upper part **108**, and a lower part **109**. The two shaft parts are joined together by a lug **110** projecting upwardly from the top of the lower part **109** into a notch **111** opening downwardly from the upper part **108**. The lower part **109** has its lower end pinned, as at **112**, and is received in an upper end of an upwardly projecting pipe member **113**. The member **113** is fixed to one end of an arm **114** by welding **115** or other suitable means. The opposite end of the arm **114** is pivotally carried on a pivot pin **117** extending through one end of a link **118**. A suitable cotter pin **119** and washer **120** retain the arm **114** in connection with the link **118**. The opposite end of the link **118** is pivotally supported on the upper end of the pivot pin **74** of the trunnion **71** and is retained thereon by a cotter pin **121**.

The upper shaft part **108** has a collar **125** welded thereto resting against the upper edge of the pipe **105** to thereby limit downward movement of the part **108**. The pin **112** is carried by a chain **122** in turn fixed at its opposite end by a bolt **123** to the plate **99**. Consequently the pin **112** may be removed and the control linkage **114, 118** be disconnected from the shaft structure **107**. Also, the lower shaft part **109** may be dropped or removed from the structure.

The upper shaft portion **108** is welded at **127** to the inner surface of an upright U-shaped channel member **128** having opposite upright and rearwardly projecting leg portions bolted at **129** to a fore-and-aft extending beam member **130**. When bolted, the beam **130** and shaft portion **107** become rigid with one another and consequently the beam serves as a cantilever type beam support for a seat **131**. The seat **131** is supported on the opposite end of the cantilever type beam **130** by means of depending plate **132, 133** that depend from the seat structure alongside and outwardly of opposite sides of the beam **130**. Bolt holes **134** are provided in the sides of the beam **130** and the brackets **132, 133** may be readjusted longitudinally by removing and inserting bolts **135** in the desired openings **134**.

Reviewing FIGS. 5–9, the control for the seat is responsive to extension and retraction of the hydraulic unit **65** in the manner presently to be described. In normal operation the lug **110** is inserted in the slot **111** and consequently as the linkage **114, 118** is moved from side to side it will affect swiveling of the seat **131**. As may be seen in FIG. 8, when the hydraulic unit **65** retracts the linkage **114, 118** swivels the lower shaft portion **109** to a position in which the seat is to the right of the swivel shaft **109** and is facing forwardly and to the left. At this position the backhoe boom extends at right angles from the floor to the fore-and-aft center line of the tractor and also extends to the left side of the implement. When it is desired to swing the implement to the front, as shown in FIG. 3, the seat will then be swung or swiveled to a position directly rearwardly of the supporting stand and in a position offset both rearwardly and between the respective foot rests **90, 91**. When it is desired to swing the backhoe so it extends to the right of the fore-and-aft center line, the linkage **114, 118** will swing the swivel shaft **109** to a position in which the seat faces slightly forwardly and to the right for easy viewing of the bucket at the end of the dipperstick. Consequently the hydraulic unit **65** not only operates to swing the boom a full 180°, but it is also effective to swing the seat in a position for easy viewing of the bucket on the end of the dipperstick.

In many instances, it is desirable to retain the seat in a fixed fore-and-aft position. This may be done by removing the pin **112** from its connecting relation between the pipe **113** and the lower shaft portion **109**. The control linkage **113–118** and lower shaft part **109** may then be removed. The pin **112** is then inserted in the openings **106** of the upper pipe **105** to extend through the slot **111**. This is best shown in FIG. 6. The seat **131** may be positioned in the manner shown in FIG. 5 and locked in that position by the pin **112** being inserted in the slot **111** or, the seat may be reversed in the manner shown in FIG. 6 so that the entire cantilever beam support projects through and between the control lever or elements **94, 96** and projects forwardly of the supporting stand **25**. This latter position will be desired when the implement is moved along a highway or its being transported from one location to another. As is clearly evident in FIG. 1, the seat **131** would normally be in an interfering position with a seat on the normal operator's station of the tractor **11**. It should also be recognized that the pin **112**, when inserted in the slot **111** when the seat is in the position shown in FIG. 6, will limit the movement of the seat within the confines of the two inner lever elements **94, 96** and consequently damage cannot be done to those lever elements. By removing the pin **112** entirely, the seat may swivel, as desired, in the pipe **105**.

In normal operation of a backhoe, it is desired to slow down or limit the rate of movement of the backhoe as it approaches its limits of movement. Reviewing FIG. 4 for the moment, the rod **67** is provided with a piston **135**. The piston **135** is supported on a threaded end **136** of the piston rod **67** by means of a nut **137** bearing against the piston **135** and tightening it against a backing plate **138** carried on the small end **136** of the piston rod **67**. The backing plate **138** has a hub or pilot portion **139** slightly frusto-conical shaped. The rod **67** also has a pilot portion **141** slightly frusto-conical shaped projecting beyond the nut **137**. The cylinder **66** is provided with cylinder heads **142, 143**. The heads **142, 143** have annular openings **144, 145** respectively that receive the hub **139** and the pilot **141** respectively as the piston **135** moves to opposite ends of its stroke. Fluid openings **146, 147** extend into the annular openings **144, 145** for purposes of moving hydraulic fluid into and out of the cylinder **66**.

As may be seen in FIG. 4, the pilot **141** normally will close the opening **145** completely as the piston **135** reaches the end of the stroke adjacent the head **143**. However, prior to the complete closing of the opening **145**, there will be a gradual diminishing amount of fluid passage due to the tapered surface of the pilot **141**. Consequently the relation of the tapered surface to the surface of the opening **145** operates as a brake and gradually slows the movement of both the backhoe as well as the seat as they move towards the limits of their swing. Likewise, the hub portion **139** operates as a brake as it enters into the opening **144**. Consequently there is no abrupt stopping of the backhoe or the seat. It should be recognized that this becomes rather important since the backhoe itself is extremely heavy and has considerable inertia upon being moved. Since the seat structure is connected indirectly with the backhoe, abrupt stopping of the backhoe creates an abrupt stopping of the seat. Consequently there would be the danger of the operator falling from the seat due to the abruptness of the stop unless there was a sufficient braking action to gradually slow the movement of both the backhoe and seat. Consequently through the hydraulic cylinder construction, the danger to both the operator as well as to the various parts of the backhoe is diminished.

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 for the purpose of clearly and concisely illustrating the principles of the invention, it was not the intention to limit or narrow the invention beyond the broad concepts set forth in the appended claims.

What is claimed is:

1. A supporting structure for an implement of the type described: a main transversely extending supporting stand having upper and lower substantially parallel trans-

verse beams rigidly interconnected at their ends by upright end structures; structure rigid with the stand projecting forwardly therefrom and having front and rear vertical pivots; a boom carrying frame means supported on the front pivot whereby the frame means may swing laterally; a laterally disposed lever having front and rear ends and supported on the rear pivot intermediate its ends, the front end of the lever being disposed forwardly of the front pivot and the rear end being disposed between the upper and lower beams; an hydraulic unit including a cylinder and a piston rod reciprocable within the cylinder disposed in the spacing between the upper and lower beams; a pivotal connection between the free end of the piston rod and supporting stand adjacent an end structure; a pivotal connection between the cylinder intermediate its ends and the rear end of the lever for effecting lateral movement of the lever in response to adjustment of the hydraulic unit; and a link connecting the forward end of the lever and boom frame means whereby the lateral movement of the former will effect lateral movement of the latter.

2. A supporting structure for an implement of the type described; a main transversely extending supporting stand having upper and lower substantially parallel transverse beams rigidly interconnected at their ends by upright end structures; structure rigid with the stand projecting forwardly therefrom and having front and rear vertical pivots; a boom carrying frame means supported on the front pivot whereby the frame means may swing laterally; a laterally disposed lever having front and rear ends and supported on the rear pivot intermediate its ends; an hydraulic unit including a cylinder and a piston rod reciprocable within the cylinder disposed in the spacing between the upper and lower beams; a pivotal connection between the free end of the piston rod and supporting stand adjacent an end structure; a pivotal connection between the cylinder intermediate its ends and the rear end of the lever for effecting lateral movement of the lever in response to adjustment of the hydraulic unit; and a link connecting the forward end of the lever and boom frame means whereby the lateral movement of the former will effect lateral movement of the latter.

3. A supporting structure for an implement of the type described; a main transversely extending supporting stand having upper and lower substantially parallel transverse beams rigidly interconnected at their ends by upright end structures; structure rigid with the stand projecting fore and aft thereof and having front and rear vertical pivots; a boom carrying frame means supported on the front pivot whereby the frame means may swing laterally; a laterally disposed lever having front and rear ends and supported on the rear pivot intermediate its ends; an hydraulic unit including a cylinder and a piston rod reciprocable within the cylinder disposed in the spacing between the upper and lower beams and being pivotally connected to the supporting stand adjacent an end structure and the rear end of the lever for effecting lateral movement of the lever in response to adjustment of the hydraulic unit; and means connecting the forward end of the lever and boom frame means whereby the lateral movement of the former will effect lateral movement of the latter.

4. Supporting structure for an implement of the type described; a main supporting stand having transverse structural portions extending between transversely spaced ends; structure rigid with the stand having front and rear vertical pivots; a boom-supporting frame means supported on the front pivot whereby the frame means may swing laterally; a laterally disposed lever supported on the rear pivot and extending forwardly therefrom to a front end disposed forwardly of the front pivot; an hydraulic unit including a cylinder and a piston rod reciprocable within the cylinder pivotally connected to the supporting stand adjacent an end and the lever for effecting lateral movement of the lever in response to adjustment of the hydraulic unit; and a link connecting the forward end of the lever and boom frame means whereby lateral movement of the lever will effect lateral movement of the boom.

5. Supporting structure for an implement of the type described: a main supporting stand having transverse structural portions extending between transversely spaced ends; structure rigid with the stand having front and rear vertical pivots; a boom supporting frame means supported on the front pivot whereby the frame means may swing laterally; a laterally disposed lever supported on the rear pivot and extending forwardly therefrom to a front end disposed forwardly of the front pivot; an hydraulic unit including a horizontally disposed and transversely extending cylinder and a piston rod reciprocable within the cylinder connected to the supporting stand adjacent an end and the lever for effecting lateral movement of the lever in response to adjustment of the hydraulic unit; and means connecting the forward end of the lever and boom frame means whereby the lateral movement of the lever will effect lateral movement of the boom.

6. A supporting structure for a forwardly directed backhoe boom comprising: a main supporting stand having upper and lower substantially parallel transverse beams rigidly interconnected and extending between transversely spaced ends; structure rigid with the stand having first and second vertical pivots; a boom-supporting frame supported on the first pivot whereby the boom frame may swing laterally; a laterally disposed lever supported on the second pivot; an hydraulic unit including a cylinder and a piston rod reciprocable within the cylinder, the hydraulic unit extending transversely from one end of the supporting stand and disposed in the spacing between the upper and lower beams; a pivotal connection between the free end of the piston rod and supporting stand adjacent said one end; vertical trunnion means supported externally on the cylinder and connected to the lever for effecting lateral movement of the lever in response to adjustment of the hydraulic unit; and a link connecting the lever and boom-supporting frame whereby the lateral movement of the lever will effect lateral movement of the boom.

7. A supporting structure for a forwardly directed backhoe boom comprising: a main supporting stand having transversely spaced ends; structure rigid with the stand having first and second vertical pivots; a boom-supporting frame supported on the first pivot whereby the boom frame may swing laterally; a laterally disposed lever supported on the second pivot; an hydraulic unit including a cylinder and a piston rod reciprocable within the cylinder, the hydraulic unit extending transversely from one end of the supporting stand; a pivotal connection between the free end of the piston rod and supporting stand adjacent said one end; vertical trunnion means supported externally on the cylinder and connected to the lever for effecting lateral movement of the lever in response to adjustment of the hydraulic unit; and means connecting the lever and boom-supporting frame whereby the lateral movement of the lever will effect lateral movement of the boom.

8. A supporting structure for a forwardly directed backhoe boom comprising: a main supporting stand having transversely spaced ends; structure rigid with the stand having first and second vertical swivels; a boom-supporting frame supported on the first swivel whereby the boom frame may swing laterally; a seat; a laterally extending seat-supporting frame supporting a seat at one end and supported on the second swivel at the other end whereby the seat may swing laterally; a laterally disposed lever pivotally supported on the supporting stand, an hydraulic unit including a cylinder and a piston rod reciprocable within the cylinder, the hydraulic unit extending transversely from one end of the supporting stand; a pivotal connection between the free end of the piston rod and supporting stand adjacent said one end of the supporting stand; vertical trunnion means supported externally on

the cylinder and connected to the lever for effecting lateral movement of the lever in response to adjustment of the hydraulic unit; and means interconnecting the lever, boom-supporting frame, and seat-supporting frame whereby the lateral movement of the lever will effect lateral movement of the boom and seat.

9. A supporting structure for a forwardly directed backhoe boom comprising: a main supporting stand having transversely spaced ends; structure rigid with the stand having first and second vertical swivels; a boom-supporting frame supported on the first swivel whereby the boom frame may swing laterally; a seat; a laterally extending seat-supporting frame supporting the seat at one end and supported on the second swivel at the other end whereby the seat may swing laterally; an hydraulic unit including a cylinder and a piston rod reciprocable within the cylinder, the hydraulic unit extending transversely from one end of the supporting stand; a pivotal connection between the free end of the piston rod and supporting stand adjacent said one end of the supporting stand; vertical trunnion means supported externally on the cylinder; and means interconnecting the trunnion means, boom-supporting frame, and seat-supporting frame whereby extension and retraction of the hydraulic unit will effect lateral movement of the boom and seat.

10. A supporting structure for a forwardly directed backhoe boom comprising: a main supporting stand having transversely spaced ends; structure rigid with the stand having first and second vertical swivels; a boom-supporting frame supported on the first swivel whereby the boom frame may swing laterally; a seat; a laterally extending seat-supporting frame supporting the seat at one end and supported on the second swivel at the other end whereby the seat may swing laterally; an hydraulic unit including a cylinder and a piston rod reciprocable within the cylinder, the hydraulic unit being connected to and extending transversely from one end of the supporting stand toward the other end; and means interconnecting the hydraulic unit, boom-supporting frame, and seat-supporting frame whereby extension and retraction of the hydraulic unit will effect lateral movement of the boom and seat.

11. A supporting structure for a forwardly directed backhoe boom comprising: a main supporting stand having transversely spaced ends; structure rigid with the stand having first and second vertical swivels; a boom-supporting frame supported on the first swivel whereby the boom frame may swing laterally; a seat; a laterally extending seat-supporting frame supporting the seat at one end and supported on the second swivel at the other end whereby the seat may swing laterally; an hydraulic unit anchored to the supported stand and including a cylinder and a piston rod reciprocable within the cylinder, and means interconnecting the hydraulic unit, boom-supporting frame, and seat-supporting frame whereby extension and retraction of the hydraulic unit will effect lateral movement of the boom and seat.

12. The invention defined in claim 11 further characterized by detachable means in the interconnecting means whereby the seat-supporting frame may be selectively interconnected to the hydraulic unit and boom-supporting frame.

13. The invention defined in claim 11 in which the first and second swivels are offset fore and aft from one another, the boom-supporting frame projects forwardly from the first swivel, the seat-supporting frame projects rearwardly from the second swivel, and the interconnecting means will effect movement of the seat and boom in opposite directions in respect to their respective swivels.

14. Supporting structure for an implement of the type described: a main supporting stand having transverse structural portions extending between transversely spaced ends; structure rigid with the stand having a vertical swivel; a boom-supporting frame means supported on the swivel whereby the frame means may swing laterally; an hydraulic unit including a horizontally disposed and transversely extending cylinder and a piston rod reciprocable within the cylinder; a connection between the free end of the piston rod and one end of the supporting stand; vertical trunnion means on the cylinder; and means connecting the vertical trunnion means and boom frame means whereby extension and retraction of the hydraulic unit will effect lateral movement of the boom.

15. For use with an implement having a forwardly directed boom structure comprising: a main transversely extending supporting stand having upper and lower substantially parallel beams rigidly interconnected at their ends by upright end structures; structure rigid with the stand having front and rear vertical swivels; a boom-supporting frame supported on the front swivel whereby the boom-supporting frame may swing laterally; a seat-supporting frame on the rear swivel; a seat on the seat frame offset rearwardly from the rear swivel; a laterally disposed lever having front and rear ends and pivotally supported on the frame intermediate its ends, the front end of the lever being disposed forwardly of the front swivel and the rear end being disposed forwardly of the rear swivel, said lever further being disposed between the upper and lower beams; an hydraulic unit including a cylinder and a piston rod reciprocable within the cylinder disposed in the spacing between the upper and lower beams; a pivotal connection between the free end of the piston rod and supporting stand adjacent an end structure; a pivotal connection between the cylinder intermediate its ends and the rear end of the lever for effecting lateral movement of the lever in response to adjustment of the hydraulic unit; a link connecting the forward end of the lever and boom frame whereby the lateral movement of the lever will effect lateral movement of the boom; and a link connecting the lever to the seat frame whereby lateral movement of the lever will effect lateral movement of the seat.

16. On a backhoe including a transverse upright frame; a forwardly extending boom; vertical swivel means between the boom and frame for effecting lateral movement of the boom on the frame; an operator's station on the supporting stand including in part a pair of transversely spaced foot rests rigidly supported on top of the supporting stand and a seat disposed above and offset fore-and-aft from the foot rests; valve structure supported on the supporting stand and including at least one pair of transversely spaced apart upright valve control elements projecting upwardly beyond the level of the seat and disposed between the foot rests; a seat support rigid with the supporting stand with means thereon defining a vertical pivot offset fore and aft from the elements and forming a first part of a vertical swivel; a cantilever beam adapted for disposition between and within the confines of the aforesaid control elements; vertical pivot means at one end of the beam adapted for cooperation with the vertical pivot to form the second part of the vertical swivel; means on the other end of the beam for connecting the seat thereto and adaptable for selectively positioning the seat lengthwise of the beam; an hydraulic cylinder; disconnectible means connecting the cylinder to the seat eccentrically of the swivel for effecting lateral movement of the seat and releasable locking means for limiting lateral movement of the beam within the confines of the control elements.

17. On a backhoe including a transverse upright frame; a forwardly extending boom; vertical swivel means between the boom and frame for effecting lateral movement of the boom on the frame; an operator's station on the supporting stand including in part a pair of transversely spaced foot rests rigidly supported on top of the supporting stand and a seat disposed above and offset fore-and-aft from the foot rests; valve structure supported on the supporting stand and including at least one pair of transversely spaced apart upright valve control elements projecting upwardly beyond the level of the seat and disposed between the foot rests; a cantilever seat support adapted for disposition between and within the confines of the aforesaid control elements; means at one end of the sup-

port adapted for vertical pivotal support on the frame; means on the other end of the beam for connecting the seat thereto; an hydraulic cylinder; disconnectible means connecting the cylinder to the seat eccentrically of the swivel for effecting lateral movement of the seat and releasable locking means for limiting lateral movement of the beam within the confines of the control elements.

18. On a backhoe including a transverse upright frame; a forwardly extending boom; vertical swivel means between the boom and frame for effecting lateral movement of the boom on the frame; an operator's station on the supporting stand including in part a seat disposed above and offset fore-and-aft therefrom; valve structure supported on the supporting stand and including at least one pair of transversely spaced apart upright valve control elements projecting upwardly beyond the level of the seat and disposed fore and aft of the seat; a cantilever seat support adapted for disposition between and within the confines of the aforesaid control elements; means at one end of the support adapted for vertical pivotal support on the frame; means on the other end of the beam for connecting the seat thereto; and releasable locking means for limiting lateral movement of the beam within the confines of the control elements.

19. On a backhoe including a transverse upright frame; a forwardly extending boom; vertical swivel means between the boom and frame for effecting lateral movement of the boom on the frame; an operator's station on the supporting stand including a seat disposed above and offset fore-and-aft therefrom; valve structure supported on the supporting stand and including at least one pair of transversely spaced apart upright valve control elements projecting upwardly beyond the level of the seat and disposed between the foot rests; a primary seat support rigid with the supporting stand with means thereon defining a vertical pivot offset fore and aft from the elements and forming a first part of a vertical swivel; a cantilever beam adapted for disposition between and within the confines of the aforesaid control elements; vertical pivot means at one end of the beam adapted for telescoping cooperation with the vertical pivot to form the second part of the vertical swivel; means on the other end of the beam for connecting the seat thereto; and releasably locking means between the vertical pivot and vertical pivot means for limiting lateral movement of the beam within the confines of the control elements.

20. On a backhoe including a transverse upright frame; a forwardly extending boom; vertical swivel means between the boom and frame for effecting lateral movement of the boom on the frame; an operator's station on the supporting stand including a seat disposed above and offset fore-and-aft therefrom; valve structure supported on the supporting stand and including at least one pair of transversely spaced apart upright valve control elements projecting upwardly beyond the level of the seat and disposed between the foot rests; a primary seat support rigid with the supporting stand with means thereon defining a vertical pivot offset fore and aft from the elements and forming a first part of a vertical swivel; a cantilever beam adapted for disposition between and within the confines of the aforesaid control elements; vertical pivot means at one end of the beam adapted for telescoping cooperation with the vertical pivot to form the second part of the vertical swivel; means on the other end of the beam for connecting the seat thereto; and means responsive to swiveling of the boom connected to the seat for effecting lateral swiveling of the seat.

21. On a backhoe including a transverse upright frame; a forwardly extending boom; vertical swivel means between the boom and frame for effecting lateral movement of the boom on the frame; an operator's station on the supporting stand including a seat disposed above and offset fore-and-aft therefrom; valve structure supported on the supporting stand and including at least one pair of transversely spaced apart upright valve control elements projecting upwardly beyond the level of the seat and disposed between the foot rests; a primary seat support rigid with the supporting stand with means thereon defining a first part of a telescopic vertical connection; a cantilever beam; means at one end of the beam adapted for telescoping cooperation with said first part to form the second part of the vertical connection and adapted for adjustment therewith to position the beam selectively inside or outside the confines of the transversely spaced valve control elements; and means on the other end of the beam for connecting the seat thereto.

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